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## Testing for Dynamical Dependence: Application to the Surface Mass Balance Over Antarctica

Quentin Dalaiden<sup>1</sup>, **Stephane Vannitsem**<sup>2</sup>, and Hugues Goosse<sup>1</sup>

<sup>1</sup>Earth and Life Institute, Université Catholique de Louvain, Louvain-La-Neuve, Belgium

<sup>2</sup>Royal Meteorological Institute of Belgium, Avenue Circulaire, 3, 1180 Brussels, Belgium

Dynamical dependence between key observables and the surface mass balance (SMB) over Antarctica is analyzed in two historical runs performed with the MPI-ESM-P and the CESM1-CAM5 climate models. The approach used is a novel method allowing for evaluating the rate of information transfer between observables that goes beyond the classical correlation analysis and allows for directional characterization of dependence. It reveals that a large proportion of significant correlations do not lead to dependence. In addition, three coherent results concerning the dependence of SMB emerge from the analysis of both models: (i) The SMB over the Antarctic Plateau is mostly influenced by the surface temperature and sea ice concentration and not by large-scale circulation changes; (ii) the SMB of the Weddell Sea and the Dronning Maud Land coasts are not influenced significantly by the surface temperature; and (iii) the Weddell Sea coast is not significantly influenced by the sea ice concentration.