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Thermal regime of continental subduction: the record from exhumed HP-LT terranes (New Caledonia, Oman, Corsica)

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Unlike the thermal regimes of present-day subduction or collision zones, the variety of possible thermal evolutions accompanying the transient stage of continental subduction (i.e. the shift from oceanic subduction to continental collision) remains poorly known. We herein show that the thermal regime of continental subduction can be confidently retrieved from three well-documented fossil settings (i.e. from high-pressure low temperature continental material from Oman, New Caledonia, Corsica) that were not modified by later collision or a later metamorphic imprint. We primarily focus on their thermal structures (derived from estimates of maximum temperatures, P-T data and age constraints) and overall tectonic organization. For the sake of comparison, new petrological investigations were performed on the metamorphic architecture of northern New Caledonia (Pam Peninsula) and are presented here. We show that the overall structure and metamorphic patterns of these three HP belts derived from continental subduction evidence striking similarities. In particular, the inferred thermal regime of continental subduction appears largely independent from the initial geodynamic setting (i.e. from the initial thermal regime of oceanic subduction, the nature of the incoming plate or of the upper plate). This suggests that continental cover units subducted over a short time period represent cold underplated material that buffers the subduction thermal regime, whatever the exact structure, nature, or thermal state of incoming material. Similarities in the type, size and P-T conditions of the various tectonic units and in the overall tectonic organization point to specific accretionary-type subduction dynamics, yet to differences in mechanical coupling between the three case studies. Our study thereby provides constraints on exhumation dynamics and models of continental subduction