



## **A surface mass balance scheme including the diurnal cycle of solar radiation for ice sheet simulations on long time scales**

Uta Krebs-Kanzow, Shan Xu, Paul Gierz, and Gerrit Lohmann

Alfred-Wegener-Institut, Helmholtz-Zentrum fuer Polar und Meeresforschung, Bremerhaven, Germany  
(uta.krebs-kanzow@awi.de)

We present a surface mass balance scheme for ice sheets, which only requires monthly mean short wave radiation, temperature and precipitation, but implicitly accounts for the diurnal cycle of short wave radiation. The scheme may be particularly suitable for long ice-sheet simulations of past and future climates. It is computationally inexpensive and can account for changes in the Earth's orbit and atmospheric composition. For evaluation, the scheme is applied to the Greenland ice sheet, forced by monthly reanalysis data from the ERA-Interim project. We then investigate the sensitivity of the surface mass balance to variations in the diurnal cycle for different continental ice sheets, using glacial and interglacial climate simulations as a forcing.

Krebs-Kanzow, U., Gierz, P., and Lohmann, G.: Brief communication: An ice surface melt scheme including the diurnal cycle of solar radiation, *The Cryosphere*, 12, 3923-3930, <https://doi.org/10.5194/tc-12-3923-2018>, 2018.