

Interactive comment on “Surface and snowdrift sublimation at Princess Elisabeth station, East Antarctica” by W. Thiery et al.

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The authors present meteorological observations recorded near the Belgian research station Princess Elisabeth in Dronning Maud Land, East Antarctica along with snowdrift parameterizations to investigate the role of surface and snowdrift sublimation in the local snow mass and energy balances over a period of two years. The results show that sublimation removes between 10% and 23% of the annual precipitation in the region, with higher values at locations prone to katabatic winds. Lower values of sublimation (18 mm w.e. yr⁻¹) are reported for Princess Elisabeth compared to other nearby sites (42–52 mm w.e. yr⁻¹) as this site is sheltered from strong katabatic winds.

This is a very well-written and interesting paper that merits to be published in The Cryosphere. I recommend the following minor comments be addressed prior to publication in the journal.

General Comments:

1) It is at times difficult to infer what the study period is. Such information could be clarified in, for instance, the Abstract and the Data and Methods sections. If data are available for up to 13 years at some sites, are the results then presented over the respective periods of data availability (e.g., Table 3)? If so, then the table caption needs to clarify this.

2) Does snowdrift erosion/deposition affect the surface mass balance of any of the instrumented sites presented in this study? This may be more of a concern for AWS 16 at Princess Elisabeth where the site is sheltered by Utsteinen ridge and may lead to a deceleration of winds and hence blowing snow deposition.

Specific Comments:

1) P. 1492, line 25: Please clarify the sign convention for all terms in the surface mass balance equation.

2) P. 1495, line 8: Delete “the” before “Princess”.

3) P. 1495, line 11: Rephrase this sentence to something as “The Princess Elisabeth AWE was deployed on . . .” Why was the AWS deployed in the shelter of Utsteinen ridge rather than in an open area?

4) P. 1497, line 18: Rephrase as: “are the momentum and heat/moisture stability functions, respectively.”

5) P. 1502, line 6: Insert “the” before “katabatic”.

6) P. 1502, line 14: This should read “drier air”.

7) P. 1503, lines 17–18: This sentence is confusing – how can 299 mm w.e. for a 2-year period correspond to 161 mm w.e. yr⁻¹ contribution to the surface mass balance?

- 8) P. 1505, line 3: Replace “till” with “until”.
- 9) P. 1506, line 5: Delete “In order”.
- 10) P. 1506, lines 7-11: This sentence is rather long and unclear. Please consider rephrasing and abbreviating this sentence.
- 11) P. 1506, line 15: Rephrase as: “during snowdrift free and snowdrift conditions, respectively.”
- 12) P. 1509, line 12: Replace “till” with “until”.
- 13) P. 1509, lines 19-20: Delete the two phrases “in order”.
- 14) P. 1510, line 8: Replace “show” with “are shown”.
- 15) P. 1512, line 6: Replace the pages with the paper # (4679) for this reference.
- 16) P. 1517, Table 2: Please correct the superscripts in “m s⁻¹”.
- 17) P. 1518, Table 3: Perhaps to provide further context to the surface mass balance and energy balance results, could the mean air temperature, relative humidity with respect to ice, and wind speed over the periods of record be added here?
- 18) P. 1519, Table 4: Could the estimate of the surface mass balance with attempts to fill in gaps in the meteorological data at AWS 16 be added here?
- 19) P. 1520, Figure 1: The x-axis label on the meridional profile should read “Latitude (°S)”
- 20) P. 1522, Figure 3: The light green lines are particularly difficult to read on this Figure.

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