

## Abstract for ICRC-CORDEX 2023, Session D2

### Developing climate information for Arctic reindeer herding communities

**H. Matthes**<sup>1</sup>, **H. Tømmervik**<sup>2</sup>, **A. Rinke**<sup>1</sup>, **S. Rasmus**<sup>3</sup>, **R. Mottram**<sup>12</sup>, **P. Mooney**<sup>4</sup>, **R. Laptander**<sup>5</sup>, **J. Landwehrs**<sup>1</sup>, **O. Landgren**<sup>6</sup>, **T. Komu**<sup>3</sup>, **K. Istomin**<sup>5</sup>, **T. Horstkotte**<sup>7</sup>, **J. O. Habeck**<sup>3</sup>, **E. Gilbert**<sup>8</sup>, **B. C. Forbes**<sup>3</sup>, **X. Fettweis**<sup>9</sup>, **J. T. Eronen**<sup>10</sup>, **C. van Dalum**<sup>11</sup>,  
**W. J. van de Berg**<sup>11</sup>

<sup>1</sup> *Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany*

<sup>2</sup> *Norwegian Institute for Nature Research, Tromsø, Norway*

<sup>3</sup> *University of Lapland, Rovaniemi, Finland*

<sup>4</sup> *NORCE Norwegian Research Centre, Bergen, Norway*

<sup>5</sup> *University of Hamburg, Hamburg, Germany*

<sup>6</sup> *Norwegian Meteorological Institute, Oslo, Norway*

<sup>7</sup> *Umeå University, Umeå, Sweden*

<sup>8</sup> *British Antarctic Survey, Cambridge, UK*

<sup>9</sup> *University of Liège, Liège, Belgium*

<sup>10</sup> *University of Helsinki, Helsinki, Finland*

<sup>11</sup> *Utrecht University, Utrecht, Netherlands*

<sup>12</sup> *Danish Meteorological Institute, København, Denmark*

In the framework of the H2020 project CHARTER, we developed a range of climate indices reflecting critical events in the reindeer herding year, which arise from combinations of the operational system of reindeer herding and meteorological seasonality. The purpose of defining these climate indices was to create a capability for analysing different projections of the future and deliver relevant information on climate change to reindeer herding communities.

Within CHARTER, we have looked at different sources of climate model output we can use to calculate future changes in our climate indices, with three important criteria in mind. 1) We want to be able to look at different possible future developments (different SSP-RCPs). 2) we want a multi-model approach so we can give estimates of uncertainty. And 3) we want high resolution data sets both in time, since the climate indices are based on daily meteorological data and spatially, so we can provide relevant information for herders on a local scale. A number of different model intercomparison projects fulfil two of the three criteria (eg the CMIP6 model ensemble fails for criterion 3, the ISIMP3 ensemble for criterion 1, CORDEX ARC-44 still fails criterion 3). CORDEX EUR-11 fulfils all three criteria, but only covers the Fennoscandian part of the Arctic. In addition, the selection of global models was not based on specific physical targets.

Within the H2020 project PolarRES, a high-resolution ensemble of Arctic climate projections is created using regional climate models to dynamically downscale GCMs selected in a storyline approach. In a first step, the RCMs produce hindcast simulations driven by ERA5 reanalysis. This study uses these simulations to evaluate model performance with respect to the climate indices relevant for reindeer herders to gain confidence in future projections of said models. We use in-situ based observations from the data set Global Summary of the day to evaluate onset and end of the continuous freezing period, hot summer days, thawing days in autumn and freeze-thaw cycles in both spring and autumn.