PHOSPHOGENESIS, SEQUENCE-STRATIGRAPHY AND PALEOCEANOGRAPHY IN GAIMAN FORMATION PHOSPHATES, ARGENTINA

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Paleoenvironmental analysis of the Cenozoic marine section cropping out near Gaiman and Rawson (Chubut Province, Argentina) shows that most of the local succession was deposited in a shallow, storm-dominated marine environment, bearing well preserved Ophiomorpha fossil traces. Sequence-stratigraphic interpretation records the effect of three sea-level oscillations. Phosphatic strata are related to mostly in situ concretions developed within transgressive-early highstand system tracts (Type 1) and to reworked and winnowed lags associated to transgressive surfaces (Type 2) which display a concentration of phosphatic concretions, ooids, vertebrate bones, teeth and shells. Close association of Callianasid bioturbation (Ophiomorpha) and phosphatic levels suggest a genetic link for both, via improved early-diagenetic water circulation and Fe and P early-diagenetic cycling. Phosphogenesis would have taken place after cold and corrosive water, probably similar to the present Antarctic Intermediate Water (AAIW), flooding the continental shelf and mixing with warmer surficial waters. This mixing could explain the contrasting indications furnished by the marine vertebrate fauna together with the general corrosion and replacement processes that are common in the Gaiman strata. The development of the phosphorites would have occurred at times of high sea-level, global climatic transition and increased oceanic circulation, probably during Late Oligocene-Early Miocene times, before the Middle Miocene warming that follows. The latter could be related to impeded circum-antarctic oceanic circulation due to he formation of an old volcanic arc in the South Sandwich Island region.