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What to watch out for when assimilating ice-cores as regional SMB proxies?

Marie G. P. Cavitte¹, Hugues Goosse¹, Kenichi Matsuoka², Sarah Wauthy³, Rahul Dey⁴, Vikram Goel⁴, Jean-Louis Tison³, Brice Van Liefferinge⁵, and Thamban Meloth⁴

¹Earth and Life Institute, Université catholique de Louvain, Louvain-la-Neuve, Belgium

²Norwegian Polar Institute, Tromsø, Norway

³Université libre de Bruxelles (ULB), Brussels, Belgium

⁴National Centre for Polar and Ocean Research, Goa, India

⁵Non-academic

Ice cores remain the highest resolution proxy for measuring past surface mass balance (SMB) that can be used for model-data comparison. However, there is a clear difference in the spatial resolution of the ice cores, with a surface sample on the order of cm^2 , and the spatial resolution of models, with at best a surface footprint on the order of a few km^2 . Comparing ice core SMB records and model SMB outputs directly is therefore not a one-to-one comparison. In addition, it is well known that ice cores, as point measurements, sample very local SMB conditions which can be affected by local wind redistribution of the SMB at the surface.

We set out to answer the question: *how representative are ice-cores of regional SMB?* For this, we use several ground-penetrating radar (GPR) surveys in East Antarctica, which have co-located ice core drill sites. Most of our sites share a relatively similar climatology, as they are all coastal ice promontories/rises along the Dronning Maud Land coast, with the exception of the Dome Fuji survey on the high plateau in the interior of the continent.

We will show that the comparison of the SMB signals of the GPR and the ice core records allows us to estimate the spatial footprint of the ice cores, and that this spatial footprint varies widely from site to site. We will provide a summary of the spatial and temporal characteristics for each location.