

Interactive comment on “Review article: Inferring permafrost and permafrost thaw in the mountains of the Hindu Kush Himalaya region” by S. Gruber et al.

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Reply to comments made by Franco Salerno (doi: 10.5194/tc-2016-104-SC1).

Thank you Dr. Salerno for your effort to comment on our paper in so much detail. Your suggestions have been very interesting and useful for improving our manuscript. We rewrote much of Section “Climate and climate change in the HKH” and inserted more local examples and references (see also the comment of Anonymous Referee 2 and our reply).

Comments by Dr. Salerno are indicated as “SC:”, author reply as “AR:”. Only sections requiring a reply are reproduced.

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SC: [Line 3, page 3] Studies on recent climate trends from the Himalayan range are limited, and even completely absent at high elevation, at this regard, I suggest to review the recent paper of Salerno et al., 2015 related to the time series of temperature and precipitation reconstructed from seven stations located between 2660 and 5600 m a.s.l. during 1994–2013 on the southern slopes of Mt. Everest.

AR: This probably referred to Page 5, Line 3 in the discussion manuscript. We inserted reference to Salerno et al. (2015) here as well as Shea (2015).

SC: [Line 9, page 3] The study of Shrestha et al., 1999 was updated by Kattel and Yao (2013). In western Himalaya (e.g., Bhutiyani et al., 2007; Shekhar et al., 2010), in eastern Himalaya and in the rest of India (e.g., Pal and Al-Tabbaa, 2010). At regional level, on the Tibetan Plateau, I suggest (Liu et al., 2006; Liu et al., 2009). Yang et al. (2006) in the northern part of the central Himalaya. Salerno et al., 2015 in the southern part of the central Himalaya. It is important to point out that winter trends are always found higher in the winter season. In the northern part of Himalaya the warming is observed to be influenced more markedly by the minimum temperature increase (as reported also by Pepin et al., 2015 for the region). In contrast, studies located south of the Himalayan ridge observed a prevalence of maximum increase. In this regard, Salerno et al., 2015 provide a sort of review of these studies. I think that the possible impacts on permafrost (and in general on cryosphere) in HKH are understandable if the scientific community start considering in greater detail the recent finding related to the climatic drivers of change, even if incomplete (considering the remoteness of the region), and even if sometime they do not go in the expected direction (e.g., summer increase of max temp).

AR: We rewrote and expanded most of Section “Climate and climate change in the HKH” taking into account your suggestions and inserted several more local examples and references. The references provided were very useful for this, thank you very much.

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SC: [Line 9, page 3] In relation to the weaking of the monsoon, Salerno at al., 2015 at local scale, but with the unique existing land time series confirm an huge decreasing in the recent years. This analysis is recently confirmed also by Salerno et al., 2016 considering the behavior of glacial unconnected lakes a gridded climatic data.

AR: The section on precipitation patterns and Monsoon weakening has been expanded; the differing sign of trends in some simulations is still mentioned.

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