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Interactive comment on "Changing surface–atmosphere energy exchange and refreezing capacity of the lower accumulation area, west Greenland" *by* C. Charalampidis et al.

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This paper presents recent changes in the energy balance and the snowpack behaviours at KAN_U situated near the equilibrium line in the accumulation zone of the Greenland ice sheet. It is not the first time that energy balance and melt from in situ observations is discussed in this south-western part of the GrIS (van den Broeke et al., 2011) but KAN_U is situated in the accumulation (while measurements from the ablation zone only was presented in van den Broeke et al. (2011)) and the discussion about the snowpack changes in 2012 is interesting, innovative and deserves to be published in TC with some minor revisions only.

The paper is clear and fits well with TC. The text is well written but sometimes it is hard to read due to the abundance of numbers and statistics in the text. Some simplifications when nothing important is told (e.g.: lines 1-10, pg 2883) could be made in the text by simply referencing to the corresponding tables.

Line 25, pg 2875 vs line 11 pg 2878: 360 or 400 kg/m3 for the snow density ?

Table 4: I am a bit surprised that we use here a mean density of 360 Kg/m3 for estimating the mean ablation rate. As snow is melting, the snowpack density should be higher. Where does the density uncertainty of 40 kg/m3 come from? Just giving the difference in snow height is for me more reliable.

Line 16, pg 2880: these low albedo values are for me more likely the result of the snowpack erosion by the wind (making apparent old firn) than reduced winter precipitation. The regional model MAR does not suggest particular low winter accumulation at KAN_U in 2012-2013.

Lines 15-20, pg 2886: I do not see the interest of discussing NAO here. The role of NAO over Greenland is well known for explaining the recent melt increase and for me, Fig 10a as well as these 5 lines should be removed.

Lines 5-12, pg 2887: The comparison with MODIS is interesting but a part of the MODIS based albedo decrease could be the result of the declining instrument sensitivity of the MODIS sensors1. This issue should be discussed. However the same albedo trend is also simulated by MAR (forced by NCEP-NCARv1) which also simulates the exceptional low albedo in summer 2012 (see Fig.1 next page)! According to MAR, it is the first time in summer 2012 since 1950 that significant ice lenses appear but in 1960, MAR also simulates high runoff rates due to snowpack meltwater saturation suggesting that it is not the first time that significant melt events occur at Kan_U. Finally, while some runoff still occurs in 2013 (while the summer was cold) as a result of the 2012 summer induced snowpack compaction, runoff disappears in summer 2014 suggesting that we need several successive summers as 2012 to have a significant

snowpack degradation. Some RACMO (or eventually MAR) outputs could be added in the manuscript to put the 2012 summer in a longer term perspective instead of using Kangerlussuaq measurements.

Interactive comment on The Cryosphere Discuss., 9, 2867, 2015.

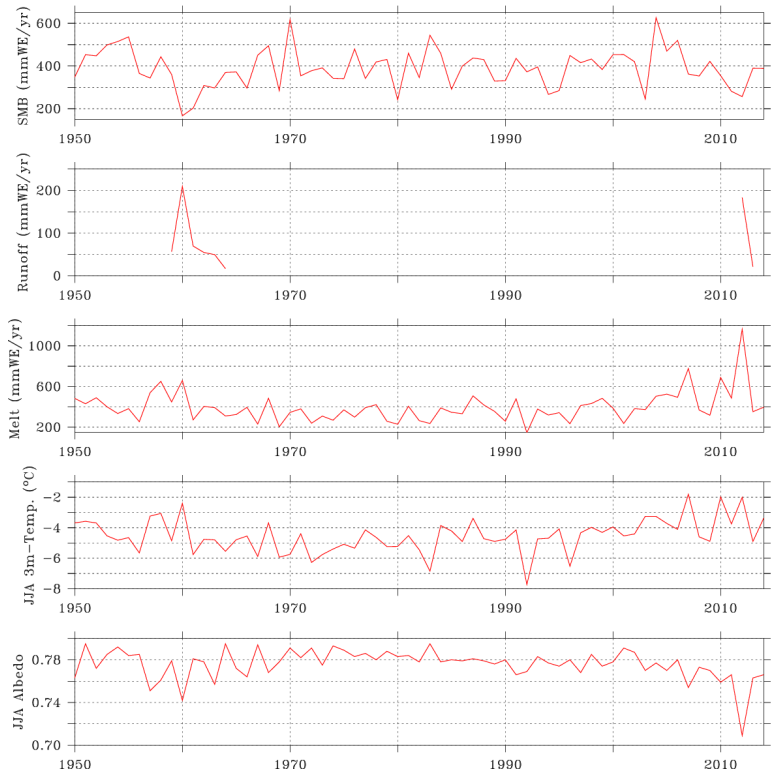

Fig. 1. SMB (mmWE/yr), Runoff, total meltwater production, JJA near-surface temperature as well as the mean JJA albedo at KAN_U as simulated by MARv3.5.2 forced by NCEP-NCARv1.