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Tectonics, eustacy and climate: Foraminifera and the late Cenozoic evolution of North-Central Chile

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The tectonic and eustatic history of northern and central Chile is important to the understanding of its climatic evolution. The northwestern margin of Central Chile, in the Atacama Desert, includes uplifted marine sequences and terraced marine sediments that contain well preserved microfossil assemblages and volcanic ash horizons. Preliminary micropaleontologic, geochemical, sedimentological and geospatial analyses of sedimentary sequences within the Tiburon Basin of the Mejillones Peninsula and in the Caldera region to the south reveal significant late Cenozoic tectonic and eustatic events that provide additional information towards our understanding of the climatic evolution of northcentral Chile.

The generalized sedimentary sequence characterizing this region is a basal diatomite containing thin phosphatic horizons, marine vertebrates and abundant planktonic and benthic foraminifera. A progressive increase in clastic input is observed up-sequence terminated by a coquina horizon of varying taxa that is capped with a cobble conglomerate with occasional boulders. Overlying the cobble conglomerate is a series of recurring foraminiferal volcanoclastic sands, mollusk horizons and thin ash beds. Ar/Ar dating of an ash horizon near the top of the sequence, and foraminiferal biostratigraphy indicate mid- to late Pliocene deposition of the sediments. Preliminary analyses and interpretation of the foraminifera and sediments indicate an initial deep water (~500 m) basin with high primary productivity related to upwelling of cold intermediate water interrupted by periods of little to no sediment input. Benthic foraminiferal assemblages from this interval are dominated by *Bulimina* and *Bolivina* taxa. This style of deposition was interrupted by a possible uplift event to the west-northwest resulting in the transport and deposition of the coquina and subsequent cobble conglomerate. This tectonic event resulted in subareal exposure to the west and increased volcanism to the east. Foraminiferal data indicate shallowing

of the basin to shelf depths (50-100 m), and sedimentological data indicates a change from biogenic sedimentation to volcanoclastic sedimentation. Geospatial data on the sedimentary units support these interpretations.

Regional similarities in the above foraminiferal and sedimentological patterns indicate an overall mid- to late Pliocene-Pleistocene shallowing with higher frequency eustatic fluctuations occurring. This was followed by a regional tectonic event resulting in further shallowing along the coast associated with increased volcanism. This is corroborated in records recovered off-shore during ODP Leg 202. These marine sequences can be correlated to marine terrace sequences observed on the Mejillones Peninsula in Northern Chile.