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Interactive comment on "Recent changes in north-west Greenland climate documented by NEEM shallow ice core data and simulations, and implications for past temperature reconstructions" *by* V. Masson-Delmotte et al.

Anonymous Referee #2

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This is a high-quality analysis of some newly-available north-west Greenland ice-core and climate data, that overall builds significantly on previous work and which will be of interest to a wide readership. There are a few points of clarification and missing references. I recommend acceptance once the following points have been addressed:

p.659, line 9: "strong relationship between surface vapour d18O and local humidity, and surface air temperature" - rephrase as slightly confusing as from units the relationship meant seems to be between dO18 and temperature (i.e. 2/3 factors, not directly humidity)?

p.659, line 27 To the 4 references cited on the strong NAO imprint and Greenland climate please add the following: Hanna & Cappelen (2003) Hanna, E. and Cappelen, J. (2003). Recent cooling in coastal southern Greenland and relation with the North Atlantic Oscillation. Geophysical Research Letters, 30(3), 1132. doi:10.1029/2002GL015797

p.662, line 12 reword to "therefore decreases with depth".

p.662, line 18, line 21 "especially for summer temperature". Add reference. E.g. a comparison of summer near-surface air temperatures for various coastal and inland Greenland sites was made by Hanna et al. (2014): Hanna, E., Fettweis, X., Mernild, S. H., Cappelen, J., Ribergaard, M. H., Shuman, C. A., Steffen, K., Wood, L. and Mote, T. L. (2014), Atmospheric and oceanic climate forcing of the exceptional Greenland ice sheet surface melt in summer 2012. Int. J. Climatol., 34: 1022–1037. doi: 10.1002/joc.3743

p.662, line 26 "NAO defined as the standardised difference in sea level pressures between Gibraltar and Iceland (Vinther et al. 2003)" - it would be better here to give the original Gibratar-Iceland NAO reference, i.e. Jones et al. (1997): Jones, P.D., Jónsson, T. and Wheeler, D., 1997: Extension to the North Atlantic Oscillation using early instrumental pressure observations from Gibraltar and South-West Iceland. Int. J. Climatol. 17, 1433-1450.

p.663, line 18 "water stable isotopes" - doesn't this technical term need brief explanation?

p.665, line 10: why does this analysis end in 2007 and not a more recent year, given the rapid recent climate changes and extremes?

p.66, line 9: "The highest d18O annual mean value is however encountered in 1928" - why? Was this an unusually warm year or was it just the near-record accumulation alone that was responsible?

p.667, line 28: change "albeit not" to "although such values are not".

p.670, line 5: why not compare with other region (e.g. DMI coastal met station) Greenland temperature records other than just the SW Greenland temperature series?

p.671, line 21: clarify whether these correlations "R>0.3" are statistically significant.

p.672, line 1 re. weather patterns and Scandinavian Blocking, I haven't seen Greenland Blocking explicitly mentioned in this discussion but I think it is important and worth mentioning.

p.673, line 11 "MAR precipitation is slightly larger" - is this statistically significant? 13-29% seems as if it MAY be quite a substantial difference.

p.674, lines 4 & 5: Again, give significance/p values for these R values.

p.676, line 16: Is there any difference in variance between ERA40 and ERA-I for the overlap period?

p.677, line 21: "Greenland warming since 1979 is strongly driven by changes in large scale atmospheric circulation (Fettweis et al., 2013a)" - please add the following references: Hanna, E., Fettweis, X., Mernild, S. H., Cappelen, J., Ribergaard, M. H., Shuman, C. A., Steffen, K., Wood, L. and Mote, T. L. (2014), Atmospheric and oceanic climate forcing of the exceptional Greenland ice sheet surface melt in summer 2012. Int. J. Climatol., 34: 1022–1037. doi: 10.1002/joc.3743 Hanna, E., Jones, J. M., Cappelen, J., Mernild, S. H., Wood, L., Steffen, K. and Huybrechts, P. (2013), The influence of North Atlantic atmospheric and oceanic forcing effects on 1900–2010 Greenland summer climate and ice melt/runoff. Int. J. Climatol., 33: 862–880. doi: 10.1002/joc.3475

p.678, line 16: clarify whether you mean "local surface AIR temperature changes".

p.679, lines 21-24: the accumulation sensitivity to Greenland temperature also depends importantly on dynamical/storm-track changes - should point this out here.

p.679, line 25 "We therefore identify unusually strong responses of both dO18 and ac-

cumulation to local temperature increase, over the decades." Does this seem to suggest changes in moisture-bearing storm tracks impinging more on this part of Greenland? Should probably comment on this.

p.680, line 4 "extreme years" - don't these also include 2012 - mention here?

p.680, line 25: AWSs, not just ice-core records, can also be used to map recent warming.

p.681, Section 4.5.2: shouldn't this include more direct discussion of 2012?

p.682, lines 3-13: what about Greenland Blocking?

p.686, line 29: add Hanna et al. (2014) (full reference above) to Fettweis et al. (2013a).

Interactive comment on The Cryosphere Discuss., 9, 655, 2015.