



Broken formations, melanges and olistostromes in Puerto Plata area (Northern Dominican Republic) as a record of subduction and collisional processes between the Caribbean and North-American plates

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The Northern Cordillera of the Dominican Republic records the (oblique) subduction and collisional processes occurred between the Caribbean and North-American plates during Upper Cretaceous to Lower Paleogene times. The boundary between these two plates can be traced within this range disrupted by an Upper Paleogene to present intense left-lateral strike-slip tectonism, onset after collision. In the western part of the range this boundary might be defined by the Camu fault. In the coastal area of Puerto Plata, located on the northern block of the Camu fault, basement rocks belonging to the subducting plate (the Puerto Plata Basement Complex) and several related units probably formed in an accretionary prism, preserve in a large (300 km²) outcrop of chaotic formations presumably formed (and exhumed) during collision. They include from broken formations and tectonic melanges to olistostromes and other coeval sedimentary deposits.

The Puerto Plata Basement Complex (PPBC) consists of highly faulted and dismembered blocks formed by discontinuous but sometimes coherent outcrops of serpentized or massive peridotite, pods of ultramafic cumulates, massive or banded gabbros and Los Caños Fm, a thick sequence of gross bedded volcaniclastic material with interbedded basaltic (sometimes pillow) or andesitic flows. All these rocks bear low grade metamorphism and lack a general deformation fabric apart from occasional transformation to mylonites due to localized shearing. The PPBC has been interpreted as a fragment of oceanic crust, belonging to the subducting (North-American) slab that has been exhumed as a tectonic melange or a broken complex.

The Imbert Fm, of Palaeocene-Eocene age, is formed by a well bedded succession of white very fine grained porcelaneous tuffs, with eventual intercalations of cherts, limestones and marls that, towards the lower part, is interbedded with volcanic-derived graywackes and limolites, and more occasionally, thick beds of conglomerates and debris. These last ones typically incorporate fragments of serpentized peridotites and blocks of the volcanic rocks identified in the PPBC. The Imbert Fm is also internally disrupted and although not a single clear contact can be observed in the field, it is considered to rest unconformably over the complex, so postdating its exhumation.

A separate mappable unit of serpentinitic breccias has recently been identified mainly distributed along the outer limits of the PPBC but also in several scattered outcrops inside it. The unit is dominantly made of fragments and blocks of serpentized peridotites, embedded in an abundant matrix of the same composition and includes also blocks of Los Caños and Imbert Fm, as well as other exotic blocks of unknown origin. In the southeastern limit of the complex, close to the Camu fault, there is a particular high concentration of exotic blocks derived from metamorphic rocks (greenschists, anfibolites, marbles and even blueschists) not exposed in any neighbouring areas and thus suggesting a deep-sited, subduction-related, feeding. The basal contact of this unit with the rocks of the PPBC is usually faulted and difficult to observe in the field, but cartographic patterns suggest that it is an unconformity. Outcrops of serpentinitic breccias show a wide variety of internal chaotic organization, from pods of tectonic melanges to the most frequent block-in matrix fabric, but most of them also show evidences of sedimentary rework.

In the easternmost part of the PPBC, the serpentinitic breccias are, in turn, the base of an olistostromic complex widely represented in the region, the San Marcos Fm. The olistostrome includes similar exotic blocks than observed in the serpentinitic breccias and blocks and olistolithes derived from the PPBC but, mainly, from the Imbert Fm. According to the described relationships, the serpentinitic breccias and San Marcos olistostrome are considered partially coeval and laterally equivalent to the Imbert Fm.