IAS Postgraduate Grant Scheme 1st Session 2008

The Intra-Tethys Upper Jurassic-Lower Cretaceous carbonate platforms. A case study from the Parnassos (Greece)

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Base-of-slope successions are characterized by a dynamic stratigraphic architecture, represented by the alternation of inner platform and platform margin-derived sediments and pelagic deposits. This pattern reflects production and export changes of the carbonate fac¬tory through time. In particular, the platform margin plays a primary role in the stratigraphical pattern of the base-of-slope successions, because of changes in its anatomy and internal structure, e.g. extension, vertical or horizontal growth potential, composition, biota diversity and distribution, are able to influence the carbonate sediments production and export processes.
During my Ph.D studies I have investigated the Middle Jurassic-Lower Cretaceous carbonate system of the Lazio-Abruzzi platform, outcropping across the central Apennines, Italy. My analyses focus on two main purposes, the first one consists on the investigation of the relationship between the stratigraphic pattern of the base-of-slope successions and the carbonate factory anatomy and changes. The second purpose is to deepen the internal structure, composition and facies arrangement of the Upper Jurassic platform margin (Ellipsactina limestones).

The IAS grant has been used to partially cover the cost of geological field trip (June, 2008) to another poorly-studied example of a Intra-Tethys carbonate depositional system, outcropping at Parnassos mountain, in the southern portion of the continental Greece. The aim is to verify if the coeval base-of-slope and margin successions of the Parnassos platform display a stratigraphic architecture similar to the carbonate system observed in the Lazio-Abruzzi area.
For the first purpose, I have studied the stacking pattern and the sediment composition of a series of Middle Jurassic-Lower Creta¬ceous base-of-slope successions. The Middle Jurassic-Lower Cretaceous base-of-slope successions of the Lazio-abruzzi area have been sub-divided into 3 large scale cycles characterized by similar internal architectures, defined by an overall symmetric stratal stack¬ing pattern, made up of a progressive thinning and fining upward trends in the lower part, and by a progressive thickening and coars¬ening upward trend in the upper part (Rusciadelli et al., 2008). In the first cycle, the coarse sediment of the lower and upper intervals are dominated by large amounts of ooids, peloids and benthic foraminifera, while the intermediate interval is characterized by very fine grained calcarenites, mainly composed by peloids. In the second cycle, resediments of the lower and upper intervals are mostly repre¬sented by a skeletal component, dominated by encrusters and straomatoporoids fragments. In the middle interval, peloidal fine grained and thinly bedded deposits largely dominate. In the third cycle, the resediments of the lower and the upper intervals display an overall composition similar to their equivalent lithofacies of the underlying cycle, represented by dominant stromatoporoids and encrusters and small amount of peloids. The particular features of this cycle is represented by intermediate interval, where peloidal facies are completely lacking and the fine grained and thinly bedded lithofacies correspond to micrites with calpionellids and radiolari¬ans.
During the field trip in Greece, with the collaboration of Dr Nicolas Carras of IGME of Athens, we have selected a series of key-stratigraphical sections across Parnassos and Vardoussia mountains to observe the western and eastern portions of platform and base-of-slope. The analyzed successions have been:

- Anthimos;
- Valanidies,
- Kokkinovrakos;
- Sikiotis;
- Dorikon;
- Mousounitsa.

Two detailed stratigraphic logs have been archived along the well exposed Middle and Upper Jurassic base-of-slope successions of Valanidies and Dorikon. I have collected 200 samples for the biostratigraphic and microfacies analyses. All samples are under prepa¬ration at the Laboratory of University G. d'Annunzio, Chieti.
Preliminary results, performed during this field trip, indicate a quite similar stratigraphic architecture for the coeval base-of-slope suc¬cessions. They are characterized by three main intervals and the composition of the resediments is comparable with the Lazio-Abruzzi counter-parts.

For the second purpose of my Ph.D studies, I have deeply investigated the anatomy and the internal organization of the Upper Jurassic Lazio-Abruzzi platform margin. The analyses focus on the composition and the biota associations distribution of the Ellipsactinia limestones, corresponding to second cycle in the base-of-slope setting. Through a quantitative and statistical facies analysis, the Ellipsactinia limestones have been subdivided into three different lithostratigraphic units (A, B, C), representing distinct and mappable lithofacies association (Ricci and Rusciadelli, 2008a, b) . Unit A is defined by the presence of coral frameworks, represented by few metres large isolated coral patch-reefs, scattered into a fine to coarse grained matrix with abundant coral fragments. Unit B is represented by isolated small corals, coral fragments, stromatoporoids and chaetetids, dispersed into a fine to coarse grained bioclastic matrix. Unit C is characterized by moderately to densely packed skeletons of calcareous sponges (stromatoporoids and chetetids), with few coral fragments, floating in a fine grained bioclastic matrix. By the mapping of the three lithostratigraphic units, is possible to observe that the margin, at large scale is characterized by an overall aggrading architecture, as suggested by a well-defined lateral arrangement of the facies belts, with units A, B and C that reflect inner, intermediate and outer margin positions, respectively. Moreover, its area is about 10km, and it tends to develop more laterally than vertically. On the contrary, the overlain Lower Cretaceous margin appears narrower than the Upper Jurassic equivalent (about 2km). It seems to build more vertically than laterally and the well-defined lateral arrangement of the facies belt is lacking.

Regarding to the field trip in Greece, two key-areas of the Upper Jurassic Parnassos platform margin have been visited. A preliminary qualitative analysis of the composition and of the benthonic association has been performed in Malandrino area (western margin) and Laikora mountain (eastern margin), where the Ellipsactina limestones are well-preserved. About 30 samples among corals, stromatoporoids and cheatetids have been collected for paleontological and paleoecological analyses.
Preliminary results suggest that the lateral arrangement of the Parnassos Upper Jurassic margin facies area is similar to the Lazio-Abruzzi counter-part. It is dominated by coral-bearing facies in the most inner part and by calcareous sponge (stromatoporoids and chaetetids)- bearing facies in the most external part. Likewise, the stratigraphical architecture of the margin shows an aggrading pattern and a decreasing area from Late Jurassic to Lower Cretaceous, similarity to the Lazio-Abruzzi area.

All preliminary analyses, performed during this first field trip across the Parnassos platform, encourage to intensify further studies addressed to a detailed cross-correlation between these two Intra-Tethys carbonate systems. I wish to collect more data from these two and others Intra-Tethys domains in order to constrain the relationship between the carbonate production and export phases and the base-of-slope stratigraphic pattern.

Acknowledgements

I am particularly indebted to Dr N. Carras for the hospitality. He made available to me his scientific materials and especially his deep knowledge of the Parnassos platform. I am grateful to my supervisor Prof. G. Rusciadelli for stimulating this study and for the co-operation in the work.

Biblography

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