Spatiotemporal distribution of temperature and hydroclimate proxy data in the Arctic

Anne Hormes¹, J. Werner², K. Husum³ and N.J. Steiger⁴

Arctic2k meeting, Vienna, Austria, 13 April 2015

The Arctic2k working group met for an open meeting during the European Geosciences Union (EGU) General Assembly 2015 to discuss the current state of the group and future activities. Twenty-five participants attended the meeting.

Johannes Werner reported on the status of the database and the plans for creating regional temperature reconstructions. As the Arctic2k region already had a well-developed database for the first phase of the temperature reconstructions (see PAGES2k Consortium 2013; McKay and Kaufman 2014), only a few new temperature records have become available since then. The largest “gap” identified in the current temperature database is a number of tree ring records, mainly from Scandinavia and Russia, that have not yet been included. Hans Linderholm is currently quality checking and formatting these records.

One problem identified in recent temperature field reconstruction attempts is the poor skill over Greenland (e.g. Anchukaitis and McKay 2014), which is surprising given the relatively good coverage of ice core records. However, it was noted that great care must be taken in communicating the reconstruction quality and uncertainties that would change through time and space. A promising method for doing this was recently showcased by the NOAA 20th Century Reanalysis Project, and consists of clouding out areas that do not fulfil the criteria for trustworthy reconstructions. Johannes Werner and Nathan Steiger offered to lead the reconstruction effort, using Data Assimilation and Bayesian hierarchical models. Contributions from other reconstruction groups are encouraged.

Climatically coherent regions that are well covered in terms of proxy data will also be identified. Generating regionally averaged reconstructions over these regions will provide a valuable second set of reconstructions that can be compared with the spatial reconstructions.

The group agreed that a reconstruction should be more than an updated version of already available spatio-temporal climate reconstructions. One novel aspect could be improving the communication and visualisation of the spatio-temporal uncertainties of the reconstruction. Additionally, a fortuitous fact is that the landmasses surrounding the North Atlantic basin are relatively well covered in terms of proxy records, and preliminary results show that good reconstruction skill over this region is possible. A North Atlantic reconstruction should enable the comparison of atmospheric circulation changes that can then be linked to high-resolution marine archives. Several decadal resolution sediment archives are available, and new sclerochronological records will hopefully become available in time for the final comparison.

AFiliations
¹Department of Earth Sciences, University of Gothenburg, Sweden
²Department of Earth Science, University of Bergen, Norway
³Norwegian Polar Institute, Tromsø, Norway
⁴Department of Atmospheric Sciences, University of Washington, Seattle, USA

Contact
Anne Hormes: anne.hormes@gu.se

References

Proxy type
- Historic
- Ice core
- Lake sediment
- Marine sediment
- Speleothem
- Tree ring
- new records
  (all types)

Figure 1: Overview of temperature proxy archives in the Arctic2k database, new records are highlighted in red.