

## ***Interactive comment on “Up the down escalator: the exhumation of (ultra)-high pressure terranes during on-going subduction” by C. J. Warren***

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Thank you Stéphane, for your comments.

I too agree that a clear determination of variations in exhumation rate with continental collision parameters such as age, volume, orogenic stage, etc. needs further investigation. Kylander-Clark et al., 2012 put forward an argument that exhumation of continental crust that was subducted during the later stages of continental collision proceeds more slowly than crust which was subducted and exhumed during the earlier stages of continental collision. What is as yet unclear is whether these late-stage terranes (Western Gneiss Complex, Dabie Sulu) initially exhume rapidly through the mantle, but then stall at the Moho or mid-crustal levels, or whether they exhume slowly through the mantle as well. The mid-temperature thermochronometers that

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are most routinely employed to estimate exhumation rates ( $Ar/Ar$  in muscovite and biotite,  $U-Pb$  in rutile and  $U-Pb$  in titanite) are currently not precise enough to be able to distinguish between these different scenarios. Is there any other geochronological/chemical/(micro)structural way of determining between these scenarios? (This is not a question specifically directed at you but more the wider community as a whole).

Further structural research is also necessary to determine the coherency of exhuming continental blocks or slices, as you mention, and to deduce when different slices are juxtaposed (during subduction or during exhumation?). Is this stacking a function of crustal strength (lithology or pre-existing structures)? Or external tectonic forces?

I am not personally familiar with the eclogites in Papua New Guinea. However at first glance, and from review of the published literature, it appears that these rocks do not conform to the “normal” view of UHP exhumation along a subduction plane. I thought this example interesting to highlight here as it might spark further research into exhumation processes. It is becoming increasingly obvious that there is no single exhumation mechanism that fits all scenarios. But it is as yet unclear whether different tectonic scenarios lend themselves to different mechanisms.

Kylander-Clark, A. R. C., Hacker, B. R., and Mattinson, C. G., Size and exhumation rate of ultrahigh-pressure terranes linked to orogenic stage, *Earth Planet.Sci.Lett.*, 321–322, 115–120, DOI: 10.1016/j.epsl.2011.12.036, 2012.

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Interactive comment on Solid Earth Discuss., 4, 745, 2012.