REGIONAL CORRELATIONS WITH LATE PALEOZOIC EVENTS IN BOLIVIA

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INTRODUCTION

Recent advancements in the Upper Paleozoic biostratigraphy and sedimentary evolution of Bolivian basins need to be taken into account in South American regional correlations. Despite the different tectonic setting, the evolution of climates, paleobiogeography and sedimentary environments throughout the region was similar, and a common general evolution (not necessarily synchronous) can be observed. This paper summarizes Bolivian Late Paleozoic paleogeography, emphasizing several aspects of interest in regional correlations, including a few considérations on the biostratigraphy.

CORDILLERAN CYCLE

The Cordilleran cycle spans the Silurian to Mid Carboniferous interval between the Ocloyic (Late Ordovician-Early Silurian) and the Eohercynian (Chanic/ Tatarenda/ Chiriguano) diastrophic phases (Suárez, 1989). A thick (up to 5 km) terrigenous sequence was deposited in a retroarc foreland basin storm-dominated shallow marine environments (Sempere, 1995; Isaacson and Díaz, 1995). Deepening events and shallowing sequences reflect both global sea level changes and regional tectonism during foreland fold-thrust development. Cold-water Malvinokaffric-realm faunal associations include highly endemic organisms which hinder precise regional correlations, besides the facies-related character of many of them (Boucot & Racheboeuf, 1993). Micropaleontological studies (acritarch, quitinozoan and conodont biostratigraphy) are recently being pursued to help in age determinations (Merino, 1991; Vavrdova et al., 1991, 1993; Liachenko, 1994).

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SYNTECTONIC DEPOSITION AND GLACIATION

Famennian to Serpukhovian deposits (Villamontes supersequence of Sempere, 1995) include frequent massive gravity-flows and redeposited sediments which were clearly syntectonic, sometimes exceeding 1 km thicknesses (Ambo Group in the Altiplano, Retama Group in the northern Subandean, and Machareti and Mandiyuti Groups in the central and southern Subandean). They represent sharp increases (a) in subsidence, due to tectonic loading (piling of thrusted units) in the foreland (probably transpressional) front, and (b) in clastic input into the basin, due to the tectonically-induced relief (Díaz, 1991, 1992; Sempere, 1995; Tankard et al., 1995). Local glaciation in adjacent highlands is indicated by the presence of dropstones and glacially-striated and faceted clasts in gravity flows, and there is no evidence for the development of large ice caps in the area (Díaz, 1991; Díaz & Isaacson, 1994). Uplift was not related to metamorphism and intrusives (Eohercynian orogenesis), and only in westernmost Bolivia restricted evidence can be found for the development of a magmatic arc to the west during this period (Díaz, in review). All the Lower Carboniferous units present an overall shallowing upwards trend of the sedimentary environments (mostly marine and coastal/deltaic), related (a) with the cesation of tectonic activity and subsidence, and leveling out of reliefs, and (b) with global regression events in late Visean and Serpukhovian times, during the onset of the main glaciation event in Gondwana.

LOWER CARBONIFEROUS BIOSTRATIGRAPHY

Plant remains calibrated with palynology establish a late Visean-early Serpukhovian age for the Siripaca and Kaka Formations (Azcuy & Ottone, 1987; Vavrdová et al., 1991, 1993; Ianuzzi et al., 1993), thus giving an upper age limit for the Ambo and Retama Groups of western Bolivia. The lack of macrofauna and the resedimented character of the facies complicates regional correlations with southern Bolivia. The only

fossiliferous unit in the southern Subandean is the Taiguati Formation (top of Machareti Group), which includes fauna from the *Levipustula levis* biozone, dated as Serpukhovian-Early Bashkirian (Namurian; Roberts, 1981; González, 1989). The extended Late Bashkirian-Moscovian (Westphalian) age that has been assumed by some authors for this biozone in South America is still under discussion, and should be taken with care (preferably disregarded!), as it would mean that the Taiguati Fm. and the Mandiyuti Group are coetaneous with the Copacabana Formation, immediately to the northwest. An early Serpukhovian (early Namurian) age has been proposed for the Taiguati Formation (Sempere, 1995).

MID-CARBONIFEROUS DISCONFORMITY

The Titicaca and Cuevo Groups (Subandean cycle) rest on different Lower Carboniferous, Devonian and Silurian units in the Altiplano and Eastern Cordillera, and thus provide evidence for a Mid Carboniferous (Serpukhovian-Bashkirian) event of marine regression and intense erosion of variable duration. Angular relations between the two cycles are very slight (apparent concordance at the outcrop), and resulted only from subaerial exposure and erosion. There seems to be no marked tectonic movements in the basin during this period, thus indicating a change in tectonic stresses and paleogeography with respect to the previous active foreland setting. This discontinuity correlates with the one at the base of the Itararé Group and Aquidauana Formation of the Paraná basin, which is also related with global transgression events (Zalán et al., 1990).

SUBANDEAN CYCLE

The Titicaca and Cuevo Groups represent a complete overall transgressive-regressive cycle (Cuevo supersequence of Sempere, 1995). The base of the Titicaca Group is diachronic, older (Late Carboniferous) to the north and younger (Early Permian) to the south, according to latest results based on calcareous algae and conodont biostratigraphy of the Copacabana Formation (Merino & Blanco, 1990; Dalenz & Merino, 1994; Isaacson et al., 1995). The Cuevo Group represents the last (youngest) reaches of the marine transgression and calcareous deposition to the south of Bolivia. It has been dated as Permian-Early Triassic (Sempere et al., 1992). The clastic wedge at the base of these groups (Yaurichambi and Cangapi Formations) represents the gradual shift of coastal (foreshore and backshore) and deltaic/alluvial deposits towards the south, as base levels rose and the paleorelief was leveled. Climate, paleogeography and tectonic setting represent a drastic change with respect to the underlying Cordilleran cycle. Climate was warmer and more arid as a result of the gradual shift of this part of Gondwana towards lower latitudes, with development of eolian dunes and mixed carbonate-siliciclastic sabkha-type tidal flats. Intense Mid Permian to Early Triassic magmatism and transpressional intracratonic deformation developed in central and southern Peru, but not in Bolivia (Sempere, 1995). Transtensional conditions in the Mid Triassic initiate the Serere supersequence of the Subandean cycle with alkaline and tholeitic basalts (Soler & Sempere, 1993).

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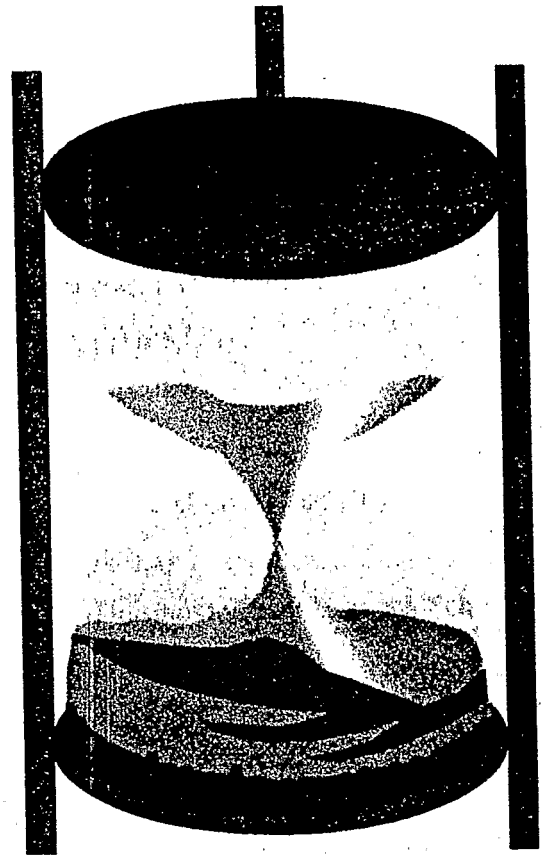
CRONOESTRATIGRAFIA DA BACIA DO PARANÁ

2° SIMPÓSIO SOBRE



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