

## ***Interactive comment on “Analysis of the mass balance time series of glaciers in the Italian Alps” by L. Carturan et al.***

**Anonymous Referee #1**

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This paper presents a comprehensive analysis of the mass balance data acquired on all Italian glaciers since the beginning of the measurements. The authors compile data covering one to five decades that mostly have a seasonal resolution and interpret changes in mass balance in connection to climatic forcing (temperature and precipitation). Data from long-term monitoring programmes are often difficult to be published and performing innovative science based on them is challenging. The authors do a good job in exploiting the full data basis for Italian glacier mass balance to come up with sound conclusions and reasonable recommendations for the future.

Nevertheless, I somewhat miss the “breaking news” in this study. Many of the findings are not actually new and the authors can often just confirm what has been said earlier. Of course, this is a problem which is not trivial to be addressed provided the available

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data that are discussed. However, by slightly shifting the focus to the more exiting and novel results I have the impression that this paper could considerably gain in quality and scope. This would mean shortening the article in certain places and providing more detailed analysis at others.

I see several additional important and interesting aspects that could at least be partly addressed by the authors:

- Data quality: An integrated interpretation of a data set as the one presented in this paper crucially relies on the quality of the data. At present, however, only very little is said about this point and no specific analyses are performed (uncertainty of the data based on general literature values). As much as I know, no homogenization (e.g. by comparing geodetic and glaciological mass balances) has been performed for most of the Italian glaciers. To ultimately increase the value of a data set, assessing the quality and performing a homogenization would be of utmost importance and should actually be performed before interpreting the data in a climatological context. I fully understand that this is not feasible in the frame of this study but the authors might still consider to dedicate some discussion or even preliminary analyses (e.g. based on published results) regarding this aspect.

- Information on investigated glaciers: Related to my point above, I also missed more detailed information on the sites. There are only tiny maps showing the individual glaciers that do neither contain contour lines nor the distribution of the measurement network. For such an overview study, it would be important to present the monitoring strategy so that the reader can judge the context of the data.

- Representativeness of glaciers: In my opinion, a central question of such an integrated analysis would be the representativeness of the individual series for a larger region (e.g. the Italian Alps). This would be very valuable for other scientists looking for time series that well describe the spatio-temporal mass balance variability and are not biased by local effects (such as Careseer, see Carturan et al., 2013). Unfortunately,

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this point is only marginally addressed in the paper. Given the approaches presented here, this aspect would be possible however to be investigated in more detail. This might allow some useful recommendations for the glaciological community.

- Structure: The description of the data and the study sites is placed in the Methods section, which is not ideal. These chapters definitely need to be separated, especially for a paper that principally relies on a strong data basis.

Detailed comments:

- Page 5853, line 20: Without knowing about the distribution of the measurements (figure) the point density is difficult to be interpreted

- Page 5855, line 10: Identical methods used for temperature and precipitation extrapolation? Partly unclear.

- Page 5855, line 29: Several studies have already indicated that at least some of the nine WGMS reference glaciers are not (not anymore) actually representative for the European Alps. This might influence comparisons as the one presented here.

- Page 5861, line 20: When discussing potential NAO effects it would be important, in my opinion, to be more quantitative: The present statements are fully qualitative. If really entering this topic the authors should be more specific and provide statistical numbers and evaluations in the context of their data.

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Interactive comment on The Cryosphere Discuss., 9, 5849, 2015.