

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

Anonymous Referee #2

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Revision of the ms. entitled “Up the down escalator: the exhumation of (ultra)-high pressure terranes during on-going subduction”, by C.J. Warren

General comment The ms. aims at reviewing processes, dynamics and existing models dealing with formation and exhumation of UHP terranes. In particular, the paper provides a synoptic view of the factors leading to decouple crustal materials from the downgoing subduction slab and promoting exhumation of UHP terranes. In general terms, the ms should be improved in some parts, particularly for what concerns its general organisation and some general issues. I am confident that this may imply a significant amount of work in revisiting the ms., but I believe that this should result in a more straightforward reading and add strength to the arguments presented, particularly to be attractive for a broader audience.

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1. As it stands the ms. does not clearly presents the “geological” data/context/background to discriminate and define boundary conditions leading to formation and exhumation of UHP terranes. What is missing first is the mention and relevance of the metamorphic history described by the UHP terranes, since different exhumation histories/processes should be recorded/monitored by the P-T-t-deformation paths followed by these units. It is thus compulsory to provide a synoptic description of the P-T-t paths followed by the UHP units and to join this information with the regional tectonic context (just transtension is mentioned in section 6.3). Different aspects (exhumation rates, metamorphic evolution and crystallisation kinetics; structurally controlled fluid flow and fluid-rock interaction and weakening, etc. . .) are treated in the ms. that should be presented in a more systematic manner in order to present the available data background and to addresses future research on the UHP issue (see also point 4, below). 2. the Introduction section is too vague and does not clearly present the real aim of the ms. Introductory statements are dispersed and often repeated in the text (see specific points below) that, consequently, looses internal consistency. It is not clear where the introduction ends and where new data are presented and discussed (see specific points): which is the message of this paper? Which part/aspect of the UHP issue does the ms. address? 3. The discussion consists of few lines (most of them part of the introduction section; see detailed comments below) and concludes with various questions: how the ms. may contribute answering to these questions? How the geological data are fitted by existing models? 4. Presented figures are derived from previously published papers and not all are essential (particularly, Fig. 8); no original synthetic scheme is presented. I would thus encourage the Author to discuss more deeply the factors/processes that control the UHP environment and to propose an original synoptic scheme where consolidated information is presented together with critical aspects for future research indicated. 5. As suggested by the other Reviewer, it is also important to present and discuss: (i) a more updated view of the existing literature on the exhumation of the UHP terranes (also taking into account models of eduction, slab break-off, and exhumation of coherent tracts of UHP units as proposed

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for the Monviso region; see below); and (ii) the issue of tectonic overpressure.

Specific points.

-Title - I agree with the other review: title is inappropriate, since exhumation of UHP rocks is not only a matter of subduction dynamics.

-section 1 -line 1-5 in pg. 747: the paper by Guillot et al. (2009) presents context leading to formation and exhumation of high-pressure rocks in convergence setting (blueschist- and eclogite-facies rocks), and not specifically to UHP terranes. How is relevant this scenario for the UHP issue? How it can be generalised? Formation of UHP units requires deep burial of crustal materials in the subduction channel at P-T conditions not compatible with those achieved in the accretionary wedge. -line 13-28 in pg. 747: these different exhumation histories should be recorded/monitored by the P-T-t-deformation paths followed by these units. It is thus pivotal to provide a synthetic description of the P-T-t paths followed by the UHP units.

-section 2 -line 16 in pg. 748. compressional exhumation: indeed, erosion is the exhumation factor (removal of the overburden) -line 19 in pg. 748. which are the two-end members? Different scenarios/models are introduced above. -line 16-19 in pg. 749, the sentence is redundant here

-section 3 -line 9 in pg. 750. this is not the case of the Western Gneiss region cited above, where syn-eclogitisation shearing has been described (cfr. Jolivet et al. 2005). -line 10-14 in pg. 753. see the alternative view presented in Anginboust et al. (2012; Journal of metamorphic geology; DOI: 10.1111/j.1525-1314.2011.00951.x) for the Monviso eclogites: mélange vs. coherent exhumation (cfr. exhumation model)

-section 3.6 This is not a real discussion section, rather it appears as introductory part that should be included/integrated with the introduction section.

-section 8. This section sound like a repetition of what said before; this section should instead present a critical comparison among the different presented models and con-

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trolling factors, and address future research on the UHP issue. This is done in part in section 9, but should be done in a more systematic way in the discussion section. -lines 18-20 in pg. 763 and lines 3-9 in pg. 764 these statements are just a repetition of what already said in the introduction section.

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

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