

Integrating petrology, P-T records and geochronology to decipher subduction-exhumation processes: The Trinidad dome, Escambray metamorphic complex, Cuba.

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The integration of field studies, analysis of mineral assemblages, P-T estimates and geochronological data constitute a key approach to unravel the mechanisms of subduction/exhumation in accretionary wedges. The Escambray Complex in Central Cuba is subdivided into several tectonic units with different metamorphic grades. It forms a nappe stack exhumed during the Late Cretaceous to Tertiary. Four nappes were recognized in the field: a high pressure (HP) nappe and three nappes metamorphosed to greenschist facies.

Analysis of macro- and microstructures, together with ⁴⁰Ar/ ³⁹Ar isotopic data, reveal the complex was buried in the subduction zone from ~75 Ma and underwent HP metamorphism in the eclogite-blueschist facies and greenschist metamorphism at shallower crustal levels. Three ductile metamorphic deformations (D₁, D₂ and D₃) indicate subduction/exhumation and nappe stacking from 75 to 50 Ma, with NNE thrusting of the HP nappe on top of the lower grade units during D₂. P-T data show the units were buried to 35 km depth (T= 400°C, P= 11 kbar, D₁) and progressively cooled to 100-300°C and P=5kbar during D₃. From 50 Ma the Escambray Complex was exhumed as a core complex and was affected by post-metamorphic strike-slip and normal faults.

The main deformational events lasted from 75-50 Ma and record 25 million years of subduction/collision/exhumation in the north western Caribbean, documenting a long lasting history of deformation and metamorphism along the leading edge of the Caribbean plate.