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Impact of snow albedo over the Greenland ice sheet on the atmospheric circulation

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The albedo of snow and ice has a strong positive feedback loop that controls the amount of solar radiation absorbed by the surface. Snow melt induced by a surface warming will lead to a decreased albedo that allows for more solar radiation to reach the surface and will further increase the melting and surface warming. In current climate models, the albedo over perennial snow is kept constant and thus, can not represent this feedback. In the recent past, a more realistic snow albedo parametrization has been incorporated into the global climate model EC-Earth3 over the Greenland Ice-sheet. To analyze and understand the impact of this new parametrization, several simulations with (and without) the modified snow albedo scheme were performed using the atmospheric general circulation model (A-EC-Earth3). When evaluating the simulated model climate, wave train-like patterns are visible in the global two meter temperature. These patterns lead back to shifts in elements of the general circulation of the atmosphere. To observe the significance of these patterns over their long term means, the Welch's t-test and the Kolmogorov-Smirnov Test were used. In a likewise manner, other atmospheric variables such as the geopotential height and mean sea level pressure were evaluated to link these patterns to a specific part of the atmospheric circulation. The latter is part of ongoing work.

Field of study

Computational Physics

Supervisor

Eigil Kaas

Author: LÜDEMANN, Dana

Presenter: LÜDEMANN, Dana

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