Welcome

It is our great pleasure to welcome you to the 3rd Hemispheric Conference on Medical Geology (3rd HCMedGeo). Montevideo is a great city for this scientific meeting and Uruguay has a rich medical, geological, and cultural history that we hope you will enjoy during the conference.

The International Medical Geology Association (IMGA) is now an outstanding International organization bringing geosciences and medical sciences education and research activities to the wide world. Throughout our regional chapters, short courses and Hemispheric Conferences, IMGA have endeavored to spread the message of medical geology and to build bridges between the earth sciences, public health, and biomedical communities. In some regions, such as Africa, South America, China and Australia, we are fostering young Medical Geologists and assisting those in training to build the skills they need to establish medical geology research activities and training centers. In all these activities, the IMGA Educational Committee has played a significant role in encouraging these regional developments, and has provided the necessary professional support.

Every two years we gather for a major Hemispheric Conference, where we are kept up to date with an outstanding Scientific Program on the latest global perspectives on medical geology and this is the case of our Montevideo Conference.

There is no doubt that the 3rd HCMedGeo will be a major learning experience for all of us attending – the young Medical Geologists as well as for those of us that have been around for a few years and are still learning –. We see excellent plenary lectures, pre-conference short courses, oral and poster presentations. This scientific meeting also gives us the opportunity to learn more about Uruguay, its traditions and natural beauty.

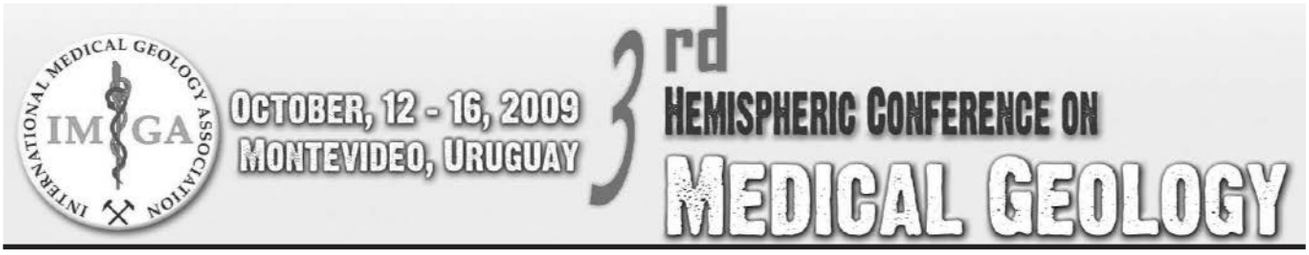
We live in challenging and difficult times of economic and political uncertainties in many parts of the world. The International Medical Geology Association can be a great instrument for building a more peaceful world as we all work together in understanding our natural environment. Friendships formed and re-energized across this Conference will enrich and broaden our personal and professional contacts. At the end of this meeting, we will leave with a better understanding of those risk factors that are important to study the range of environmental and health issues we all face.

On behalf of the Scientific and Organizing Committees we welcome to Montevideo with great enthusiasm and we hope you will take with you, lasting memories of a productive and remarkable scientific event.

Enjoy this 3rd Hemispheric Conference on Medical Geology!

Nelly Manay,
Chairperson
3rdHCMedGeo

Jose A. Centeno, Chairman, IMGA
Chair-International Scientific Committee,
3rdHCMedGeo



3rd. Hemispheric Conference on Medical Geology

Scientific Program

Book of Abstracts

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Organizing Committee

Organizing Institutions

- International Medical Geology Association (IMGA)
- Uruguayan Society of Toxicology and Ecotoxicology (SUTE)
- Department of Toxicology and Environment Hygiene, Faculty of Chemistry of Uruguay (FQ) University of the Republic

General Chairperson

- Nelly Mañay (FQ,SUTE,IMGA)

ISC Chairperson

- Jose A. Centeno (IMGA,FQ)

Scientific Program

- Jose A. Centeno
- Maria H. Torre
- Adriana Cousillas
- Rosario Guerequiz

Logistic

- Teresa Heller
- Cristina Alvarez

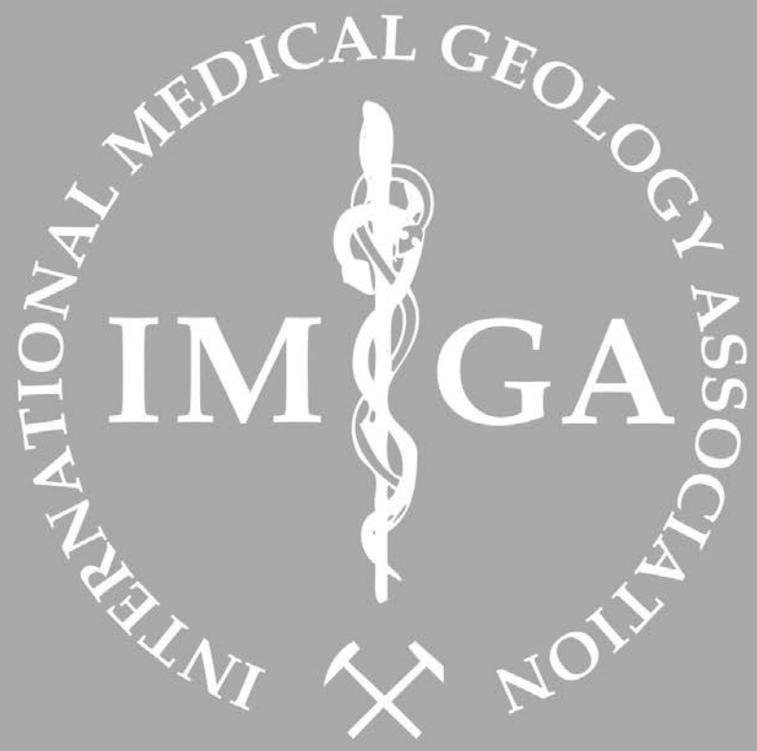
Finances

- Laura Pereira

International Scientific Committee

- Romulo Angelica (Brazil)
- Aurora Armienta (México)
- Laura Borgel (Chile)
- Rafael Cervantes (Bolivia)
- Gerald Combs (USA)
- Adriana Cousillas (Uruguay)
- Eduardo Anselmo Da Silva (Portugal)
- Bernardino R. Figueiredo (Brazil)
- Robert B. Finkelman (USA)
- Cesar Goso (Uruguay)
- Brian Gulson (Australia)
- Amalia Laborde (Uruguay)
- Marta Litter (Argentina)
- Kaj Lax (Sweden)
- Monica Bastos Paolliello (Brazil)
- Geoffrey Plumblee (USA)
- Olle Selllinus (Sweden)
- Cassio Silva (Brazil)
- Ester Sztein (USA)
- Kevin Telmer (Canada)
- Maria H. Torre (Uruguay)
- Chin-Hsiao Tseng (Taiwan)
- Phillip Wenstein (Australia)

Summary



3rd Hemispheric Conference on Medical Geology

Scientific Program

TIME	Monday, 12 October 2009	
9:00-17:00	Preconference Activities: Short Courses and Workshop	
17:30-20:00	IMGA Strategic Planning Meeting	
	Tuesday, 13 October 2009	
9:00-18:00	Preconference Activities: Short Courses and Workshop	
20:00 - 22:00	Welcome reception	
TIME	Wednesday 14 october 2009	
ROOM	NEW YORK	
8:00 - 9:00	Acreditations - Registrations	
ROOM	PARIS	
Chairpersons:	A. Cousillas/ L. Pereira	
9:00 - 9:30	Opening Ceremony	
9:30-9:45	Developing Medical Geology in Uruguay **Keynote Lecture - N. Mañay**	
9:45-10:30	Health and Earth - Medical Geology: Building a Safer Environment **Plenary Lecture - Jose A. Centeno**	
10:30 - 10:45	Coffee break	
ROOM	PARIS	TOKYO
Chairpersons:	M. Lyles / N. Mañay	O. Selinus /M. Torre
10:45 - 11:15	Middle East Dust: Potential for Infections and Toxicological Effects from Acute and Chronic Exposure **Opening Lecture - Mark Lyles**	Medical Geology as an important tool in pulbic health **Opening Lecture - Olle Selinus**
11:15 - 12:00	Animals as Sentinels of Human Environmental Risks: Exposure Biomarkers in Pets. A Medical Geology Approach **Lecture - Nelly Mañay**	Mercury, Gold, People and the UNEP global mercury treaty **Lecture - Kevin Telmer**
	Integrated system for risk evaluation of contaminated sites **Lecture - Laura Borgel**	Medical Geology approach for livestock health in Uruguay: the case of Cu deficiency in Salto department **Lecture - Maria H. Torre**
	Environmental Health in Bolivia: Pesticides, health and enviroment **Lecture - Rafael Cervantes**	
12:00 - 14:00	Break	
ROOM	PARIS	
14:00 - 14:45	Medical geology in Brazil **Plenary Lecture - B. Figueredo**	
ROOM	PARIS	TOKYO
Chairpersons:	P. Tchounwou / A. Cousillas	A. Armienta - M. Litter
14:45 - 15:15	Toxicokinetics and biomarkers of lead-induced toxcity in red swamp crawfish (Procambarus Clark II) **Opening Lecture - Paul B. Tchounwou**	Arsenic in groundwaters of México: What do we know? Where should we go? **Opening Lecture - Aurora Armienta**
15:15 - 16:00	An EXAFS, micro-XRF and micro-XRD study of Pb speciation in Pb-rich household dusts from urban canadian homes **Oral Presentation - Lachlan MacLean**	The problem of arsenic in Argentina and Chile - **Lecture - Marta Litter**
	Acute Ecotoxicity and Preliminary Determination of a Critical Dose of Sewage Sludge for Tropical Soils **Oral Presentation - Ricardo G. Cesar**	
	Indoor versus outdoor sources of lead and other metals in household dust: application of synchrotron microanalysis **Oral Presentation - Heather E. Jamieson**	Origin of high arsenic groundwater in Thermal Zone of the Guarani Aquifer System South Domain (Argentina and Uruguay): considerations about human health and the thermal groundwater uses **Oral Presentation -Gerardo Veroslavsky**
16:00 - 16:30	Coffee break + poster session 1	
16:30 - 17:30	Comparison of erionite from mesothelioma villages of Cappadocia, Turkey: Original "old" Sarihidir vs relocated "new" Sarihidir **Oral Presentation - A. Umran Dogan**	How to use the groundwater resources at geo-pollution area on organoarsenic compounds **Oral Presentation - Nirei Hisashi**
	Nacre as calcium-source for osteoporosis **Oral Presentation - Xavier Bourrat**	Arsenic in groundwater in a mining area. A case study in Mexico **Oral Presentation - Sofía E. Garrido**
	The etiology of balkan endemic nephropathy -and equation still not solved **Oral Presentation - Calin A. Tatu**	Effect of organic acids on the monoelement and competitive adsorption of trace elements **Oral Presentation - Leonid Perelomov**
	Arsenic and mercury mineralization and nail accumulation elated to borate deposits and drinking water in Kutahya, Turkey **Oral Presentation - Meral Dogan**	Manganese removal in drinking water **Oral Presentation - Nicolás Rezzano**
ROOM	PARIS	
Chairpersons:	Jose Centeno / Olle Selinus / Bob Finkelman	
17:30 - 18:30	IMGA Executive Committee Annual Meeting	
	Social Activity (optional)	

TIME	Thursday 15 October 2009	
ROOM	PARIS	
9:00 - 9:45	An isotope geochemistry approach to medical problems **Plenary Lecture - Brian Gulson**	
ROOM	PARIS	TOKYO
Chairpersons:	B. Gulson / M. Paollielo	M. Cave / L. Pereira
9:45 - 10:15	Lead levels in milk and blood from donors to the breast milk bank in southern Brazil **Opening Lecture - Monica. B. Paollielo**	Measuring human exposure to harmful elements in soils - exploring the links between bioavailability, bioaccessibility and geochemistry **Opening Lecture - Mark Cave**
10:15 - 11:00	Coffee break + poster session 2	
Chairpersons:	B. Gulson / M. Paollielo	M. Cave / L. Pereira
11:00 - 12:00	Multidisciplinary actions on lead contamination in Uruguay **Oral Presentation - Adriana Cousillas**	Study of the inmobilization of heavy metals in contaminated soils using different phosphate species **Oral Presentation - Gualberto Trelles**
	The occupational and environmental health hazard of quarried volcanic deposits **Oral Presentation - Sabina A. K. Michnowicz**	Geogenic sources, geoavailability and regional exposure levels evaluated for shallow and underground waters in the influence area of Farallon Negro Volcanic Complex, Catamarca province, Argentina **Oral Presentation - Luis H. Ferpozzi**
	Groundwater and flow modeling of the Yabucoa Valley aquifer, Puerto Rico: a case study for the tropics **Oral Presentation - Lorna Jaramillo**	Metal speciation and bioaccessibility of arsenic and nickel in airborne dust near mining and smelting operations **Oral Presentation - Heather E. Jamieson**
	Volcanic pollution in surface and groundwaters of El Salvador, Central America **Oral Presentation - Dina L. López**	Removal of heavy metals from aqueous solution by adsorption on sepiolite Guerrero **Oral Presentation - Rosa M. Coronado**
12:00 - 14:00	Break	
ROOM	PARIS	
14:00 - 14:45	Soil: The Essence of Medical Geology **Plenary Lecture - Robert Finkelman**	
ROOM	PARIS	TOKYO
Chairpersons:	J. Centeno / S. Fiore	R. Finkelman / E. Da Silva
14:45 - 15:30	Mineralogical risk induced by naturally occurring asbestos: "A case study" **Opening Lecture - Saveiro Fiore**	Geological materials and their beneficial effects upon human health: some portuguese case-studies **Opening Lecture - Eduardo A. Da Silva**
	Children environmental diseases in contaminated sites **Lecture - Amalia Laborde**	
15:30 - 16:30	Toxicants in art materials for children: Situation in Uruguay **Oral Presentation - Teresa Heller**	Geologic calcium for drugs and cosmetics **Oral Presentation - Xavier Bourrat**
	The Mineralogical Composition of House Dust in Ontario, Canada **Oral Presentation - Michael H. Woldemichael**	Therapeutic potential of marine peloid muds from the eastern Adriatic coast **Oral Presentation - Goran Kniewald**
	Geotoxic anomalies in fissured hard rockaquifers of lower triassic sandstones (Iberian Range, valencia-spain) and their effects in the quality of drinking waters **Oral Presentation - Elena Giménez-Forcada**	Manganese and chromium in groundwater of the phreatic aquifer in the barreal basin. Córdoba province, Argentine **Oral Presentation -Mónica Blarasin**
	Geoavailability and geographic distribution of constituents with impact on human health researched on natural shallow waters of San Lucas stream, in Farallon Negro Volcanic Complex, Catamarca province, Argentina **Oral Presentation - María F. Décima**	Geoenvironment and evolution of the genus homo in neogene **Oral Presentation - Luiz E. Mantovani**
16:15 - 17:30	Coffee break + poster session 3	
17:30 - 18:30	Awards, Closing Ceremony	
8:30 -12:00	Closing Dinner with typical Show (optional)	
TIME	Friday 16 october	
9:00-18:00	ALL DAY FIELD TRIP AND TOUR (optional)	

Monday, 12

08:00 - 09:00	Londres Room

Acreditations - Registrations

08:30 - 17:00	Tokyo Room

Pre-Conference activities / Courses

Geosciences for Environmental Managment (GEM) Annual Meeting

IUGS-GEM Officers:

Dr. Kevin Telmer	Chairman of GEM
Prof. Qingcheng He	Vice-chair of GEM
Dr. Kunio Furuno	Japan branch of GEM
Dr. Brian Marker	Observer, Secretary and Co-proponent of WG on Dust
Prof. Hisashi Nirei	Japan branch of GEM
Prof. Bernardino Figueiredo	Officer for South America
Dr. Philipp Schmidt	Thome Officer
Dr. Sulemana Al-Hasan	Candidate Officer for Africa,
Dr. Mihir Deb	Candidate Officer for India/Asia
Dr José Centeno	Officer for Caribbean Basin and Co-proponent and Chair of WG on Dust, Chairman and Representative of IMGA
Prof. Igor Zektser	Officer for Russia, and Chairman of WG Geology and Ecosystems
Dr. David Liverman	Chairman of WG Communication of Geosciences
Mrs Roma Kanopiene	Secretary General of GEM
Dr Kai Lax	Treasurer of GEM
Prof. Eduardo da Silva	Officer for Europe
Prof. Ben Mapani	Oficer for Africa
Mr. Peter Crockford	Information Coordinator
Dr. Laurance John Donnelly	Officer and Proponent of Working Group on Geoforensics

Monday, 12

08:30 - 19:00	Paris Room A

Pre-Conference activities / Courses

CYTED- Red IBEROARSEN: Course on Arsenic Remediation Technologies (First Day)

8:30 - 9:00	Registration
9:00 - 9:15	Opening
9:15 - 10:00	Presentation of the Course. Ocurrence and Chemistry of Arsenic in Waters. Synopsis of Technologies of Removal - **Marta I. Litter**
10:00 - 10:30	WHO Guidelines for Drinking Water Quality and the Iberoamerican Regulation on Arsenic **María Luisa Castro de Esparza**
10:30-11:00	Distribution of Arsenic in Iberoamerica - **Jochen Bundschuh**
11:00-11:30	Coffee Break
11:30-12:00	Analytical Methodologies for Determination of Arsenic and Arsenic Species in Waters and Soils - **Silvia S. Farías**
12:00-12:30	Coagulation and Coprecipitation - **Ana M. Sancha**
12:30-13:00	Fundamentals of Adsorption in Liquid-Solid Systems **Roberto Leyva Ramos**
13:00- 14:00	Lunch (not included)
14:00-14:30	Membrane Separation Applied to High Arsenic Water Content for Drinking Water Treatment **Guillermo Tarquini**
14:30-15:00	Electrochemical Method **Sofía E. Garrido Hoyos**
15:00-15:30	Functional Polymers and Membranes for Arsenic Removal **Bernabé L. Rivas**
15:30-16:00	In-situ Technologies for Arsenic Removal: A Critical Review **Antonio M.A. Fiúza**
16:00-16:30	Removal of Arsenic from Groundwaters by Using Permeable Reactive Barriers of Organic Matter/Limestone/Zerovalent Fe Mixtures **J.L. Cortina**
16:30- 17:00	Coffee Break
17:00-17:30	The Role of the Water Matrix in the Selection of Technologies of Arsenic Removal **Ana M. Sancha**

Iberoamerican Experience in Arsenic Removal from Waters

18:00-18:30	Experiences on Arsenic Removal Techniques in Argentina **Ana M. Ingallinella**
18:30-19:00	Iberoamerican Experience in Arsenic Removal from Water at Treatment Plants: The Chilean Case - **Ana M. Sancha**

17:30 a 20:00	Tokyo Room

IMGA Strategic Planning Meeting

Tuesday, 13

08:00 a 09:00	Londres Room

Acreditations - Registrations

08:00 a 17:00	Tokyo Room

Pre-Conference activities / Courses

GEM Workshop on Environmental Management

8:00 - 9:00	Registration
9:00 - 9:30	Welcome and Opening Talk - **Kevin Telmer** , Chairperson, Commission on Geosciences for Environmental Management
9:30 - 10:00	Adaptation to climate change
10:00 - 10:30	Adaptation to climate change
10:30 - 11:00	Coffee Break
11:00 - 11:30	Carbon Capture and Storage
11:30 - 12:00	Groundwater and environment
12:00 - 12:30	Geochemistry and Health Effects of Dust

Lunch Break

14:00 -17:00 Breakout workshop sessions:

(i) Dust and Medical Geologoy
(ii) Climate Change Adaptation
(iii) Carbon Capture and Storage
(iv) Groundwater
(v) Geopollution and man-made strata
(vi) Gold and Mercury and People
(vii) Communication with mass-media.

Sharing results - Summary

Closing keynote speaker

Tuesday, 13

09:00 a 19:00 — Paris Room A

Pre-Conference activities / Courses

CYTED- Red IBEROARSEN: Course on Arsenic Remediation Technologies (Second Day)

9:00 - 9:30	Argentina: Low-Cost Solar Methodologies for Arsenic Removal **M. Litter**
9:30 - 10:00	Phytotechnologies Applied to Arsenic Water Removal **Alejo Pérez Carrera**
10:30 - 11:00	Arsenic Abatement Through Electrochemical Corrosion of a Fixed Bed of Metallic Iron **R.E. Cáceres**
11:00-11:30	Coffee Break
11:30-12:00	Removal and Fixation of Arsenic in the Mining Industry: The Challenge of Minimizing Disposal Areas and Maximizing Long-Term Stability **Virginia S.T. Ciminelli**
12:00-12:30	Zero Valent Iron: Progress and Prospect of its Application to Arsenic Abatement Processes Induced by solar Radiation in Natural Waters of the Atacama Desert **Lorena Cornejo P.**
12:30-13:00	Chitosan Impregnated with Iron Oxide Particles: A Biosorbent that Selectively Removes Arsenic from Synthetic and Natural Waters **Luis H. Cumbal**
13:00-13:30	Arsenic Removal by Limestones at Zimapán, México **M. Aurora Armienta**
13:30-14:00	Removal of Arsenic in Water in Puno Wells/Employment of Alufloc **María Luisa Castro de Esparza**
14:00- 14:20	Closing ceremony
14:20-15:20	Lunch (not included)
15:20-19:00	IBEROARSEN Network Coordination Meeting

Tuesday, 13

08:00 a 18:30 — Paris Room B

Pre-Conference activities / Courses

Short Course on Medical Geology

0800 - 0900	Registration
0900 - 0945	Welcome Remarks and Course Overview - **Jose A. Centeno**, IMGA, USAFIP **Robert B. Finkelman**, IMGA, University of Texas at Dallas
0945 - 1030	The Emergent Discipline of Medical Geology – Past, Present and Future - **Olle Selinus** IMGA, SGU
1030 - 1100	Coffee Break
1100 - 1145	Metals, Metalloids and Trace Elements - A Medical Geology Perspective **Jose A. Centeno**, IMGA, USAFIP
1145 - 1230	Natural and Anthropogenic Sources of Trace Elements in the Environment **Robert B. Finkelman**, IMGA, UT-Dallas
1230 - 1400	Lunch (not provided)
1400 - 1445	Chemical, Biological and Microbiological Characterization of Desert Dust **Mark B. Lyles**, BUMED, Washington, DC
1445 - 1530	In-vitro measurement and validation of the human bioaccessibility of As, Cd, and Pb in Soils **Mark Cave**, BGS, UK
1530 - 1600	Coffee Break
1600 - 1640	Development and Use of International Databases for Medical Geology **Olle Selinus**, IMGA, SGU
1640 - 1715	Quantitative Aspects of Medical Mineralogy: Erionite Series Minerals **A. Umran Dogan**, Ankara University, Turkey; University of Iowa, USA
1715 - 1745	Quantitative Aspects of Medical Mineralogy: Asbestos Group Minerals **Meral Dogan**, Hacettepe University, Turkey
1745 - 1830	Health Benefits of Rocks and Minerals **Robert B. Finkelman**, IMGA, UT-Dallas
1800 - 1830	Group Discussion
1830	Adjourn

Wednesday 14

08:00 a 09:00	New York Room

Acreditations - Registrations

09:00 a 09:30	Paris Room

Opening Ceremony

Chairpersons: A. Cousillas/ L. Pereira

Chemistry Faculty - Dean Dr. Eduardo Manta
Ministry of Public Health - Minister Dra. María Julia Muñoz
IMM Municipality of Montevideo - Mayor Dr. Ricardo Erlich
International Medical Geology Association - President Dr. Jose A. Centeno
Uruguayan Society of Toxicology and Ecotoxicology - President Dra.Quim. Nelly Mañay
ANII - President Rodolfo Silveira
PEDECIBA - Director Dr. Enrique P. Lessa

09:30 a 09:45	Paris Room

Keynote Lecture - N. Mañay

Developing Medical Geology in Uruguay

09:45 a 10:30	Paris Room

Plenary Lecture - Jose A. Centeno

085 Health and Earth - Medical Geology: Building a Safer Environment

10:30 a 10:45	New York Room

Coffee Break

Wednesday 14

10:45 a 11:15		Paris Room

Opening Lecture - Mark Lyles

Chairpersons: M. Lyles / N. Mañay

104 Middle East Dust: Potential for Infections and Toxicological Effects from Acute and Chronic Exposure

11:15 a 11:30		Paris Room

Lecture - Nelly Mañay

Chairpersons: M. Lyles / N. Mañay

086 Animals as Sentinels of Human Environmental Risks: Exposure Biomarkers in Pets. A Medical Geology Approach

11:30 a 11:45		Paris Room

Lecture - Laura Borgel

Chairpersons: M. Lyles / N. Mañay

087 Integrated system for risk evaluation of contaminated sites

11:45 a 12:00		Paris Room

Lecture - Rafael Cervantes

Chairpersons: M. Lyles / N. Mañay

080 Environmental Health in Bolivia: Pesticides, health and enviroment

12:00 a 14:00	

Break

Wednesday 14

10:45 a 11:15	Tokyo Room

Opening Lecture - Olle Selinus

Chairpersons: O. Selinus / M. Torre

027 Medical geology as an important tool in environmental health

11:15 a 11:30	Tokyo Room

Lecture - Kevin Telmer

Chairpersons: O. Selinus / M. Torre

105 Mercury, Gold, People and the UNEP global mercury treaty

11:30 a 11:45	Tokyo Room

Lecture - Maria H. Torre

Chairpersons: O. Selinus / M. Torre

015 Medical Geology approach for livestock health in Uruguay: the case of Cu deficiency in Salto department

12:00 a 14:00

Break

14:00 a 14:45	Paris Room

Plenary Lecture - B. Figueredo

Chairpersons: N. Mañay / A. Cousillas

008 Medical geology in Brazil

Wednesday 14

14:45 a 15:15 — Paris Room

Opening Lecture - Paul B. Tchounwou

Chairpersons: P. Tchounwou / A. Cousillas

057 Toxicokinetics and biomarkers of lead-induced toxcity in red swamp crawfish (Procambarus Clark II)

15:15 a 16:00 — Paris Room

Oral Presentations

Chairpersons: P. Tchounwou / A. Cousillas

012 15:15 An EXAFS, micro-XRF and micro-XRD study of Pb speciation in Pb-rich household dusts from urban canadian homes - **Lachlan MacLean**

046 15:30 Acute Ecotoxicity and Preliminary Determination of a Critical Dose of Sewage Sludge for Tropical Soils - **Ricardo G. Cesar**

071 15:45 Indoor versus outdoor sources of lead and other metals in household dust: application of synchrotron microanalysis - **Heather E. Jamieson**

16:00 a 16:30

Coffee Break - Poster Session 1 (Topics 1 and 6)

16:30 a 17:30 — Paris Room

Oral Presentations

023 16:30 Comparison of erionite from mesothelioma villages of Cappadocia, Turkey: Original “old” Sarihidir vs relocated “new” Sarihidir - **A. Umran Dogan**

018 16:45 Nacre as calcium-source for osteoporosis - **Xavier Bourrat**

024 17:00 The etiology of balkan endemic nephropathy -and equation still not solved - **Calin A. Tatu**

022 17:15 Arsenic and mercury mineralization and nail accumulation elated to borate deposits and drinking water in Kutahya, Turkey - **Meral Dogan**

Wednesday 14

14:45 a 15:15 — Tokyo Room

Opening Lecture - Aurora Armienta

Chairpersons: A. Armienta - M. Litter

021 Arsenic in groundwaters of México: What do we know? Where should we go?

15:15 a 15:45 — Tokyo Room

Lecture - Marta Litter

Chairpersons: A. Armienta - M. Litter

006 The problem of arsenic in argentina and chile

15:45 a 16:00 — Tokyo Room

Oral Presentations

Chairpersons: A. Armienta - M. Litter

003 Origin of high arsenic groundwater in Thermal Zone of the Guarani Aquifer System South Domain (Argentina and Uruguay): considerations about human health and the thermal groundwater uses - **Gerardo Veroslavsky**

16:00 a 16:30

Coffee Break - Poster Session 1 (Topics 1 and 6)

16:30 a 17:30 — Tokyo Room

Oral Presentations

031 16:30 How to use the groundwater resources at geo-pollution area on organoarsenic compounds - **Nirei Hisashi**

058 16:45 Arsenic in groundwater in a mining area. A case study in Mexico **- Sofía E. Garrido**

002 17:00 Effect of organic acids on the monoelement and competitive adsorption of trace elements **Leonid Perelomov**

037 17:15 Manganese removal in drinking water - **Nicolás Rezzano**

Wednesday 14

17:30 a 18:30 — **Tokyo Room**

IMGA Executive Committee Annual Meeting and Strategic Planning

Chairpersons: Jose Centeno, Olle Selinus and Bob Finkelman

Social Activity (optional)

Thursday 15

09:00 a 09:45 — **Paris Room**

Plenary Lecture - Brian Gulson

Chairpersons: B. Gulson / M. Paollielo

014 An isotope geochemistry approach to medical problems

09:45 a 10:15 — **Paris Room**

Opening Lecture - M. B. Paollielo

Chairpersons: A. Armienta - M. Litter

088 Lead levels in milk and blood from donors to the breast milk bank in southern

10:15 - 11:00

Coffee Break - Poster Session 2 (Topics 2, 5 and 8)

11:00 - 12:00 — **Paris Room**

Oral Presentations

069 11:00 Multidisciplinary actions on lead contamination in Uruguay - **Adriana Cousillas**

050 11:15 The occupational and environmental health hazard of quarried volcanic deposits. **Sabina A. K. Michnowicz**

078 11:30 Groundwater and flow modeling of the Yabucoa Valley aquifer, Puerto Rico: a case study for the tropics - **Lorna Jaramillo**

039 11:45 Volcanic pollution in surface and groundwaters of El Salvador, Central America. **Dina L. López**

Thursday 15

09:45 a 10:15	Tokyo Room

Opening Lecture - M. Cave

Chairpersons: M. Cave / L. Pereira

019 Measuring human exposure to harmful elements in soils – exploring the links between bioavailability, bioaccessibility and geochemistry

10:15 - 11:00

Coffee Break - Poster Session 2 (Topics 2, 5 and 8)

11:00 a 12:00	Tokyo Room

Oral Presentations

020 11:00 Study of the inmobilization of heavy metals in contaminated soils using different phosphate species - **Gualberto Trelles**

048 11:15 Geogenic sources, geoavailability and regional exposure levels evaluated for shallow and underground waters in the influence area of Farallon Negro Volcanic Complex, Catamarca province, Argentina - **Luis H. Ferpozzi**

072 11:30 Metal speciation and bioaccessibility of arsenic and nickel in airborne dust near mining and smelting operations - **Heather E. Jamieson**

062 11:45 Removal of heavy metals from aqueous solution by adsorption on sepiolite Guerrero **Rosa M. Coronado**

12:00 - 14:00

Break

Thursday 15

14:00 - 14:45 | Paris Room

Plenary Lecture - Robert Finkelman

Chairpersons: J. Centeno / S. Fiore

007 Soil: The Essence of Medical Geology

14:45 - 15:15 | Paris Room

Opening Lecture - Saveiro Fiore

Chairpersons: M. Cave / L. Pereira

103 Mineralogical risk induced by naturally occurring asbestos: “A case study”

15:15 - 15:30 | Paris Room

Lecture - Amalia Laborde

Chairpersons: M. Cave / L. Pereira

Children environmental diseases in contaminated sites

15:30 - 16:30 | Paris Room

Oral Presentations

065 15:30 Toxicants in art materials for children: Situation in Uruguay - **Teresa Heller**

073 15:45 The Mineralogical Composition of House Dust in Ontario, Canada **Michael H. Woldemichael**

036 16:00 Geotoxic anomalies in fissured hard rockaquifers of lower triassic sandstones (Iberian Range, valencia-spain) and their effects in the quality of drinking waters **Elena Giménez-Forcada**

049 16:15 Geoavailability and geographic distribution of constituents with impact on human health researched on natural shallow waters of San Lucas stream, in Farallon Negro Volcanic Complex, Catamarca province, Argentina - **María F. Décima**

16:30 - 17:30

Coffee Break - Poster Session 3 (Topics 3 and 4)

Thursday 15

14:45 - 15:15 — Tokyo Room

Opening Lecture - Eduardo A. Da Silva

Chairpersons: R. Finkelman / E. Da Silva

044 Geological materials and their beneficial effects upon human health: some portuguese case-studies

15:15 - 15:30 — Tokyo Room

Lecture - Nestor Campal

Chairpersons: R. Finkelman / E. Da Silva

15:30 - 16:30 — Tokyo Room

Oral Presentations

017 15:30 Geologic calcium for drugs and cosmetics - **Xavier Bourrat**

061 15:45 Therapeutic potential of marine peloid muds from the eastern Adriatic coast **Goran Kniewald**

059 16:00 Manganese and chromium in groundwater of the phreatic aquifer in the barreal basin. Córdoba province, Argentine **- Mónica Blarasin**

043 16:15 Geoenvironment and evolution of the genus homo in neogene - **Luiz E. Mantovani**

16:30 - 17:30

Coffee Break - Poster Session 3 (Topics 3 and 4)

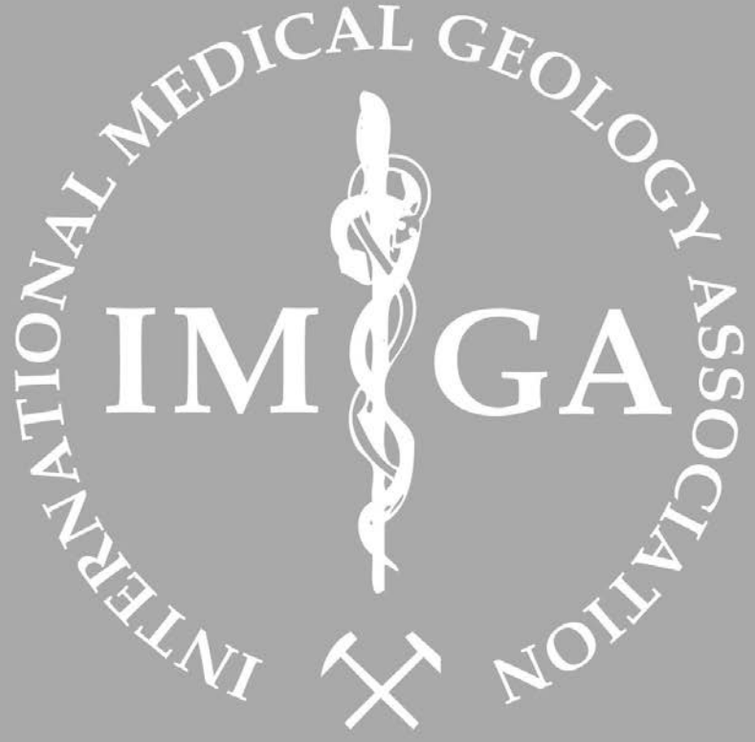
Thursday 15

17:30 - 18:30		Paris Room
Awards, Closing Ceremony		

20:30 - 24:00	
Closing Dinner (optional)	

Friday 16

08:00 a 18:00	
All day field trip and tour (optional)	



3rd Hemispheric Conference on Medical Geology

Plenary Lectures

Soil: The Essence of Medical Geology

007- Robert B. Finkelman, University of Texas at Dallas, Richardson, TX, USA. bobf@utdallas.edu

Soil is the naturally occurring, unconsolidated mixture of minerals and organic matter that covers most of the Earth's land surface. Of all the geologic materials and processes that impact animal and human health, soil may be the most significant. All essential nutrients are ultimately derived from crops grown on soil, animals that graze on soil, or water that has been in contact with the soil. We inhale soil particles in the dust that we breathe. Children, and some adults, eat soil and some medications, especially those used by indigenous peoples, are derived from soil. Soils deficient in essential elements are believed to contribute to diseases such as Keshan Disease and Kashin-Beck Disease in China attributed to Se deficiency. Soils deficient in multiple essential elements have been cited as the cause of Mselani Joint Disease in South Africa. Soils enriched, by natural or anthropogenic activities, in potentially toxic trace elements have contributed to worldwide lead poisoning, selenium poisoning in China, fluorosis in areas of active volcanism, thallium poisoning in China.
Radon released from soil is a major contributor to lung cancer. Inhaled minerals from wind-blown soils can cause silicosis and asbestosis. Soil particles can act as a host for numerous human and animal pathogens. In the U.S. and Mexico inhalation of wind-blown soils hosting fungal spores have caused Valley Fever. Clay derived from selected soils has been used for millions of years to settle upset stomachs and counteract the actions of certain poisons. Clays have also been used as a poultice and has been effective is stopping Buruli Ulcer (flesh eating bacteria). The benefits and detriments of geophagy have been hotly debated for decades. Better knowledge of the soils mineralogical, trace element, and zoonotic composition can help prevent many health problems and advance its therapeutic uses.

An isotope geochemistry approach to medical problems

014- Brian Gulson, Graduate School of the Environment, Macquarie University, Sydney, Australia

Isotope methods originally developed for the earth sciences are being increasingly applied in the fields of the environment and health. Two elements of specific interest are lead, because of its toxicity and zinc, because of its essentiality to human health and its increasing use in personal care products such as sunscreens. Recent case studies of the application of these isotopes to health problems will be presented including the bird kill and human exposure to lead in Esperance (Western Australia) and the source of lead in rainwater tanks. Up-to-date results of a recently completed trial evaluating skin absorption of zinc nanoparticles in a sunscreen using zinc isotopes will be presented

Medical Geology in Brazil

008- Bernardino R. Figueiredo, Institute of Geosciences and Environmental Studies Center, University of Campinas, Brazil.
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Advances in medical geology as an emerging research area can be noted in many countries in response to the global environmental crisis. As a typical twenty-first century science, it may benefit from the current revolutionary achievements in environmental medicine, computer, communication and other sciences. In Brazil high quality data on environmental contamination and human exposure to arsenic, lead and mercury were reported in the last years. Some initiatives to conduct low-density geochemical mapping have been undertaken in Brazil and a world-class project on Geomedicine is being carried out in the State of Paraná. Southern region, aimed to check probable relation between certain types of cancer and the environment. In other places different geochemical compartments such as soil, water and air are examined from the view of probable effects on human health. Those are the cases of air pollution in the megacities and in rural areas and of some investigations on natural fluorine occurrences. Coincidently, the most significant advances in the field of medical geology have occurred in those regions where geochemical mapping was conducted. The value of these studies is being perceived as economically important for the health sector as well as for agricultural and farm industries. In the last years several scientific events dedicated to Medical Geology were held in Brazil and some publishing and network initiatives contributed to disseminate scientific information. The efforts were oriented to clarify that all specialties of Earth Sciences can greatly contribute to medical geological studies. But effective dialogue within the Earth Science community as well as with other professionals, especially those from health sector, are required for Medical Geology to be successful.
Key words: Medical Geology, geochemical mapping, Brazil

Health and Earth - Medical Geology Building a safer environment

085- José A. Centeno, PhD, FRSC, US Armed Forces Institute of Pathology, Washington, DC, centeno@afip.osd.mil

Understanding the potential adverse health effects of the natural geochemical environment is of pivotal importance on the development of national and international programs to protect public health. Natural earth processes, including emissions and transport of dust, earthquakes, landslides, volcanic emissions, etc, continue to cause numerous deaths and immense suffering worldwide. Traditionally, the limited extent of interdisciplinary cooperation at the interface between earth sciences and public health has restricted the ability of scientists to respond to complex environmental health problems. Medical Geology is aimed at improving interdisciplinary interactions among earth and public health scientists, providing the basis for innovative and exciting research that can lead to new discoveries and greater knowledge.1-3.
In this presentation, a brief discussion of recent developments on the integration of earth science and public health will be presented, with particular emphasis on continue stimulating collaborations and research interactions between these disciplines.

References:
1. Centeno JA. Natural disasters and their long-term impacts on the health of communities. J Environ Monit 2008;10:266.

2. Centeno JA. Impacts of the natural environment on human health. Interciencia 2008;33(3):169-171.

3. Selinus O. Alloway B, Centeno JA, et al. Essentials of Medical Geology - Impact of the Natural Environment on Human Health. Elsevier and Academic Press, 2005.

3rd Hemispheric Conference on Medical Geology

Opening Lectures

Measuring human exposure to harmful elements in soils – exploring the links between bioavailability, bioaccessibility and geochemistry

019- Mark Cave, British Geological Survey, Keyworth, Nottingham, NG12 3NX, UK

In the UK, large areas of the country have relatively high concentrations of naturally occurring potentially harmful elements (PHE) in the soil which are a potential hazard to human health. The large numbers of confounding factors arising from a 21st century lifestyle make it difficult for epidemiological studies to show the PHE is the unequivocal cause of an adverse human health outcome. It is easier to show that populations which live on land with elevated PHE concentrations have a higher exposure than those with low PHE values. Biomonitoring studies can measure these differences in the human body burden through the analysis of blood, urine, hair or finger/toenails. With the need for regulatory bodies to make rapid decisions on contaminated land and planning applications, however, there are not always human subjects to sample and the need for ethical approval makes biomonitoring time consuming and expensive. A simpler approach is to investigate how the physico-chemical properties of the soils control the bioaccessibility of the PHE. As an example, studies show that humans ingest c. 100 mg of soil per day from our local environment, maybe more for children playing in back gardens and play grounds or populations that practice pica. Importantly, when a soil is ingested, only a fraction of the PHE in the soil is mobilised in the human gut and passes into body (the bioavailable fraction). This presentation will show how a relatively simple physiologically based in-vitro test can be used to assess how much of the PHE enters the human body when soil is digested and that the test can be validated against in-vivo measurements. The presentation will also show that the bioaccessible fraction can be related to the geochemistry and the physical properties of the soil as measured by a sequential extraction test and Near Infra-red (NIR) spectroscopy. Understanding the relationship between soil properties and the bioaccessible fraction has allowed predictive models of bioaccessibility to be made using simple screening tests and, combining these models with geochemical soil surveys of the UK, bioaccessibility hazard maps can be produced. The methodology has been demonstrated on the River Tamar catchment in the South West of the UK.

Arsenic in groundwaters of México: What do we know? Where should we go?

021- M. Aurora Armienta, Instituto de Geofísica, Universidad Nacional Autónoma de México, Circuito Exterior, C.U. México D.F., 04510, México, victoria@geofisica.unam.mx

The geological characteristics of México favor natural arsenic presence in many aquifers. This fact is especially relevant, since more than two thirds of the drinking water is extracted from wells. The first documented cases of chronic As poisoning occurred the mid XXth Century, among people drinking polluted water at "Comarca Lagunera" northern México. Other As-contaminated zones have been identified since then. Natural dissolution of As-bearing minerals and inappropriate mine waste disposal released As to groundwater at some historical mining zones. Water-rock interactions at high temperatures also promote As increase in certain geothermal areas, both, in exploitation wells for thermal energy and in wells used as potable water sources. The geochemical process releasing As from the solid matrix have not yet been identified in most polluted zones. At Comarca Lagunera the origin of As is still under research with diverse hypotheses like evaporation, desorption or dissolution reactions. Epidemiological and toxicological studies have revealed the potential or actual damage of As-polluted water intake at several towns. Authorities constructed aqueducts to deliver safe water to exposed populations, or lowered As levels by mixing non-polluted water at some sources. Only in a few cases treatment plants have been installed. These actions lack of sustainability, since groundwater is the only water source in many zones resulting very costly to pump the water from distant places, and are particularly difficult in dispersed rural towns. Affordable water treatment procedures have been developed by Mexican researchers. However, they have not yet been applied to public systems of water supply. More research needs to be done to identify sources, geochemical processes, and mobilization of As in groundwater around the country. Communication and interaction among academy and water authorities must be increased. Specific procedures to treat As-tainted water should also be established on a regular basis.

Medical Geology as an important tool in environmental health

027- Olle Selinus, Geological Survey of Sweden

Medical Geology has grown rapidly in ten years. It brings together geoscientists and medical/public health researchers to address health problems caused by geological materials and processes . In January 2006 the International Medical Geology Association (IMGA) was established. Information can be found on the website http://www.medicalgeology.org. IMGA has organised itself in regional divisions all over the world and also chapters in several countries. Regular conferences have started, e.g. hemispheric conferences in South-Central America where the conference in Uruguay is an excellent example.
Medical geology is also involved in promoting medical geology at meetings around the world by organizing and/or sponsoring special sessions or symposia on medical geology. Short courses have been presented in 40 countries and have been attended by thousands of students and professionals with backgrounds in geoscience, biomedical/public health science, environmental science, geography, engineering, chemistry, etc.
There are new plans for a big program on Urban areas and health which will be presented, involving six international unions, ICSU and WHO where a core activity in this rapidly growing field will be geoscience and medical geology as a base for work in urban areas all over the world.
The lecture will also bring to attention other activities going on now, e.g. local offices, new books and publications, international activities, education activities, new activities with ICSU etc

Geological Materials and Their Beneficial Effects Upon Human Health: Some portuguese case-studies

044- E. Ferreira da Silva, GeoBioTec – GeoBiosciences, Geotechnologies and Geoengineering Research Center. Universidade de Aveiro. Campus de Santiago. 3810-193 Aveiro. Portugal. eafsilva@ua.pt

Man and minerals are chemical systems having in common, in their composition, the major chemical elements O, H, C, N, the so-called mineral salts sulfur, P, Na, K, Mg, Ca and some others called oligoelements or micronutrients or trace minerals such as Fe, Cu, Zn, Se, Mn, I, F which are essential both to life and to the formation of minerals. Hence, considering their physical and chemical properties, minerals can be essential to keep human health in good shape, but in certain circumstances, deficiency or excess of minerals can be factors of human disease generation.
The positive effects of minerals on the human health are acknowledged since antiquity. Mineral resources such as special clays, muds and special sands, thermal spring water or just mineral water have been and are still being used as curative or healing materials, in thermal resorts, thalassotherapy centers and spas.
This presentation discloses examples of the positive effects of a special clay (bentonite) and of a special sand (biogenic carbonate sand) from the island of Porto Santo (Madeira archipelago) which have been traditionally used, almost in the natural state, in topical applications particularly for the treatment of musculoskeletal diseases. It is shown that specific properties of minerals, such as crystal size, crystal habit, hardness, specific heat, heat diffusiveness, chemical composition, solubility and dissolution rate are relevant to justify the positive effects of minerals on human health (Gomes and Silva, 2006).
The study of the geochemical and mineralogical properties of the volcanic muds (Azores island) and clays (Rebelo et al., 2005; Terroso et al., 2006) are also presented. These studies was carried out aiming the selection of potential suitable materials for the formulation of thermal muds and their possible application on Portuguese thermal centers and contribute for the development of quality normative and standards of Portuguese thermal muds.

Gomes, C. S. F. and Silva, J.B.P. Minerals and Human Health. C. Gomes y J. Silva, eds., 142pp (2006).
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Terroso D., Rebelo M., Santos A., Rocha F., Ferreira da Silva E., Patinha C. and Forjaz V.H. Joint Meeting Clay Minerals Society/French Clay Group (Oleron, France), 256 (2006).

Toxicokinetics and Biomarkers of Lead-Induced Toxcity in Red Swamp Crawfish (Procambarus clarkii)

057- Paul B. Tchounwou and Ana Balarezo, Environmental Toxicology Research Laboratory, NIH RCMI - Center for Environmental Health, College of Science, Engineering and Technology, Jackson State University, 1400 Lynch Street, USA. paul.b.tchounwou@jsums.edu

In recent years, technological advances and application of toxicity biomarkers are contributing significantly to the risk assessment of low levels or trace amounts of pollutants in various environmental ecosystems. In this research, we studied the acute and sub-chronic toxicity of lead as Pb(NO3)2, on red swamp crawfish (Procambarus clarkii). Bioassays were conducted according to standard static-renewal protocols. Following subchronic exposure-depuration bioassays, the distribution of Pb in crawfish tissues was assessed by atomic absorption spectrometry, and the activity of two oxidative stress biomarkers (LPO and SOD) in crawfish hepatocytes was evaluated by spectrophotometry, at two different exposure concentrations (25 and 50 ppb). Results revealed that Pb was toxic to P. clarkii and its toxicity was concentration -and time-dependent. During subchronic exposure, Pb was found to be unevenly distributed in tissues; the gills showing the highest Pb-affinity (>80%) and muscle showing the smallest one (<20%). The biomarkers of Pb induced stress were up-regulated in a concentration-dependent manner over the course of exposure; the greatest values for LPO and SOD were recorded at the 4th week exposure to 50 ppb of Pb 30.25 ± 6.31 nmole/gwet-w and 1.59 ± 0.22 U/gwet-w, respectively, compared to 10.56± 2.28 nmole/gwet-w and 1.10 ± 0.08 U/gwet-w in the controls. In light of these results, it was concluded that Pb is toxic to P. clarkia. This invertebrate species also showed a high capacity for Pb accumulation, especially in the gills. LPO and SOD analysis also showed a strong association with Pb-exposure. The up-regulation these biomarkers was time- and concentration- dependent. Therefore, these biomarkers could be used as early warning signals in biomonitoring programs involving Pb contamination of aquatic ecosystems.

Keywords: Lead, crawfish, toxicokinetics, biomarkers
Acknowledgements: This research was financially supported in part by a grant from the National Oceanic and Atmospheric Administration – NOAA Grant No. NA17AE1626, Subcontract No. 27-0629-017, and in part by a grant from the National Institutes of Health RCMI-Center for Environmental Health – G12RR13459 at Jackson State University.

Lead Levels in Milk and Blood from Donors to the Breast Milk Bank in Southern Brazil

088- Monica Maria Bastos Paoliello[2];Gina Ayumi Kobayashi Koyashiki[1]; Tiemi Matsuo[3]; Marcia Benevenuto de Oliveira[4] ; Leda Mezzaroba[2] ; Conceição Aparecida Turini[2], Maria de Fátima Carvalho[5]; Alice Momoyo Sakuma[5]; Marli Terezinha Oliveira Vannuchi[4]; Claudia Santiago Barbosa[6]. [1]Núcleo de Estudos em Saúde Coletiva, Universidade Estadual de Londrina, PR, Brazil; [2]Departamento de Patologia, Análises Clínicas e Toxicológicas, Universidade Estadual de Londrina, PR, Brazil; [3]Departamento de Estatística, Universidade Estadual de Londrina, PR, Brazil; [4]Departamento de Enfermagem, Universidade Estadual de Londrina, PR, Brazil; [5]Instituto Adolfo Lutz, São Paulo, Brazil; [6]Aluno de Iniciação Científica, Curso de Farmácia e Bioquímica, Universidade Estadual de Londrina, PR, Brazil.

Abstract: Brazilian scientific production on the adverse effects of lead on the general population is still very limited. Lead, a potentially toxic substance, has become a public health problem due to its effects, mainly affecting the central nervous system and the effects on the synthesis of heme. The aim of this study is to evaluate the level of lead exposure of donors to the breast milk Bank in the city of Londrina, Parana, by estimating the levels of that metal in milk and blood samples. This is a cross-sectional study conducted during the period of January and July, 2007. All mothers who were enrolled as donors in the breast milk Bank were included in this study. A total of 92 volunteers that presented the following inclusion criteria were included in the project: volunteers who were healthy, without any chronic disease, full term pregnancy, breastfeeding between the 15th and 210th day after the baby was born, and living in the city involved in the study. Lead in milk and blood was quantified using the ICP-MS technique (Inductive Coupled Plasma Mass Spectroscopy). All mothers signed a consent form approved by the Research Ethics Committee from Londrina State University. The median lead concentration in milk samples was 3.0 mg/L, varying from 1.0 to 8.0 mg/L. Average amount (median) of lead in blood was of 2.7 mg/dL, varying from 1.0 to 5.5 mg/dL. In Spearman correlation analysis, significant but modest correlations could be observed between the concentration of lead in blood and in milk (rs=0.207, p=0.048), hemoglobin and ALAD activity (rs=-0.264, p=0.011), level of lead in blood and mother's age (rs=0.227, p=0.029). However, for haematocrits and haemoglobin, the correlation was higher (rs=0.837, p<0.001). No statistically significant associations were found between concentrations of lead in milk and blood and demographic variables studied, obtained through interviews and validated questionnaire. The ratio lead in milk/blood was equal to 0.11. In general, the values found in the present study are similar to those obtained in non-exposed populations in other countries, and are within normality.

Key words: Lead exposure, lead in human milk, ICP-MS; ALAD activity

Mineralogical Risk Induced by Naturally Occurring Asbestos: Case Study

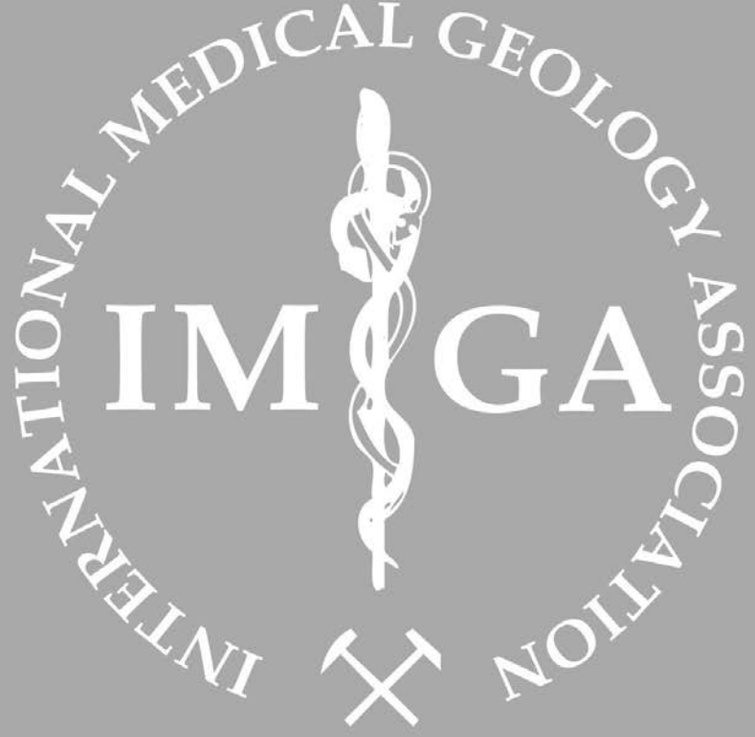
103- Saverio Fiore, Laboratory of Environmental and Medical Geology, Institute of Methodologies for Environmental Analysis – CNR, Zona Industriale Tito Scalo, Potenza, 85050 Italy. fiore@imaa.cnr.it

Over the last two decades the presence of asbestos minerals in workplaces such as quarries and factories as well as buildings has been drawing governments' attention. However, epidemiological data have shown an increase in deaths from asbestos-related pathologies due to the environmental exposure to naturally occurring asbestos (NOA). This includes fibrous minerals usually found in serpentinites but also in other basic and ultrabasic rocks. In order to assess the risk induced by the presence of NOA, which can be defined as a Mineralogical Risk, extensive and multidisciplinary studies have been carried out along the Calabria-Basilicata border, two regions situated in Southern Italy. There lithologies mainly containing tremolite and subordinately chrysotile outcrop. The area under investigation covers 750 km2 and includes towns and villages.
In the space of three years 600 air samples, 700 rock samples (soil, fluvial and detrital sediments, massive rocks) and 120 freshwater samples were collected in proximity of outcrops containing tremolite. These samples were investigated by SEM, PXRD, OM and microXRD. Laboratory analytical investigations were preceded by lithological, geomorphological and land use mappings supported by a MIVIS observation.
The results obtained show a high concentration of asbestos fibres both near the areas where ophiolitic rocks outcrop and where these rocks were used as crushed stones. All this occurs in the absence of an anthropic activity. As expected the concentrations depend on temperature and humidity and they range from 'non-detectable' to 5.0 f/L. The amount of airborne fibres also increases in the presence of a minimal anthropic activity such as vehicle transit, and can easily reach such high concentrations (15f/L) as to become an environmental emergency.
Further studies are necessary in order to propose an algorithm able to "measure" the mineralogical risk induced by asbestos. Currently covering NOA with "clean" soil or planting grass are the only ways to reduce the exposure.
Keywords: Mineralogical risk; Abestos; Tremolite

Middle East Dust: Potential for Infections and Toxicological Effects from Acute and Chronic Exposure

104- M.B. Lyles*, H.L. Fredrickson, A.J. Bednar, H.B. Fannin, D. Griffin and T.M. Sobecki

In the Middle East, dust/ sand storms are a persistent problem and can deliver significant amounts of micro-particulates via inhalation into the mouth, nasal pharynx, and lungs due to the fine size and abundance of these micro-particulates. The chronic and acute health risks of this dust inhalation have not been well studied nor has the dust been effectively characterized as to its chemical composition, mineral content, or microbial flora. Scientific experiments were designed to study the Kuwaiti and Iraqi dust as to its physical, chemical, and biological characteristics for its potential to cause adverse health effects. Results indicates the mineralized dust is composed of calcium carbonate in a coating over a matrix of metallic silicate crystals containing a variety of metals constituting ~1% w/w of the total dust exposure. Additionally, the particles consist of ~1% bioavailable aluminum and ~1% elemental iron. Microbial analysis reveals a significant biodiversity of bacterial, fungi, and viruses of which approximately ~28% are known pathogens. The level of total suspended particle mass combined with environmental and physiological conditions present constitute an excessive exposure to PM10 and PM 2.5 with the potential for long-term adverse health effects. These results suggest that the level of micro-particulate exposure coupled with the microbial and metal content could constitute a significant health risk both long-term and acute. This data taken with other existing work suggest that further research is warranted to provide insight into potential health risks both acute and chronic.



3rd Hemispheric Conference on Medical Geology

Lectures

The Problem of Arsenic in Argentina and Chile

006- Marta I. Litter, Gerencia Química, Centro Atómico Constituyentes, Av. Gral. Paz 1499, 1650 San Martín, Prov. de Buenos Aires, Argentina.
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Instituto de Investigación e Ingeniería Ambiental, Universidad Nacional de Gral. San Martín, Peatonal Belgrano 3563, 1° piso, CP 1650, San Martín, Prov. de Buenos Aires, Argentina. litter@cnea.gov.ar

Water pollution by arsenic is a worldwide problem with high impact in the poorest regions of the Planet. In natural waters, As is present as several chemical forms, a key factor in its mobility, availability and toxicity. Arsenic is classified as a Group A carcinogen (human carcinogen), and severe health effects have been observed in populations drinking arsenic-rich water over long periods, affecting presently to more than 100 million people and causing the appearance of Chronic Endemic Regional Hydroarsenicism (HACRE in Spanish), an illness with high incidence in Asia and Latin America. Symptoms of this illness are palm-plantar hyperkeratosis, damage to the central neural system, hepatic damage, fall of hair, skin cancer and cancer of internal organs (lungs, liver, kidney and bladder). So far, there is no treatment for HACRE, and the only way to struggle the illness is prevention, including reduction or elimination to As exposure . Anthropic activity also contributes to arsenic pollution but to a less extent. Keeping in view the toxic effects of arsenic on humans, the World Health Organization (WHO) recommends a limit of 10 µg L-1 in water for human consumption.
In Latin America it can be calculated that around 14 million people are affected. In Argentina and Chile, the problem is known since decades, affecting mainly isolated (urban and rural) populations not connected to drinking water networks. In Argentina, the regions with the highest arsenic contents in waters belong to the Chaco-Pampean Plain (1 ´ 106 km2), Puna and Cuyo - ; arsenic concentrations vary between 4 to 5300 µg L-1 and, in some places, 99% of groundwaters exceeds the WHO guideline. The north of Chile, from Arica until Antofagasta, presents worrying levels, with concentrations 6 to 300 times higher than the limit recommended by OMS2.

Keywords: Arsenic, Argentina, Chile

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Medical Geology approach for livestock health in Uruguay: the case of Cu deficiency in Salto department

015- María H. Torre

Nowadays, the study of essential elements in the environment and the relationship between their deficiency and health became an important area of the Medical Geology.
In Salto department of Uruguay, local veterinarians have observed in bovine and ovine herds a distinctive group of signs currently called “growth syndrome”. Prevailing signs are anemia, low weight, bone deformities, diarrhea, infertility, low milk production, among others. This syndrome is associated with copper deficiency. In this exposition the diagnosis of this syndrome, the study of probably causes and the alleviation using copper complexes with aminoacids will be presented.

Animals as Sentinels of Human Environmental Risks: Exposure Biomarkers in Pets. A Medical Geology Approach

086- Prof.Dra. Nelly Mañay, Dept. of Toxicology and Environmental Hygiene, Faculty of Chemistry, University of the Republic (UdelaR) Montevideo-Uruguay
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Toxic chemicals in the environment, can be absorbed and cause adverse health effects on living organisms. To assess their toxicity risks in humans, it is necessary to determine the concentration of chemical species that can produce such effects, and measure the magnitude of them. The use of biomarkers is widely used in biological monitoring of susceptible human populations and is also used to sensitive living species in the ecosystems.
Pets can also suffer from diseases attributable to environmental pollution and may even be more susceptible to poisoning, presenting serious health problems before they occur in the human population. For example, dogs can provide lead exposure key diagnostic elements, to take into account in children living with them, because these pet species are susceptible to develop early severe lead intoxication symptoms.
In human medicine, the use and the recognition that animals can be used as “sentinels” of environmental health hazards are not yet widely used and generally the data from these animals are not considered for medical intervention.
We present examples with a Medical Geology approach, of some animals as human environmental health risks sentinels and the results of a comparative study of blood lead levels in populations of dogs and children in Uruguay, which highlights the importance of biological monitoring in pets to prevent childhood lead poisoning and the benefits of sharing data and research on human and animal environmental health impacts.

Integrated System for Risk Evaluation of Contaminated Sites

087- Laura Börgel, Forensic Medicine Department, University of Chile, Ernesto Pinto Lagarrigue, 8420445, Chile. dra.borgel@toxicologia.org

There are many methods for evaluating chemical substances exposition risk, involving from laboratory analysis (EPA1, 6, 7) to experimental studies (OECD2, 7); mathematics models as REACH2, 7 and EPA with theoretical bases that allow us to make modeling for an specific risk and others related with the laboral background (OSHA, NIOSH, OMS) 3, 4, 7.
The evaluation of contaminated sites is more complex and requires the integration of the factors: agent, host and environment; to establish the cause-effect according to the concentrations of the contaminant in the studied place, but also environmental routes and access ways (ATSDR5, 6, 7), the physical and chemical properties of it and its behavior in this environment must be established, based on ATSDR and REACH we can make an estimation of the risk, for establishing if the exposition to a particular pollutant present or not specific risks of adverse effect on short or long term in populations.
This integrated system requires a multidisciplinary study plan, which considers different professionals, the use of normalized methods (EPA, OECD); that analyze the local characteristics of the place in study (topography, weather, and others (ATSDR)), and based on the modeling of REACH we will obtain the internal doses for populations compared with the data of the not contaminated places, so we can define exactly the risk of the exposed populations.
This integrated system involves the diverse methods, which allows us to establish with greater certainty the risk of a contaminated site. Also it allows us to make a prognostic of the specific situations for new industrial development, generating preventive actions and mitigating potential risks. It has applications for: government decisions, regulatory aspects, chemical security management of industries, forensic investigation, risk communication, a better protection of the environment, and for promoting a better life quality.

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Mercury in ASM, Extent, Causes, Solutions and Reduction Scenarios: A profitable transition away from isolation and Mercury use

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The use of mercury in Artisanal and Small Scale Gold Mining (ASGM) is explained through case studies. Strategies for reduction are identified at the local, regional, and global scales. ASGM is an enormous sector that involves over 70 countries, approximately 10 to 20 million miners, a primary economy of $10 billion/year, and a secondary economy of at least $50 billion/year. It is a huge source of wealth for the world's poor. However, due to extraction methods, it is the largest contributor of mercury to the environmental after coal burning.

Miners use mercury for a surprising number of reasons. Among them: it is easy; independent - 1 person can do it; effective - often it gets more gold in less time compared to other affordable methods; accessible; very cheap; facilitates precise transactions (trading); produces quick capital (1 day); can be used as a tool to divide profits; indentured miners have no choice; and miners and communities are not aware of the risks. Efforts to reduce mercury use must therefore consider these reasons and be incentive driven and easily implemented on the local level. Because mercury is directly involved in the revenue of ASM miners, because it can represent a liability and risk to companies when used on their concessions, and because cost effective improvements in practices can often be simple, reducing the use of mercury is often a good entry point for developing a functioning trustful relationship with ASM communities. A relationship which can later be expanded to resolve other issues.

Case studies are used to highlight two of the main processes for mining gold with mercury, the associated problems, some successful intervention programs, other potential solutions, and reduction scenarios. Several specific recommendations for action are given in which the roles of industry, NGO's, governments, banks and scientists are outlined.

This issue is now on the top of policy agendas at the World Bank (http://www.artisanalmining.org/); industry (ICMM: http://www.icmm.com/; World Gold Council: http://www.gold.org/) and the United Nations (http://www.chem.unep.ch/MERCURY/) It is of particular importance to the Global Mercury Treaty that was unanimously agreed to be developed and in place by the world's nations by 2013.

Environmental diseases in children and contaminated sites

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The industrialization patterns patterns and unsustainable consumption that dominated the last decades, have released into the atmosphere large quantities of chemicals now present in soil, food and water. In contaminated sites, direct exposure is permanent, and potentially reach large dose of contaminants. Thus, the changes in health and development of common subclinical course, reached in several cases the range of clinically overt disease.

Contaminated sites are a high risk to children's health. Exposure to chemicals at these sites constitutes a major driving force behind the development of these children, as well as genetic economic and social factors. Children are particularly vulnerable to environmental toxins because their exposure is greater: consume more water and breathe more air than adults relative to their weight, they breathe closer to the ground, have a hand-mouth behavior that facilitates the ingestion of soil. They are also more vulnerable because they are in the development stage and hence differentiation, cell multiplication and physiological maturation.

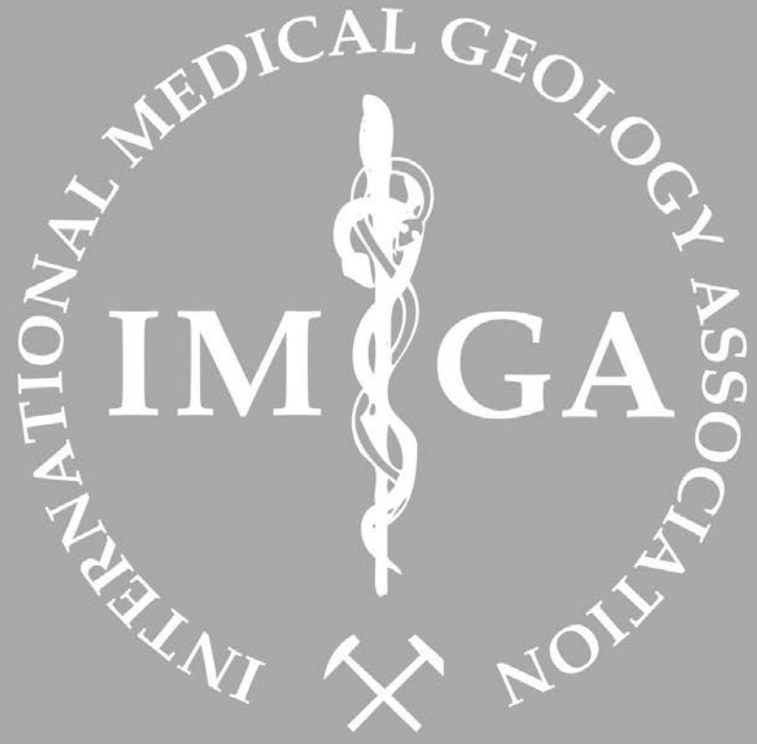
Neurological, respiratory and skin diseases, and altered immunity, among others, may be linked to toxic exposure in contaminated sites. Contaminated sites are characterized by unacceptable levels of toxic of persistent toxics as PCBs and metals.

Most contaminated sites are associated with most studied ancient metallurgical processes as Silver Valley in Idaho USA, or La Oroya in Peru, Abra Pampa in Argentina or La Teja in Montevideo

Former chemical industries such as Minamata in Japan, have been paradigms of the dramatic effects of mercury pollution.

The United States estimates that more than three million children living within 1.5 km from a contaminated site. There are a numebr of places contaminated with chemical mixtures, not well identified and whose toxicity has not been well defined.

The main role of clinical toxicology is to meet the demand of the population to be assisted and rehabilitated. In this sense a fundamental contribution is in the diagnosis of poisoning, or defining the causal relathionship of the contaminants in the profile of health / illness of the population. The main challenge is to recognize the interactions between various pollutants and the risk factors often present in affected populations, poverty and social inequity, food shortages and infectious diseases. The protection and rehabilitation measures will depend on the ability to address pollution in the framework of strategies to promote a healthy development of children.



3rd Hemispheric Conference on Medical Geology

Oral Presentations

Effect of Organic Acids on the Monoelement and Competitive Adsorption of trace elements

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Mobility of trace elements in soils is affected by sorption/desorption reactions, which are the predominant factors that control their bioavailability. Organic ligands may affect these processes modifying the surface properties of the minerals, complexing elements in solution and forming many species with different affinity for the surfaces of the sorbents and, finally, competing with trace elements for sorption sites. We investigated the effect of increasing concentrations of organic acids (oxalic, citric and glutamic) on the adsorption of trace elements (cupper, lead and zinc) by synthetic goethite from monoelement and multielement solutions at different pH.
In the absence of organic acids the amount of adsorbed elements strongly increased by increasing pH. The order of decreasing relative affinities of metals for goethite was: Cu>Pb>Zn, which may be attributed the order of the first hydrolysis constants. Organic acids added together with the elements increased the adsorption of the cations, especially Cu, compared to the metals without organic substance. The effect of oxalic and citric acids on the adsorption of Cu and Pb by the mineral was similar. Ligand/element ratio seems to be critical factor in the operating adsorption processes. In the presence of increasing concentrations of oxalate and citrate, the metals adsorption onto goethite firstly increased and then decreased. Glutamic acid initially increased adsorption and then adsorption of the cations was practically constant.
Cupper and lead strongly competed for the sorption sites on the surfaces of the mineral. At pH 4.5-5.0 the sorption of a given metal onto goethite was inhibited in the presence of increasing concentrations of the other element. Finally, the presence of organic ligands previously added to goethite or added as a mixture with cupper and lead strongly affected their competitive adsorption.
The research was supported by Russian Foundation for Basic Research (Project N 08-05-00419).
Keywords: trace elements, organic acids, adsorption.

Origin of high arsenic groundwater in Thermal Zone of the Guarani Aquifer System South Domain (Argentina and Uruguay): considerations about human health and the thermal groundwater uses

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Interest in arsenic content of groundwater has greatly increased because of the augmented awareness on human health effects (e.g. skin lesions, hyperkeratosis, skin cancer), as well as to decrease the costs of treatment of groundwater supplies used for consumption. Groundwater with high contents in arsenic may be found in some areas of the world, normally in hydrogeological systems where the extent of flushing with groundwater is very low, and is associated to younger continental sediments in arid or semi-arid climates (e.g. alluvial plain or inland basins) [1]. The Guarani Aquifer System (GAS), located in South America, represents a typical example of a transboundary aquifer. It was recently studied in the Project for the Environmental Protection and Sustainable Development of GAS, achieved by Argentina, Brazil, Paraguay and Uruguay. During the Project, groundwater was sampled to analyze arsenic content. The thermal waters of the GAS South Domain, along the Uruguay River, represent an important resource base that supports a growing tourism industry in Argentina and Uruguay. In this zone the groundwater, normally sodium chloride bicarbonate type [2], and several wells used for thermal activities presents arsenic contents between 23 to 40 mg/L, higher than the WHO guidelines for drinking water (<10 mg/L). The presence of arsenic, hitherto unknown, was associated to hydraulic connection between the GAS and the underlying Paleozoic aquifer units. This suggestion is supported by: (a) regional hydrochemical and hydrodynamic knowledge about the GAS, (b) geological framework along the Uruguay River, (c) mineral composition and petrophysics of the Paleozoic units, (d) water well design and (e) arsenic contents between 71 to 94 mg/L that were recognized in the proximity of this area, in wells drilled in the Paleozoic units. According to these results use of the thermal zone of SAG, along Uruguay River, for touristic purposes should be re-evaluated.
Keywords: Guarani Aquifer System, arsenic, thermal tourism.
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Relationship Between total Concentration and Dilute Hcl Extraction of Heavy Metals in Sediments of Harbors and Coastal Areas in Korea

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Total concentrations of Cr, Ni, Cu, Zn, Cd and Pb in surface sediments were determined to investigate the regional trends of heavy metal contamination in 11 coastal areas in Korea. Enrichment factor (EF) of heavy metals was calculated by comparing the level of their regional background. The EF values of Cu, Zn and Cd were greater than 1.5 in most samples, which indicate that these metals might be anthropogenically contaminated in most parts of study areas. The averages of EF values in total study areas were 0.99 for Cr, 1.05 for Ni, 4.23 for Cu, 1.80 for Zn, 3.92 for Cd, and 1.54 for Pb, respectively.
Single step extraction method using 1M HCl was useful to deduce the anthropogenic sources of heavy metals in study areas. Dilute HCl extraction method was used by 1M HCl for 4h at room temperature (20°C) at a sample to extractant ratio of 1:20 (w/v). The 1M HCl extractable fractions of each metal varied from 0.3 to 37.3 % for Cr, 1.9 to 66.3 % for Ni, 4.2 to 92.9 % for Cu, 7.1 to 99.7 % for Zn, 10.9 to 98.9 % for Cd and 15.0 to 99.1 % for Pb. Comparing 1M HCl extractable fraction to total concentration, large portions of Cu, Zn, Cd and Pb were present as potentially labile fractions from anthropogenic input. Also 1M HCl extractable fractions of Cu, Zn, Cd and Pb were significantly correlated with their EF values showing $r > 0.68$.

An Exafs, Micro-xrf and Micro-xrd Study of Pb Speciation in Pb-rich Household Dusts from Urban Canadian Homes

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The total amount of an element in a system is not necessarily a good measure of its potential health risk; rather it is the chemical and physical form (i.e. speciation) of the metal of interest which dictates its reactivity and toxicity. Thus, where anomalous metal concentrations are encountered metal speciation needs to be elucidated in order to refine the risk assessment of these substances. In particular, knowledge of metal speciation is needed to: a) understand the oral bioaccessibility of the metal compounds in the host matrix b) identify their chemical form (e.g. carbonates, oxides, alloys, sulfides, organometallics); and c) determine their probable sources (e.g. consumer products, such as paint, or external industrial pollution sources). In this paper we used bulk extended X-ray absorption fine structure spectroscopy (EXAFS), micro X-ray fluorescence spectroscopy (micro-XRF) and micro X-ray diffraction (micro-XRD) to determine the speciation of lead (Pb) present at elevated concentrations (>1000 mg Pb kg-1) in settled house dust.
The results of this study demonstrate that EXAFS is capable of identifying Pb species in house dust. Linear combination fitting of the c(k)•k2 data show that Pb is complexed in a variety of molecular environments, associated with both the inorganic and organic fractions of the dust samples. The inorganic species of lead identified were: Pb metal, Pb carbonate, Pb hydroxyl carbonate, Pb sulphate and Pb oxide. Pb citrate was the only organic species identified by linear combination fitting of the EXAFS data. Micro-XRF and micro-XRD analyses of the same dust samples supported the EXAFS results.
Synchrotron-based radiation studies like these may provide a fingerprint for various sources of Pb in houses (outdoor vs. indoor) and may help to determine any transformation processes that Pb may undergo inside a building. Understanding these processes would have important implications for policy development on indoor environmental health.
Keywords: House dust, Pb Speciation, EXAFS

Geologic Calcium for Drugs and Cosmetics

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This work is a new discipline of sustainable development: our approach of Medical Geology is to turn Geology as a new reservoir for seeking active substances for health and cosmetics. In this work we have developed the case of calcium carbonate as a source of low-cost calcium and associated organic molecules. Calcium plays an important role in the structure of the skin and its intercellular communication. Presently, most of the geologic calcium production is in the form of Calcium Carbonate for cosmetics to be used as abrasive filler in tooth paste for example.
The purpose of the present work is to study the residual contents of biocarbonates. The study consists in extracting, in identifying and in analyzing the residual activity of the organic molecules associated with the bio-mineralization for osseous mineralization or skin care.
The sampling was carried out in Orgon, France (Urgonian stratotype) a quarry of rudists-based fossil reef dated back to the lower cretaceous (120 My). Biomineralization is a process by which living organisms produce minerals, often to harden or stiffen existing tissues (i.e. shell, teeth or bones). These skeletal elements and the organic matrix are subjected to diagenetic and taphonomic events which can alter the biological signals.
Using fluorescent photonic microscopy but also transmission electron microscopy (TEM) and scanning electron microscopy (SEM), the presence of the original organic matrix within the rudist fossil shells and debris has been testified. Using cathodoluminescence method, we were able to detail the diagenetic process. The external prismatic layer had been preserved, suffering only from a centripetal recrystallization. This thick layer thus preserved the endogenous organic matrix which was of use to the shell mineralization. It was successfully extracted to study its composition and residual activity.
Keywords : Calcium, Cosmetics, Carbonate

Nacre as Calcium-Source for Osteoporosis

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Nacre or mother of pearl is studied as a model of mineralized tissues. It represents also a potential source of active substances for numerous pharmaceutical applications of public health. In this work the targeted diseases are osteoporosis and skeletal disturbances. Calcium needs to be present in the daily diet, needs also to be assimilated and more importantly fixed in the bone tissues. This is the role of different active molecules present in bio-mineralized tissues as nacre. Nacre fluid or molecules trapped in nacre are good examples to study how Nature manages transport and implementation of calcium in the mineralized tissues.
In the present work we have obtained extracts from nacre and tested their activity in the case of preostoblast mammal cells differentiation. The capacity of enriched-calcium extracts to stimulate the mechanisms of osseous mineralization was tested on MC3T3-E1 cells, a clonal preosteoblastic cell line originated from new-born mouse. The differentiation into osteoblasts and the mineralization were improved in presence of the extracted nacre fractions: 16 days are needed instead of 25 when the medium in not supplemented. Raman spectroscopy and the electron microscope prove the nature of the hydroxyapatite deposits.
Keywords : Nacre Fluid, Biogeochemistry, osteoporosis

Study of the Inmobilization of Heavy Metals in Contaminated Soils Using Different Phosphate Species

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ANTECEDENTS -The use of diverse forms of the phosphate has demonstrated to modify the mobility of the Pb and other heavy metals as well as to reduce their bioavailability (1) . There has been investigated the application of diverse forms of the phosphate for the immobilization: apatite of diverse geological origins (2) , apatite synthesized in the laboratory (3) or phosphoric acid (1)
METHODOLOGY- It has been investigated the effect of the immobilization of Lead, Chrome and Cadmium using apatite of geological origin(HA), bone powder (BP), apatite synthesized in the laboratory (HAPC) and phosphoric acid (H3PO4). Tree different contaminated soils were studied . A fixed dose of apatite were used and the effect of the pH is studied for every soil and every mineral form of apatite measuring the heavy removable metal in hot HNO3 by flame AAE
RESULTS The HAPC was the most efficient mineral form,achieving percentages of removal up to 61 %.It follows the HA with minor values (29 %).
The BP is slightly effective in the conditions of the experience for all the soils in study, independently of the pH.
The pH has a marked influence in the removal in case of the HAPC For the case of HA,the effect of the decrease of the pH is translated in a reduction in the percentage of removal for both previous soils.
The H3PO4 does not present significant effect in the removal of lead applied(hardworking) doses.
CONCLUSIONS The stabilization is dependent on the pH but one cannot affirm a general principle
For the studied soils the order of efficiency is: HAPC> HA> H3PO4> BP Turns out to be promissory the application of the HAPC in acidified way, which must be investigated more exhaustively. This mineral form turns out to be effective for the stabilization of the Cr and the CD.
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Key words: Remediation, Heavy Metals, Apatite.

Arsenic and mercury mineralization and nail accumulation related to borate deposits and drinking water in Kutahya, Turkey

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Abstract. Extraordinarily high arsenic (As) and mercury (Hg) levels are present in the environment derived from natural and anthropogenic sources in Kutahya , western Anatolia, Turkey. One of the sources of As and Hg is associated with the world-class borate deposits, which is the most important and strategic minerals in Turkey. In this study the following important points were observed: (i) As and Hg minerals identified in the area were either in sulfide or oxides/hydroxides forms. Anthropogenic activities such as mining and tailings may have one of the major inputs; (ii) As content of water from various sources including rocks (i.e., aquifer type rocks and minerals) were very high. However, Hg content of water from the same locations was below the detection limits; (iii) A pilot study was conducted to assess the utility of using human nails as a biomarker for As and Hg concentrations in the exposed population including borate mine operators from the villages. As and Hg concentrations of all nail samples were high, with borate miners demonstrating the highest levels. The high correlations of As and Hg in nail samples suggest that these elements may be a good measure of long-term exposure and exposure pathways via borate deposit and contaminated water in the area. The nail specimens serve as effective biomarkers of exposures to both As and Hg. Direct input from water, As and Hg vapors, and fine particles generated during open pit mining in the area may have important health input(s). Since impact of ingestion and inhalation of As and Hg on human health was observed, for a complete mining assessment, it is important to facilitate the development of a predictive capability for the environmental behavior of borate and similar mineral deposits and landsfills for future use.

Comparison of erionite from mesothelioma villages of Cappadocia, Turkey: Original "old" Sarihidir vs relocated "new" Sarihidir

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Abstract. In the 1950's, Sarihidir village of Cappadocia, Turkey was relocated across the Kizilirmak river due to frequent flooding problems. To distinguish between the two villages, the original village is termed as "old" Sarihidir and newly established village is termed as "new" Sarihidir. Residents of the "old" Sarihidir village have history of very high percentages of malignant mesothelioma (MM) as both malignant pleural mesothelioma - MPM and malignant peritoneal mesothelioma - MPEM, which discovered in 1970's. Houses in the "old" Sarihidir village made from volcanic tuffs obtained from nearby sources, which contaminated with erionite, the most carcinogenic mineral known and listed as Group-I carcinogen for humans. Mesothelioma cases reduced drastically after relocation of the village across the river, although intention of relocation was not related with the MM epidemic. Our detailed field work showed that many villagers carried construction materials (i.e., building blocks from their old houses) to the new village and use them as construction materials either in their new houses or as garden walls. In this study, we obtained and compared the construction materials and outcrop samples from both the "old" and "new" Sarihidir villages. Over 60 representative samples were studied in detail using high resolution field emission scanning electron microscopy, x-ray microanalysis, and powder x-ray diffraction techniques. Our results show that the same type of erionite can be found in stones in the "old" and the "new" Sarihidir villages. Air sampling studies are in progress to measure erionite concentration in both villages. It is possible that the relatively lower number of erionite containing stones or cleaning altered outer part of the older stones before using in the "new" village reduces the amount of erionite in the air and that this reduction might be related to the observed decreased mesothelioma incidence. Surveying should continue for the future cases of MM.

The Etiology of Balkan Endemic Nephropathy and Equation Still Not Solved

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After more than 50 years of research several advances have been made towards unravelling the causative factors of Balkan endemic nephropathy, a fatal kidney disease that has been plaguing certain restricted geographic areas of the Balkan Peninsula. A phytotoxin, called aristolochic acid (AA) and produced by the plant Aristolochia clematitis (birthwort) has been proposed to be responsible for the kidney failure and the associated urothelial cancers and more recent data has pointed to the presence of biomarkers (DNA-AA adducts) of previous exposure to aristolochic acid of BEN patients. However, such adducts can be the mere consequence of the presence of Aristolochia clematitis in high abundance in the endemic, but as well in nonendemic, areas. The potential pathway of exposure to AA is unclear, although wheat flour contamination might be the vehicle for the toxin. If this is true or not it is still an open question, as long as similar contamination and similar exposure pathways may occur in many other places where there is no BEN. Even if Aristolochia clematitis is an important risk factor for BEN (along with a peculiar genetics of the susceptible population) an additional, geographically confined, agent may contribute in a synergistic or additive way to the etiology of the disease. Our original proposal was that Pliocene lignite deposits, present in and around the endemic areas would provide the geographic character of the disease. The Pliocene lignites are immature coals, capable of leaching large amounts of potentially nephrotoxic organics that end up in the untreated water supplies of the villagers. These compounds, with or without any biogeochemical alterations on their route from the coal to the aquifer, may set up the stage for other toxins, like AA, to have significant impact in causing BEN, in a multifactorial disease induction pattern.

How to use the groundwater resources at geo-pollution area on organoarsenic compounds

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Ground water for drinking water of the apartment building contained diphenylarsinic acid (DPAA) in Kamisu city, Ibaraki prefecture, Japan. The characteristics of the acid poisoning include brainstem-cerebellar and cerebral symptoms (Ishii et al., 2004).
After that, phenylarsonic acid (PAA) which may be a degradation product of DPAA is detected in the ground water. Both organoarsenic compounds are detected in groundwater and soil in the paddy field. To have the sustainable pumping without the compounds, the pumping and observation well system is set as follows.
In the area, three main aquifers are developed with the sub-aquifers intercalated among each aquifer. The groundwater in middle and upper aquifers is not contaminated by both organoarsenic compounds but polluted in lower aquifer.
Each of well screens for pumping and observation is set relatively in upper aquifer, middle aquifer and sub-aquifer overlying the lower aquifer with polluted groundwater. As the result of monitoring the ground water level in relation to the concentration of the organoarsenic compounds such as DPAA, PAA, etc., we could succeed to get the sustainability on the pumping up of ground water without the pollution from the middle to the upper for paddy field.
Key Words: geo-pollution, diphenylarsinic acid (DPAA), phenylarsonic acid (PAA), organoarsenic compounds

Geotoxic anomalies in fissured hard rockaquifers of lower triassic sandstones (iberian range, valencia-spain) and their effects in the quality of drinking waters

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In the second half of the last century, some researches about presence of geotoxic trace elements in groundwaters have been carried out, related to the fact that high concentrations of these elements in drinking waters are dangerous to health. One of the topics mostly studied has been the presence of arsenic (As) in groundwater. However, As frequently has a positive correlation with another elements1 with regard to geotoxic anomalies.
Fissured Hard Rock Aquifers (FHRA) aquifers provide an alternative water supply of good quality for drinking water2. However, these aquifers sometimes have water quality problems due to high concentrations of some geotoxic trace elements3. This paper focuses on the results obtained from some samples taken from springs and boreholes in fissured aquifers of Buntsandstein (Lower Triassic). These results reveals that Ca,Mg-HCO3 is the dominant hydrochemical facies nevertheless important concentrations of ion sulfate occur sometimes in very high concentration as well. Moreover, the levels of As and Ba (and fluoride in minor quantity) are relatively high4. The hydrochemistry of the fissured aquifer of Buntsandstein Facies is determined largely by its lithology and mineralogy5. The presence of magnesium and geotoxic trace elements as As, Cu, Pb and Zn (and likely also for Ba) seems to be associated to chlorite and hydrothermal veins of barite (Alpine Phase)6. The sulfate character of many of these waters indicates the influence of flushing of the evaporite layers (Mid to Upper Triassic), or the presence of ancient, sulfate-enriched seawater. These waters have an important influence in adjacent alluvial aquifers located in low areas. The authors highlight that FHRA are an important source of water supply when there is no other sources of drinking water. However, behind the use of these aquifers remains a risk associated to the fact of their peculiar chemical composition. Frequently, some important alluvial aquifers are associated with them and this implies that those alluvial aquifers might have water quality problems related to inflows from these FHRA.
Keywords: Environmental geochemistry, FHRAquifers, Geotoxic trace elements,
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Manganese removal in drinking water

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Antecedents. Because of the accumulation of biofilm inside the distribution pipes and the increase of water demand in November 2005, the organoleptic quality of drinking water in Montevideo was negatively affected. Concentrations over 0,1 mg/L of Mn affect the organoleptic characteristics. OMS considers that the limit in order to protect public Health on Mn is 0.5mg/l. The main objective of this project was to determine different ways to achieve a guidance value of 0,01 mg/L in the potable water produced in Aguas Corrientes.
Methodology. The contribution of raw water and coagulant was studied, in order to determine which was the main source for manganese presence and which one could be successfully minimized in the short term. Water quality monitoring was carried out throughout the contribution basin, and the different types of coagulants used in Aguas Corrientes where analyzed. Manganese removal experiences were carried out using settled water, different oxidant products (sodium hypochlorite, chlorine dioxide, ozone) and a scale sand filter.
Results. Manganese concentration varies significantly throughout the contribution basin. Manganese levels varied depending on coagulant type and source. Liquid aluminum sulphate bought from a supplier showed lower manganese levels than aluminum sulphate produced in Aguas Corrientes. These differences may be due to different fabrication processes and different bauxite qualities. Coagulant contribution varies from 3,5 to 21,6 kg/day, while raw water contribution varies from 8,2 to 13.5 kg/day. From manganese removal experiences with sodium hypochlorite, efficiencies of 90% where achieved.
Conclusions. Coagulants contribution to manganese presence is significative, so in order to control it, measures for coagulants quality and for the bauxites used for its preparation should be applied. Raw water also contributes to the problem, so further studies on the contribution basin should be carried out and specially in the sub basin of the Santa Lucia River.
Key words: Drinking water, Coagulants, Manganese removal

Volcanic pollution in surface and groundwaters of El Salvador, Central America

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During recent years several investigations have been done on the hydrogeology and geochemistry of surface and ground waters of El Salvador. These investigations show that in addition to the presence anthropogenic contaminants, the waters present high concentrations of chemicals that are likely of volcanic origin, specially boron and arsenic (up to 10 and 0.331 ppm, respectively). The volcanic origin of these pollutants is evidenced in the correlation between chloride and sulfate in the waters, suggesting the input of volcanic components to the aquifers. Two lakes nested in volcanic calderas (Coatepeque and Ilopango) present the highest concentrations of boron and arsenic. These contaminants are present also in streams and springs located close to these lakes. For the groundwater aquifers, arsenic is also a common pollutant, especially in the aquifer of San Miguel. This aquifer is located close to San Miguel volcano to the east of the country. For the groundwater aquifers, the spatial correlation between geological structures and lithology, water temperature, and chemical concentration has been investigated to identify the areas that are more likely to have higher concentrations of volcanic pollutants. In El Salvador, the effect of these contaminants on human health, or their fate in the biotic environment has not been investigated thoroughly. In terms of exploitation of volcanic aquifers for irrigation and domestic water supply, areas with larger inputs of volcanic contaminants should be avoided. These areas can be identified considering the geological location of springs and wells, their chemical composition, and ground water flow directions.

Indicate the referred Nº of Scientific Topic of your abstract: No. 3 Environmental geochemistry and health

Geoenvironment and evolution of the genus homo in neogene

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Antecedents
Relationships between biotic communities and environment modulate the evolution of species. The genus Homo passes to have a fossil register since Gelasian Period, in the limit between Pliocene and Pleistocene Periods, from 1,9 Ma with Homo habilis developing in a unique environment in terms of ecological conditions. The group of archaeological data that we have nowadays links the hominids and mainly the genus Homo development to the African Rift. Other Homo branches that emigrate from this region and had continued been adapted to other areas of Africa and Eurasia did not result in the present-day man.
Methods
So that, according to autoecological principles, this region of the African Rift Valley so extremely diversified in environmental circumstances had linked the best conditions for the evolution of Homo sapiens. Soil development over distinct bedrock layers appears controlled by relief and climate, underlining the suitability of the region as a model area for in-depth gradient studies on ecosystem processes.
This environment is structured by the characteristics of the Rift:
1) Mountain horsts, mainly lined North-South, with median direction, almost normal to the trade winds of both hemispheres, generating effects of altimetry and thermal gradients, and even orographic rains and pluvial shadows.
2) Basic and acid volcanism varying with running lava and gray ejections, endorreic hydrographic bays and hemi-closed bays with backgrounds occupied by lakes and swamps that concentrate salts and nutrients (Na, Ca, Mg, Fe, Co, Cu, S, Cu).
This complex group composes a scenery of intercutted compartments, with valleys under climates , passing from subhumid in altitude to semi-arid to arid in the bottom, with soils of eutrophic characteristics, arriving to be vertisols.
Results and conclusions
So it is created an environment of opened vegetation with grass cover, facilitating the orthograde posture; numerous sites of resources spatially and seasonally differentiated with referentials of relief, leading to the maintenance of special grupal and temporary memory; lots of floristic resources, including hunting , fishing and gathering, ensuring the eutrophic character with high level of macro and micro mineral nutrients in the land environment.
Keywords: human evolution , Neogene , Rift Valey
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Acute Ecotoxicity and Preliminary Determination of a Critical Dose of Sewage Sludge for Tropical Soils

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Toxic effects on Earthworms (Eisenia andrei) were studied in a latosol and chernosol (B horizon) amended with sewage sludge (SLD), in order to determine a preliminary critical dose for its use in the agriculture. Acute toxicity test (14 days of exposition), using Eisenia andrei, was performed according to the procedure proposed by ASTM. Based on past studies about SLD toxicity for soil macrofauna, the following doses were studied: 6.66%, 13.32%, 19.98%, 26.64%, and

33.3% for the latosol - and 6.58%, 13.16%, 19.74%, 26.40%, and 32.98% for the chernosol. Whenever possible, the lethal dose for 50% of the organisms (LC50) was estimated using the program Biostatic for Windows. It was not possible to estimate the LC50 for the chernosol, since the acute test revealed no mortality for all tested doses. However, changes on the skin color of the organisms were observed, suggesting possible sub-lethal effects of the SLD addition. In the latosol, 100% of mortality was observed for the three highest doses. Such result suggests that the natural properties of tested soil classes played an important role in the contaminants bioavailabity In this case, possibly the presence of 2:1 clay minerals (with high cationic adsorption) in the chernosol may have stimulated the decreasing of the contaminants concentrations in the soil solution - geochemical fraction highly bioavailable for the earthworms – resulting in a lower level of mortality in comparison with the latosol. LC50 for the latosol was estimated in about 15.14%. In future works, bioaccumulation and behavioral tests with Eisenia andrei as well as quantification of toxic metals and biomarkers will be performed, in order to determine a critical dose of SLD considering chronicle effects on the organisms.
Key-words: sewage sludge, earthworms, ecotoxicity.

Geogenic sources, geoavailability and regional exposure levels evaluated for shallow and underground waters in the influence area of Farallon Negro Volcanic Complex, Catamarca province, Argentina

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In this contribution, abundance and geographic distribution of 73 constituents of natural waters have been evaluated, defining geochemical baselines, and identifying geogenic sources and areas with unsafe levels of exposure to human health. The research covers 13,050 km2 and includes the Volcanic Complex together with the structural saline basins of Campo del Arenal and Pipanaco. This contribution is part of the SEGEMAR "EGCVFN Project ".
Physiochemical parameters and alkalinity were measured locally. Samples were processed "in situ". Chemical analysis of water samples were carried out by a Canadian laboratory, using ICP-MS, ICP-OES, ICP-ES, and ion chromatography methods.
Regional abundance, geographic distribution and baselines were defined for 73 constituents of the tested natural waters.
Relict geothermal systems, andesite and dacite volcanic rocks, porphyry mineralized areas and saline basins are geogenic sources of the constituents of natural water.
It has been identified two different areas with high levels of exposure: ZNEEC1. The constituent has proved harmful effects on human health and exceeds the maximum allowance required by the standard (natural contamination). Al-As-Pb-Zn in the drainage area of Belén river; Al-Cr-As in small areas in Campo del Arenal; As-Mo in Pipanaco; Al-Cd-Cu-Zn-Mo-Tl in San Lucas, Capillitas and Candado streams (natural acid drainage); and As-Cd-Pb-Tl in the geothermal system of San Buenaventura fault in the Vis Vis river. ZNEEC2. High content of this constituent, but benign and / or harmful effects to human health have still not been well established. Br-Cs-Li-I found in Belen and Vis Vis rivers and Pipanaco.
The regional definition of geochemical baselines and areas with high levels of exposure to natural contaminants in waters is a valuable tool for national and regional authorities responsible for Health, Environment and Territorial Planning, and also to advance in further studies on specific public health in these environments.
Keywords: geochemical baselines, level of exposure, natural pollution

Geoavailability and geographic distribution of constituents with impact on human health researched on natural shallow waters of San Lucas stream, in Farallon Negro Volcanic Complex, Catamarca province, Argentina

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In this contribution, abundance and geographic distribution of 73 constituents of natural waters in San Lucas stream have been evaluated, and geochemical baselines as well as extent of dispersion have been defined for those constituents which have effects on human health. The research examines the stream from its headwaters, which is a phenodacitic phorphyry with acid drainage, hidrotermal alteration and Cu-Au-Mo mineralization, up to its infiltration, 4.5 km downstream.
Physical chemical parameters and alkalinity were measured locally. Samples were processed "in situ". Chemical analysis of water samples were carried out by a Canadian laboratory, using ICP-MS, ICP-OES, ICP-ES, and ion chromatography methods.
Local abundance and geographic distribution were defined for 68 constituents of the natural calcium-magnesium-sulfate waters of San Lucas stream. Baselines has been established for 20 constituents included in Law 24.051 (dangerous waste).
Al-Cd-Cu-Zn-F-Co-Ni-Be are highly geoavailable in the headwaters of San Lucas stream, in the natural acid drainage area of the mineralized phorphyry, and up to its middle section. From this point to the infiltration area, constituents such as Cu, Zn and SO4, show high geoavailability with concentrations that exceeds the maximum allowance required for water intended for human use.
According to a precautionary criteria and for the prevention of impacts in human health, were identified moderated geoavailabilities (Cs-Mn-Pb-Tl) to elevated geoavailabilities (Br-Ce-Li-I-Ca-Dy-Er-Eu-Ga-Gd-Hf-Ho-La-Lu-Nd-Pr-Rb-Re-Sm-Sr-Tb-Y-Yb) of benign and/or harmful effects of these constituents on the environment and human health that have not been quite stablished yet.
The definition of geoavailability levels and total extent of the geographic distribution is the first step for the Authorities to stablish its ability to evaluate real impacts and hazards over human health, as well as the impact of future mining actions of mineralized phorphyry.
Key words: geochemical baselines, natural acid drainage, geographic distribution

The occupational and environmental health hazard of quarried volcanic deposits

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Introduction
Volcanic ash has been recognised for many years as a potential respiratory health hazard based on industrial evidence of disease from quarrying crustal material. However, to date, the health hazard of quarried volcanic material has not been investigated. Here, we investigate whether quarried volcanic material poses a similar respiratory hazard to fresh volcanic tephra. Quarried material may have enhanced toxicity because of freshly-blasted surfaces or may have reduced reactivity because of weathering of loose deposits. Two potential mechanisms have been identified for volcanic ash to cause respiratory disease: 1) volcanic ash can contain respirable crystalline silica, as quartz or cristobalite (in industry, classed as a human carcinogen and cause of silicosis). 2) Iron in volcanic ash may contain iron which can generate the hydroxyl free radical. Iron catalysed free-radical generation is known to be both a lung inflammation factor and a carcinogenic factor.
Methodology
This is a transdisciplinary study encompassing environmental and personal exposure monitoring, mineralogical and toxicological analyses, and social science methodology. Airborne and deposited dust samples have been collected from quarries in New Zealand (where lava is freshly blasted) and will be collected from Montserrat (where old pyroclastic flows are quarried). Mineralogical analyses incorporate grain size, composition (including crystalline silica quantification), surface area and reactivity (radical generation) experiments. In-vitro toxicology will test known outcomes of mineral toxicity such as cell necrosis, inflammation and fibrosis. This will lead to a hazard assessment incorporating the mineralogical and toxicological information. Interviews with quarry workers will reveal social aspects which may influence health and safety attitudes and will help to shape recommendations for improving exposure levels in the quarries.
Results
Analysis of grain size, surface area and reactivity are being undertaken at the time of submission. The resulting data will be presented at this conference.
Keywords
Respiratory health hazard. Quarried volcanic material

Arsenic in groundwater in a mining area A case study in Mexico

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This study is located in an abandoned mining area of south of the State of Morelos, with Ag-galena (PbS) and esfarelite (ZnS) deposits. The Ag is the metal of most interest. Other metals were found like as Cu, Pb Zn and Au. The geology is characterized by the presence of andesites and trachytes [1]. The mines are flooded by the rising level of groundwater once abandoned. This water is used as drinking water and waterhole.
Between the years 2005 and 2007, water samples were collected in abandonment mines, springs and wells. The results verify that only the samples collected in the mines have high arsenic values (between 0.01 and 0.60 mg L-1). Fe (0.05-0.80 mg L-1), Mn (0.05-1.64 mg L-1), Pb (0.005-1.339 mg L-1) and Cd (0.001-0.016 mg L-1) were also detected at concentrations above the standard Mexican drinking water. The correlation of SO4-2- with As is negative (R = -0.45), suggesting that the oxidation of sulphides process were not the origin of arsenic in the water. Nor are there any correlation between As and Fe (R = 0.08). The mechanism that seems probable is the desorption by reducing specified surface and/or in the charge surface.
The evaluation of the risk of exhibition and damage to the health has been based on the USEPA methodology [2], that consists of: to identify the danger, evaluation dose-answer, analysis of the exhibition and characterization of the risk. 93 questionnaires to volunteers were applied (92 valid and one non-answer); 57 of the participants were women and 35 men. Residents with 2 to 78 years of age included themselves, obtaining the information of the children through the mother. Of the total of survey, 43% are with high potential exhibition arsenic, because ingest water of the distribution system, or of small spring, 11.8% have average exhibition, since they consume water of the system and bottle water, and 45.2% ingest bottle water, reason why can assume they are little or not exposed to arsenic through consumption water. All the population of the community of Huautla is exposed by the metalloid, through water that is used for the food preparation.
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Keyword: arsenic, drinking water, toxicity risk.

Manganese and chromium in groundwater of the phreatic aquifer in the barreal basin. córdoba province, argentine

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In the south of Córdoba province, groundwater is used for all human activities, being neccesary to define its aptitude for different uses. The objective of this work is to assess groundwater quality in the sedimentary phreatic aquifer of El Barreal stream basin (Córdoba, Argentina), to calculate characteristic baseline water values and anomalies related to Chromium and Manganese to establish relationships with hydrogeological issues and land uses. The main activity in this region is agriculture (soybean-corn-wheat) which uses pesticides and fertilizers, being cattle breeding subordinated. A tannery in the central sector of the basin is working since 20 years ago. A routine hydrogeological service was made, 53 groundwater samples from the unconfined aquifer were abstracted and chemical analyses were made (ICP-MS). The data were studied by means of conventional techniques. The results showed that the aquifer is moderately polluted, with some Nitrate values higher than the characteristic baseline value (10,6 mg/l), which was calculated with Walter (1) methodology. In relation to Mn and Cr, some sites with contents above the characteristic baseline value (Cr =2,5 and Mn= 2 ug/l) were found. Chromium showed a moderate to high lineal direct correlation with Mn (r= 0,7 p=<0,001). Both, Cr and Mn, showed moderate lineal inverse correlation with disolved oxygen (OD), r=-0,6 p=<0,001 y r=0,7 p=<0,001, respectively. The higher values of Cr and Mn, 65 and 3,400 ug/L, respectively, were found in sites where OD was below 2 mg/L, all of them located in the wetland area where the tannery discharges the effluents and in some sites of punctual contamination, where high quantities of organic matter from cattle are arriving to the aquifer. Only few anomalous results were related to the mineralogy of the sourrounding outcropping rocks.
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Therapeutic potential of marine peloid muds from the eastern adriatic coast

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Marine peloids and peloid muds occur in several places along the north-eastern coast of the Adriatic sea. The most important peloid deposits are located at Ankaran (Slovenia), Meline on the island of Krk, Nin, Makirina bay, Morinje bay (Croatia) and Herceg Novi (Montenegro). The peloids are formed in shallow, low-energy lagoons or peritidal environments with a more or less restricted connection with open marine waters. The recent sediment is represented by a layer of variable thickness, consisting of organic- and carbonate rich clayey silt. The ubiquitously present framboidal pyrite implies micro-environments with strongly reducing conditions even in the uppermost part of the sediment column, in spite of intensive bioturbation and irrigation due to macrobenthic organisms. In-situ production of methane has not been observed. The peloids have been investigated for their sedimentological characteristics, trace element content, dissolved inorganic carbon (DIC) and 13C. The peloids of the Adriatic sea have been used for therapeutic purposes since Roman times.
Keywords: marine peloids, therapeutic use, Adriatic sea

Removal of heavy metals from aqueous solution by adsorption on sepiolite

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Water pollution caused by heavy metals has attracted much attention in recent years because several of the heavy metals are very toxic. The main sources of metal pollution in superficial waters are the discharges of industrial and municipal wastewaters. Adsorption has been extensively applied for the removal of metals from water solutions. Several natural clays have high cation exchange capacities and can be used as heavy metal ion exchangers. The adsorption of heavy metals on clays has not been studied extensively and very few works have been reported about the adsorption of heavy metals on sepiolite. Sepiolite (Si12O30Mg 8(OH)4(H2O)4·8H2O) is a natural hydrated magnesium silicate clay mineral and is a fibrous clay. The clay mineral was characterized by various analytical techniques. The experimental adsorption equilibrium data were obtained in a batch adsorber and were interpreted reasonably well with the Langmuir isotherm. The adsorption capacity of sepiolite was largely dependent upon the solution pH. The capacity of the sepiolite for adsorbing heavy metals decreased in the following order: Cr(III) > Cd(II) > Cu(II) > Zn(II) > Ni(II) > Ag(I). The adsorption isotherm can not be determined in the whole pH range since at very acidic pH the sepiolite was dissolved and at neutral and basic pH some of the metals precipitated as hydroxides. The effect of the solution pH on the adsorption of Cd(II) on sepiolite was studied and the adsorption capacity diminished considerably reducing the solution pH from 7 to 3. This tendency was attributed to the interaction between the surface of the sepiolite and the Cd2+ present in the aqueous solution. The effect of the temperature on the adsorption isotherm of Cd(II) on sepiolite was studied and the results indicated that the adsorption capacity was augmented by increasing the temperature from 15 to 35 °C.
Key words: Adsorption, heavy metals, sepiolite

Toxicants in Art materials for children : Situation in Uruguay

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Introduction: From the origins of mankind people have performed plastic arts creation, as a special form of expression, employing a variety of materials, both natural and man made. Nowadays it is a most popular and widespread activity among children.
Children from ages 2 to 12, through the use of art materials, may be exposed to a number of potentially hazardous chemical susbstances, at home and in educational centres. A higher toxicocinetics, the immatureness of both enzymatic and immune systems and their specific behavioral characteristics, make children more prone to intoxications.
The CTEH first got in touch with this issue when asked to make an assessment on the possible presence of formaldehyde in an art material intended for child use.
Objective: To make known the possible toxic risks associated with the use of art materials by children in Uruguay.
Methodology: a) Study and listing of art materials for children in the Uruguayan market b) Review of current legal norms c) Presentation of results to the scientific community, teachers, parents and general public.
Results: Uruguay is still lacking specific legislation for children's art materials, although there is a related regulation for toys.
Conclusions: There is a growing awareness on this matter,but more steps must be taken towards safety in the use of art materials.
Key words: art materials, children, toxic risk

Multidisciplinary Actions on Lead Contamination in Uruguay

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SUMMARY
Uruguay's Lead contamination became a matter of public concern in 2001, when cases of children with blood lead levels (BLL) higher than 20 micrograms/dL appeared in some areas of a low-income-neighbourhood of Montevideo.
The aim of this presentation is to show the results of multidisciplinary actions taken to prevent lead exposure risks (since 2001), as a response from decision makers through political actions, regulations and health risk management with an ecohealth approach.
We evaluated changes in blood lead levels of different populations (children, exposed adults and non exposed adults) before and after the actions were taken (1992 and 2004-2008 respectively). We considered also variables such as age, sex, area of residence, available environmental lead data and the leaded gasoline phasing out process, completed in 2004.
All BLLs evaluated in this study were performed with QA/QC.associations.
BLLs and single variables were assessed using statistical analysis.
For exposed adults we found that occupational BLLs were still high, although the new laws concerning lead workers have been approved and now BLL must be controlled in the health certificate protocol once per year.
For children populations and non exposed adults there is a significant decrease of BLL values (almost 50%) in comparision with studies done before the changes.
We conclude that the observed results are mainly due to the public sensitisation together with the integration of the multidisciplinary actions promoted.
Key words: Lead, ecohealth,community

Indoor versus outdoor sources of lead and other metals in household dust: application of synchrotron microanalysis

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Metal-bearing particles in household dust are expected to originate from both exterior (for example, soil tracked in by residents) and interior sources. Ingestion of metal-bearing dust and tracked-in soil is widely considered to be a key pathway for childhood exposure in the interior environment.
We have developed a micro-analytical approach which characterizes individual metal-bearing particles in dust and soil samples by identifying element correlations and, where possible, microcrystalline structures. This is accomplished using a powerful, focused synchrotron-generated X-ray beam and collecting X-ray fluorescence and X-ray diffraction data. Minimal sample amount and preparation are required.
These methods were applied to dust samples collected using the high volume small surface sampler (HVS3) from different rooms within an urban house characterized by anomalously high indoor/outdoor metal concentration ratios. The study revealed both interior and exterior sources for the metals. The identification of a variety of Pb-based and non-Pb paint pigments as well as gypsum, bassanite (plaster) and portland cement in the bedrooms indicates in-home renovation as the source of elevated Pb and other metals. Zinc is present as zincite and wurtzite, likely associated with the paint pigment lithopone. However, Zn and Cu are also present in metallic forms, indicating other anthropogenic sources. In contrast to anthropogenic and probably interior metal-hosting particles in the bedrooms, Pb is associated with Mn and Fe hydroxide and phosphate minerals in the living room, similar to particles identified in the garden soil collected outside the house. Arsenic-bearing particles in living room dust contain Cr and variable amounts of Cu, suggesting the presence of treated wood.
The results indicate that metal-bearing particles can originate from a variety of sources and that those can vary within a house. In the house studied, Pb and Zn both originated from paint pigments which were probably redistributed as small particles during home renovation. However, Pb is also associate with soil particles in other parts of the house.
Keywords: House dust, metals, speciation

Metal speciation and bioaccessibility of arsenic and nickel in airborne dust near mining and smelting operations

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Soils and exposed solid wastes from mining and smelting operations may be a source of airborne dust, particularly in unvegetated and windy areas. Metals and metalloids are particularly elevated in dusts near industrial sites that operated before emission controls were enforced. Ingestion and inhalation of metal-bearing particles is considered a potential exposure pathway, and particle size and metal speciation are expected to influence the risk to human health. We have conducted two studies in publicly-accessible areas designed to isolate and characterize the fine fraction of dust that is likely to be inhaled.
Soils were sampled (upper 5 cm) near the Ni smelting centre of Kalgoorlie, Western Australia, which has been identified as an asthma "hot spot". Samples were dry-sieved to separate the respirable fraction (less than 10 microns). Total Ni content is highest near the smelter, as is the bioaccessible fraction determined using a simulated lung fluid. The first two steps of a sequential extraction method were used to isolate the water-soluble and exchangeable Ni phases. The simulated lung fluid extracted an average of 2% more Ni than the two leaches combined. Both sequential extraction and electron microprobe analysis suggested most of the Ni is bound in relatively-unavailable phases, which is consistent with the low Ni bioaccessibility values measured.
Airborne dust was sampled directly over As-rich mine tailings in Nova Scotia, Canada using a cascade impactor that separated the particles into size fractions, and characterized using synchrotron-based microanalysis. Calculated As/Fe ratios suggest the particles are mostly scorodite ($FeAsO_4 \cdot 2H_2O$) and hydrous Fe arsenate. Microdiffraction confirmed the presence of microcrystalline scorodite and amorphous As-Fe phases. MicroXANES analysis of selected As-rich particles on the filters indicates that most contain As(V). Scorodite has been shown to be relatively insoluble in acid solutions such as gastric fluids but may be more bioaccessibile in pH-neutral lung fluids.

The mineralogical composition of house dust in ontario, Canada

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Despite increasing concern about the presence of heavy metals, pesticides and other toxins in indoor environments, very little is known about the physical and chemical composition of ordinary household dust. This study represents the first systematic investigation of the mineralogical composition of indoor dust in Canada.

Specimens of dust were obtained from homes in six geographically separate cities in the Province of Ontario: two located on the metamorphic and igneous rocks of the Precambrian Canadian Shield (Thunder Bay and Sudbury), the other four located on Palaeozoic limestone and shale dominated bedrock (Barrie, Burlington, Cambridge, and Hamilton). Fifty-four samples of household vacuum dust were obtained. The coarse fraction (80 – 300 µm) of this dust was subjected to flotation (using water) to separate the organic components (e.g. insect fragments, dander), natural and synthetic materials (e.g. fibers, plastics) from the mineral residue. The mineral fraction was then analyzed using quantitative point counting, polarizing light microscopy, powder X-ray diffraction and scanning electron microscopy methods.

Despite the great distances between the sampling localities and the distinct differences in bedrock geology, the mineral fraction of dust from all six cities is remarkably similar and dominated by quartz and feldspar, followed by calcite, amphibole, and lithic fragments. Some evidence of the influence of local geology can nevertheless be found. For example, a relatively higher proportion of sulphide minerals is observed in the two cities on the Canadian Shield where these minerals are clearly more abundant in the bedrock. Specimens from Sudbury, Canada's largest mining centre located atop a nickel-sulphide mineral deposit, showed the highest sulphide contents. Quartz is the dominant mineral in all cities. All grains have internal strain features and fluid inclusions that are indicative of a metamorphic-igneous provenance.

In all cities, sand is used on their streets as an abrasive for traction during the icy winter season. This sand is obtained in all cases from glaciofluvial deposits that were ultimately derived from the rocks of the Canadian Shield in the last Pleistocene glaciation which affected all of Ontario. Thus, tracking in sand is the most plausible mechanism by which quartz was introduced into these homes since sampling was done, in all cases, in the winter season.

Our initial results indicate that glacial deposits dominate the mineral composition of indoor dust in Ontario cities and that nature of the underlying bedrock is relatively of minor importance.

Key words: House Dust; Indoor minerals; Canadian Shield.

Groundwater and flow modeling of the Yabucoa Valley aquifer, Puerto Rico: a case study for the tropics.

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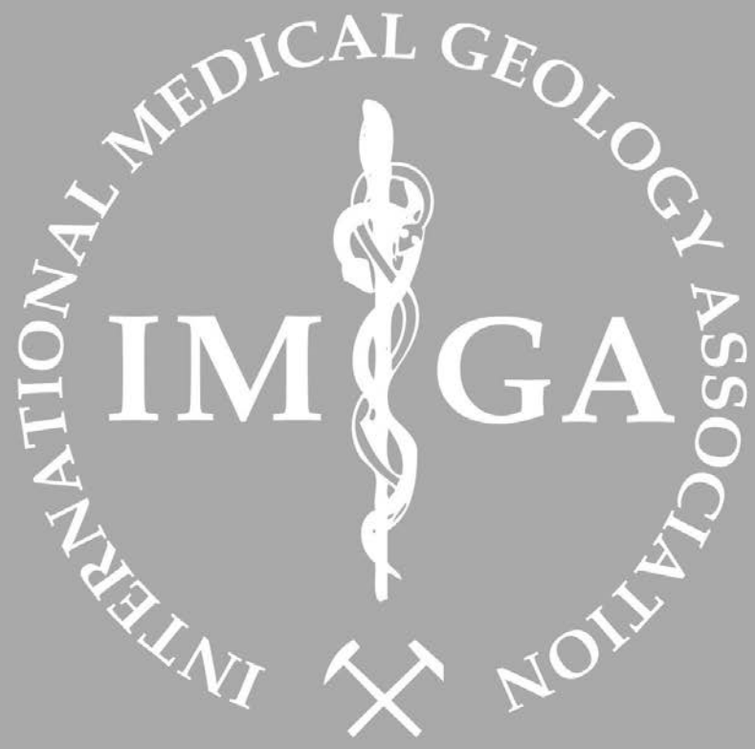
The supply and quality of water are important issues to the world. Water resources in the world are limited and the pollution of this natural reserve is a progressive problem. The total amount of water in the world is 1,386,000,000 cubic kilometers. A total of 97.5% of this supply is in the oceans. The remaining 2.5% is distributed between other categories from which only approximately 0.4% is readily available for human consumption. From this extremely small amount it is necessary to subtract all the freshwater bodies that are polluted as a result of human activities involving pesticides, industrial chemical compounds, war-derived chemicals, and domestic derived substances. Fresh water found in streams is only about 0.0002% of the total world's water reservoirs, while the largest reserve (0.75%) is in the form of groundwater, which supplies 20-25% of the world's drinking water (UNESCO, 2006).

Groundwater is found in naturally occurring geologic areas known as aquifers. These areas are basically regions where water is storage under the surface and can be obtained by means of pumping techniques or artesian wells. Highly permeable sediments and fractured rocks provide open spaces were water is contained after it infiltrates across the surface following precipitation. In Puerto Rico such areas are mainly observed within alluvial deposits and limestone. Groundwater moves at low velocities; filling all void spaces available within sediment grains and rock fractures.

Groundwater dynamics is also influenced by climatic conditions. The precipitation and evaporation rates determine how much recharge is available for a given aquifer. In the case of Puerto Rico recharge is significant and most of it occurs along the Central Cordillera or through the surface of alluvial sediments. These alluvial deposits, or sediments deposited by rivers, constitute the principal shallow aquifers of the island. Deeper aquifers also occur, but these are harder to reach due to greater water table levels.

Among aquifers located at different depths, shallow aquifers are more susceptible to pollution if the contaminant sources are related to human activities. Underground tanks and pipelines, septic tanks, pesticides, fertilizers, landfills, and chemical processing industries are some examples of potential sources of pollutants. Records from the Environmental Protection Agency evidence the history of groundwater contamination in Puerto Rico from superfund sites records. Incorrect water management methods in Puerto Rico induce water contamination, contributing to the potential impairment of groundwater quality.

As a result, this research will focus on the water resource situation on the island using a case study from a selected aquifer, the Yabucoa Valley aquifer. The principal objective of the research is to describe the characteristics and conditions of this regional aquifer using groundwater modeling methods. The results obtained in this study are the base for establishing future works on water resources management, future planning and mitigation techniques for Puerto Rico.



3rd Hemispheric Conference on Medical Geology

Posters

Uranium in foodstuff vegetables: should inhabitants of Cunha Baixa uranium mine site be concerned?

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The conservation and provision of soil and water with quality are essential for the growth of plants. Food safety through nutritious and biological quality is not a new issue but is currently a matter of great concern. Agricultural soils and groundwater contamination is a major environmental problem in many mine sites as Cunha Baixa (Portugal) where uranium-mining activity runned from 1970 to 1993.
The aim of this work was to evaluate the uranium concentration in foodstuff vegetables grown in the surrounding agricultural soils mine area which are currently used by the inhabitants of Cunha Baixa village on their diet, as part of the chemical risk assessment of this area.
Soils, water irrigation and edible tissues of carrot, potato, cabbage, lettuce, green bean and apple (Daucus carota L., Solanum tuberosum L., Brassica oleracea L., Latuca sativa L., Phaseolus vulgaris L., Malus domestica Borkh) were sampled and uranium analysed in Actlabs Laboratory (Canada) after physical preparation: air-dried and 2 mm sieving for soils; NHO3 acidification to pH < 2 for water samples; water washing, weighing before and after drying (40º C) and grinding for plants.
Soils irrigated with U-contaminated water (218 to 1040 µg/L) presented total uranium concentration (100 to 427 mg/kg) 20 to 8-fold higher than soils irrigated with non-contaminated water (< 20 µg U/L). Uranium bioconcentration (mg/kg fresh weight) in the edible plant tissues showed in general the same soil trend and the following rank order: lettuce (63-234)> green beans pods (26-30) > cabbage (10-26) > carrot without peel (10-16) > potato tubers without peel (1.6-4) > apple (1.6) when watered with U-contaminated water and lettuce (8-31) > green beans pods tissues (12-21) > potato tubers without peel (1.3-3.5) > cabbage (0.9) > carrot without peel (0.8) when watered with non-contaminated water. Besides the high U concentrations in some plants, the results obtained by calculation taking into account the ingestion dose, age and weight of Cunha Baixa inhabitants were reassuring as the level of uranium vegetables uptake was low and posed no chemical health risks.
Keywords Uranium, bioconcentration, health risk

Atmospheric pollutants in rural and urban areas in são paulo state, brazil and effects on human health

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Human exposure to atmospheric pollutants has been investigated in rural and urban areas in Brazil in relation to the air quality national standards. Probable relationships with respiratory and cardiovascular diseases were assessed, mainly among children and elderly people. In São Paulo State, important industrial and agricultural center located in Southeastern Brazil, periodical sugar cane burning in the rural area is responsible for emissions of HCOO-, CH3COO-, C2O4,
-2, SO4
-2, NO3
-, K+, NH+4, Mg+2 and Ca+2 and some metals like Fe, Cu, Al and Zn. These pollutants at least double their concentrations during burning seasons, contributing with 60% of fine inhaled particulate matter (PM2.5). In São Paulo city and metropolitan area, vehicular traffic contributes up to 89% of pollution, being that SO2, NOx and volatile organic compounds (VOCs) play an important role in particulates formation. According to the Technology and Environmental Company of São Paulo (CETESB) data as well as to other data from academy and hospitals there is a positive correlation between atmospheric pollution peaks and health problems. Studies carried out in sugar cane regions revealed that occur an increase up to 200% in respiratory problems among children and elderly people due to high concentrations of MP10, MP2.5, black carbon, Al, Si, Mn, K and S during burning seasons and that increasing in particulate matter concentration is related to peaks of hospital admissions for hypertension. Recent studies in the metropolitan area indicate that increase of CO and SO2 in the atmosphere disturbs the blood pressure whereas Na, Mg and Cl prevailing in the coarse fraction (PM2.5-10) may be associated with decrease on the lung functions and may respond for an increase of 30% in respiratory problems among children in severe pollution days.
Key words: air pollution; human diseases; São Paulo State.

Automated method for total selenium determination in drinking water samples by HG-AAS.

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Selenium occurs in nature at low concentrations, therefore the analytical determination requires highly sensitive techniques. From the environmental point of view it is important because of its toxicity to humans due to the narrow range between dietary deficiency and toxic level.[1]
An automated method for the determination of selenium in drinking water is proposed. It is based on a multicommutated flow system with detection by hydride generation - atomic absorption spectrometry (HG-AAS)[2]. The system uses a peristaltic pump and two solenoid valves. A personal computer controls the valves and the acquisition and processing of the data.
Detection and quantification limits were 0.08 mg L-1 and 0.27 mg L-1 respectively, linear range was up to 27 mg L-1, sampling frequency was 160 hour-1. The accuracy was evaluated by spiking various water samples, with recoveries in the range 95% -116%. Compared with the manual method (APHA 3114) the system consumes 15 times less sample and the reducing agent used is 6 times more diluted with the consequent reduction in the generation of pollutants and waste. As an additional advantage the system is very fast and efficient.
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Keywords: total selenium, hydride generation, automation

Synthesis of new metallic complexes with organophosphorus ligands with potential use in remediation processes

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Antecedents
The organophosphorus compounds chlorpyrifos and dimethoate are widely used due to their insecticide action. The usual methods for destruction are simple treatments with sodium hydroxide and hypochlorite that produce undesirable consequences for the environment. Methods more specific are also used like physically trapping onto matrices, X-ray degradation and bacterial detoxification.1 However, complexation of pesticides with metals as a technique for extraction and controlled release has not been extensively explored.2
With the aim of studying the possible remediation process by means of the formation of insoluble metallic complexation, new copper and cobalt complexes with chlorpyrifos and dimethoate were synthesized and characterized. Besides, the solubility of the complexes will be reported.
Methodology
The copper complex was synthesized under reflux mixing an aqueous solution of copper chloride (100 mM) and a dimethoxyethane solution of chlorpirifos (300mM) at 80ºC. Green crystals were obtained. Yield 82%.
The brown reddish cobalt complex was synthesized by a similar technique but mixing an aqueous solution of cobalt chloride (100 mM) and a methanolic solution of dimethoate (300mM) at 65ºC. Yield 79%.
Both complexes were structurally characterized by elemental analysis, electronic and infrared spectroscopies. Besides, solubility was tested.
Results
The stoichiometries determined by elemental analysis were [Cu(chlorpyrifos)2Cl2]·2DME(A) and [Co(dimethoate)3]·H2O×3(MeOH)(B). The UV-Vis spectrum of A showed one band at 475 nm. The IR spectra of the free ligand and the complexes allowed us to verify the copper coordination through the sulfide from P=S group and the heterocyclic nitrogen atom.
The UV-Vis spectrum of B showed two bands at 465 and 578 nm. The IR spectrum suggested the coordination through the carboxylate group and the sulfide atom from P=S group.
Conclusions
Two new metal-pesticides complexes were synthesized and characterized. The solubility profile of these products holds promise for its potential use in the removal of pesticides in effluents.
Keywords: pesticides, remediation, organophosphorus, metallic complexes.
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Copper deficiency in grass in the region of salto (uruguay), potential cause of "growth syndrome" in cows

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Antecedents
Medical Geology is a scientific discipline that studies the relationship between natural geological factors and health in man, animals and plants (1). Copper, an essential metalloelement, is necessary for normal metabolism and consequently a daily dietary intake and absorption are required. Recognized copper dependent enzymes (cytocrome c oxidase, superoxide dismutases, lysyl oxidase, etc) decrease their activity when copper level is low causing different disorders. Usually these disorders are not related with the real cause and consequently symptomatic treatments (vitamins, antibiotics, etc) were used.
In the Cuenca Lechera II of Salto, veterinarians observed in bovine and ovine herds a distinctive group of signs currently called "growth syndrome": anemia, low weight, bone deformities, persistent diarrhea, infertility, low milk production, among others. Our previous studies showed that cows with growth syndrome had low serum copper level. When cows were supplemented with copper complexes the signs disappeared (2).
With the aim of studying the causes of this deficiency the copper level in grass were measured.
Methodology
Forage samples of five different locations of Salto were collected with a hand clipping method and analysed according to AOAC techniques for determination of Cu. Data were analyzed by SAS statistic program, comparing mean values using Tuckey test with a probability of 5%.
Results
Although there is no complete agreement with the requirements of copper for cows, 10 mg/kg DM is usually considered adequate or recommended. Most of the samples were well under that value. Besides, a seasonal fluctuation of copper levels in herbage was observed.
Conclusions
The low copper level in grass in addition with our previous studies that showed low Mo and low S levels in the region, permitted to postulate that this is a primary deficiency and probably the cause of hipocupraemia in ovine and bovine herds.
Keywords: copper, hipocupraemia, medical geology
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Risk communication and governance in contaminated areas: an analysis of Brazilian and Uruguayan experiences

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Abstract
Dealing with risks associated with chemical substances, and unknown effects of hazards demands a collective decision-making process (known as Risk Governance), which takes account that all actors involved in a risk situation have the right to participate in the solution of the problems that they faced. This participation is facilitated when a dialogue (identified as Risk Communication) is promoted. Although scientists and authorities agree about the importance of these aspects in the risk management process and in Medical Geology studies, three cases involving lead contamination in Brazil and Uruguay highlight that the debate and practice of Risk Communication and Governance is reduced yet. In this abstract we seek to explore this issue through analysis of a study focusing on the communication about risk for affected communities, and their engagement in risk management. Based on bibliographic research and analysis of journalistic articles and interviews, we identified a lack of adequate planning for release information to local people in Ribeira Valley (BR), which undermined the relationships between researchers and community, besides contributed to a panic situation among people. We verified an absence of a community involvement plan, which produced a feeling of exclusion from the decision-making process. In Santo Amaro (BR) we identified a concern about risk communication, although local people had demanded more information about the problem (which demonstrated a lack of appropriate communications' strategies). There was a local association that pressed government to solutions, but we verified that the level of public involvement was probably not as extensive as it could have been. In La Teja (UR) we verified how relevant public mobilization could be in the risk management. Although the risk communication strategies were not appropriate to open dialogue and to promote public participation, an association had an important role to guarantee information to local people and press the government for actions.
Key-words: lead contamination, risk communication, risk governance

Lead availability and bioaccessibility in soils of the portugal centre region

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The hazard imposed by trace element contaminants within soils is dependent on their ability to migrate into water systems and their availability for biological uptake. The degree to which a contaminant may dissociate from soil solids and become available to a target organism (i.e., bioaccessibility) is therefore a determining risk factor. The aim of this work is to study the lead availability in soils, and lead bioaccessibility. Lead availability was estimated through weak extractions; this easily mobilisable fraction can be determinate to indicate the risk arising from metals that may be released into the soil water phase and become available for plant uptake, entering into the food chain. The use of in vitro models assessing bioaccessibility of soil-bound lead in human gastrointestinal tract under simulated fasted and fed conditions is desirable in order to define the amount of an element that is actually readily available for uptake. We investigated soils, from Central of Portugal, on the <250um soil fraction of the upper 5cm of the vertical profile (<250um soil fraction is the soil fraction that adhere to the hands).
To determine the weakly bounded Pb to the solid phase, the soil was submitted an extraction with NH4Ac. The extracted Pb concentrations vary between a minimum of 0.4 and a maximum of 33.6 mg/kg and the percentages of extraction vary between 0.5 and 40% of the total concentrations. Some of the samples with higher percentages of available Pb were selected to the bioaccessibility assays. The in vitro digestion model used represents a static gastrointestinal system simulating the gut of a young child. The first results indicate that lead in the Portugal Centre Region is essentially in non-bioaccessible forms. However, the recovery rates obtained are only fairly acceptable and much more assays have to be done. An important result, confirmed by other studies, is that Pb bioaccessibility increases significantly under simulated fed-conditions.

Metal fractionation in topsoils from the marrancos gold mineralisation, Northern Portugal

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The Marrancos gold mineralisation produced a geochemical signature composed by Fe-As-Se-Bi-Au-Ag-Te-(Cu-Pb-Zn-Sn-W). Across the study area there is some evidence of past mining and exploration activity indicating that these soils may be locally disturbed. The shallow mineralised quartz veins were exploited for gold by the Romans. Several galleries were also constructed during the 2nd World War, probably for the exploration of quartz-cassiterite-wolframite veins. However, the main mineralised body at depth was never explored.
The -200 mesh of 144 topsoil samples was analyzed by ICP-MS to determine total contents of 53 elements. Based on the obtained data, 10 topsoil samples were selected to do the metal speciation. A sequence of 5 leaches of increasing strength was then used in these soil samples. The results show different behaviours for different toxic elements. Total Cd concentrations in these soils are low, with a median value of 0.1 mg/kg. However, 1 to 20 % of the extracted Cd was leached from the most soluble phases (exchangeable cations and amorphous Fe oxides). This means that a significant amount of this toxic metal is held in readily soluble mineral forms that can be released to the soil. Total Pb concentrations are not very high in these soils and the amount of the heavy-metal extracted by the 1st leach is quite insignificant. However, the element is quite immobile and can

accumulate in the soil up to hazardous levels. Total As concentrations in these soils are extremely high. A large area has As concentrations above 1000 mg/kg. Although the % of extracted As is low (0.5 to 4%), in four of the samples the more labile forms of As occur in concentrations above 200 mg/kg. One sample reaches the 1000 mg/kg of As extracted by the first two leaches. Therefore, prior to the exploration of this deposit a careful environmental study should take place to minimize heavy-metal contamination of the surface materials (soils, plants, sediments, waters).

Environmental Geochemistry of Tucano Garimpo, Monte Alegre de Goiás, Brazil

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The mining, an activity performed by humans since the beginnings of humanity always demanded the removal of minerals from the property type. The activity of digging incorporates activities related to mining that degrade the environment and its existence leads to the occurrence of irreversible impacts on the environment and involve the social issue of most evident. This research investigates the question of its optical digging by environmental liabilities, determining the mercury concentration in sediments of dam, the pile of waste and also in biological material (hair of the inhabitants of the gold mining and muscles of fish). The area selected for this study is the Tucano Garimpo located in the municipality of Monte Alegre de Goiás, distant 700 km from Goiânia, the capital of Goiás State. To determine the environmental condition of the area, were performed multi elementary analysis of sediments and waters of gold mining. The results indicate the need for frequent monitoring in the areas of mine and the dam due to the possibility of contamination and the region where the pile of waste must be isolated, such the gravity of the situation. There are also good for human health and the ichthyofauna in relation to the concentration of mercury, even surrounded by a very unhealthy environment.
Key Words: Mercury. Digging. Environmental Analysis.

Biomineralization in discopyge tschudii electric organs

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South American ray Discopyge tschudii (Torpediniforme) is an electric fish. Torpedinidae have since constituted the choice system for studying the biochemistry, morphology, physiology, and cell biology of the cholinergic system in general (Prado Figueroa and Barrantes, 1989). In this study the electric tissue was analyzed by mineralogical microscope (DMLP Leica). The aim of this stage was to study some characteristics which are not detected by biological microscope. The obtained results are useful and applicable to other alive organism, due to the similarity with human nervous cholinergic system. Here is the link with medical geology. In electric organ was identified permineralization (Fernández López, 2000) by silica. This one shows two different stages of crystallization. One is constituted by a cryptocrystalline variety and the other is constituted by a microcrystalline one. The cryptocrystalline variety is placed at the end of the channels and into the nucleus. It shows an irregular continuous arrangements (salt and pepper). The other variety develops chalcedony as spheres with a exactly defined axial cross, reaching 15-20 mm in diameter. Probably the silica should be as a gel state which would be precipitated as a cryptocrystalline form at Eh between 0.0 to –0.2 and pH ranging 7 to 8. With the time, this one could be evolved to a more mature form constituted by a microcrystalline form defining chalcedony spheres. The immature variety should place in the external area belonging to a extracellular matrix. The incoming flow cause the permineralization through the permeable membrane and into the cell the chalcedony is precipitated.

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Levels and elemental characterization of pm10 samples collected in abra pampa, northwest argentina. implications for inhalation of hazards around old foundry metals plant

047- Luis Ferpozzi

Concerns about levels of particulate matter less than 10 mm in aerodynamic diameter PM10 and their potential health effects have been raised by residents living around a former Pb-bearing mineral processing plant “Metal Huasi”, Abra Pampa village, NW Argentine. Abra Pampa town (S22° 42’ 34’’; W 65° 41’ 29’’; ~3500 masl) is located in ecoregion called Central Andean dry Puna.
PM10 samples were simultaneously collected by means of 4 Minivol AirMetric samplers, three of them located in sampling sites less than 0.5 km away from the former plant, and the fourth ~ 1 km away in the outskirts of Abra Pampa. These sampling settings were chosen to best reflect particulate matter human exposure. Weather data have also been recorded at each sampling site by using Pegasus meteorological stations.
Six five-day sampling campaigns were performed (16-20 August 2007, 4-8 October 2007, 17-21 November 2007, 20-24 March 200, 13-17 June 2008, 25-29 November 2008). Altogether 120 PM10 samples were collected during 2007/2008 monitoring campaigns.
Mass concentrations of Pb, Zn, Cu, K, Ca, Ti, Fe and Mn were obtained by analyzing the aerosol samples by using particle induced X-ray emission (PIXE) technique carried out in TANDAR Laboratory (National Commission of Atomic Energy).
Globally, a PM10 average concentration of 37 mg/m3 (± 23 mg/m3) was observed, with daily values mostly oscillating from ~15 mg/m3 to ~80 mg/m3.
Regarding metals concentrations, the most enriched elements were K, Ca, Fe and Ti to a lesser extent, with global mean concentrations of 1 mg/m3, 0.6 mg/m3, 1 mg/m3, and 0.07 mg/m3, respectively. Elements such as Cu, Zn, Mn and Pb were found to have mean concentrations of 0.012 mg/m3, 0.021 mg/m3, 0.024 mg/m3 and 0.038 mg/m3, respectively.
It is important to mention that PM10 24-hs levels did not exceed the quality level of 150 24-hs mg/m3 imposed by national legislation (National Law 24585). Regarding Pb concentration, the measured levels were well below the limit of Pb of 1.5 mg/m3 permitted by national government law (National Law 24585).

Trace-element quality problems in groundwater from salí river basin, tucumán province, argentina

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The Chaco-Pampean Plain is the largest and most populated geographical region in Argentina. Its central part is the site of the country’s most important cities. One of the greatest obstacles for the socioeconomic development of the region is the Quality of the water resources and the consumption of contaminated groundwater by the rural population that may cause H.A.C.R.E. (Endemic Regional Chronic HydroArsenicism) and affects, potentially, four million inhabitants.
The Salí River basin, in the NW Argentina (6,000 km2 area) has been filled by Tertiary and Quaternary loess deposits, substantially reworked by fluvial and aeolian processes. It develops from the eastern border of the Sierras del Aconquija (5,000 m a.s.l.). Rainfall reaches 1,500 mm in the mountains, 900 mm in the piedmont and 600 mm on the eastern border of the plain.
Waters are universally oxidising, usually with high bicarbonate concentrations and high pH, particularly in shallow groundwater which shows a wide range in arsenic concentrations (12.2 to 1,655 µgL-1); consequently all samples are above the WHO guideline value (10 µgL-1). Fluoride concentrations range from 50 to 8,740 µgL-1. Boron, vanadium and uranium concentrations are also high in shallow aquifers, although trace-element concentrations are significantly lower in deep ones.
The source of the mentioned trace-elements are the volcanic components of loess deposits that host sorption and desorption processes, occurring onto Al and Fe oxide and oxi-hydroxide surface, and regulate the distribution and mobility of trace elements in the aquifers of the basin. In addition, a strong pollution has been found. It has been caused by noncontrolled industrial effluents which have given rise to an increase of chromium concentration in groundwater up to values over WHO guideline (50 µgL-1). In deep aquifers chromium concentrations range from 129 to 250 µgL-1 and from 79.4 to 232 µgL-1 in shallow ones.
Keywords: trace elements, arsenic, groundwater

The radon carcinogen agent in lucrecia city, northeastern brazil: gross gamma ray and indoor radon

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The Lucrecia city (Rio Grande do Norte, Brazil) showed in recent years high mortality index for different cancer types when compared with other neighbors regions. The international epidemiological studies performed on cohorts of uranium miners show that health hazard from high radon exposure is an increased risk of lung cancer. Domestic radon has been identified as the most important environmental risk factor for lung cancer. In the present abstract, the result from 110 long term passive radon detectors (E-PERM® System) installed in 100 dwelling in Lucrecia city are presented. The survey was performed during two periods of three months on the dry season (December-February) in the main bedroom. All dwelling are un-ceiling and have ceramic roof, while the floor is tiled or cemented. The choice of different dwelling was randomly (distributed between urban and rural areas). The gamma radiation level was also checked in each dwelling using a RS-125 gamma spectrometer (range 913-5625 cpm; MED: 3539; GM: 3505; SD: 567). For the two periods, the GM for indoor-Radon were determined as 220 Bq/m3 (SD: 957; range 40-7679; MED: 237). In the first measure period all dwelling exceed the EPA-USA action level of 148 Bq/m3 (range: 170-6538; MED: 307; GM: 370; SD: 956) but in the second measure period, the data is more scattered (range: 42-7679; MED: 115; GM: 135; SD: 919). This fact was due to abnormal early begin rain epoch occurred. These results show that for the Lucrecia city, further and more extensive research is needed.

Ten years of participation in proficiency testing for metals exposure biomarkers

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Medical Geology is the science dealing with the relationship between natural geological factors and health in humans and animals. To assess this health environmental impact, it is necessary to achieve reliable results in chemical analysis. The CEQUIMTOX (Specialized Center on Chemical Toxicology) analyzes trace metals in biological matrices, such as lead in whole blood, chromium in urine, selenium and zinc in serum, among other metal biomarkers and it is certified according to the standard ISO 9001:2000.
A very important part of the quality assessment system is the measurement of the reliability through a good performance in proficiency testing (i.e. interlaboratory controls). One of the main uses of proficiency testing schemes is to assess laboratories' ability to perform tests competently. This may include assessment by laboratories themselves, by their clients, or by other parties such as accreditation or regulatory bodies.
The objective of this presentation is to show the results of our participation in several interlaboratory controls within the last ten year period.
There are several ways to measure the performance of the proficiency tests results, being the z-score the most used.
Graphical methods are used to facilitate interpretation on interlaboratory results. This is a very useful tool for monitoring performance over time.
As a consequence of the successful participation in one of this interlaboratory controls, CEQUIMTOX has been awarded with a CDC certificate that recognizes our proficiency in the analysis of lead in whole blood.

Identification of spatial patterns of heavy metals of the Centre Region of Portugal related to site-specific characteristics

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Abstract
This paper presents preliminary results of the project FESHE_Bio, financed by the Portuguese Foundation for Science and Technology, which intends to assess foetal exposure to lead, assessed using environmental physical (soils) and biological (mosses) monitoring, measured in samples (97 sites) collected at the Centre Region of Portugal. The soils samples was analysed in two granulometric fractions (250mm and 2mm) at different depths (0-5cm and 5-20cm). Both soils (top soil and bottom soil) and mosses were assayed for 37 chemical elements.
Multivariate statistical methods (Multiple Correspondence Analysis and Principal Components Analysis) and GIS based approach were used to (i) identify relationships among the chemical elements related to some site-specific environmental characteristics like land-use, geology, soil grain size, and others and; (ii) to define their spatial patterns of variation. The results show that the soil data from both fractions are mainly the reflex of the regional geology. Nevertheless the data from the top fraction shows more vulnerability to punctual sources and to the coastal areas, where the influence of marine spray and antropogenic activities, linked to urbanizations, traffic lines, industries and mining, are higher. The moss data seemed to be more sensitive to antropogenic contamination than the soil data, being more adapted to assess human contamination.
The contamination areas, associated with Pb, Cu, V and Zn, are located closed to urban areas with important industrial development, where the NW zone around Aveiro city is the most significant.

Influence of grazing practices on cow milk quality - case study the comarnic poieni bauxite quarry, romania

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The present research investigates the influence of grazing practices on the quality of cow milk, with special focus on the cattle grazing in the area of the former Comarnic Poieni mining sector (Hunedoara district, Romania). Traditionally, country farming and producing of livestock are two major occupational activities in the area of the study. The presence of the former bauxite quarry, exposed to complex weathering factors and surface run-off, have a direct influence in the local chemistry of the soil, vegetation and water. Transhumance as an annual practice results in cyclic feeding patterns of the cattle, where periods of uncontaminated feeding alternate with periods of feeding and drinking off the contaminated areas of the bauxite quarry. The methodology of the study consisted of the complex investigation of water chemistry, soil geochemistry and milk chemistry. The quality of soil and water was investigated through chemical analysis performed on samples collected from the contaminated area of the abandoned bauxite quarry and mining dumps. Soil samples collected along profiles intersecting the open pits were analyzed for metals with X-ray fluorescence. Water samples collected from accumulation of meteoric water in the quarry were analyzed for both dissolved and total metals by atomic absorption spectroscopy. Raw milk samples from four cows were collected during two stages, corresponding to the periods of ingestion of clean, respectively contaminated food and water. The milk samples were analyzed using a X-ray fluorescence spectrophotometer for inorganic elements: silica, sodium, magnesium, phosphorus, sulfur, chloride, potassium, calcium, chromium, cobalt, nickel, cooper, zinc, manganese, bromide, iron and aluminum. Based on the chemistry data, the influence of the chemical elements intake on the composition of milk was analyzed and interpreted. Results indicated a direct correlation of increased concentration of certain chemical elements, such as Mn, Fe and Al in the milk, following contaminated feeding.
Keywords: Comarnic Poieni, bauxite, grazing.

Scientific Topic of the abstract: 3c
3. Environmental geochemistry and health
c. Veterinary Geology. The Impacts of geologic factors on animal health

Evolution of blood lead level in children montevideo uruguay

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In Uruguay, as in other countries, lead pollution is still an important environmental health problem.
Montevideo has several leademitting industries, and lead is still used in pipes, especially in old homes. Until December 2003, primary gasoline used in Uruguay contained tetraethyl lead (TEP) as an antiknock agent, but it has been replaced by methyl tertbutyl ether.
The adverse effects of lead are well known, environmentally exposed children are the most affected population.
In 2001 several areas of Montevideo have been identified as highly contaminated by lead, and consequently a large number of children had high blood lead levels (BLL).
At that time an adequate regulatory framework did not officially exist in our country. Neither were established guidelines for evaluation and control of environmental pollution and its risks on a regular basis. Nowadays this has changed.
Since then, children who receive medical assistance in Montevideo by the Department of Public Health and have BLL higher than 20 µg/dL, are referred to the Pereira Rossell Hospital (CHPR). Iron supplementation and dietary hygiene measures have been taken to reduce the absorption of lead in these children. Periodic extractions of blood were done for control, and the analysis were performed at the CEQUIMTOX, using AAS.
The objective of this work is to evaluate the results of those children through the course of time. More than 5000 blood samples have been analyzed, and a statistically significant decrease of the blood lead levels is observed, due mainly to the public sensitization together with the promotion of multidisciplinary actions.

Presentation of the research group on medical and forensic geoogy, colombia

060- Ana María Rojas, Sandra Carolina Londoño, Cristina Garzón Universidad Nacional de Colombia. Grupo de Investigación en Geología Médica y Forense
Tópic: Education and profesional opportunities in Medical Geology

The group is created as a student group in 2007 as a response to the research interest detected in the forum "Medical geology and forensic geology. Alternatives of research in Colombia" held in 2006, organized. by geosciences students of the Universidad Nacional de Colombia.
The group is presented in the II Hemispheric Conference of Medical geology held in Brazil In October 2007 and it joins the IMGA creating in 2008 Colombian Chapter.
In 2009 coordinates the Ist Iberoamerican course of Forensic Geology and initiates a network between the National University of Colombia, Ingeominas and the National Institute of Legal Medicine and Forensic Ciences. Currently the group aims to create networks with the Environmental ministery and Public Health Organizations and entities.
Since 2008 it has been working in the creation of a new node of medical geology in Cuba.
Methodology
The activities have been directed towards the divulgation of medical and forensic geology through lectures, courses, and other academical activities as well as applied research, aiming at the integration of sciences. and disciplines to find solution for current geo- environmental and health problems
Results
Lecutres given in 3 international and 3 national events
2009
· IMGA colombian chapter
· Official support form Universidad Nacional and registration in Colciencias as a formal research group.
· 1st Iberoamerican course of Forensic Geology 2008
· Establishing Laboral links between the group and the Ingeominas (Mercury med. geo. studies) and National Institute of legal medicine and forensic sciences
· Creation of a student group on medical geology in the Universidad Libre.
Conclusions
The recent advances of the research group on Medical and forensic geology since its first presentation are shown. Through the organization and hard work, with students, teachers and proffesionals, the promising field of medical geology can be boost and awareness about the relevance of the integration of sciences to solve earth-health problems can be effectively convey. Through IMGA the integration into global cooperation and support networks can be efficiently accomplished.
Although in Colombia the objects of study of medical geolgy have been developed under different disciplines, the medical and forensic geology group of Colombia is currently pioneering the integration of medical and geological efforts trying to explain, comprehend and solve the earth and health issues.
Key words. Medical and Forensic Geology group, advances, Colombia.

Trace elements in agricultural soils and crops in argentina

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Trace element toxicities in livestock are caused by drinking water or foods with high contents of these elements. The transfer of trace elements from soils to the edible parts of plants is a key step in the route of entry into the human food chain. Trace element concentrations in forages are related to the availability in soils and the ability of a crop to take up and translocate them to the edible parts. The aim of this study was to determine trace element concentrations in soils and alfalfa (Medicago sativa) in dairy farms located in Córdoba province, Argentina. Trace elements were determined by ICP-OES. Determinations were performed in duplicate with a relative error < 1.0%. Arsenic levels in soil (2.1 to 8.2 mg/kg) were into the range of values reported in non contaminated areas. In alfalfa leaves, arsenic levels ranged between 0.1 to 1.5 mg/g. Levels of Cd, Cr, Cu and Zn in soils were in the range reported for agricultural soils in Canada or United Kingdom. In alfalfa, concentrations of Cd were below the detection limit of the method and Cu (8.2 to 15.2 mg/kg) was below the phytotoxicity level. Cobalt and Zinc concentrations were inside the normal range reported in literature. Pb levels were low, both in soils and alfalfa, due to the lack of industrial pollution in the study area. The concentrations of Mo were high in alfalfa leaves (3 to 11.2 mg/kg), this fact must be considered due to the risk of toxicity for livestock. Selenium levels were low in the studied soils (0.2 to 0.8 mg/kg) and thus, under the detection limit in forage. In Argentina, studies on trace elements concentrations in soil and forages are scarce, thus, the results of the present work are a contribution to establishing baseline levels.
Key words: trace elements, forages, livestock

Checking the use of lichens as bioindicators of air quality case of study: Bogotá, Colombia.

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Tópico: Medicina ambiental, toxicología ambiental y Geología Médica. Biomarcadores y enfermedad.

Antecedents
The lichens have an important role as bioindicators of immediate reading of environmental contamination, climate change and soil stabilization.
However, in tropical areas in Colombia have been few studies on the subject although the air pollution problems caused by fossil fuel use is an increasingly serious problem with negative impacts on human health.
Methodology
We collected lichens had a population of approximately the same coverage, in order to compare their growth or decline, their vitality, color and strength in three different environments:
1) Free air, 2) in a container contaminated with gasoline 3) in a container contaminated with gas vehicles (carbon monoxide).
In the environment 1 the lichens were exposed outdoors without any type of container that was enclosing them. In the environments 2 and 3 got in glass containers of 3000 cm3 and later I inject the gas slowly.
Gas collection: it did through condoms made in exhaust of gasoline and gas.
Analysis of results: measuring methods were used focusing on the diameter of the thallus and apothecia production and percentages of coverage.
Measurement was performed weekly coverage of plant samples in each environment, so the observation of their external characteristics. In the case of the genus Usnea lichen also measured up to their thallus.
Results
When the pollution is high the Lichen populations decline or disappear. Therefore, their presence or absence in a region is
a major natural element that provides information about the status of pollution.
Flavopunctelia species turned out to be the most resistant to pollutants.
The Usnea species turned out to be the most sensitive pollution.

Natural gas is the fossil fuel with lower environmental impact.
Its main component is methane, which is considered a major greenhouse gas.
A smaller amount of waste produced in the combustion permits its use as an energy source directly in production processes or in the tertiary sector.
Reduced emissions of gaseous pollutants (SO2, CO2, NOx and CH4) per unit of energy produced
Conclusions
Lichens can be used to identify elements that are in the air, so you can get a list of agents that are in the air and its impact on human health, animal and plant health, especially in large cities where Pollution from fossil fuels is increasing. This work constitutes a contribution in the field of medical geology as it shows clearly the effect of a mineral resource, in this case oil, transformed by man into a toxic agent that threatens their health and that of other animal and plant species such as lichens.
Keywords: Pollution, Lichen, Public health.

Inventario de elementos traza como base para estudios ambientales. Tucumán y Catamarca, Argentina

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Abstract
El área de estudio abarca a las Cumbres Calchaquíes, sierra de Aconquija y el extremo norte del bloque Ambato, en el margen occidental de la provincia de Tucumán y el extremo oriental de la provincia de Catamarca, Argentina.
Se estudian 14,976 datos geoquímicos de sedimentos de corriente de los elementos Cu, Pb, Zn, Mn, Mo y As, obtenidos de las Cartas Geoquímicas Multielementos San Miguel de Tucumán, Concepción y Belén publicadas por el Servicio de Geología y Minería de la Nación (1, 2 y 3). Estos datos fueron analizados con métodos goestadísticos multivariantes y correlacionados con las unidades geológicas aflorantes, teniendo en cuenta la red de drenaje superficial y las subcuencas hídricas que permiten determinar un área de aporte y un área de influencia sobre las poblaciones del lugar. Hacia el oeste, la red de drenaje forma parte de la cuenca del río Santa María y del Salar de Pipanaco; al este, el río Salí es el colector principal que descarga sus aguas en el Embalse de Río Hondo y forma parte de la cuenca del Río Dulce que desemboca en la Laguna Mar Chiquita.
Importantes ciudades se ubican en el pedemonte occidental y oriental de las sierras mayores y otras poblaciones menores ocupan los valles intramontanos. En el sector Tucumano se destaca la actividad ganadera con importantes tambos para la producción lechera. La actividad agrícola constituye un recurso importante con la producción de hortalizas, arándanos, porotos, nogales, forrajes, caña de azúcar, citrus, tabaco, papa, soja. En el valle de Tafí se destaca la agricultura con la producción de papa, porotos, frutilla y forrajes sobre la ganadería, al igual que en los valles del bloque Ambato (Campo del Pucará, Sínguil, Balcozna, etc.). En el Valle de Santa María se destaca la actividad vitivinícola por los cultivos de vides.
La concentración geoquímica promedio de los elementos estudiados es Cu: 22.2, Pb: 22.7, Zn: 77.3, Mn: 680, Mo:1.06, As: 5.32 (ppm) (4). Se determina que la concentración geoquímica más alta de As se encuentra en el extremo sudoriental de las Cumbres Calchaquíes y extremo sur de la sierra de Aconquija. Las mayores concentraciones de Pb se observan en las Cumbres Calchaquíes y sierra de Aconquija y Zn predomina en el bloque Ambato. Altas concentraciones de Cu y Mn se observan fundamentalmente en la sierra de Aconquija y bloque Ambato y Mo se presenta con mayor frecuencia en la sierra de Aconquija.
Keywords: Geochemical, Environmental, Trazas

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Antartic the main laboratory

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Science is the principal human activity in Antartica, a continent without borders ,an operational infrastructure escential to continuation of the science. It,s based in the collaboration. the continent and the seas around it are naturally laboratory to investigate astronomy, astrophysic, glaciology. geology/geophysics, oceanography, the atmospheric sciences, ecology, communication, energies sources, biology, and biomedicalscience,The\insigths from these disciplines provide new knowledge with global implications, and remote lands areas provide umpararalled research analogs for other planets We can study the past the present and the future ,and we don't. ve several time. Artigas is the Uruguayan base since 1984, I ll introduce you as the chief commander medical doctor, and toxicologist, the possibilities, Is coldest, driest, higest, windiest, and isolated continent in the hearth, and is changing, and confirmed our past. We must learn about this

Environmental Geochemistry and Medical Geology Program: Results 2003-2008

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This program began in 2003, formulated by researchers from several organs, institutions and universities, aiming to assess, through low-density geochemical survey, in the whole national territory, the chemical compositions (multi-elements) of bedrock, soil and surface and underground water. It aims to make available, to different kinds of users, information to research for new mineral deposits, natural fertility for agriculture, sources of natural and anthropogenic contamination of chemical elements harmful to human, animal and environmental health.

Within the period from 2003 to 2008, approximately 4,041 samples of public water drainage and supply, current sediment and soil were collected. 53 cations and the anions chloride, fluoride, sulfates, nitrates, nitrites and phosphates, in addition to the physical-chemical parameters of water such as pH, dissolved oxygen, temperature and conductivity were analyzed.

Concerning the results of the elements that may cause damage to public health, the values found in wells to human supply in Parintins, about 63% showed high levels of nitrate, aluminum and ammonia. About 80% of 78 samples of water supply, in the Northeast of Pará, revealed excessive values for Al and Pb, respectively, 18 and 145 times the maximum allowed by CONAMA and WHO, followed by the contents of B, Cd, Fe, Cu , K, Mn, Zn and P. Similarly, there were results for the states of Ceará and Goiás. In the first, the water supply had been improper (heavy metals) in 43% of 234 samples (tubular and Amazon wells, dams, lakes and rivers) and in the second also (heavy metals) in 38% and 8%, nitrate and phosphate, of 238 samples (ETAs – water treatment stations - and tubular wells).

Keywords: Low-density mapping, environmental geochemistry, health geochemistry

Presentation of the research group on medical and forensic geoogy, Colombia

084- Ana María Rojas, Sandra Carolina Londoño, Cristina Garzón
Universidad Nacional de Colombia. Grupo de Investigación en Geología Médica y Forense Tópic: Education and profesional opportunities in Medical Geology

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• Creation of a student group on medical geology in the Universidad Libre.
Conclusions
The recent advances of the research group on Medical and forensic geology since its first presentation are shown. Through the organization and hard work, with students, teachers and proffesionals, the promising field of medical geology can be boost and awareness about the relevance of the integration of sciences to solve earth-health problems can be effectively convey. Through IMGA the integration into global cooperation and support networks can be efficiently accomplished.
Although in Colombia the objects of study of medical geolgy have been developed under different disciplines, the medical and forensic geology group of Colombia is currently pioneering the integration of medical and geological efforts trying to explain, comprehend and solve the earth and health issues.
Key words. Medical and Forensic Geology group, advances, Colombia.

Radon gas and electromagnetics correlation on human health

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Background: In 1996, the magazine New Scientist reported on the Henschaw Denis scientific research at the University of Bristol, England. They related to electromagnetic fields that attract radon radioactive waste and those acceding to penetrate the respiratory air, in combination with atmospheric moisture forming water droplets that vibrate aerosols with electromagnetic waves of high voltage cables, there direct penetration of gas in the lung tissues. Methodology: a methodology of correlation between geological, installation of pylons and human settlements. Therefore acknowledges the presence of geologic formations that contain uranium or batholiths of granodioritic rocks and / or granite pylons, population and epidemiological registry. Results: The EPA says that radon is a public health problem, this gas can enter homes and contaminate wells or springs. In England as hazardous radiation effects of 200 Becquerel/m3 in a hundred thousand homes. It has been shown that radon decays by emitting high energy particles that become polonium by electromagnetic effects, this radioactive gas break molecular bonds of the human organism in the short and long term. Conclusions: In 2006 the authors presented a project in the batholith of the Coastal Range of central Chile, high relief near the Pacific coast used by power transmission companies with pylons. It was to correlate the potential effects of radioactive pollution in cities and towns of the region, unfortunately the Ministry of Health and CONICYT blamed lack of funding for this research. This presentation is an invitation to start geological projects in areas consistent with the rock types listed and its correlation with public health problems.
Keywords: radon, electromagnetic, health.

Volcanic activity and its environmental effects in Chile

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Background: Chile is a volcanic country, which has generated three tectonic units of relief: Cordillera de Los Andes, Intermediate Depression and Coastal range. It has set up a territory in four areas of plateau, from north to south: the plateau rhyolite, andesite-basalt Center, south-Patagonian and Antarctic basaltic; chronologically Recent volcanic activity until 1600, last 12,000 years and 1,000 .000 years. Chronologically, rocks latest Pliocene cover up most of the Andes Mountains andesite, dacite, rhyolite and basalt, in the Miocene and Pliocene rhyolites dominates Ignimbrites plateau in the far north and sporadically until Lat. 27 º South. The South Central area is under the control of the plateau andesite-dacite, with interbedded Ignimbrites.
Methodology: A location has been correlated volcanic eruptions number of registered chemical characteristics and environmental effects.
Results: Close correlation with the business climate: in the North maintains no permanent runoff cover intact with interbedded volcanic minerals, origin of the salt flats that dominate the current Chilean desert. In South Central, the hydrographic network has suffered deformations Lonquimay Volcano (1988) and more recently the Chaitén (2008). From a chemical standpoint the Hudson volcano located in the Patagonia (August 1991), chlorine expelled, affecting the ozone layer and its subsequent results measured an increase in UV radiation in the southern areas of the country, the volcano Lonquimay (December 1988-March 1999), erupted fluorine, which showed effects of fluorosis, osteoporosis, insomnia, eye damage and respiratory damage in animals and local people.
Conclusions: Unknown are the effects east of Chile due to the South Pacific contraalisios carrying ashes into the Atlantic. In 1931 the eruption of the volcano sent ash Descabezado Grande to the Bay of Rio de Janeiro.
Keywords: Plateau, volcanic ashes, fluorosis.
Reference: International Association of Volcanology and Chemistry of the Earth´s Interior IAVCEI International Symposium on Volcanology, Andean and Antarctic Volcanology Problems 9-14 September 1974 Santiago de Chile.

Space analysis of the dengue distribution on Rio Grande do Norte State (ne Brazil) (2004 to 2008)

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The State of Rio Grande do Norte (RN) has register the great increase of cases of Dengue (vector Aedes Aegypti) on more than one decade. Just in the 1st quarter of 2008, the number of cases has an increase of 134% of the classic type and of 622% for the hemorrhagic type. The use of maps of spatial distribution of cases of Dengue is indispensable for the planning and the control, using the largest potentiality of GIS for to optimize the activities of epidemic surveillance to specific population groups. Through the generated maps (2004) we could verify that the main distribution class in RN corresponds to the bass epidemic risk, and only smallest classes belong to the areas with high and medium risk. This result is indicative of the control of the Dengue in the State in 2004 and notify a great number of class zero. In the year of 2006 there are a small decrease of the class zero and an increment of the middle and high risk epidemic classes. In 2007 doesn't occurs any class zero, what means, that there was occurrence of the disease in all of the municipal districts and they were notified. In 2008 there was a great increase with the proliferation of the epidemy in some important municipal districts, with an augment of the class of low risk and a decrease in the classes of medium and high epidemic risk. The most affected areas is clearer located on the Central Potiguar, Rural Potiguar and Leste Potiguar meso-regions with are the most vulnerable areas to the proliferation of the epidemic.

Radioactivity of pegmatite rocks on seridó region and the influence on the public health

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The paper present the preliminary evaluations of a study accomplished on the radioactive minerals and secondary minerals of uranium that occurs in pegmatite of the Seridó Region (NE Brazil) and their relationships with the several sources of water provisioning and population nuclei of the area of the municipal district of Parelhas and Equador (RN). In general, the pegmatite of this area have radioactive indexes associated to the dispersed uranium in the crystalline meshes of different minerals, and also for the presence of primary and secondary minerals of uranium that appear associates to the rifts and cavities in the pegmatite rocks and in the tourmaliniferous granites.
In this area, the regional radioactive background varies from 250 to 350 shocks/second, while in the pegmatite areas the variation is much larger (500 to 1000 cps). Geochemistry studies and preliminary environmental hydrochemistry suggest that the acid underground oxidizers waters attack and dissolve the pegmatite radioactive minerals, generating rich solutions in salts of uranium [UO2CO3 and UO2(CO3)22-]. These solutions remaining acid, will contaminate the aquifers, except if they find a geochemistry barrier (alkaline and reductor) that will force the precipitation of the autunite and others secondary mineral of uranium that occurs in some pegmatite in the area of Parelhas. The initial part of this study evaluates the distribution of the pegmatite of larger concentration of radioactive minerals and make a spatial analyses (GIS) on the relationships of the occurrence of these radioactive minerals and their proximity with sources of water supply and habitation nuclei.
Keywords: Radon, Pegmatite, Public Health

Heavy metal contamination in the area of acari and its impact on population health (rn-brazil)

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The studied area is one of the most important mineral provinces of Rio Grande do Norte State (NE Brazil) which has had intensive exploitation activities between the years of 1940 to 1996. This article presents a geochemical investigation of stream sediments taken in the drainage system between the Brejui and Barra Verde mines, and the Gargalheiras municipal water reservoir, in Acari city (RN). In addition to the major elements, the trace elements V, Cr, Co, Ni, Cu, Zn, As, Rb, Sr, Zr, Mo, Sn, Ba, W were analyzed and metal levels reported in the literature for the same area are used. The elements W, Mo, Cu, Sn and in part Zn are emitted from the mining waste dumps and show elevated concentrations due to both, wind and fluvial transport. The concentration of Cu in stream sediments close to the mines reaches toxic levels. Other elements are geogenic, their abundance is controlled by detrital and clay minerals as well as by organic matter. At the mouth of the drainage system to the reservoir the elements W and Mo are still enriched in the stream sediments relative to the geogenic background by factors of 29 and 21. The process of element dispersion described here lasts for approximately 60 years now. If this is taken into account and that the water of this reservoir supplies the city of Acari and several communities of this area, and that the heavy metals accumulate in the human organism with the time, the situation encountered here starts to be of significant social-environmental and public health gravity.
Key Words: mine pollution, heavy metals, tungsten

The role of acid volatile sulfide in the control of potential metal bioavailability in contaminated sediments from a tropical estuary, southeast brazil

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Estuaries, in general, are reducer environments in which anthropogenic activities could result in high metal levels in the sediments. Sulfides are important phases that control the concentration of free metals in these sediments. The ratio of AVS (monosulfide - analytically denominated acid volatile sulfide) to SEM (simultaneously extracted metals, extracted to cold with a solution of diluted HCl) is frequently used as an indicator of potential sediment bioavailability of these metals in anaerobic environments. When AVS molar concentrations exceed those of SEM, bioavailability has not been considered significant. Measurements of AVS and SEM (Hg, Cu, Pb, Cd, Zn, and Ni) were combined in order to verify the ecological hazard of contaminated sediments from the Santos-Cubatão Estuarine System (SE Brazil), which is located in one of the most industrialized areas in Latin America. Intertidal sediments from the Morrão River estuary were collected seasonally in short cores (70 cm length). The cores have predominance of fine-grained sediments (silt-clay) at the top and fractions more sandy at the deeper layers. Values of loss on ignition (LOI at 550 ºC), indicative of the relative concentrations of organic matter, presented higher concentrations (6.20 to 13.41%) particularly in the first 30 cm in the study sediment cores. Values of AVS presented significant variations along the profiles and among the cores sampled (0.09 to 31.90 µmol g–1). Concentrations of SEM also presented significant variations (0.112 to 8.373 µmol g–1). The redox conditions, organic matter contents and grain-size were the main controlling factors on SEM distribution. However, clear relationships among these variables and AVS were not observed. The molar SEM/AVS ratios were frequently > 1 especially in the summer, suggesting major metal bioavailability hazard in this humid hot season.
Keywords: potential bioavailability; geochemistry of sediments; metals.

The presence of arsenic in north of portugal in various sampling media: a preliminary study.

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The concept of low-density/low-cost sampling for geochemical mapping has increased interest over the past two decades1,2. The continental area of Portugal is covered by a low density geochemical survey (652 sites, 1 site/135 km2), taking as the sampling media topsoils (upper mineral horizons, A) and organic horizons (humus, O). The compilation of all data led to the production of the first Soil Geochemical Atlas of Portugal revealing areas with high concentrations of potential harmful elements3. The aim of this study was to assess As concentration in soils, rocks, and groundwater. The highest As values are located in the Central Iberian Zone and relate to a granitic basement, associated with the contact between granites and metasediments, mineral occurrences and abandoned mining areas. The Vila Flor area was selected because several high As concentration (> 10 µg/L) were reported in water for human supply. Standard methods for sampling, sample preparation, and analysis were used in order to achieve high quality and consistent data. Each sample was analyzed for 32 chemical elements and pH was determined in soils and groundwaters. In addition to total contents (extracted with aqua regia), about 20% of the soil samples were leached with ammonium acetate (AC) in order to assess the bioavailability of arsenic. The fractionation of As was studied using a 7-step sequential selective chemical extraction technique in rock samples of the Phyllite – Quartzite Formation4. Notwithstanding the high total As concentrations in soils the concentrations derived by AC leaching were low, diminishing possible ecotoxicological effects. However, the results from SSCE showed the presence of As linked to hydrossoluble (maximum extraction achieved: 4%, representing 125 mg/L) and bioavailable phases (maximum extraction achieved: 11%, representing 400 mg/L). Arsenic content in groundwater samples are in accordance with the obtained results as high grades were found (2 to 634 µg/L).
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Keywords: Arsenic; Geochemical mapping; Portugal.

Environmental health impacts due to disperse mineralisation in south africa

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Abstract
The crust of South Africa has undergone various episodes and styles of ancient mineralisation, dating as far back as the Achaean. Substantial quantities of elements, both nutritional and toxic, that were involved in ore formation processes have been later deposited together with the ores. Since the Pleistocene, these elements have been moved around and redistributed by the suficial processes of intense weathering, leaching and eluviation. It is therefore not uncommon to find large tracts of the country containing element toxicities or deficiencies which are closely related to patterns or localities of mineralization. Through soils and water, this variation is transmitted into the biosphere in food and domestic water supplies.
Nutrient deficient soils (due to geogenic processes) may be the principal causative factor in devastating endemic osteoarthritis disease that affects two thirds of the women in Maputaland, for instance. The impact of geology on animal health is also of critical concern to both farmers and managers of the hugely important wildlife game reserves. But, there is still a dearth of knowledge on the implications of these variations for animal health and the environment. Nor is there adequate documentation of the known variations.
This paper discusses a few known relationships between trace element excess/deficiency stemming originally from mineralisation processes and the local and regional distribution of human and animal diseases (Mseleni joint disease, iodine deficiency disorders, fluorosis, selenium deficiency/HIV, pneumoconiosis, and so on) in South Africa. It is submitted that organized effort in detecting and verifying such relationships would help greatly in broadening the diagnostic spectrum and therapy for a number of environmental diseases in the country.
Keywords: Medical geology, mineralisation, South Africa

Validation of method for determination of mercury in milk bovine using spectroscopy atomic absorption and cold vapor

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ABSTRACT
The validation of a suitable methodology for the decision of mercury in samples of raw milk has involved to adjust and to find the better instrumental conditions to process samples, using the microwave digestion system and the technique of spectroscopy of atomic absorption and its connected systems. The samples were obtained from supermarket of habitual consumption.
This skill is based on the measurement of the luminous absorption, according to a certain and defined wavelenght for every analyte, with characteristics of sensibility, selectivity, precision and accuracy.
The statistical studies carried out on the data compiled during the development of the analysis between them, the model of the squares minimum as model linearity of the method, Fischer test, adjusting ranges from 1 to 10 ppb for Hg,.
Moreover, the detection limit (LDD), quantification limit (LQD) and recovery factor is determined that to Mercury (Hg) the LDD is 0,6 mg/L, LQD is 0,8 mg/L and the average recovery is 90%.
The precision of the method was measured by looking for the variation coefficient RSD of the repeatability and RSD reproducibility being their values of 9,6 and 12,2, respectively and in agreement with HorRat equation.
Finally, these results allow to reach the established requirements in the analytic techniques validation model and the control program of raw milk residues of Agriculture and Livestock Service, besides complying on the external requirements according to established criteria in the Codex Alimentarius, the Organization of Nations United for the Agriculture and the Food (FAO), the World of Health Organization (WHO) and the World Organization Commerce (OMC).

Maternal and infant exposure to manganese

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Introduction
While manganese (Mn) is an essential element it is also highly neurotoxic at elevated doses. Ingested Mn has not previously been a subject of concern as the intestinal absorption and excretion is under homeostatic regulation (1). However, several recent studies have reported associations of excessive Mn intake from drinking water and food with behavioural and intellectual functioning in children (2-5).
Methodology
Samples of drinking water, breast milk, urine and blood were analysed for Mn in 408 women during early pregnancy and lactation.
The women lived in an area with elevated Mn and arsenic (As) concentrations in drinking water derived from wells in Bangladesh.
Results
Around 40% of the sampled wells had Mn concentrations above the health-based guideline value set by WHO and were in general inversely correlated with concentrations of As. The water Mn correlated with urine Mn, but not with blood or breast milk. No correlations were found between Mn concentrations in urine, blood or breast milk. Compared to other populations worldwide, the Bangladeshi women had elevated blood and urine Mn concentrations, but Mn in breast milk was within the normal range.
Conclusion
The elevated Mn concentrations in blood and urine of the Bangladeshi mothers are like due to exposure from both food and drinking water sources.
The low Mn concentrations found in breast milk suggest a strict regulation of transport in the mammary gland. The results indicate that elevated maternal exposure to manganese does not lead to excessive exposure of breast-fed infants. This stresses the importance of breast feeding to protect the infant from elevated exposure, especially in areas where naturally high manganese concentrations are found.
Keywords: drinking water, breast feeding, Bangladesh
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For more information, please see: K.S. Ljung, M.J. Kippler, W. Goessler, G.M. Grandér, B.M. Nermell, M.E. Vahter, Environ. Sci. Technol. 43 (2009)

Acid sulfate soils - a human health issue

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Introduction
Acid sulfate soils (ASS) have been described as the “nastiest soils on earth” because of their strong acidity, increased mobility of potentially toxic elements and limited bioavailability of nutrients. They only cover a small area of the world’s total problem soils, but often have significant adverse effects on a local scale.
Methods
We have reviewed and evaluated the potential health issues of ASS, in relation to the provisional, regulating, cultural and supporting ecosystem services identified in the UN’s Millennium Ecosystem Assessment. While the problems related to agriculture, aquaculture and the environment have been the focus of many ASS management efforts, the connection to human health has largely been ignored.
Results
The improper management of ASS can have a profound effect on human health. It affects every ecosystem service needed for human well-being. Provisional services are affected through reduced fresh water supply and adverse effects on plant and aquatic ecosystems; regulating services through disturbed pollution

and disease control; cultural services through effects on recreational areas; and supporting services through the corrosion and unstable soil masses that result in damaged property, roads and pipelines.
As ASS often coincide with high population density areas along the coasts of many developing countries, their negative impacts on ecosystems can have serious implications to those least equipped for coping with the adverse effects of improper management.
Conclusion
It is recognised that ASS can have significant implications on food security and livelihood, as well as on community cohesiveness and the spread of vector-borne disease. However, the connection between these outcomes and ASS is often not obvious and it is therefore argued that the impact of such soils on human well-being needs to be recognised in order to raise awareness among the public and decision makers, to in turn facilitate proper management and avoid potential human ill-health.
Keywords: oxidation, soil quality, management
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Bioavailability, ecotoxicity and geological characteristics of trace lead in sediments from two sites on río negro river, uruguayabstract

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The bottom sediments in the North Western area of the Río Negro river, Uruguay, are composed of sedimentary rock deposits from the Gondwana continent. The reducing environment and particle size might be responsible of the characteristic water color. The clay fraction is a laminated structure of phylosilicate with SiO4 and alumina groups. The minerals are montmorillonite and illite of 2:1 structure, alternated with Aluminum gibbsite. The sequence of sedimentation which took place under oxidative conditions during the Carboniferous Period and started with extended deposits of tillits, associated to varvic lutite, sand and sea level deposits, indicative of circumpolar conditions. Permian Period sediments, which were placed under reductive conditions, are rich in fossil vegetation and bituminous lutite, which composes their carbonous fraction. Monthly samples at two sites on the River negro at Baygorria and Bonete locations were analyzed for both particle size and lead. Lead was determined by Atomic Spectrometry in river water and sediment. Particle size of sediments was determined by sieving and sedimentation. Data showed that Baygorria´s sediments in average have a much bigger percentage of clay than Bonete´s (20.5 % and 6.0 %, respectively). The lead determination was quantifiable in Baygorria´s sediments, meanwhile the lead concentrations in Bonete´s sediments were always below the detection limit. Lead concentrations of the water samples were also always below the detection limit. A battery of bioassays was employed: growth and survival test with the amphipod Hyalella curvispina, acute toxicity screen with bioluminescent bacteria Photobacterium leiognathi and acute bioassay with Pimephales promelas fish. Even though not significant toxicity was demonstrated, somewhat higher toxicity was found in the samples from Baygorria site, showing a possible concentration of the contaminant in the clay fraction.Keywords: bioavailability , bioassays, Permian

Application of X-Ray Fluorescence in environmental studies in a region of Montevideo – IAEA Project RLA/7/011

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Abstract
The X Ray Fluorescence (XRF) is an instrumental analytical technique, which can be applied to the analysis of different kind of matrices.
The XRF allows the quantitative analysis of different elements present in a sample.
In the present study, soils and particulate air matter of a region of Montevideo were analyzed by XRF with the purpose of the characterization the elemental composition and the determination of the possible sources of contamination.
The present study involves the region of the "Central Térmica" for energy generation (Central Batlle), Fuel Refinery (ANCAP), and the most important routes of access to Montevideo City, that involves heavy traffic, industrial activities in the neighbourhood Bella Vista and others.
The soil samples were taken in depth and then were cut in portions of 0 – 2 cm and 2 – 4 cm. The follow elements were analyzed in soil samples: Al; Si; P; S; K; Ca; Ti; V; Cr; Fe; Mn, Ni, Cu, Zn, Br, Pb, Y, Sr and Zr.
The elemental composition in particulate air matter was evaluated. The follow elements were analyzed: Al; Si; P; S; K; Ca; Ti; V; Cr; Fe; Mn, Ni, Cu, Zn, Ge, Ba, Pb, Y, and Sr in 180 samples of PM 2,5 and 184 samples of PM 10. The samples were taken with a Gent sampler using Nucleopore membranes.
Data evaluation was done using Multicomponent Analysis. Enrichment Factors were calculated. The SPSS software was used.
Some sources involved in the activity of the studied region were identified.
This study shows the applicability of XRF like as a useful tool for the characterization of soils and particulate air matter (PM 2,5; PM 10).
Keywords: X Ray Fluorescence; soil; PM 10 Y PM 2,5
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Comparison of the performance of anthropogenic inappropriate agricultural practices on soil in the wetlands of guacheneque, Bogota, Colombia

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Background
Agronomist with the development led to an excessive use of agrochemical agents such as fertilizer materials, pesticides, including pesticides, which are governed by a bad use in irrigation of crops of potatoes, vegetables in the Paramo of Guacheneque (Villa Pinzon) in the birth of the Bogota River. Such actions create a physical disturbance of the soil chemistry generating instability and impacts of this type, degrading the soil increased, making it suitable for low agricultural production, threatening agriculture. This decline in productivity generated by the farmers in need of continued and excessive use of these agents to make this a vicious cycle based on a problem of climate change
Methodology
Took place in the study area described above which allowed us to be able to identify in the horizons of the soils to expand our research, then
taking a sample of Horizon 0 to determine the potential excess nitrate, potassium, sodium in culture.
It is done with laboratory analysis of cation exchange, organic matter, Ph.
Results
Analysis of Cation exchange capacity:

$$CIC = \frac{Meg}{100\ gr} = \frac{V^* 0.1 * 100}{5\ gr}$$

1. Virgin Soil: 14.4

2. Cultivated soil: 12.6

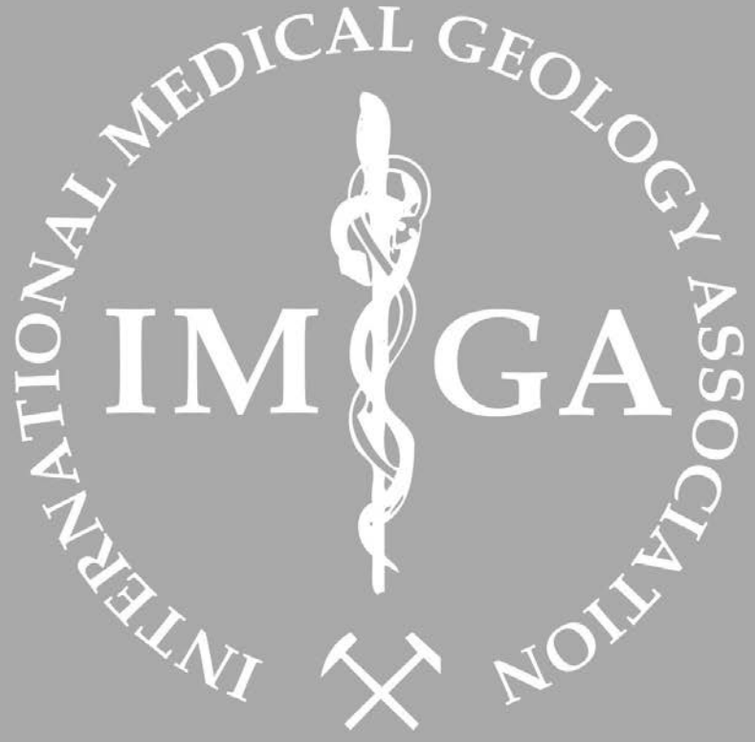
Analysis of organic matter:

$$Me.Ox.g = \frac{(B\text{-}T)\ NFe}{Peso\ suelo\ (gr)}$$

$$\%C = Me.Ox/g * 12/ 4000 * \frac{1}{0.77} * 100$$

$$\%MO = \%C * 1/0.58$$

Found between the soil characteristics of different watersheds. Confirmed that a higher pH the greater the percentage of organic matter.
Topographical conditions and weather outside may be the cause of the difference.
Conclusions
The lack of information to the rural population that has the effect of fertilizer on the environment and health.
The advantages and disadvantages of organic farming compared to a sustainable agro-ecological.
Changes in biogeochemical cycles, such as water by excess fertilizer
The onset of disease by direct contact of the fertilizer
Keywords: public health, agroecologyc, environmental quality



3rd Hemispheric Conference on Medical Geology

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024	Calin A. Tatu	The Etiology Of Balkan Endemic Nephropathy -An Equation Still Not Solved
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043	Luiz E. Mantovani	Geoenvironment And Evolution Of The Genus Homo In Neogene
047	Luis H.Ferpozzi	Levels And Elemental Characterization Of PM10 Samples Collected In Abra Pampa, Northwest Argentina. Implications For Inhalation Of Hazards Around Old Foundry Metals Plant
052	Thomas F. da C. Campos	The Radon Carcinogen Agent In Lucrecia City, Northeastern Brazil: Gross Gamma Ray And Indoor Radon
063	Karin Eliaeson	Relationships Of Geochemistry And Multiple Sclerosis
067	Samira Tabasi	Medical Geology Studies On The Arsenic Polluted Area Of Kouhsorkh, NE Iran
068	Indira Forero	Comprobación Del Uso De Líquenes Como Bioindicadores De La Calidad Del Aire.
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070	M. Ibrahim	Protective Effect Of 1-(2-(2-(-2-(Aminoethyl)Phenyl)Diselanyl)Phenyl) Ethanamine On Paracetamol Induced Hepato Toxicity And In Rat Liver
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036	Elena Giménez-Forcada	"Geotoxic Anomalies In Fissured Hard Rockaquifers Of Lower Triassic Sandstones (Iberian Range, Valencia-Spain) And Their Effects In The Quality Of Drinking Waters"
039	Dina L. López	Volcanic Pollution In Surface And Groundwaters Of El Salvador, Central America
045	Jochen Bundschuh	"Arsenic In Groundwater: A Global Environmental Health Problem"
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055	Monica Rădulescu	Influence Of Grazing Practices On Cow Milk Quality - Case Study The Comarnic Poieni Bauxite Quarry, Romania
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083	Cassio R. Silva	Environmental Geochemistry and Medical Geology Program: Results 2003-2008
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092	Reinaldo Petta	Radioactivity of pegmatite rocks on seridó region and the influence on the public health
093	Reinaldo Petta	Heavy metal contamination in the area of acari and its impact on population health (rn-Brazil)
094	Érico C. Nizoli	The role of acid volatile sulfide in the control of potential metal bioavailability in contaminated sediments from a tropical estuary, southeast Brazil
095	Manuela Inácio	The presence of arsenic in north of portugal in various sampling media: a preliminary study.
102	Ricardo A. Fonseca	Comparison of the performance of anthropogenic inappropriate agricultural practices on soil in the wetlands of guacheneque, Bogota, Colombia

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077	Rosario Guerequiz	Environmental Risk Assessment of Arsenic In Uruguay
099	Karin S.Ljung	Acid sulfate soils – a human health issue
100	Diana M. Míguez	Bioavailability, ecotoxicity and geological characteristics of trace lead in sediments from two sites on río negro river, Uruguay

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079	Natacha Ocaranza Arce	Georeferentiation Of The Provinces Of The Metropolitan Region
096	Humbulani, R. Mundalamo	Environmental health impacts due to disperse mineralisation in South Africa

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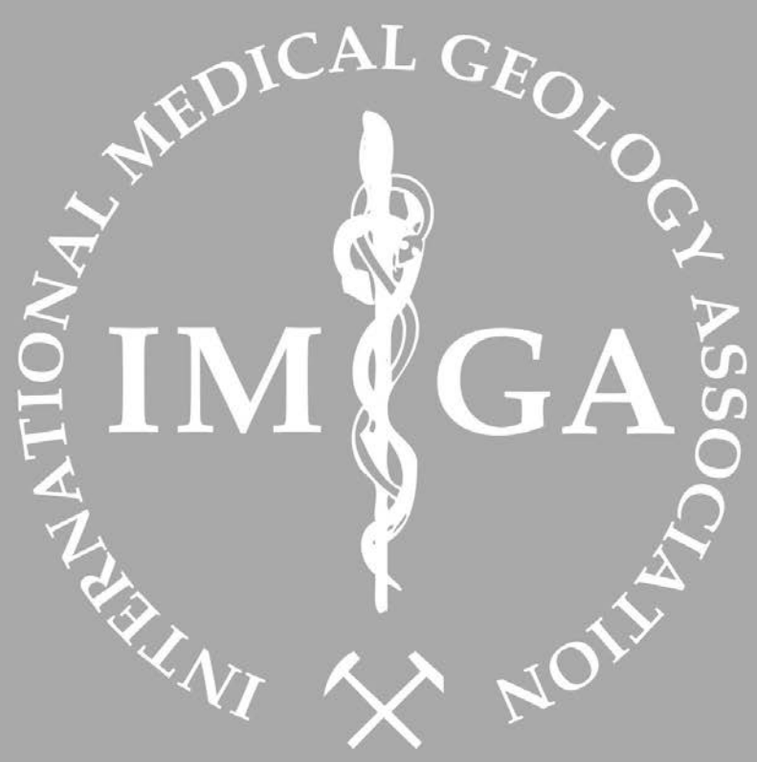

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