

SANDOVAL GUTIERREZ Maria Isabel (2015): Late Mesozoic to Neogene radiolarian biostratigraphy and palaeoceanography in the Caribbean and East Pacific Region Abstract

Radiolarians constitute a good tool for contributing to the biostratigraphy of accreted terranes and in deep-sea sediment sequences. The use of radiolarians is also proven to be valuable as a palaeoceanographic indicator. The present study evaluates radiolarians in three different geological settings, in order to better constrain the age of the sites and to try to understand their palaeoenvironmental situation at different periods, particularly in the Caribbean-Central America area.

On the Jarabacoa Block, in Central Dominican Republic, a hundred meters of siliceous mudstones (Pedro Brand section in the Tireo Group) was dated as Turonian–Coniacian in age using radiolarians. A ^{40}Ar - ^{39}Ar whole rock age of 75.1 ± 1.1 Ma (Campanian), obtained in a basalt dyke crosscutting the radiolarian bearing rocks, a consistent minimum age for the pelagic-hemipelagic Pedro Brand section. The Jarabacoa Block is considered as the most complete outcrop section of Pacific ocean crust overlain by a first Aptian–Albian phase of Caribbean Large Igneous Province-type activity (CLIP), followed by the development of a Cenomanian–Santonian intraoceanic arc, which is in turn overlain by a late Campanian–Maastrichtian CLIP-phase. The Tireo Group records an episode of pelagic to hemi-pelagic and intermediate to acidic arc-derived sedimentation, previous to the youngest magmatic phase of the CLIP. Thus, the section of Pedro Brand has been interpreted in this study as being part of the intraoceanic arc.

In northern Venezuela, a greenish radiolarite section from Siquisique Ophiolite (basalts, gabbros and some associated cherts) in Guaparo Creek has been studied. In previous studies, the Ophiolite unit (Petacas Creek section) has been dated as Bajocian–Bathonian, based on ammonites present in interpillow sediments from basalt blocks. New dating of the present study concluded in an Aptian?–Albian–Cenomanian age for the Guaparo creek section (middle Cretaceous), based on radiolarian assemblage associated to basalts-gabbros rocks of the unit. Previous plagioclase ^{40}Ar - ^{39}Ar ages from the Siquisique Ophiolite may be slightly younger (94–90 Ma.) and may, therefore, represent younger dykes that intruded onto a well-developed sheeted dyke complex of the Siquisique.

The geochemistry of these rocks and the palaeotectonic reconstruction of the Caribbean area during this period suggest that these rocks were derived from a mid-ocean ridge with an influence of deep mantle plume. The Siquisique Ophiolite most probably represents a fragment of the proto-Caribbean basin.

The Integrated Ocean Drilling Program Expedition 344 drilled a transect across the convergent margin off Costa Rica. Two sites of this expedition were chosen for radiolarian biostratigraphy and palaeoceanographic studies. Both sites (U1381C and U1414A) are located in the incoming Cocos plate, in the eastern Equatorial Pacific. The succession of U1381C yields a Middle Miocene to Pleistocene age, and presents an important hiatus of approximately 10 Ma. The core of U1414A exposes a continuous sequence that deposited during Late Miocene to Pleistocene (radiolarian zones RN6–RN16). The ages were assigned based on radiolarians and correlated with nannofossil zonation and tephra ^{40}Ar - ^{39}Ar datation. With those results, and considering the northward movement of the Cocos plate motion (about 7 cm/year), deduction is made that the sites U1381C and U1414A were initially deposited during the Miocene, several hundreds of kilometres from the current location, slightly south of the Equator. This suggests that the faunas of these sites have been subjected to different currents, first influenced by the cold tongue of the South Equatorial

Current and followed by the warm Equatorial Countercurrent. At last, coastal upwelling influenced faunas of the Pleistocene.