
Interactive comment on “How much can we save? Impact of different emission scenarios on future snow cover in the Alps” by Christoph Marty et al.

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Received and published: 1 November 2016

The authors assessed the future projection of snow depth in the Alps by accounting for future temperature and precipitation change under different emission scenarios. The results are interesting and can advance our understanding in the impact of climate change on mountain snow. Here, I have a short comment. Several recent studies (e.g., Painter et al., 2013; Liou et al., 2014; Lee et al., 2016) found that deposition of light-absorbing aerosols (mainly black carbon and dust) substantially decreases snow albedo, which further reduces snow depth and cover. However, this factor has not been considered by the authors in the future projection, which could play an important role. It would be helpful if the authors could include some discussions on these recent findings and the uncertainty due to this aerosol-snow effect in the projection of snow depth.

Response:

In contrast to other mountain regions, the effect of the deposition of light-absorbing aerosols on the seasonal snow cover in the Alps is currently small due to the frequent snow fall events and the relatively small amount of impurities. However, we agree that this effect may be more important in future due to increasing de-glaciated area. We therefore added the following sentence to uncertainty chapter:

“Moreover, above this elevation glacier melt may decrease the spring snow albedo by dust from exposed moraine rubble and glacial till (Oerlemans et al., 2009).”