AAPG International Conference
Barcelona, Spain
September 21-24, 2003

Lorcan Kennan[1], James Pindell[1] (1) Tectonic Analysis, Ltd, West Burton, West Sussex, United Kingdom

Terrane accretion in the Northern Andes: the Caribbean connection

Pacific-origin models for Caribbean Plate imply strong Cretaceous interaction with northern Andes, and this is reflected in regional structure, stratigraphy and magmatism. Intra-American models do not imply this and cannot explain dramatic contrasts in Cretaceous orogenesis, magmatism between northern Andes (Ecuador, Colombia) and central Andes (central Peru to Bolivia). Plate reconstructions show trailing edge of Caribbean Plate defining a triple junction with Farallon and South America Plates, intersecting Peru trench south of Piñon Terrane during the Aptian. Costa Rica-Panama "arc" initiated at the transpressive Caribbean-Farallon plate boundary. North of the triple junction, Cretaceous subduction-related magmatism is largely absent due to extremely slow oblique low-angle subduction. Intense dextral shear resulted in accretion of bouyant Caribbean Plateau basalts, interleaving of oceanic and continental terranes and northward-younging uplift, erosion and clastic foreland sedimentation. In contrast, "typical" Andean magmatism and deformation dominated the central Andes. Orogenesis in northernmost Peru, Ecuador, Colombia comprised highly oblique back-arc basin closure, unroofing of Ecuadorian Eastern Cordillera, followed by final accretion of volcanic arc terranes, and superimposition of "Andean-type" magmatism as the triple junction migrated north. Subsequent deformation was dominated by foreland-directed thrusting, with less intense dextral shear and limited forearc deformation. At the southern end of this orogen, the Talara, Progreso basins formed in a back-arc setting and were sheared into their current forearc positions. New paleogeographic maps explain the original depositional contexts of key formations. Thus, hydrocarbon systems models should not assume an entirely forearc setting for features such as heatflow and source rock environment.