Biogenic carbonate sands from Atlantic islands of the Macaronesia archipelago: Differentiation based on mineralogical and geochemical data

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In several islands of the Azores, Madeira, Canaries and Cape Verde archipelagos, which altogether belong to the comprehensive bio-geographic region called Macaronesia archipelago, there are larger or smaller deposits of biogenic carbonate sand. The deposits of this special sand were formed from the accumulation of sand size bioclasts (calcareous exoskeletons) derived from the dismantling during the Last Great Glaciation of reef barriers essentially made of coral and red calcareous algae, which had been developed in particular climatic and oceanic conditions during the Upper Pleistocene on some shallow segments of the coastal shelf existent around the volcanic islands. The authors of this paper have studied representative samples of biogenic carbonate sand from occurrences in several islands of the archipelagos referred to: Terceira' island (Praia da Victória) and Santa Maria' island (Praia Formosa) in the Azores archipelago, Madeira' island (Caniçal) and Porto Santo' island (Praia da Calheta) in the archipelago of Madeira, Gran Canaria' island (Playa de Maspalomas) and Furteventura' island (Playa de Jandia) in the Canaries archipelago, Sal' island (Praia de Santa Maria) and Boavista' island (Praia de Chave) in the Cape Verde archipelago. Bioclasts are associated with volcaniclasts in distinct proportions. Bioclasts are constituted of the following minerals: calcite, Mg-calcite and aragonite, whereas the volcaniclasts usually consist of feldspar and magnetite. Ca, Mg and Sr are the major elements forming the bioclasts, and P, S and I are minor or trace elements existing in the bioclasts. In the case of Porto Santo' island, more precisely in the beach and frontal dune deposits, the volcaniclasts do not exceed 10%, and sand-bathing (psammotherapy) has been a traditional practice to treat muscular-skeletal diseases. Mineralogical and geochemical data made possible the differentiation of the studied biogenic carbonate sands and the southward progress of the ice front and sea level fall, and consequently the dismantling of the reef barriers. Radiocarbon dating provided ages within the range 30,000-6,000 BP, approximately, for the biogenic carbonate sand of the distinct studied deposits, the age diminishing southward. The contents of meta-stable minerals, Mg-calcite and aragonite diminish southward, from older to younger biogenic carbonate sands.

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