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Exhumation processes in oceanic and continental context

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AB Despite the growing amount of data on surface horizontal displacement, the vertical movements of the lithosphere and exhumation processes at convergent plate boundaries are still poorly known. Petrological and geochronological data on High-Pressure to Ultra High Pressure Low-temperature metamorphic rocks provide invaluable constraints on the behaviour of convergent zone. On one hand, the development of in situ datings coupled with more and more precise and continuous pressure-temperature estimates allow the trajectory of subducted rocks to be followed in the 2D thermal-depth (T-Z) field. On the other hand, thermo-mechanical numerical model allow the trajectory of subducted rocks to be followed in the 4D X-Z-T-deformation space. The combination of worldwide natural data with numerical model emphasizes the following salient results: - Whatever their origin (continental or oceanic), the exhumation of HP to UHP rocks is related to convergent processes. - Exhumation of solid rocks requires the weakening of the subduction channel by occurrence of hydrated sediments, hydrated peridotites or local melting. - The driving forces responsible for exhumation are a combination of buoyancy (dominant for continental rocks exhumation) and channel

flow coupled with underplating (dominant for oceanic rocks exhumation) - Exhumation velocities are independent of plate velocities: i) low velocity (< 5 mm/yr) exhumation of HP-LT metasediments (P< 2.5 GPa, T < 600°C) is a long-lasting process, which occurs in an accretionary wedge environment; ii) low to intermediate velocity (5 < v < 30 mm/yr) exhumation of HP to UHP (< 3 GPa < 650°C) oceanic rocks is a long-standing (Caribbean) or a transient processes (Alps), which occurs within the serpentinite subduction channel; iii) high velocity (up to 40 mm/yr) of UHP (up to 6 GPa, 900°C) continental unit occurred in the mantle wedge combining both astenospheric return flow and buoyancy forces.
DE: 3613 Subduction zone processes (1031, 3060, 8170, 8413)
DE: 3652 Pressure-temperature-time paths
DE: 3654 Ultra-high pressure metamorphism
DE: 3660 Metamorphic petrology
DE: 8110 Continental tectonics: general (0905)
SC: Volcanology, Geochemistry, Petrology [V]
MN: 2007 Fall Meeting

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