

## The initiation of subduction in the Caribbean realm: The La Tinta mélangé, eastern Cuba

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The subduction initiation processes have been traditionally documented by the presence of boninite rocks and more recently, by a forearc basalt (FAB) and boninite sequence. Gabbroic rocks occur below the FAB and above the mantle peridotites in an undeformed forearc sequence (Ishizuka *et al.*, 2011). FAB lavas and related dikes have chemical composition similar to a mid-ocean ridge basalt (MORB) (Reagan *et al.*, 2010; Ishizuka *et al.*, 2014; Pearce, 2014), although FAB use to present lower TiO<sub>2</sub> (<1–1.5 wt.%) and a slight depletion in high field strength elements (HFSEs, *e.g.* Nb, Ta), indicating a light, initial subduction component. When these sequences are deformed and incorporated in the crust, they show a deformation and commonly appear as serpentinitic matrix mélanges with blocks of different lithologies. This is the case of the La Tinta mélangé, a small, but singular ultramafic mélangé sheet, cropping out in eastern Cuba. It is composed of dolerite-derived amphibolite blocks embedded in a serpentinite matrix. The basic blocks have a mid-ocean ridge basalt (MORB)-like composition, showing little if any imprint of subduction zone component, similar to most FAB and MORB worldwide. One of the amphibolite blocks have a hornblende <sup>40</sup>Ar/<sup>39</sup>Ar age of 123.2 ± 2.2 Ma, suggesting that the protoliths of the amphibolite blocks correspond to some of the older lithologies of the Caribbean realm formed during the earlier stage of subduction initiation of the Early Cretaceous Caribbean arc. The La Tinta amphibolites would correspond to fragments of sills and dikes of hypoabyssal rocks formed in the earlier stages of a subduction initiation scenario in the Pacific realm (ca. 136 Ma). The protoliths of the amphibolites formed at the beginning of subduction of the Proto-Caribbean (Atlantic) slab by a partial melting of upwelling fertile asthenosphere, with no interaction with slab-derived fluids/melts. This magmatic episode probably correlates with Early Cretaceous basic rocks described in Hispaniola (Gaspar Hernandez serpentinitized peridotite-tectonite). Following the magmatic episode, the dikes and sills cooled and metamorphosed due to hydration at a low pressure (ca. 3.8 kbar) and medium to high temperature (up to 720 °C) amphibolite-facies conditions and reached ca. 500 °C at ca. 123 Ma. At this cooling stage, the hydration of the ultramafic upper mantle resulted in the serpentinite formation, favoured by a faulting during extension of the fore-arc that indicates an early stage of dike and sill fragmentation and serpentinite mélanges formation. The full development of the mélangé, however, could have taken place during the tectonic emplacement (obduction) onto the thrust belt of eastern Cuba during the latest Cretaceous.

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