The Cryosphere
Discussions

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Interactive comment on "A satellite-based snow cover climatology (1985–2011) for the European Alps derived from AVHRR data" *by* F. Hüsler et al.

Anonymous Referee #3

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General Comments:

The authors describe a promising approach in preparing long term snow cover climatology for the European Mountains based on daily, full resolution AVHRR data. Cloud cover – constituting a limiting factor when it comes to snow cover analyses – is removed applying a temporal filter to the snow maps that were produced using a modified version of the SPARC routine. The authors investigate long term trends of Alpine snow cover and conclude that for the entire Alpine region no such linear trends in snow cover duration exists. The overall quality of the manuscript is good and the presented results fall within the scope of the journal. I therefore recommend to accept the manuscript for publication after some minor aspects have been taken into account:

Specific Comments:

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-It would be interesting to get an overview about the different NOAA-satellites and according AVHRR generations (1/2/3) that were processed and analysed during the study. Figure 2 could be improved by including such information. Since AVHRR/1 only comes with four channels, detection of cirrus clouds is often a problem for these observations. Even though you state an overall accuracy of ∼90% for your snow cover classification I doubt that this quality is possible for AVHRR/1 data.

-Cloud removal: As already stated in an earlier comment, in –depth validation using station data also outside of Switzerland would contribute to the quality of the manuscript. The problem is that especially in the mountainous regions of the Alps, only very few stations may exist for the observation period (you may check ECA&D data for that purpose). However: I suggest that if no real in situ data is available, you may try to simulate "artificial clouds" by recoding cloud-free pixels within your snow maps. After processing these scenes with your temporal gap-filling technique you may estimate the accuracy of this technique more precisely.

-In the general discussion section it is stated that 1km spatial resolution is a minimum requirement for complex terrain snow cover products. However, within the GCOS "Systematic Observation Requirements For Satellite-Based Data Products for Climate" (2011 update) 100 m is given as target requirement. Therefore, this sentence should be modified/removed from the manuscript.

-Figures like Fig. 7, or 9 to 11 would benefit from adding additional information like annual departures from mean temperature (Fig. 7) or standard deviation of surface temperature (Fig. 11). As temperature is the dominant factor in prolonging or shortening of snow cover duration, such information would add to the overall quality of the manuscript and help to understand the mechanisms and dynamics of climate change in Alpine environments. However, it is clear that such data may not be available for the whole area and in sufficient quality for the complete time series.

Interactive comment on The Cryosphere Discuss., 7, 3001, 2013.