

Are the Late Tournasian-Viséan sequences in central western Argentina climatically controlled? The Maliman Formation data set

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During the Late Devonian to the Early Permian the supercontinent Gondwana experienced diachronically one of the most severe glaciations occurred during the Palaeozoic, which includes three major events of Devonian–Early Carboniferous, early Late Carboniferous, and late Late Carboniferous–Early Permian ages (López Gamundí, 1997). The effect of such climatic event has been considered the main allocyclic control in successions distributed in Euro-American basins. It is particularly well understood during the mid to Upper Carboniferous but the incompleteness less studied Lower Carboniferous successions, mostly situated in this part of the western Gondwana, prevents a comprehensive analysis to determine if climatic or another type of control prevailed in the sedimentary architecture of facies, floras and faunas distribution. Indeed, the endemism of several plant and invertebrate taxa makes correlations between both hemispheres less accurate. In central western of Argentina a Tournasian age for the Malimán Formation was based on a cephalopod (*Protocanites scalabrinii* Antelo) never re-found. Palynomorphs suggested a Viséan age and some invertebrate fossils were not very useful to dating the successions. The source of the stratigraphic, palaeontological and sedimentological data came from the Cortaderas creek (type locality) where the angular unconformity with the Devonian units is very well exposed and the conformable contact with the overlying Cortaderas Formation (Early-Late Carboniferous) is also very clear. The study of the Malimán Formation in Don Agustín and Chaco creeks, situated several kilometres to the south of the type locality results crucial to introduce new relevant information, in order to precise age and the allocyclic processes controlling the internal evolution of the unit. The succession starts with continental (mainly fluvial) deposits easily distinguishable in the field by an intense dark to light green colour that contrasts with the multicolour beds of the Chigua Formation and the very dark green-grey turbidites of the Pircas Negras Formation. The fluvial section includes high sinuosity channels containing abundant plant remains and alluvial plains having, sometimes, intense bioturbation and palynomorphs of late Tournasian-Viséan age (Pazos *et al.*, 2005). The nonmarine record in the early stages of the basin infill is now correlatable with others Lower Carboniferous units outcropping in Precordillera (e.g. El Ratón Formation). Upward in the succession is possible to recognise the alternation of three cycles composed of green and brownish sections that represent marine-transitional (greenish) and fluvial-deltaic (brownish) environments. In the first shallow marine-transitional section bivalves, gastropods and one cephalopod occur. It possibly indicates the *Protocanites scalabrinii* Zone. The second marine section is composed of heterolithic couplets containing abundant grazing traces, bivalves and possible syneresis cracks, while plant remains and palynomorphs are scarce. Finally the last marine section starts with dark grey claystones and siltstones having ripples, fine grained diamictites and isolated out-sized clasts. These clasts are here interpreted as dropstones and constitute one of the earliest evidences of the cooling in the basin. Palaeontologically this section contains a unique conularid fragment and *Rosellia* traces in the coarsening and shallowing upward section. The succession continues with a thick interval (hundred of metres) of coarsening and thickening upward packages interpreted as delta system deposits and follows with a thick interval of conglomerates that belongs to the Cortaderas Formation. Thus, the cyclicity registered in the Malimán Formation records transgressive-regressive cycles deposited mainly during the Viséan. The basal and top limits of the Maliman Formation are the results of tectonic activity but the internal high frequency facies shifting is probably the record of glacioeustatic changes related to the Carboniferous glaciation.

López Gamundí, O.R., 1997, Glacial–postglacial transition in the Late Paleozoic basins of southern South America, in Martini, I.P., ed., Late Glacial and Postglacial Environmental Changes-Quaternary, Carboniferous–Permian and Proterozoic: Oxford Univ. Press, New York, p. 147–168.

Pazos, P. J., di Pasquo, M., and Amenabar, C.R., 2005, La sección basal de la Formación Malimán (Carbonífero Inferior) en la quebrada Don Agustín, provincia de San Juan, Argentina: rasgos sedimentarios y paleontología: XVI Congreso Geológico Argentino (La Plata, *en prensa*).