Integrated stratigraphy of Neogene diatom-rich sediments (Bahía Inglesa Formation) in northern-central Chile

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Abstract

Reduced landward moisture transport due to cold upwelled surface waters of the Humboldt Current System (HCS) is one of the primary triggers of hyperarid conditions in the Atacama Desert. Marine sediments exposed along the coastline of northern Chile provide a unique archive of land-ocean coupling between coastal upwelling related to the HCS and paleoclimate in the Atacama Desert during the Neogene. Here we aim to establish a refined stratigraphic framework for the emplacement of diatom-rich deposits of the Bahía Inglesa Formation at Quebrada Tiburón (27∘S).

The marine sediments exposed at Quebrada Tiburón lie transgressively above the pre- Cenozoic basement. Laminated diatomaceous muds is intercalated with sandy deposits. Benthic foraminiferal assemblages and test morphology reveal a shift from trochospiral and planospiral (predominantly epifaunal) to serial (infaunal) morphotypes between sands and diatomaceous muds, respectively. Together with plankton assemblages dominated by diatoms and *Globigerina bulloides*, the diatomaceous muds reflect a highly productive coastal upwelling regime and low oxic, eutrophic conditions at the seafloor. However, occasional layers of bioturbation within the diatomaceous succession also imply phases of relaxed upwelling conditions. The new stratigraphic framework will thus allow the assessment of Neogene upwelling behavior and variability off Chile on orbital time scales.

Preliminary results based on calcareous nannoplankton, diatoms and planktonic foraminifera indicate a stratigraphic range from the upper Miocene (Messinian) to the lower Pliocene for the diatomaceous muds. Evidence from the δ18O of the benthic foraminifera *Uvigerina*

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peregrina further ties the upper part of the succession to an uppermost Zanclean age < 3.9 Ma. In a next step, the stratigraphic framework will be further improved by new data from magnetostratigraphy, Sr isotopes, and tephrochronology.

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