

Data rescue of national and international meteorological observations at Deutscher Wetterdienst

Birger Tinz¹, Hermann Mächel², Lydia Gates¹, Frank Kaspar² and Axel Andersson¹

Deutscher Wetterdienst, ¹ DWD Marine Climatological Monitoring Centre, Bernhard-Nocht Str. 76, 20359 Hamburg, Germany;

² DWD National Climate Monitoring, Frankfurter Str. 135, 63067 Offenbach am Main, Germany

Germany's National Meteorological Service (Deutscher Wetterdienst, DWD) hosts extensive archives of historical handwritten journals of weather observations in Offenbach and Hamburg. These comprise not only observations from German land stations, but also of the world's oceans as well as land stations from overseas. DWD is in the process of digitising these archives.

Goal

The goal of the DWD projects is the digitisation and quality control of the enormous amount of data of handwritten journals. The digitisation of data of four different data archives is still ongoing. The digitised data are a valuable source of historical information for investigations of global climate in many parts of the world and an important input for regional and global re-analyses. The digitised and quality controlled data will be made available to all interested scientists.

1 German climate stations

Fig. 1a shows the state of digitalisation of daily precipitation (left) and sub-daily climate records (right) for Germany. About 2/3 of all records are already digitised, 1/3 is only available as hardcopy or on micro-films. In the project KLIDADIGI about 4.6% of the precipitation and 4.9% of the climate records were digitised over the last 8 years.

Fig. 1b shows the spatial distribution of the stations with digitised precipitation data and those stations with 100 years and more of data.

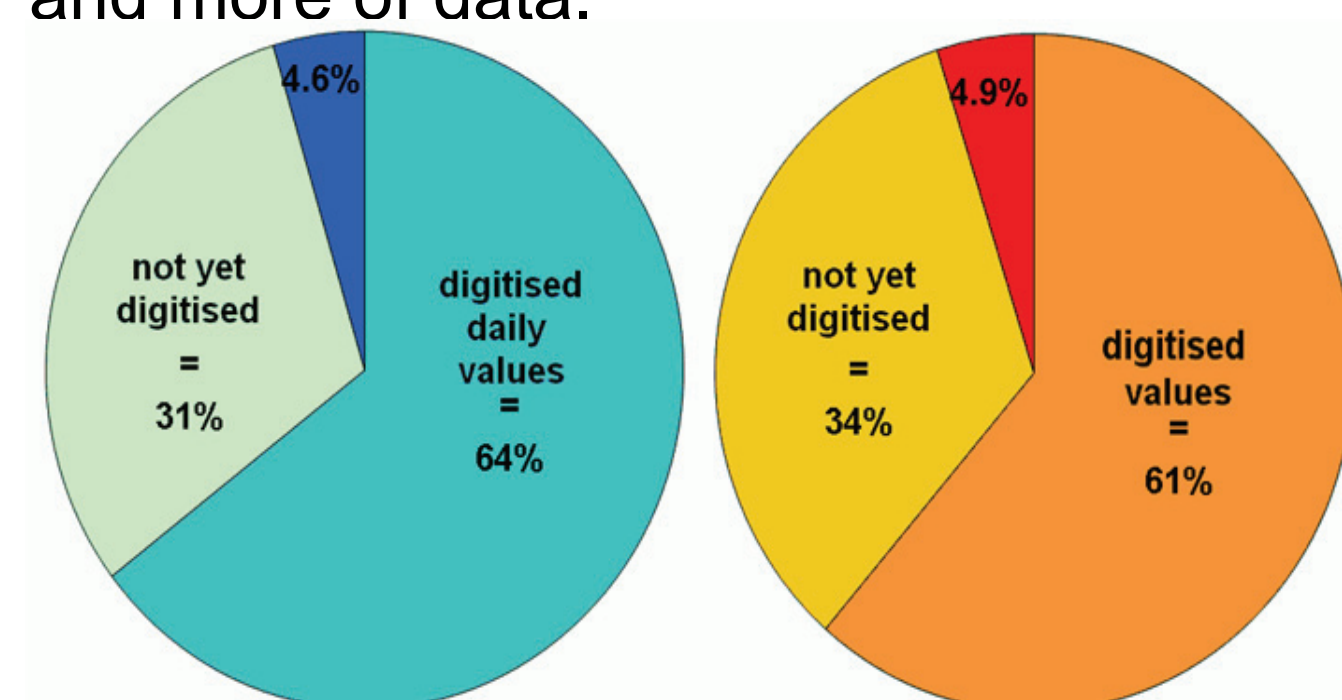


Fig. 1a: Precipitation (left) and climate records (right) for Germany. New daily and sub-daily data that have been digitised in KLIDADIGI are shown in dark blue and dark red.

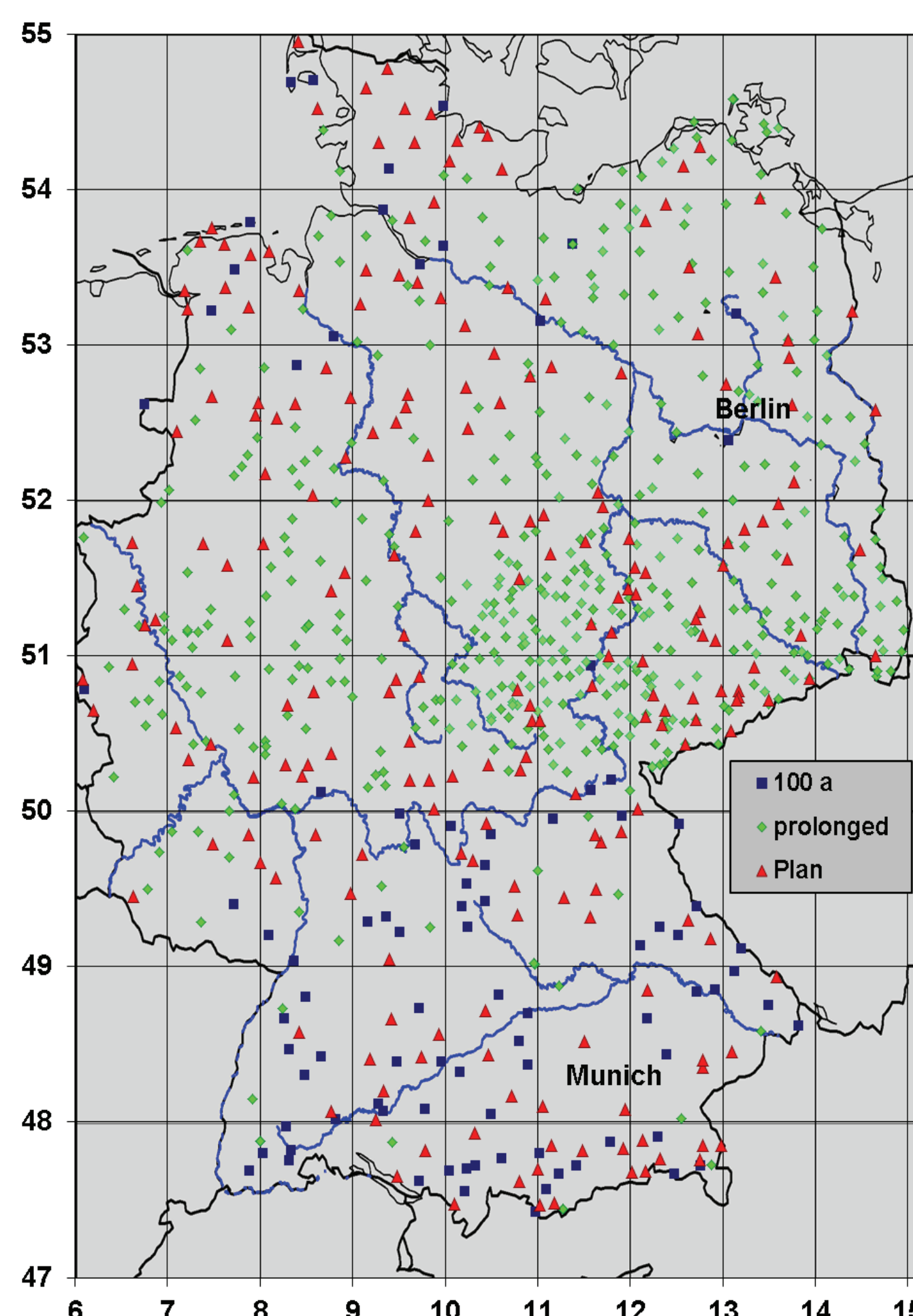


Fig. 1b: Distribution of precipitation stations with digitised precipitation data

2 Ship observations

There are about 37 000 meteorological logbooks in the Hamburg archive of Deutscher Wetterdienst, originating from Deutsche Seewarte, the old German Marine Observatory. These logbooks were provided to German ships to collect weather information during their voyages. The collection started in 1876 and

continued until World War II. In the HISTOR project the material is scanned and digitised. After a high level quality control the data will be exchanged and can be used for climate research and reanalyses. The data from the North and South Atlantic is already digitised.

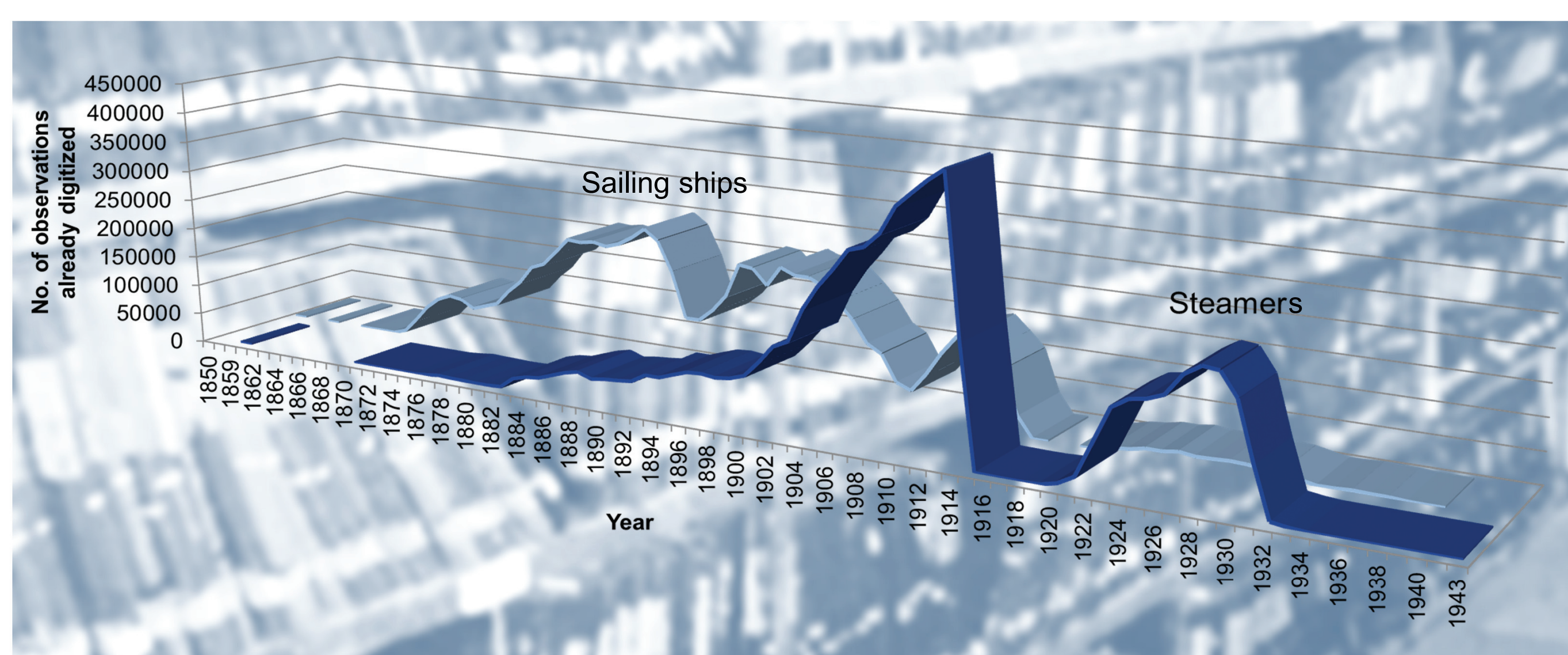


Fig. 2: Number of digitised observations from sailing ships and steamers (in total 15.1 million out of approx. 21 million at the time of writing)

3 Overseas stations

Fig. 3 shows the geographical position of the more than 1550 overseas stations of the Deutsche Seewarte. The climate journals include data of precipitation, temperature, weather type and other parameters, mostly during the periods 1884–1919 and 1930–43. The handwritten records are digitised at Seewetteramt Hamburg and integrated into data bank of DWD, the DWD Climate Data Centre.

198 stations (12 %) have been digitised so far. Quality control as well as statistical investigations are under way. The data can be compared to present day observations and may contribute to the reference base for purposes of climate change assessment. Historic "El Niño / Southern Oscillation" (ENSO) events, tropical storms or climate impacts of severe volcanic eruptions can be investigated.

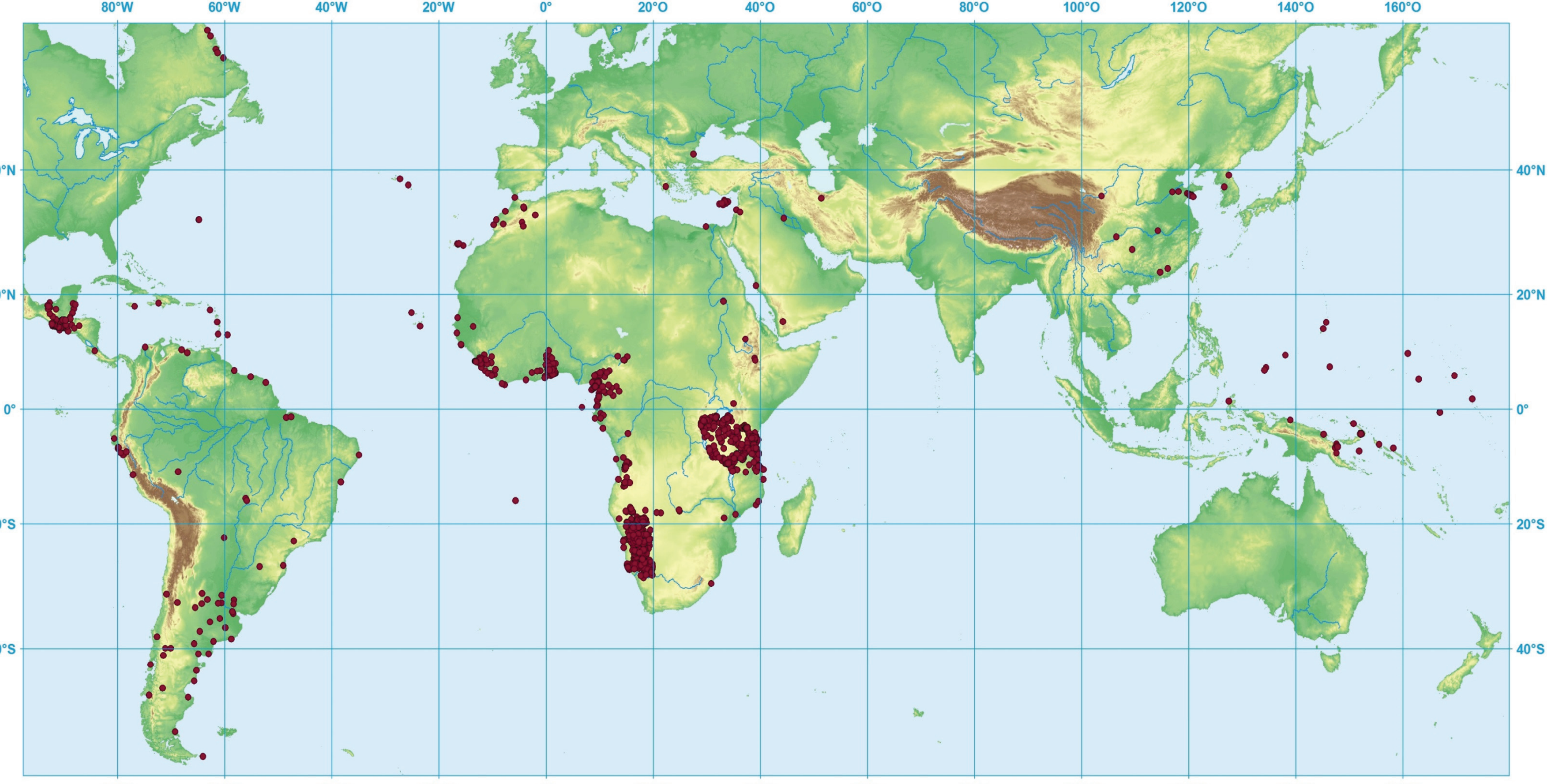


Fig. 3: Position of overseas stations of Deutsche Seewarte 1830-1943

4 Signal stations

Fig. 4 shows the locations of the signal stations of Deutsche Seewarte / Deutscher Wetterdienst reporting sub-daily weather observations in the period 1877–1999. The archive consists of handwritten weather records. All journals contain values of wind force and direction, and, before 1940, also of sea level pressure and precipitation. The number of the stations varied over the years with

a maximum of 110 stations in 1910. Until now, the values of the period 1969 to 1999 have been completely digitised. For the period 1877–1968 a selection of 15 stations is in the process of digitising. If the station is nowadays positioned in Denmark, Poland, Russia or Lithuania, the data will be forwarded to the National Meteorological Service of the respective country after digitisation.



Fig. 4: Position of signal stations of Deutsche Seewarte / Deutscher Wetterdienst

International commitments

The data of the four archives will be quality-controlled and integrated in the DWD Climate Data Centre. Original documents have been handed over to the Austrian and Czech Meteorological services (phenology). DWD supports data rescue activities in the context of the Southern Africa Science Service Centre for Climate Change and Adaptive Land-use (SASSCAL, BMBF) and within EU-FP7-Projects, e.g. COPERNICUS.-UERRA.

DWD entered into international commitments and handed over HISTOR data to ICOADS in 2015, data of 13 stations to China Meteorological Administration in 2015 and data of signal stations at the Polish coast to the Institute of Meteorology and Water Management in 2014. For more information see Kaspar, F., Tinz, B., Mächel, H., and Gates, L.: Data rescue of national and international meteorological observations at Deutscher Wetterdienst, Adv. Sci. Res., 12, 57-61, doi:10.5194/asr-12-57-2015, 2015.



Contact: Birger.Tinz@dwd.de, Hermann.Maechel@dwd.de

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