

Interactive comment on “Channel flow, tectonic overpressure, and exhumation of high-pressure rocks in the Greater Himalayas” by Fernando O. Marques et al.

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Response to the Reviewer's comments

Reviewer#1 1. “For this manuscript, my main concern is about the extremely high overpressure (even larger than ten times of the lithostatic pressure). I think such high values should be strongly related to the specific model geometry (upward taper), which is the most favorable condition for the overpressure. This geometry is constructed by comparing with the GHS geometry (cf. Figure 1b, c). In this model setup, the Tethys Himalaya (TSS shown in Figure 1b) is considered as a strong wall (rigid or rheologically strong); however, if TSS is weak, i.e. comparable to the GHS, then the channel

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geometry will be downward taper or parallel walls, similar to the general subduction channels. In the latter case, I do not think such high overpressure could be obtained.” The Reviewer is right, the high values of TOP do not apply if the boundary conditions are different. We have now made clearer, in a separate section, the effects of boundary conditions.

2. “Secondly, there are many previous numerical studies for the tectonic overpressure. I think a general discussion and comparison is required. In this manuscript, the authors just comment that ‘previous models have used two of the three main possible configurations of a subduction channel: parallel-sided and downward tapering, which have been shown to produce relatively small overpressure ($TOP < 3$) (e.g. Li et al., 2010).” General discussion and comparison added.

3. In my opinion, for the overpressure $TOP = \text{dynamic pressure} / \text{lithostatic pressure}$, the value 3 is quite large, which indicate the dynamic pressure is three times of the lithostatic. In this case, the rocks at 30km depth can obtain the pressure of up to 90 km. So it is better not to consider it as ‘small overpressure’.” Corrected.

4. “In order to avoid the possible misleading for the UHP community, I suggest adding a separate section at the end of the paper to discuss the specific conditions and/or model limitations of the current more theoretical studies. Actually, many explanations have already been included in the main text (located in different sections).” Separate section added to the Discussion.

The Discussion section has been fully revised following the Reviewer's comments.

Lisbon, 16 June 2018

Fernando Ornelas Marques on behalf of all authors

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2018-37/se-2018-37-AC1-supplement.pdf>

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