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Blowing snow representation in COSMO-CLM^2 : the case of the Roi Baudouin Ice Shelf, East Antarctica

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Recent findings point out the importance of ice shelf dynamics to control the mass balance of the Antarctic Ice Sheet. Wind-induced processes play a key role in the health of the ice shelves: the surface energy balance and surface melt of the ice shelves is affected by processes such as drifting snow, frequently observed at the surface of the Antarctic continent. The relocation of drifting snow particles and sublimation locally lead to the emergence of blue ice areas (BIAs), that have a lower albedo than snow, and thereby invokes a positive feedback enhancing local surface melting, common in the vicinity of ice shelves grounding line. An understanding of these processes can be achieved by using a regional climate model. However, for this purpose a blowing snow routine needs to be implemented.
We implement the simple bulk model for blowing snow from Déry and Yau (2001) in the regional atmospheric COSMO-CLM model coupled to the land component of CESM, the Community Land Model. The coupled COSMO-CLM^2 model was adapted to accurately represent the Antarctic conditions, contributing to the CORDEX-ANT effort and includes snowpack adaptations for a better perennial snow surface and mass balance representation over the ice sheets and glaciers. A simulation over the Roi Baudouin Ice Shelf, East Antarctica includes the blowing snow routine and allows us to analyze the effect of the displacement and sublimation of the drifting snow particles on the surface mass balance and dynamics of East Antarctic ice shelves. More precisely, by initiating two simulations with either a uniform snowpack, or the existing BIAs (and their characteristics) we can evaluate the ability of the routine to create or maintain the existence of the BIAs. Expected results of the two simulations will give insights on processes leading to ablation induced by the wind over the ice shelf, and the comparison between the two scenarios will enable to quantify wind-albedo and melt-albedo feedbacks on the
Roi Baudouin Ice Shelf.