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## ***Interactive comment on “Near-surface climate and surface energy budget of Larsen C ice shelf, Antarctic Peninsula” by P. Kuipers Munneke et al.***

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Article synopsis: The article entitled, “Near-surface climate and surface energy budget of Larsen C ice shelf, Antarctic Peninsula” presents results from an analysis of AWS measured meteorological factors related to surface energy balance and melting. Authors examine AWS data trends for a two year period and use measured data as input to a surface energy balance model to resolve all energy balance components. Results indicate presence of summertime convection and elucidate the importance of sub-surface solar heating on the melt duration and magnitude.

Overall Summary: Generally the article is well written and organized. I was most impressed with the results related to how representative measured 2-m air temperatures are of surface melt. This finding constitutes a significant finding with broad ramifica-

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tions. We are currently working on surface melt issues over Antarctic ice shelves and find the lack of extensive measurements from AWS systems a difficult constraint requiring that we use measured 2-m temperatures as a proxy for melt. Below are my comments. Some organization edits are suggested. Technically, I express some questions about model sensitivity to some assumptions such as grain size specification and data treatment.

Recommendation: I would recommend the paper for publication and look forward to seeing it in print.

Specific Comments -page 2668 SECTION 2.1 and 2.2: much of the information related to instrument performance specifications and operations length can be put in a table.

-page 2669 line 12: why not use a combination of information from the periods before and after periods of substantial riming (perhaps interpolating the data over these periods) unless the variance pre and post riming periods was substantially high. The specified constant value may be reasonable given riming events occur under periods with low wind speeds. . . a possible sensitivity analysis of modeled fluxes based on the use of a 1 m-s constant value may be warranted. (line 15) This also has implications for the correction of air temperatures during calm periods, which I assume are coincident with riming events as well.

-page 2670 lines 5-7: awkwardly stated, should revise. -page 2670 line 16: a constant sub-surface grain size of 100um was used though there can be variation in grain size, particularly during new snow fall events of an order of magnitude. How might this affect estimated shortwave radiation penetration? Was the use of this value derived from previous literature or based on estimates of grain size distributions from the snow pits excavated during the field campaigns? Kuipers et al. (2009) demonstrate grain size and density analysis of firn in the upper few cm and indicate a range I grain sizes (between 100-500um). Though this analysis was conducted in Greenland at Summit, I might expect a grain size distribution biased towards the higher end of the spectrum

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due to frequent summertime melting.

-no mention of solar loading and treatment of solar loaded thermistor data in the analysis?

-I thought the results regarding the potential overestimation of melt through the use of 2-m measured temperatures was quite interesting, but perhaps the correlation between 2-m temperature and melt becomes more substantially as a temporally integrated relationship between antecedent melt and temperature.

-(minor edit): page 2675 line 15: section 3.4 title heading is awkward can revise to something like "Convection and Temperature Inversion"

-Several figures require some revisions so axis labels and figure annotations are legible. I would suggest rescaling in some cases. The most significant issues of this kind are related to the following figures: -Figure 2 -Figure 3 -Figure 5 -Figure 6 -Figure 7 -Figure 9

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Interactive comment on The Cryosphere Discuss., 5, 2665, 2011.

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