

ARSENIC ENRICHMENT IN SURFACE WATER AND SOIL IN YARLUNG TSANGPO AND SINGE TSANGPO DRAINAGES IN TIBET, CHINA

SHEHONG LI^{1*}, MINGGUO WANG¹, HUI WANG¹, BAOSHAN ZHENG¹, QIANG YANG², YAN ZHENG³

¹*Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, 550002, China*

²*Lamont-Doherty Earth Observatory of Columbia University, New York, 10964, USA*

³*School of Earth and Environmental Sciences, Queens College, The City University of New York, New York, 11367, USA*

lishehong@vip.gyig.ac.cn

The average soil arsenic concentration was reported to be 18.7 mg/kg based on a survey of 205 samples in Tibet. This is considerably higher than the commonly cited crustal background value of 10 mg/kg of As for soil, and is unlikely due to anthropogenic pollution. To investigate the origin of this geochemical anomaly in soil arsenic, water (n=80), stream sediment (n=69), soil (n=79) and rock (n=58) samples were collected from the Yarlung Tsangpo (upstream of Brahmaputra) and Singe Tsangpo (upstream of Indus) drainage basins in June 2008.

Arsenic enrichment is pronounced in the Singe Tsangpo drainage basin. The average arsenic concentration in soil, stream sediment and stream water is 44±26 mg/kg (n=33), 42±40 mg/kg (n=37) and 58±69 µg/L (n=39), respectively. In the Yarlung Tsangpo drainage, the average arsenic concentration in soil, stream sediment and stream water is 30±33 mg/kg (n=23), 28±11 mg/kg (n=28) and 11±16 µg/L (n=30), respectively. The average concentration of arsenic in upstream water of Yarlung Tsangpo River is 38±28 µg/L (n=5), and is much higher than the value of 5±3 µg/L (n=23) downstream. The high background concentration of arsenic in soil of this area may be associated to the broad distribution of ophiolite melange and meta-sedimentary sequences containing shale, phyllite and schist that may be rich in arsenic. However, the average concentrations of As in rocks from Singe Tsangpo and Yarlung Tsangpo are 11.2±9.2 (n=27) and 9.2±14.0 (n=23) respectively and the maximum concentration is 35±6 mg/kg in metamorphic breccia. It is likely that soil As enrichment results from the weathering process of rocks.

Water from other sources sampled in Tibet also show As enrichment. Water from two hot springs contain 5985 µg/L and 3842 µg/L arsenic. A dug well (about 2 m depth) is found to contain 195 µg/L As. The average arsenic concentration of salt lake water is 1947±3619 µg/L (n=8, range 40-10626 µg/L), but a fresh water lake has 21 µg/L arsenic. The positive correlation between [As] and [Na]⁺[K] in water samples indicates that arsenic enrichment in water from the Singe Tsangpo and the upstream of the Yarlung Tsangpo may be associated with the salt lakes or hot springs in these drainages basin.

As enrichment in the water and sediment in Singe Tsangpo and upper Yarlung Tsangpo drainages may pose a potential risk of endemic arseniasis for the residents in this area.

Keywords: arsenic, enrichment, Tibet