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The Arctic Regional Reanalysis of the Copernicus Climate Change Service

Harald Schyberg (1), Heiner Körnich (2), Roger Randriamampianina (1), Eivind Støylen (1), and Xiaohua Yang (3)

(1) Norwegian Meteorological Institute, (2) Swedish Meteorological and Hydrological Institute, (3) Danish Meteorological Institute

We will present status and plans for the Arctic regional reanalysis of the Copernicus Climate Change Service (C3S). The project aims to produce an Arctic regional reanalysis over two Arctic subdomains of interest for change processes and economic activities. The reanalysis will cover the period 1997 - 2021 with a horizontal resolution of 2,5 km. Additionally a proof-of-concept for a pan-Arctic reanalysis will be provided for a period of one year.

The system to be used is based on the HARMONIE-AROME Numerical Weather Prediction (NWP) system, with additions and configuration choices for reanalysis purposes with that system. Global reanalysis data from ERA5 will be used for lateral boundaries. The Arctic reanalysis will add value versus the global reanalysis by providing higher-resolution and by using regional data not used there.

Developments to adapt the system for reanalysis purpose included modifications in the assimilation setup, 3D-Var background error statistics and uncertainty estimation. The upper air assimilation uses conventional observations and, since there are gaps in the conventional observing system, has emphasis on using satellite datasets which have good coverage in the Arctic. This includes important parts of the satellite observing system such as microwave and infrared radiances, atmospheric motion vectors, scatterometer winds and radio occultation data. Handling of “cold surfaces” in the surface scheme, such as snow, sea ice and glaciers, which are important in the Arctic, has also received special attention with the aim to give a better representation than in the global reanalysis.

In addition to the development of the system itself, we present the present status of its production and we give an assessment and analysis of the quality of the reanalysis products.