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Discussions

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Interactive comment on "The effect of mountain uplift on eastern boundary currents and upwelling systems" *by* Gerlinde Jung and Matthias Prange

Anonymous Referee #1

Received and published: 12 May 2019

Modern coastal upwelling systems initiated and intensified since the Neogene. However, the reasons for their strengthening throughout the Miocene and Pliocene remain unclear. In the paper, the authors carry out sensitive experiments to investigate the impacts of mountain uplift on the three upwelling systems. The authors carefully diagnose the model outputs, in particular clearly illustrate the feedbacks behind the upwelling responses. The paper is well written. I would recommend its publication after considering the suggestions below.

General comments:

1. The author should introduce the vertical mixing schemes in the model. In addition to the background vertical mixing, does the model include other vertical mixing parameterizations, for example the tidal mixing, the eddy mixing. Some of these mixings are

also influenced by changes in winds. In other word, when the topography is modified, the changes in winds will also influence these vertical mixings. If these vertical mixings remain unchanged, there are some uncertainties included in the current simulations.

2. The uplifts of the Andes and North American Cordillera induce significant cooling around the adjacent upwelling regions. The authors should potentially compare some model outputs with existed proxy data?

3. For the cross-section analysis, I recommend the authors could also do that with an averaged latitude zone over the upwelling regions, especially for the vertical velocity response, rather than using a specific latitude.

4. I am interested in the thermocline depths changes around the three upwelling regions and their potential impacts on the cooling strength.

Specific comments:

1. Page 3 line 15 : "Neogene" not "Neogen"

2. Figure 1 and 9-12, Please denote each panel with alphabet letters.

3. Figure 8b, please explain why choose the depth of 47m here rather than 70m?