DETRITAL ZIRCON GEOCHRONOLOGY OF PALEOCENE/EOCENE TURBIDITES FROM VENEZUELA AND OFFSHORE ISLANDS: IMPLICATIONS FOR LATE CRETACEOUS SUBDUCTION INITIATION ALONG THE LEEWARD ISLANDS AND AVES RIDGE

(Geocronología de zircones detriticos procedentes de turbiditas del Paleoceno/Eoceno de Venezuela e islas costa afuera: Implicaciones en la subducción del Cretácico Tardío a lo largo de las Antillas de Sotavento y la prominencia de Aves)

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(Cartel en DVD anexo, carpeta 015)

Tectonic reconstructions suggest the oblique collision between the Caribbean and the South American plates as beginning on Late Cretaceous through Paleocene times. During this time flysch and wildflysch sequences were deposited on the foredeep and later deformed and uplifted as long as the Caribbean plate continued its eastward movement. As a result, a "belt of flysch units" can be observed along northern Venezuela (Matatere, Guárico and Pampatar formations, among others), Curacao, Bonaire, Trinidad (Chaudière Fm) and Barbados (Scotland Group). It is believed - from petrologic and paleocurrents studies - that the sediments that compose these sequences came from sources located on the North (volcanic island arc) and South (passive margin units and/or Guyana Shield). Ages of deposition of these units have been determined from the sometimes scarce fossil record and stratigraphic correlations but this data is not yet conclusive, keeping the uncertainty about the origin and nature of these rocks.

U/Pb dating techniques with Laser ablation – inductively coupled plasma mass spectrometry (LA-ICPMS) were applied on detrital zircons to determine ages of crystallization of the parental material and, when possible, age of deposition. Comparing the geochronological information between the Paleocene-Eocene turbidites and Early Cretaceous passive margin units would give better approximations about the nature of the turbiditic sequences in northern Venezuela and their timeframe location within the Caribbean evolution models.

The siliciclastic Cretaceous passive margin units of northern Venezuela have long been considered to have been derived from erosion of the Guyana Shield to the south. These are compositionally mature quartzose sediments due to deep tropical weathering in the source. Our detrital zircon data indicate a clear Guyana Shield provenance but also contain an abundance of "Grenville age" 950 Ma -1.3 Ga zircons that must have been derived from an Andean source. The Santa Marta Massif in the Colombian Andes is a likely candidate for this detrital component. Surprisingly even the Barranquín Formation of eastern Venezuela contains the "Grenville age" component despite being located a considerable distance from an Andean source. We speculate that the deltaic deposits of the Barranquín Formation were fed by a proto Orinoco river which drained the Andes and flowed through the Espino Graben, now buried by younger sediments (see figure 1). This idea has been suggested by KASPER & LARUE (1986). And by J. PINDELL (personal communication).

The framework grains of our turbidite samples contrast strongly with the quartzose strata of the passive margin. Although variable, our samples consistently contain plagioclase and volcanic rock fragments and in some cases primary igneous hornblende derived from a volcanic and plutonic source terrane. Detrital zircon data support the petrographic data. The turbidites have older zircon components similar to the passive margin samples including a prominent "Grenville age" signature but also contain abundant Eocene and Late Cretaceous detrital grains presumably derived from the Caribbean arc (Leeward Antilles/Aves Ridge). The lack of significant detrital grains with ages older than 90 Ma suggests that the arc basement is no older than ca. 90 Ma and marks the time of subduction initiation along the southern margin of the Caribbean Plateau.

Our preliminary interpretation is that arc magmatism initiated along the Aves Ridge/Leeward Antilles in the Late Cretaceous and was constructed on a basement of the only slightly older Caribbean Large Igneous Complex (CLIP). Thus, the Leeward Antilles/Aves Ridge does not have a Greater Antilles arc basement. We suggest that the Greater Antilles arc terminated southward at a transform boundary that separated proto -Caribbean oceanic crust from the Greater Antilles arc and the CLIP. Subduction initiation along the transform generated the Leeward Antilles/Aves Ridge island arc.

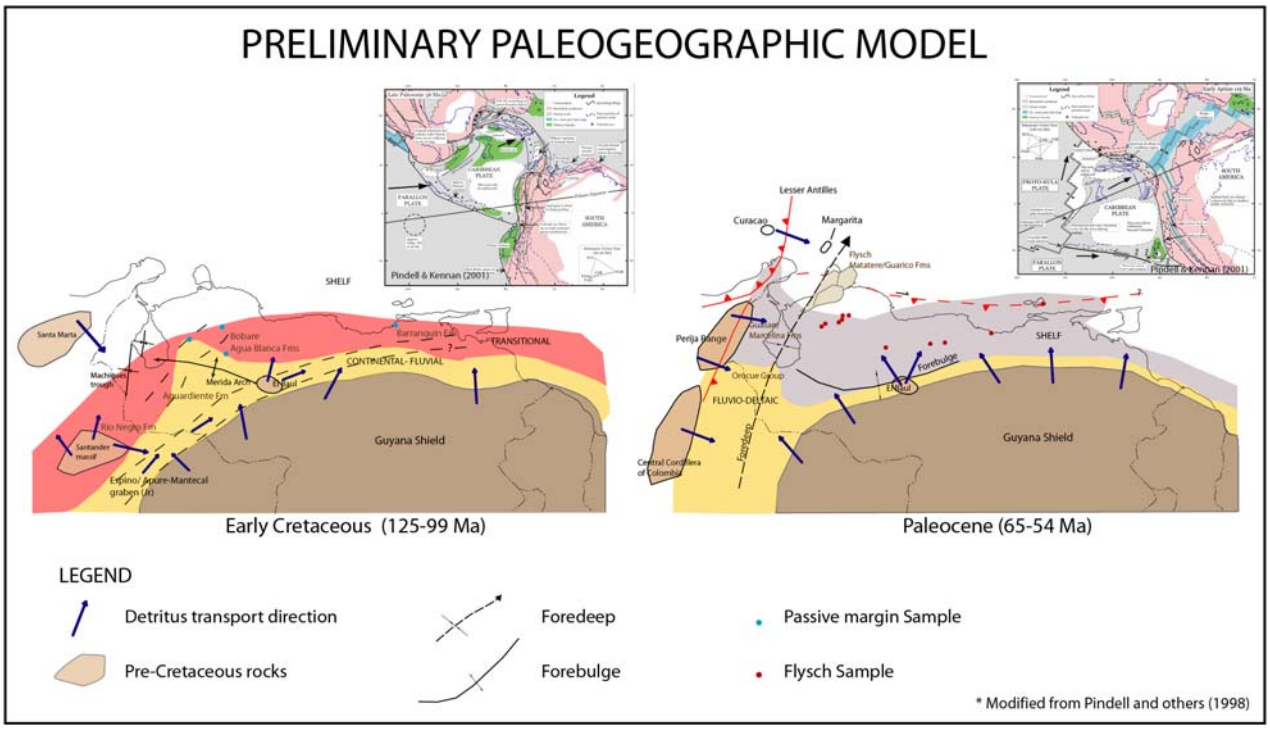

Fig. 1. Preliminary interpretation of the palaeogeography of Venezuela during the deposition times of the passive margin and turbiditic units. Modified from PINDELL *et. al (1998).*

PETROGRAFÍA DEL GRANITO DE VALERA, ESTADO TRUJILLO
(Petrography of the Valera Granite, Trujillo state, Venezuela)

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Se caracteriza petrográficamente la unidad de rocas granitoides conocida como Granito de Valera. Este cuerpo, que aflora en un área de cerca de 100 km^2, hacia el sur de la ciudad de Valera, estado Trujillo, Andes venezolanos, ha sido considerado como intrusivo en las rocas del Complejo Iglesias (KOVISARS 1972, RAMÍREZ *et al.* 1972, BURKLEY 1976).

Para llevar a cabo el trabajo se seleccionaron treinta secciones finas para determinar su mineralogía. Ésta fue estimada visualmente, siempre considerando la fábrica y la presencia de fenocristales o vetas que pudieran alterar los resultados. Todos los granitoides mostraron cuarzo, feldespato potásico, plagioclasa sódica, biotita y moscovita, como minerales esenciales. En algunas muestras de metagranitos se encontró sillimanita y a veces granate. Como accesorios, aparecen circón, apatito y monacita. En rocas de composición granodiorítica se encontró epidoto, esfena y alanita. Los minerales secundarios incluyen clorita, epidoto microgranular, esfena microgranular y sericita.

Mediante la aplicación a los resultados petrográficos del esquema de clasificación modal de la IUGS (LE BAS & STRECKEISEN, 1991), encontramos que la mayor parte de las rocas expuestas, consisten de granitos *sensu stricto*, con algunas granodioritas, tonalitas y dioritas, localmente. Además de la clasificación antes mencionada, las variaciones texturales relacionadas con el desarrollo de orientación o foliación, permitieron reconocer dos tipos litológicos-texturales principales: los metagranitoides y los gneises graníticos. Mineralógicamente, ambos litotipos son similares, con abundancia de micas (indicativo de carácter peralumínico) y minerales de alteración. Las rocas son en general blastoporfídicas,

Las texturas consideradas como primarias o debidas a procesos magmáticos son: porfídico-poiquilítica y granítica (equigranular) y zonada. Las texturas y estructuras que evidencian procesos magmáticos tardíos y post-magmáticos son: intercrecimientos mirmekíticos y pertíticos, maclado secundario, alteración (cloritización, sausuritización, sericitización) y transformación polimórfica (triclinización de la ortosa). Las rocas de ambas unidades exhiben grados variables de deformación y muestran caracteres tanto de tipo frágil como de tipo dúctil.