

**HIGH-RESOLUTION FACIES ANALYSIS OF A MIOCENE LACUSTRINE DELTA, ÑIRIHUAU FORMATION, NORTH PATAGONIAN ANDES, ARGENTINA****C. Santonja<sup>1</sup>, C. Benavente<sup>2</sup>, A.M. Heredia<sup>3</sup>, J.M. Ballesteros Prada<sup>4</sup>, J. Suriano<sup>2</sup>, F. Bechis<sup>4</sup>**

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The Ñirihuau basin is located between 41° and 43° S on the eastern side of the North Patagonian Andes, Argentina. Its filling consists of a sequence of Oligocene to Miocene volcanic rocks (Ventana Formation) followed by Miocene volcanoclastic, clastic, and carbonate rocks (Ñirihuau and Collón Curá formations). The Ñirihuau Formation is interpreted to be deposited on alluvial, fluvial, deltaic, and lacustrine environments. According to available U-Pb geochronological data, this unit is constrained to the early to late Miocene (22–11 Ma). Recently, tetrapod footprints were found in the middle section of the Ñirihuau Formation (~15–13 Ma; Langhian–Serravallian) in siltstones from Las Bayas creek outcrops, located in the northeastern sector of the Ñirihuau basin. The aim of this study is to characterize, through a high-resolution sedimentological analysis, the depositional paleoenvironments of the lacustrine facies where the footprints are preserved and to identify the lake basin type represented. For that purpose, a 122-meter-thick stratigraphic section was surveyed in detail. Additionally, photogrammetry and 3d scanning techniques were applied to the outcrops to enhance the understanding of spatial distribution of the sedimentary deposits. The impressions interpreted as footprints are recognized in four levels concentrated at the lowermost portion of the stratigraphic section (at about 3, 9, 16 and 23m) with most of the best-preserved footprints registered as trampling at 16m. The deposits were characterized according to lithology, color, sedimentary structures, bed geometries, and fossil content. Four facies were recognized, which were grouped into two different facies associations (FA). FA1 corresponds to a perennial lake with fluvial input, while FA2 represents the delta plain from a deltaic system. The lowermost portion of the section is constituted mainly by marginal lacustrine deposits (where the tetrapod footprints are preserved) interbedded with lower-delta-plain deposits, interpreted as laterally adjacent sub-environments. Up in the section, in the middle and upper portions, lower-delta-plain facies are recognized underlying the lake center facies. Finally, the section is capped by upper-delta-plain deposits, which contain well-preserved distributary channels and floodplain deposits. Considering the recognized aggrading-prograding stacking pattern with shoaling upwards parasequences, it can be concluded that this points to a balanced-fill lake.