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Discontinuous exhumation of oceanic crust: Insights from blueschists and eclogites into the subduction channel

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High-pressure low-temperature (HP-LT) metamorphic rocks provide invaluable constraints on the behavior of convergent zones. Based on a worldwide compilation of key informations pertaining to fossil subduction zones (shape of exhumation P-T-t paths, exhumation velocities, timing of exhumation with respect to the convergence process, convergence velocities, volume of exhumed rocks,...), this contribution reappraises the burial and exhumation of oceanic blueschists and eclogites, which have received much less attention than continental ones during the last two decades. Whereas the buoyancy-driven exhumation of continental rocks proceeds at relatively fast rates at mantle depths, oceanic exhumation velocities for HP-LT oceanic rocks, whether sedimentary or crustal, are usually $\sim$ mm/yr. Underplating, detachment faulting and erosion, which are the driving exhumation mechanisms for the sediments, often preserve the continuity of the P-T conditions resulting from the more or less steady-state accretion of the sedimentary material. In contrast, blueschist and eclogite mafic bodies are systematically associated with serpentinites and/or a mechanically weak matrix and crop out in an internal position in the orogen. Oceanic crust rarely records P conditions $>$ 20-23 kbars, which suggests maximum depths for the sampling of slab-derived oceanic crust. On the basis of natural observations and calculated rock densities, we propose that beyond depths around 70 km there are either not enough serpentinites and/or they are not light enough to compensate the negative buoyancy of the crust. Most importantly, this survey demonstrates that transient exhumation is the rule for the oceanic crust: exhumation takes place either early (Franciscan, Chile), late (New Caledonia, W. Alps) or incidentally (SE Zagros, Himalayas, N. Cuba) during the subduction history. Comprehensive models are presented to account for these different

timings. Understanding what controls this transient exhumation and the detachment and migration of oceanic crustal slices along the subduction channel will provide useful insights into the interplate mechanical coupling in subduction zones.