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**Jurassic clastic wedges sourced from the Huíncul Arch.**  
**A case study in the Picún Leufú area. Neuquén Basin, Argentina.**

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The Huíncul Arch constitutes an extensive and complex east-west oriented tectonic structure in the southern part of the Neuquén Basin, Argentina. Previous studies relate this positive structure to transpression and transtension within a wrench fault system (Ploszkiewicz *et al.* 1984), or repeated tectonic inversions of rift blocks (Vergani *et al.* 1995), mainly during the Late Jurassic – Early Cretaceous. The presence of structural and stratigraphic barriers all along this ancient structure controlled the migration and trapping of hydrocarbons, resulting in the occurrence of many oil fields at both sides of the uplifted area (Cruz *et al.* 2000). Although evidences of ancient subaerial exposure and erosion of Early to Middle Jurassic strata in the axes of the Huíncul Arch seem to be clear at some outcrops (e.g. Cerro Lotena, Cerro Granito, and Bosque Petrificado), deposits equivalent to these erosional surfaces were not previously been identified and mapping in the field.

Detailed field studies on Middle to Late Jurassic strata (Challacó, Lotena and Tordillo formations) cropped out at the Picún Leufú area, provides new insights to analyze the evolution of this structure from the associated deposition. Sedimentological and stratigraphic evidences strongly support that the Dorsal of Huíncul was (at least partially) subaerially exposed during the Callovian – Kimmeridgian. Jurassic (and older) strata uplifted along the Huíncul Arch acted as a physical barrier that partially isolated the Picún Leufú Sub-basin (south) from the central Neuquén Basin (Zavala & González 2001).

This paper also documents for the first time the existence of deposits supplied from the erosion of uplifted Jurassic strata along the Huíncul Arch. These clastic wedges (displaying “abnormal” paleocurrents from the northeast) occurred in the Challacó, Lotena and Tordillo formations (Fig 1), thus suggesting uplift episodes youngest that previously considered (Intracallovian & Intramalm unconformities).

In the case of the Tordillo Formation, in the area comprise two clearly differentiable sub-units, bounded by an unconformity: (1) a basal sub-unit, composed of conglomerates and red mudstones of fluvio-lacustrine origin, and (2) an upper sub-unit, integrated by sandstones of aeolian origin (dunes and dry interdunes). Within the basal sub- unit (1), two small-scale fining-upward sequences can be recognized. Facies changes and paleocurrents indicate that the conglomerates were supplied from the northeast, from where probably were provided by erosion of coarse-grained deposits of the Middle Jurassic Lajas Formation. Although these conglomerates and mudstones were previously assigned to the Tordillo Formation, it is possible to correlate this sub-unit with the Fortín 1° de Mayo Formation (Leanza & Hugo 1997), described for the southern part of the Picún Leufú sub-basin (Gulisano *et al.* 1984).

The upper sub-unit (2), on the other hand, is disposed over a regional unconformity with clear evidences of deflation (ventifacts). It displays large-scale cross bedding, probably related to aeolian dunes, with paleocurrents from the southwest. This last sub-unit is in turn unconformably covered by offshore marine mudstones of the Vaca Muerta Formation, which is the main source rock of the Neuquén Basin.

Due to re-sedimentation, deposits in clastic wedges are relatively loose packed. Since these wedge shaped and porous clastics are located below organic-rich shales of the Vaca Muerta Formation, they could eventually be easily charged, and are good candidates for stratigraphic trapping. Nevertheless, according to their dimensions, these possible plays could not be easily identified using conventional 2D seismic.

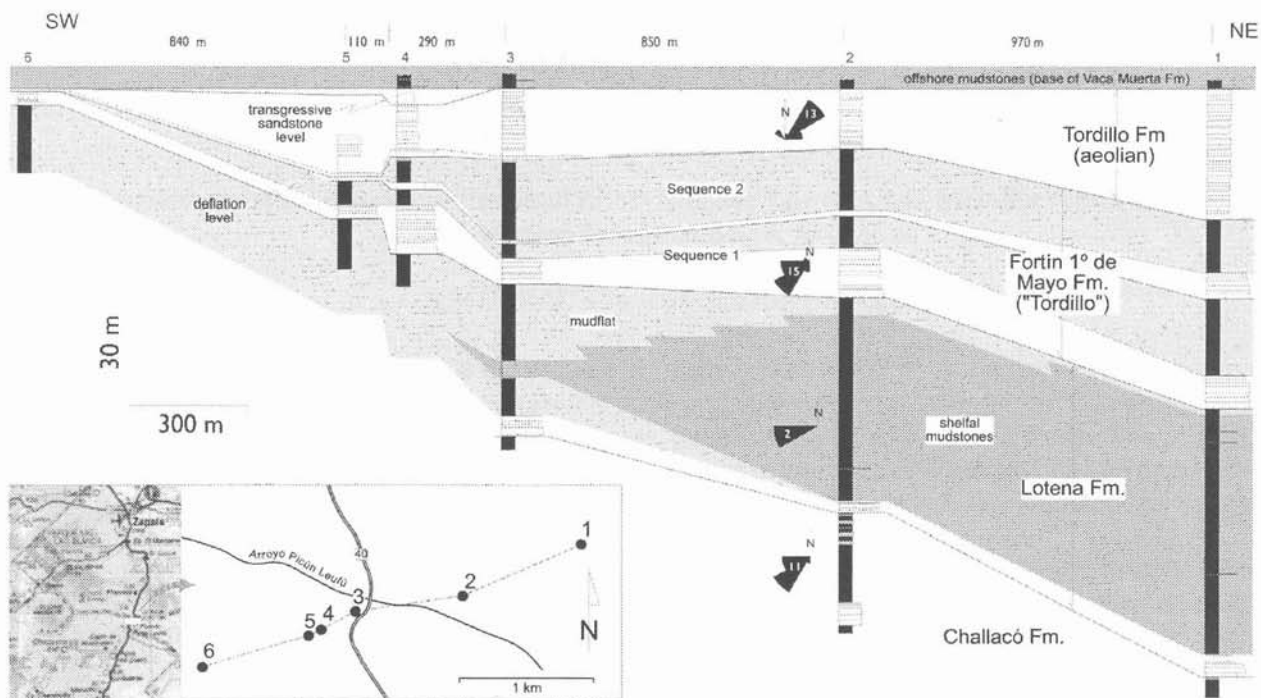


Fig. 1. Detailed cross-section of the Lotena and Tordillo formations in the Picún Leufú area, flattened at the base of the offshore mudstones of the Vaca Muerta Formation. Note the overall wedge geometry.

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