Geophysical Research Abstracts, Vol. 8, 01964, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01964

Transfer of the North-Western Caribbean plate to the North American continental margin: Geodynamic evolution of the Cuban archipelago

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The Cuban orogenic belt records subduction, volcanic arc formation and accretion along the pre-Eocene north-western leading edge of the Caribbean plate. Geologic evidence indicates a two-stage development with a change in subduction polarity from a south to south-west-dipping Cretaceous to a north-dipping Paleocene to Early Eocene volcanic arc.

A volcanic arc developed in the north-western Caribbean region from the Aptian-Campanian. The south-dipping subduction polarity is indicated by the Late Cretaceous subsidence of the North American palaeomargin and the north to north-west directed tectonic transport in the Cuban thrust belt during the Paleocene to Middle Eocene. The ophiolites within the central and western Cuban thrust belt apparently represent remnants of oceanic lithosphere that formerly separated the Cretaceous volcanic arc and the North American paleomargin. The metamorphic complexes may comprise parts of a Middle to Late Cretaceous subduction-accretion complex. The subduction-accretion complex was overthrust by the Cretaceous volcanic arc units as a result of the collision with the North American paleomargin.

The onset of collision between the Cretaceous volcanic arc and the North American paleomargin dates back to the Late Campanian when volcanic activity ceased. Following the initial collision, ophiolites and thrust sheets of the Cretaceous volcanic arc advanced onto the North American paleomargin until the Late Eocene, whereas strike-slip faults bound domains that display an eastward younging trend in the termination

of the thrusting process.

After the initial collision of the Cretaceous arc with the North American paleomargin, a continued relative northward movement of the Caribbean plate can be inferred from the eastern Cuban ophiolites (Mayarí-Baracoa massif). These rest on top of the Cretaceous volcanic arc and record Maastrichtian thrusting, uplift and gravitational sliding of oceanic lithosphere from a southern direction.

As a further result, a north-dipping subduction zone was established in the back arc area of the Cretaceous volcanic arc during the Danian. This subduction zone consumed oceanic lithosphere of the Caribbean plate during the Paleocene until the Middle Eocene and was related to the development of the Cayman-Turquino arc. The arrival of the Caribbean Large Igneous Province stopped the subduction and the relative northward movement of the Caribbean plate towards the North American plate. Sinistral transform faulting was initiated in its place. Probably from the Middle Eocene onward, the east-west striking Oriente transform fault system truncated the Cayman-Turquino volcanic arc. After its initiation, the present day northern boundary of the Caribbean plate was established.