

## **DMI Report 22-22**

# **Mapping of the surface air temperature in Greenland since 1870**

**Final scientific report of the 2021 National Centre for Climate  
Research Work Package 2.3.1, GRL Vejrdata**

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# 1. Scientific summary

## Short description

Purpose of this work package is to design, develop, build and run a sustainable AI/ML system to create a daily near-surface air temperature data set from 1870 covering all corners of Greenland with consistent uncertainty information. The work in 2021 aimed at creating a quality controlled observational data set, which can be used for the more elaborate studies by a PhD student in 2022+.

## Overall results

- Quality control of temperature data (mean temperature code 101, maximum temperature last 12 hours code 113, and minimum temperature last 12 hours code 123) from weather stations in Greenland from 1958-2013 (data after 2014 has already been quality controlled). The quality controlled data is available in the database climadb, and information about the quality of the data can be accessed through the label. For more information about the label, please contact Michael Skelbæk Kamp (msn@dmi.dk). The quality control is carried out manually by the use of time series graphs. Other meteorological parameters and data sources have been used to accept or exclude data.
- Preparation of exclusion files containing all excluded data from the quality control procedure described above, which can be used for machine learning by the PhD student.
- Description of climatologists' work regarding the work package, which has been coordinated with relevant work package team members:
  - Manual quality control (QC) of hourly in situ data from stations in Greenland in the period 1958-2013. Data from 2014 and onward have already been quality controlled. Other quality controlled meteorological parameters can also be provided if necessary.
  - The manual QC procedure is carried out on hourly data from around 48 stations in Greenland. A visualization tool is used to plot data in order to examine potential erroneous or missing data. If data is erroneous, a label in the database is changed and thus indicates that data is erroneous.
  - Preparation of exclusion files containing lists for all stations with erroneous data to be used in connection to machine learning by the PhD.
  - Overview of missing daily data of 101, 113 and 123 in the period 1958-2020 (script or results can be shared).
  - Professional back-and-forth regarding data quality and how some QC procedures can be automated.
- In December 2021 the PhD student Dina Rapp was hired by the Niels Bohr Institute (section PICE) via a new collaboration agreement between NBI and NCKF/DMI. Internal supervisor

(at NBI) is Bo Møllersøe Vinther and external supervisors (at NCKF) are Eigil Kaas and Jacob L. Høyer.

## Next steps

The PhD student (Dina Rapp) will – together with her supervisors – define the detailed methods to be used for the extended “hindcast” for all Greenland.