



Geodynamic implications of zircon ages from Cuba

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Available zircon ages for rocks from Central and Eastern Cuba include the Escambray Massif (ESC), the Mabujina Amphibolite Belt (MAB), the Cretaceous Primitive Volcanic Arc (KPIA), the Cretaceous Calc-alkaline Volcanic Arc (KCAA), the Purial Massif (PUR), the Northern Ophiolite Belt (NOB), and the Palaeogene Volcanic Arc (PVA). These existing ages are used to infer the geologic history of the northern margin of the Caribbean Plate.

The ESC is a Mesozoic composite terrane subducted during the Cretaceous and accreted to the volcanic arcs terranes in the late Cretaceous. Detrital zircons from metasediments document a complex source made of Grenvillian (1187 Ma, 964-1506 Ma), Pan-African (594), and Palaeozoic (279-484 Ma) components. Jurassic clastic sediments from the continental margin terrane of western Cuba have shown also a Grenvillian source component. This group of ages may indicate derivation from the Maya or Chortis Blocks of Central America. Detrital zircons from an eclogite lens in the ESC yielded 201-256 Ma, suggesting a complex picture of sedimentation of an old source component onto Jurassic oceanic floor.

A zircon age of 133 Ma in a trondhjemitic gneiss of the Mabujina belt (MAB) indicates that this unit represents KPIA in central Cuba, which correlates with the Lower Cretaceous primitive island arc rocks documented in the Greater Antilles Virgin Islands, Puerto Rico and the Dominican Republic. Granitoid samples from the Manicaragua

pluton intruding MAB and from the Camagüey plutons intruding KCAA, provided emplacement ages of 93-83 Ma and 104-81 Ma, respectively, indicating a continuous calc-alkaline magmatic evolution through about 20 m.y. in central Cuba. The PUR is considered the easternmost metamorphic equivalent of the KCAA of Cuba. A tonalite from the Yayabo River in the southern PUR yielded a concordant zircon age of 113 Ma, co-relatable with the KCAA in central Cuba.

Zircons from a plagiogranite fragment within the Northern Ophiolite Mélange in central Cuba provided a concordant age of 86 Ma documenting oceanic crust formation in the late Cretaceous. The simultaneous development of arc magmatism in the region suggests oceanic crust formation during the same time interval. Tectonically emplaced within the Northeastern Cuban Ophiolites occur Late Cretaceous primitive island arc PIA rocks from which sheared felsic volcanic rock and a tonalite, yielded 86 Ma determined from zircons. This date confirms that PIA rocks in the Caribbean can be both Early and Late Cretaceous in age.

The PVA of the Sierra Maestra, SE Cuba, includes calc-alkaline tonalites and trondhjemites that were generated in an intra-oceanic arc for which zircon emplacement ages between 60 and 48 Ma were determined. These support the concept of separating, at least in Cuba, the Paleogene volcanic arc from the Cretaceous volcanic arc.

Interestingly, zircon xenocrysts of ~440 and 980 Ma ages in the KCAA rocks suggest the presence of an old crust component in the Cretaceous arcs magmas that is best explained as material transferred from the subducted slab sediments to the suprasubduction environment. The presence of this component also in the ESC may be supportive of models of Pacific origin of the Caribbean Plate, but additional detailed provenance studies are needed to address properly this question.