

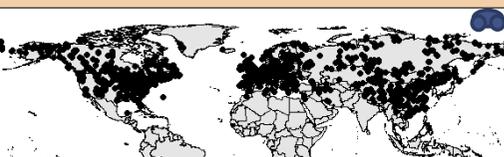
# Challenges in creating and exemplary applications of two cross-repository data compilations on sedimentary pollen and permafrost ground temperature

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## CROSS REPOSITORY DATA COMPILATIONS

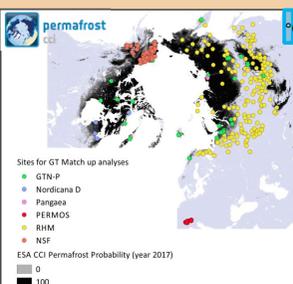
Two ongoing projects:

1. Compilation of a Northern Hemispheric Pollen Data collection



**Fig. 1:** Northern hemisphere fossil pollen dataset (pollen databases and original publications)

2. Compilation of a Northern Hemisphere permafrost temperature data collection (1980-2018)



**Fig. 2:** Northern hemisphere Permafrost\_cci Permafrost Probability and in situ ground temperature stations (grouped by data source), including PERMOS boreholes in the Swiss Alps. Permafrost CCI (2019) Product Validation and Intercomparison Report (PVIR)

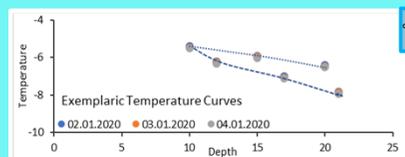
## DATA REPOSITORIES

- NeotomaDB
- European Pollen Database (EPD)
- Global Pollen Database (GPD)
- PANGAEA
- Global Terrestrial Network for Permafrost (GTN-P)
- Roshydromet (RU)
- National Science Foundation (US)
- Nordicana D (CA)

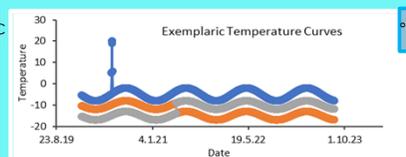
## CHALLENGES OF DATA COMPILATIONS

Data Accuracy: Unflagged and/or erroneous data

→ time consuming, manual checking necessary and sometimes impossible



**Fig. 3:** Ground temperature data of one borehole, probably being two boreholes (exemplary)



**Fig. 4:** Ground temperature data with sensors temporarily taken out of the borehole or shifted sensor positions (exemplary)

Thematic accuracy: E.g. changing taxonomic assignments

Resolution of data: Taxonomical, Temporal and Spatial variability

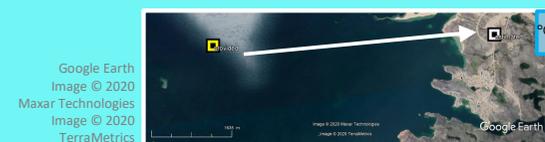
→ standardization and/or harmonization necessary

Location Accuracy: Too low with only two digits of decimal degree; transposed digits; wrong conversion between decimal degrees and degree/minute/second

→ shifting coordinate positions of sediment cores from land to water difficult if lake name unclear and/or many lakes in the surrounding  
→ shifting coordinate positions of permafrost cores from water to land difficult with missing description



**Fig. 5:** Sediment core position outside the lake



**Fig. 6:** Permafrost borehole position within the sea



**Fig. 7:** Permafrost borehole position inside a river. In situ MAGT 2010 at 1.6 m depth: -4.3 °C

## HOW DATA COMPILATION - CHALLENGES AFFECT APPLICATIONS

1. Northern Hemispheric Pollen Dataset

Application:

Climate reconstruction

→ Modern analogues of surface pollen and climate data need correct position for correct data  
→ Taxa combination and harmonization needed for more/better climate analogues

Vegetation reconstruction:

→ Taxa harmonization on higher levels results in more and better comparable data on large spatial and temporal scales

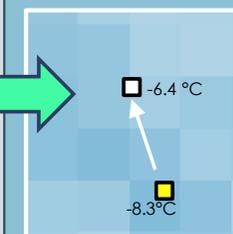
2. ESA CCI Permafrost

• <http://cci.esa.int/Permafrost>

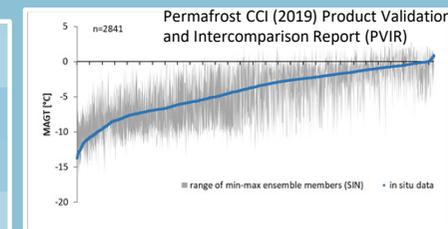


Application: Validation of ESA\_cci Permafrost products

- Mean Annual Ground Temperature (MAGT)
  - Permafrost Probability (MAGT<sub>2m depth</sub> < 0 °C)
- Wrong coordinates result in wrong pixel-based Permafrost\_cci MAGT temperature  
→ Missing data accuracy results in wrong in situ temperature



**Fig. 8:** Permafrost\_cci MAGT at 2 m depth for year 2010



**Fig. 9:** Permafrost\_cci MAGT min-max of 5 ensemble members vs in situ MAGT over all years and depth