SMHI

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Digitization of historical wind speed observations at the Swedish Meteorological and Hydrological Institute by Erik Engström et al.

Contributors

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Motivation

- Changes in wind climate have a multitude of effects on the society and the environment.
- Extreme winds can damage infrastructure, agriculture, forestry and buildings.
- Wind energy has a key role in the transformation to a sustainable fossil free energy system.
- Under a warming climate, one of the major uncertainties on the causes driving the climate variability of winds over land (i.e., the “stilling” phenomenon and the recent “recovery” since the 2010s) is mainly due to short availability (i.e. since the 1960s) and low quality of observed wind records as stated by the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).
- With this project we present a joint initiative between the Swedish Meteorological and Hydrological Institute (SMHI) and the University of Gothenburg. The aim is to fill the key gap of short availability and low quality of wind datasets to increase the scientific understanding on the causes driving wind speed variability in a changing climate across Sweden by rescue and assessment of wind observations.

WINDGUST

- WINd Data rescue by Gothenburg University and Smhi to assess Trends
- The project “Assessing centennial wind speed variability from a historical weather data rescue project in Sweden”, funded by FORMAS – A Swedish Research Council for Sustainable Development (ref. 2019-00509).
- A kick-off meeting for the project were held online 21 April with the participants from SMHI and Gothenburg University.
- The project is arranged in three work packages (WP).

3 work packages

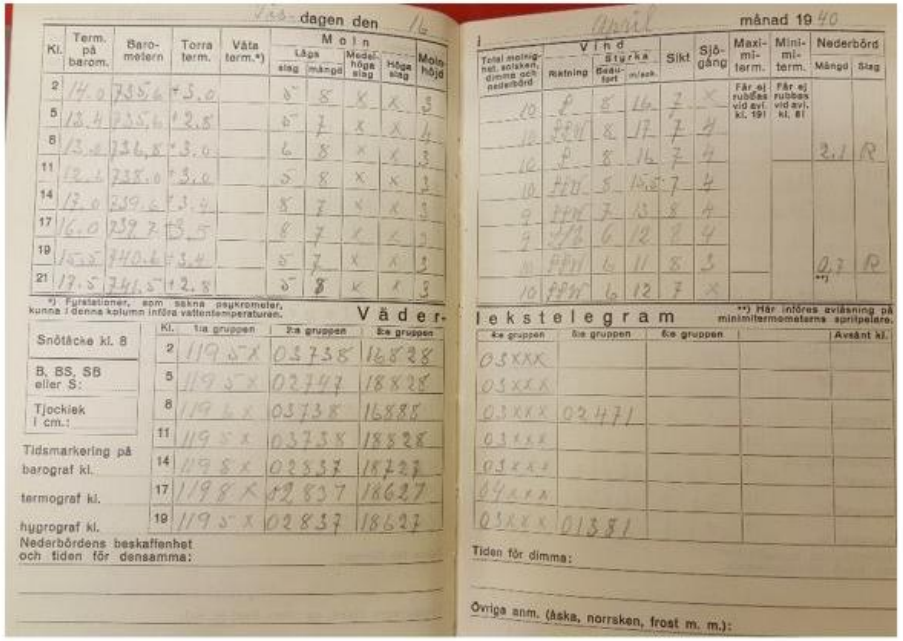
1. Wind speed data rescue, scanning and digitization
   SMHI

2. Quality control and homogenisation.
   SMHI and GU

3. Assessment and attribution of historical wind speed trends. Publication and communication of the results.
   GU and SMHI

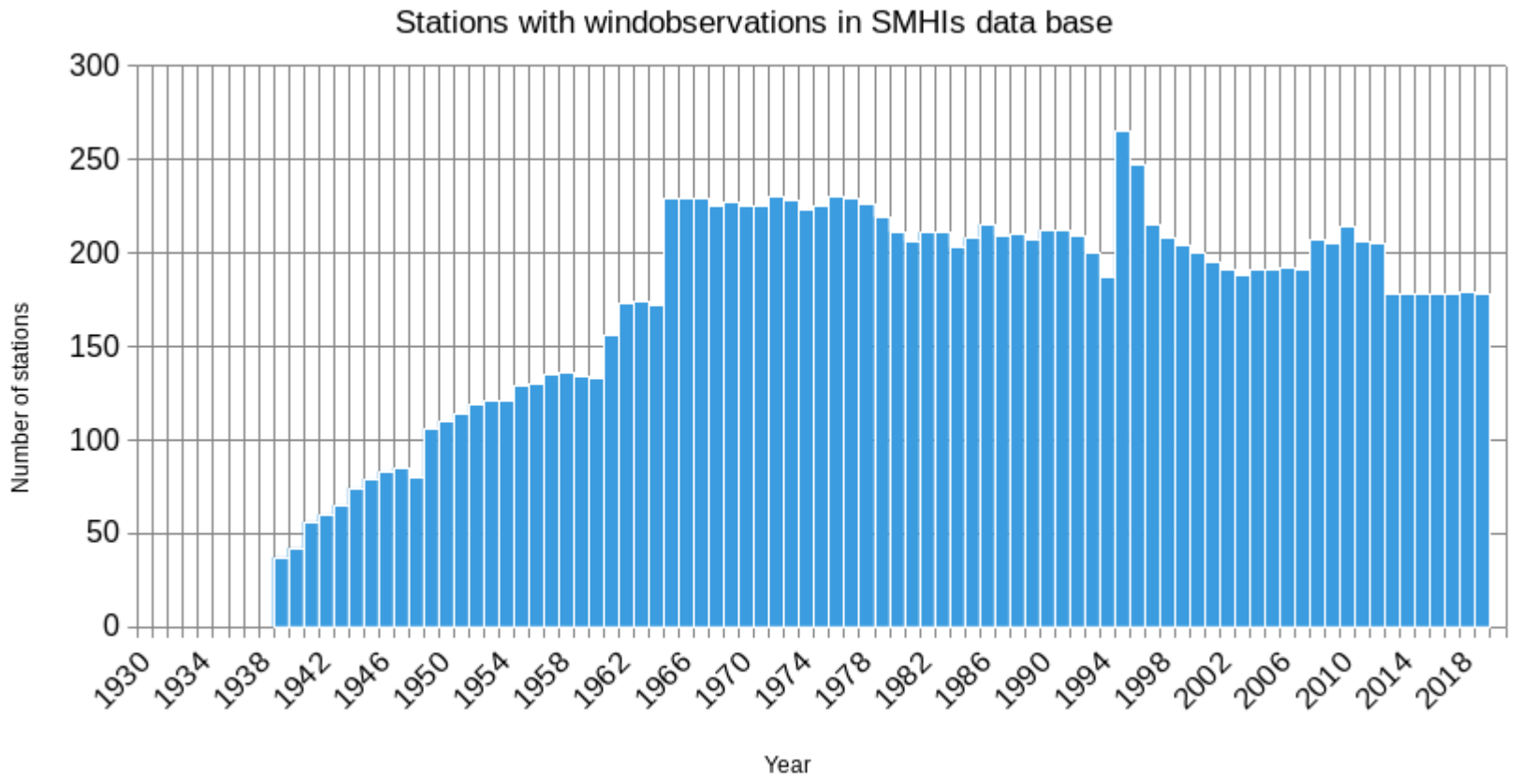
WP 1 Scanning and digitization

- SMHI will scan and digitize wind observations from journals stored in the weather archives at SMHI. Both the wind speed in meters per second and the wind direction with a resolution of 32 directions will be digitized. The photos below show the staff at the weather archive at SMHI and an example of an historical journal.



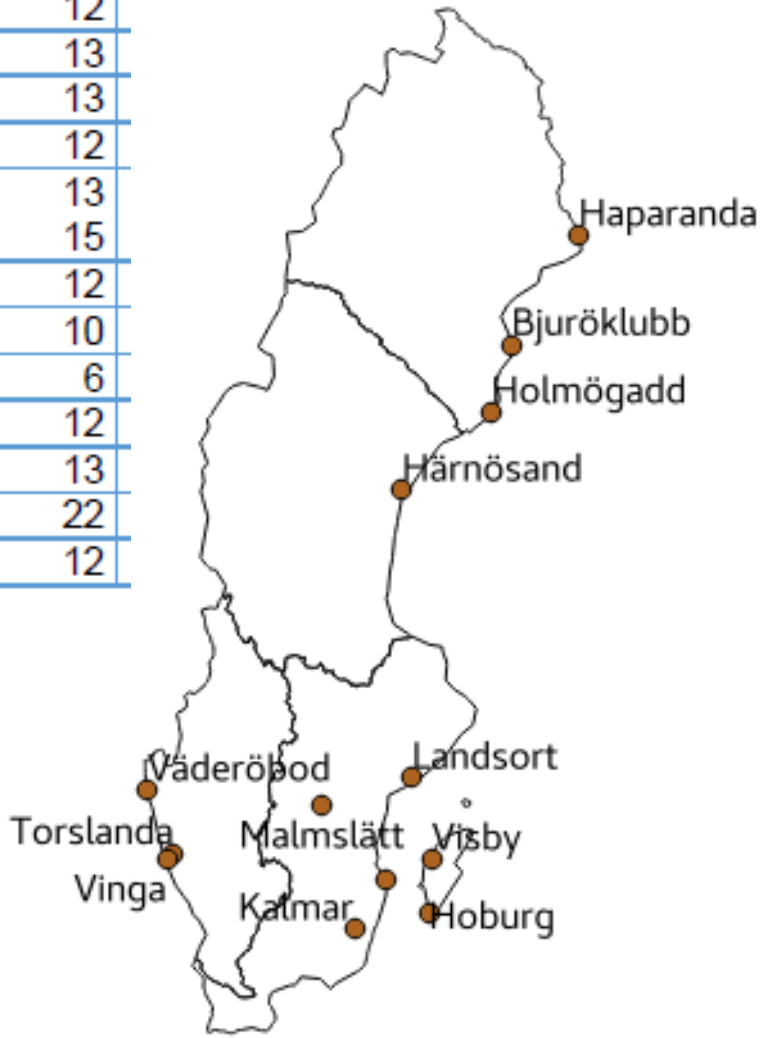
Digitized wind data

- The figure below show the number of stations with digitized data for each year available in the ”MORA” data base at SMHI.



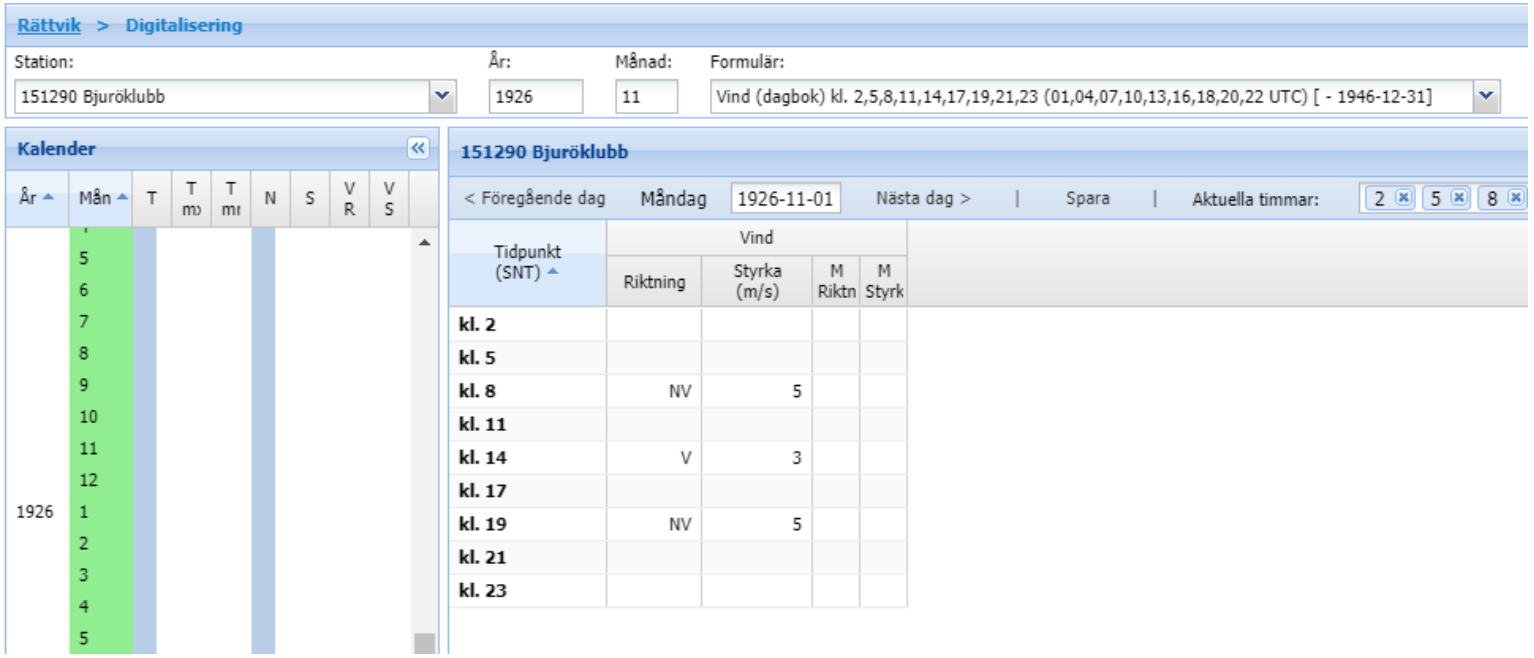
ID No.	Station	Start	Stop	Years
151290	Bjuröklubb	1926	1938	12
163950	Haparanda	1925	1938	13
68550	Hoburg	1925	1938	13
140360	Holmögadd	1926	1938	12
127380	Härnösand	1925	1938	13
66640	Kalmar	1927	1942	15
87450	Landsort	1926	1938	12
85240	Malmslätt	1928	1938	10
71430	Torslanda	1932	1938	6
71380	Vinga	1926	1938	12
78390	Visby	1925	1938	13
81620	Väderöbod	1926	1948	22
77220	Ölands norra udde	1926	1938	12

- The table shows the time period for each station that will be digitized in the project.
- The figure shows the position of the stations that will be digitized.



WP 1 Work procedure

1. The journals are brought up from the weather archive and each page is scanned. Each page corresponds to one day and each book covers 6 month of observations. Then the journals are put back in the archive.
2. The data is digitized from the scanned files in a newly developed digital templet and is directly stored in the ”MORA” data base at SMHI. The figure below show a example of the templet.



Outlook

- WP2 Quality control and homogenization.
  During 2021 quality control and homogenization will be done in the project. The homogenization will be performed by the novel protocols proposed by Azorin-Molina and Minola using reference series based on geostrophic wind, nearest stations, or reanalysis datasets such as ERA-20C (https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era-20c; which covers the entire past century, and the European reanalysis from Copernicus, produced by SMHI (https://climate.copernicus.eu/regional-reanalysis-europe; Borsche et al., [2015]) covering the period 1961-2018. The reference data will serve as the basis for homogenizing rescued wind speed series by the relative Alexandersson's standard normal homogeneity test (SNHT) (Alexandersson and Moberg, 1997) under the Climatol package (http://www.climatol.eu/).

- WP3 Assessment and attribution of historical wind speed trends.
  During 2022 trends and variability in the Swedish wind climate will be analysed. Trends will be evaluated at monthly, seasonal and annual time-scales.

Thank you for your interest!

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