



Sedimentology, paleontology and age of the Ayacara and Lago Ranco formations (south-central Chile, 40°- 42°S). Tectonic implications.

Alfonso Encinas (1), Patricio Zambrano (1), Pablo Bernabe (1), Kenneth Finger (2), Luis Buatois (3), Paul Duhart (4), Victor Valencia (5), M Fanning (6), and Francisco Herve (7)

(1) Departamento de Ciencias de la Tierra, Universidad de Concepción, Casilla 160-C, Concepción, Chile., (2) University of California Museum of Paleontology, 1101 Valley Life Sciences Building, Berkeley, CA 94720-4780, United States. , (3) Department of Geological Sciences, University of Saskatchewan, 114 Science Place, Sask., Canada SK S7N 5E2., (4) Servicio Nacional de Geología y Minería, La Paz 406, Puerto Varas, Chile, (5) Research School of Earth Sciences, Australian National University, Canberra, Australia., (6) Department of Geosciences, University of Arizona, 1040 E. 4th Street, Bldg. #77, Tucson, AZ 85721, USA., (7) Departamento de Geología, Universidad de Chile, Casilla 13518, Correo 21, Santiago, Chile.

Deep-marine, Mio-Pliocene strata correlative with the Navidad Formation crop out in different areas along the forearc of south-central Chile (~34°-41°) and have also been recognized in boreholes drilled on the continental shelf. However, at Lago Ranco (40°S) and Ayacara (42°) there are outcrops of marine strata whose age and correlation with these units remain uncertain. These deposits consist of rhythmic successions of sandstone and siltstone representing facies similar to those of the Navidad and correlative formations. These marine successions are known as the Estratos de Lago Ranco and Ayacara formations. They both crop out in the western Andean Cordillera near the limit with the Intermediate Depression at Lago Ranco and the submerged equivalent of this physiographic unit at Ayacara. There are very few studies carried out on these units and most of them consist of internal reports and unpublished theses. In order to unravel the sedimentary environment, age and tectonic history of this area during the Neogene we carried out sedimentological, ichnological and micropaleontological studies. In addition, we carried out U-Pb dating in detrital zircons (LAICPMS and SHRIMP).

Our studies show the presence of sedimentary features and ichnofacies typical of deposition in a deep-marine environment for these units. In agreement, benthic foraminifers (*Cyclammina incisa* and *Siphonodosaria sangrinensis*) indicate lower bathyal depths (1500 m). U-Pb (LAICPMS and SHRIMP) indicate a maximum depositional age of around 20 Ma for these units. In agreement, the occurrence of the planktic foraminifer species *Globorotalia siakensis* (P22-N14), *Globigerinoides quadrilobatus* (N6-Recent) and *Globigerinoides sikanus* (N8-N9) in strata of the Ayacara Formation suggest an early-middle Miocene age for this unit.

These data indicate that the area corresponding to the western Main Andean Cordillera in south central Chile, was subjected to major subsidence during the early-middle Miocene. Major subsidence of the margin has been attributed to an important event of subduction erosion that would have removed the underside of the upper continental plate and caused its thinning.