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Interactive comment on "Accelerated wastage of the Monte Perdido Glacier in the Spanish Pyrenees during recent stationary climatic conditions" *by* J. I. López-Moreno et al.

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López-Moreno et al (2015) provide the most detailed assessment of areal, thickness, and volume changes on a Pyrenees glacier. This is a crucial moment to do so, as the glacier is losing volume so quickly. The use of DEM and TLS are an excellent combination. I only have minor comments on the glaciology. There is one significant issue the over reliance on a single weather station examined for seasonal changes in either temperature or precipitation. This single weak data set is used to identify that ablation increase is not the reason for increased volume loss. This maybe but until the data is stronger including use of SWE, precipitation and temperature records during

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the wet periods of spring and fall and more than a single weather station is used the conclusion is not justified. With better meteorological data for more robust analysis this will be a fine contribution.

Abstract: 5022-15-18: Data presented is not sufficient to warrant the conclusion that local climate change cannot explain the acceleration, particularly in light of the next sentence, which notes recent changes can be explained.

5022-18-21: It is noted that the glacier shrank in recent years, but then the warming since the Mid- 1800's is used. Instead of the more recent 0.2 C per decade noted in paper.

5024-17: And many are in disequilibrium and cannot survive (Pelto, 2010).

5025-20: is the mass change in m or m w.e.?

5026-4: One station not sufficient, just because it is closest does not make it best either. There are other stations not far away such as Torla and Bescos. These are lower elevation but have good long records. Deaux et al (2015) examined the 1950-21010 period at a monthly scale with 66 stations and precipitation at 139. Surely some of that can be utilized. This topic is further discussed below

5027-12: do not need "currently" twice in this line.

5028-5: The statement that most of the precipitation occurs in spring and autumn also indicates the importance of reporting temperature changes during these months specifically. Are these part of your ablation season or accumulation season?

5029-16: It would be useful to see the location of the scan station and the fixed points on the glacier. These could be added to current figure 5 for the reference points anyway.

5031-17: Define the ablation and accumulation season. Given that the ablation season can expand in length using a limited frame may not be sufficient for temperature.

5032-10: Use a deviation in precipitation not "very wet". Also note here mild winter and

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cool ablation season. This may indicate importance of accumulation season temperature changes.

5032-25: Significant thinning even in the highest regions of the glacier, indicate the lack of a persistent accumulation zone, and that the glacier cannot survive (Pelto, 2010).

5034-23: If possible it would be ideal to report the AAR for the three years somewhere on this page.

5035-13: This statement needs to be reexamined the data presented are not sufficient to show that the acceleration in mass loss cannot be explained by recent climate change. That may be the case, but not based on this data.

5035-18 Must define ablation season and must examine the period from April-October as any expansion in length of ablation season, or shortening of accumulation season is important. Figure 2 indicates warming in the accumulation season that could be important. This could change the amount of snowpack, SWE retained. Also this data is based on one station, which is not robust, and is not shown to match regional trends. There are many stations in this range, you must utilize others to demonstrate a real trend. One key point is that a long term average not always best measure. In the plot shown 8 of last 11 years have been notably above the trend line, and only two are notably below. The average of all these years, would miss the important role that the trend of warm summers play. The one really cold summer will affect the average greatly, but as noted does not compensate on the glacier for the warm summers.

5035-24: Accumulation season precipitation not the best measure since increased freezing level and rain rates can be important. Particularly true given comment in paper note above that spring and fall are the wettest periods. The maximum snow depth may argue against this, but not in SWE, depth is not a good measure. It is noted on the next page that Buisan et al (2015) had other evidence of more snow days. This needs more careful usage. They examine 38 stations all below 1500 m. The two closest to Perdido are Torla and Bescos which in their figure 12 have negative trends in snowfall.

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More snow days does not necessarily mean greater swe at the end of the accumulation season and further given the decline near Perdido is a poor reference. In the western US the ratio of SWE to precipitation has declined due to more winter rain and melt events (Mote et al., 2008).

5037-8: Again what have been the AAR during recent years. The loss of ice thickness across the glacier indicate that there is not a persistent accumulation zone. Pelto (2010) observed that this is a symptom of a glacier that cannot survive, there can be years be with accumulation, but if the many do not and the retained snowpack of good years is lost in bad years, then in fact no accumulation persists.

5037-28: This is dependent on initial ice thickness too, if the eastern part is not thicker than the west it may not last longer. Also given the stated lack of avalanching, a remnant may not last much longer, as this is the typical reason (Hoffman and Fountain, 2007).

References: Buntgen et al (2008) not cited in text.

Figure 3: Top photograph overexposed a bit, bottom photograph underexposed, both could be adjusted to better view glacier surface.

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Interactive comment on The Cryosphere Discuss., 9, 5021, 2015.