EVENT STRATIGRAPHY AND ALLOSTRATIGRAPHIC SUBDIVISIONS FOR THE ORDOVICIAN SYSTEM OF THE ARGENTINE PRECORDILLERA, SOUTHWESTERN GONDWANA

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INTRODUCTION

As in other regions of the world a rather abundant stratigraphic nomenclature has been used to name Lower Paleozoic units in the Argentine Precordillera (Furque & Cuerda, 1979; Baldis *et al.*, 1982). In several cases different names are used for the same stratigraphic interval (Astini, 1994, 1995) in different areas of the basin. An allostratigraphic approach (*cf.* Walker, 1990; Woodcock, 1990) where strong emphasis is given to the sedimentary breaks, allows simplification of the stratigraphic picture and greatly helps in basin analysis and event-stratigraphic studies. In this contribution an allostratigraphic division for the Ordovician of the eastern tectofacies (according to Astini, 1992) of the Argentine Precordillera is presented. This method allows differentiation of the main breaks in the sedimentary record by considering a chronostratigraphic framework for the basin and also addresses the problems and causes of the disrupted stratigraphic record. The method can be applied in the Precordillera because of the relatively good knowledge on its faunas and their resolution and the relative clarity of the regional context (Astini *et al.*, 1995).

ALLOSTRATIGRAPHIC APPROACH FOR SEQUENCE STRATIGRAPHY AND BASIN ANALYSIS

Several tentative and partial sequence stratigraphic schemes have been published in recent years on the Lower Paleozoic of the Argentine Precordillera including those of the author. Nevertheless, a main discussion on weather the Vail (several authors in Wilgus *et al.*, 1988, Van Wagoner *et al.*, 1990) or the Galloway (1989) criteria fits better is still lacking. Much of this problem could be solved by considering the bounding unconformities and their nature. A good starting point is that of an Allostratigraphic approach. Although of limited predictive potential (Martinsen *et al.*, 1993) this may offer operational advantages over the other schemes and may be more useful than sequence stratigraphic models in basins with complicated tectonism and variable sources, where the relativity of sea level cannot be ignored.

The relative magnitude and extent of different unconformities in a given basin can be assessed by constructing the rock preservation curve (Astini, 1993). This technique is described in detail by Woodcock (1990) and allows understanding the basin fill. On the basis of eleven generalized

Woodcock (1990) and allows understanding the basin fill. On the basis of eleven generalized chronostratigraphic logs carried out in a south-north trend in the Ordovician System of the Precordillera a rock preservation curve was constructed (Fig. 1). Although some outcrop limitations affect the proved hierarchy of some of the gaps, showing them as of a more limited extent (local unconformities), by considering the intervening facies their local versus regional origin can be estimated. Such is the case of the two lower units (not everywhere exposed) which are entirely carbonate and represent members of an evolved passive margin succession (Astini *et al.*, in press) or the upper units, which, although of limited outcrop extent, have a distinctive glacial origin. In both cases a global (eustatic) character for their bounding unconformities can easily be accepted.

Although a detail analysis of the driving mechanisms behind the above defined sequence stratigraphy is beyond the scope of this paper, a tentative interpretation is possible on an event-stratigraphic level. For this purpose a smoothed version of the rock preservation curve was drawn (Fig. 2), which can be interpreted as a relative sea-level curve, considering that the unconformities are due to relative base level fluctuations. Taking in consideration the cases outlined in the previous paragraph, the relative extent of the unconformities point out the local versus worldwide origin. Short-life widespread unconformities as those located between the carbonate alloformations (A & B, base of La Silla and base of San Juan Afms, respectively) as well as those related with the Late Ordovician glaciation (F & G, base and top of Don Braulio Afm) are interpreted as eustatic. Tectonic or subsidence components are ruled out in A and B due to their position in relation to a mature passive margin evolutionary stage. F and G are related respectively with wax and wane stages of the Hirnantian glaciation that affected Gondwana. Longer-life interruptions in the sedimentary record (D & E) (Llandeilo and Caradoc draw-downs) are, at least in the Precordillera, related to main tectonic events like the accretion of Precordillera terrane to western Gondwana and the postcollisional relaxation period, although enlarging eustatic components cannot be ruled out. The longer span gap in C is locally expanded due to the diachronic effect given by the progress of a migrating foredeep during the approach of the Precordillera Terrane to western Gondwana in the Early-Mid Ordovician. This widely developed diachronous unconformity partially overlaps with global sea-level fluctuations.

CONCLUSIONS

A rock preservation curve based on eleven generalized chronostratigraphic logs carried out in the Ordovician System of the Argentine Precordillera (western Argentina), serves as a basis to highlight continuous sedimentation episodes separated by local and/or area-wide unconformities. Several allostratigraphic units were recognized and served as a ground for an event-stratigraphic approach based on presence and absence of rock record. Finally, a relative sea-level curve was constructed reflecting the extent of the recognized unconformities. This approach greatly simplifies basin analysis focusing on event-stratigraphy as a major tool in revealing basin evolution and basin fill architecture. Minor extent unconformities are interpreted as due to local subsidence pulses, whereas major unconformities are due either to sea-level eustatic changes or to regional tectonic events. Short-life widespread unconformities as those located between the carbonate alloformations (La Silla and San Juan Afms) or those related with the Late Ordovician glaciation (Don Braulio Afm) are interpreted as eustatic. Longer life interruptions in the sedimentary record (Llandeilo and Caradoc draw-downs) are, at least in the Precordillera, related to main tectonic events like the accretion of Precordillera to western Gondwana and the postcollisional relaxation period. The longer span gap is locally expanded due to the diachronic effect of tectonism.

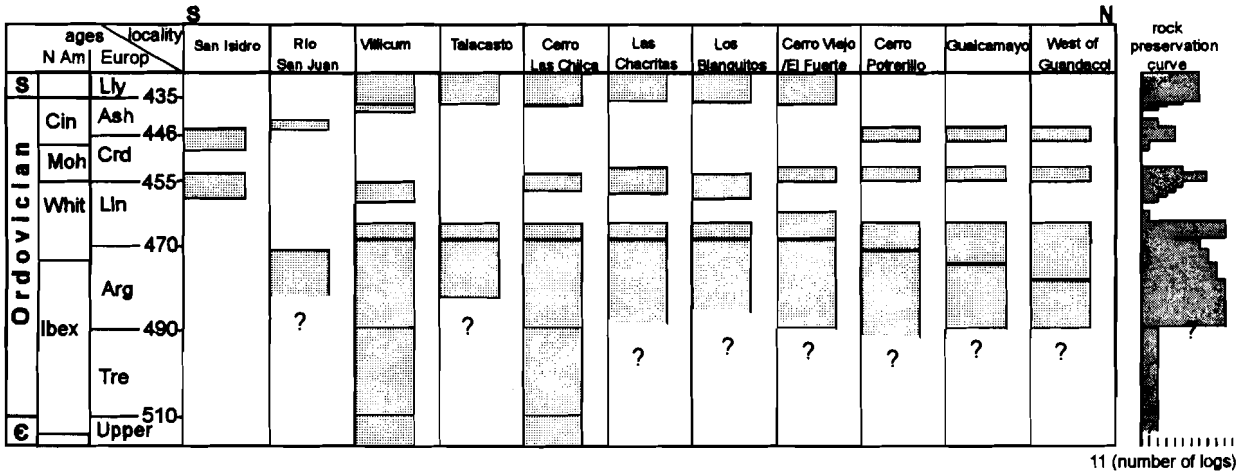

Fig. 1: Rock preservation curve constructed for the Ordovician System of the Argentine Precordillera based on eleven chronostratigraphic logs distributed in a south-north trend along the Precordilleran trhust belt.

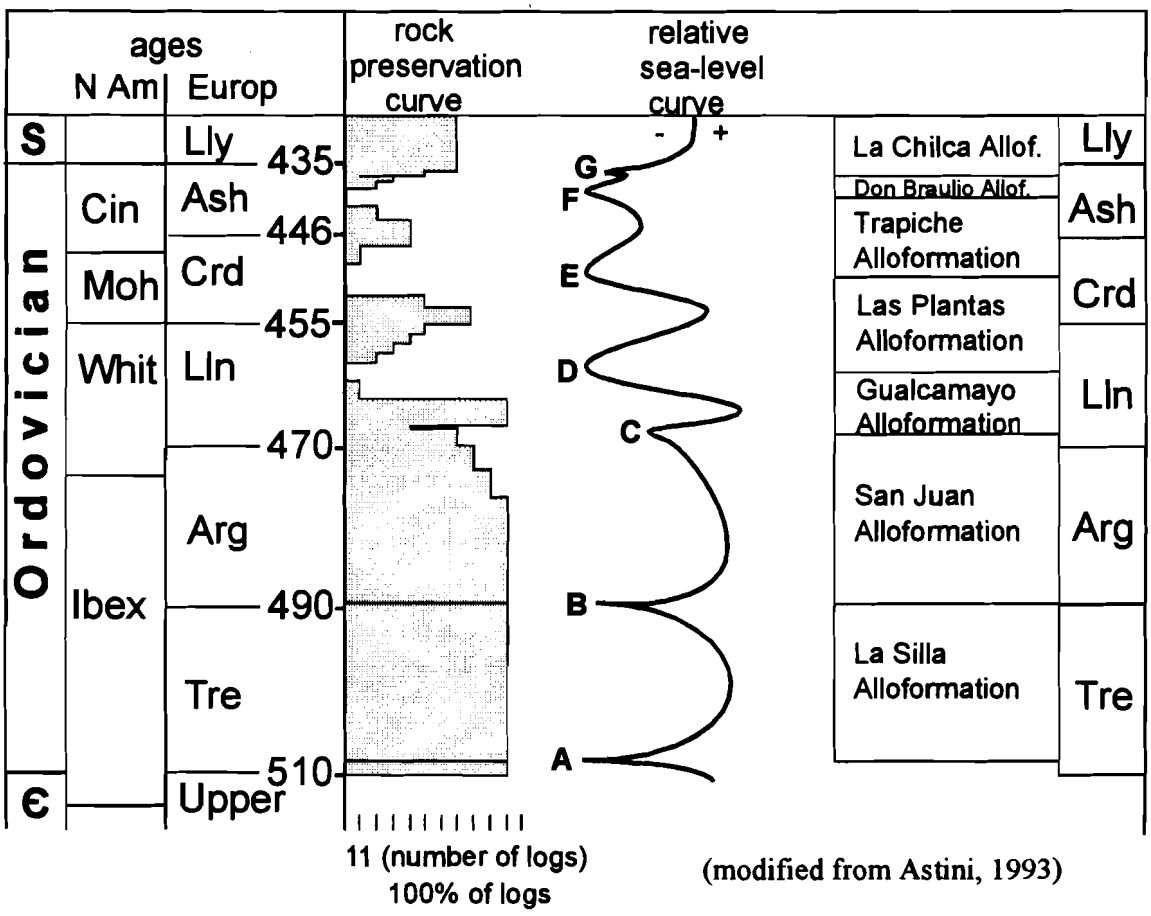

Fig. 2: Smoothed rock preservation curve and allostratigraphic division of the Ordovician of the Precordillera basin. For discussion on the curve see text.

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