Anuário do Instituto de Geociências - UFRJ
ISSN 0101-9759 Vol. 29 - 1 / 2006 p. 480-481

FORAMS 2006

Maastrichtian-Paleocene deposition in the Paraíba Basin, NE Brazil

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The Paraíba Basin, located along the Atlantic margin of NE Brazil, is subdivided into three sub-basins: Olinda (south), Alhandra (middle) and Miriri (north). Only the Olinda sub-basin contains a complete Maastrichtian-Paleocene carbonate sequence. This sequence is relatively unknown, except for the K-T boundary transition at the Poty Quarry and Ponta do Funil, which are among the best K-T sections in South America. Previous studies have detailed the K-T transition in the Poty Quarry, but the physical aspects and geological nature of this record and its correlation with the Chicxulub impact are still under debate.

A US-Brazil funded cooperative project between Geosciences Departments at Princeton University and the Federal University of Pernambuco (CNPq/NSF) drilled the Paleocene through Maastrichtian sequences in three localities (Poty, Olinda, Itamaraca). The main objectives include the evaluation of environmental changes during the Maastrichtian and the K-T boundary transition. The wells span the carbonate sequences from the Maria Farinha (Paleocene) to the base of the Gramame (Maastrichtian) Formations. The Itamaracá-core is located in the deepest part of the Olinda sub-basin, with Poty and Olinda in the shallower flanks. The deep basin location of the Itamaracá core is evident by the presence of small slumps (50-100cm). These slumps are probably related to gravity flows. In addition, we examined and sampled several K-T outcrops.

Preliminary results from sedimentology, biostratigraphy and physical stratigraphy suggest that the carbonate deposition began after a maximum flooding surface, which produced a phosphate-rich layer. This phosphatic layer marks a sequence boundary at the top of the Itamaracá Formation (transitional sequence). The Gramame Formation shows a monotonous sequence of marls, marly limestones and limestones. Deposition occurred in a shallow low-energy environment, resulting in intermittent reworking, erosion and shell bed

accumulations. Upper Maastrichtian sediments show a strong reduction in the macrofossil components compared with the underlying high diversity assemblages at the base of the Gramame Formation. Ammonites disappear two meters below the K-T transition. Observed Ichnofossils suggest the Cruziana ichnofacies, with low diversity dominated by large *Thalassinoides* and *Planolites*.

The top of the Gramame Formation is separated from the Maria Farinha Formation by a conglomeratic bed that marks the K-T transition. This conglomerate was observed in all three wells and in outcrops. The origin of this conglomerate is still under debate and under intensive study. It has been variously interpreted as impact-generated tsunami deposit, storm deposit, tectonic breccia or sea level lowstand. Our preliminary investigation of this conglomerate reveals a 40-50cm thick mass flow deposit consisting mainly of phosphate and glauconite pebbles, occasionally graded, and floating in a micrite matrix. This coarser material probably derives from the dislocation of the uppermost Maastrichtian phosphatized hardground that developed in more proximal areas and can be observed in outcrops. Such sedimentological features are not unique and frequently associated with the sea-level fall and/or local tectonic activity, which mark the uppermost Maastrichtian. The age of deposition of this mass flow is still in question. Although previous studies have placed it at or below the K-T boundary, the presence of Danian planktic foraminifera puts this age in question. It remains to be determined whether their presence is the result of burrowing or whether the breccia is of early Paleocene age. Above the K-T transition, the cores reveal gradual shallowing, marked by glauconitic and phosphatized beds and shell layers. The presence of *Ostrea* sp. and a large number of callianaseadean crabs suggests the proximity of estuaries or tidal conditions.