Reconstruction of extreme cold and warm weather and climate events in Poland from the 11th to the 18th century in the light of the documentary evidence

PhD project

In the last two decades, some climate reconstructions (average seasonal air temperature, mean annual ground temperature and some precipitation characteristics) for the last millennium have been conducted for Poland, but extreme Weather and Climate events (hereinafter WCs) have rarely been analysed. In the context of current global warming and its projected further increase in rate, WCs will be increasingly common and a danger to both natural ecosystems and human society (IPCC 2007, 2013). To better prepare, especially for negative consequences, we absolutely need a long-term perspective and greater knowledge to meet these challenges. That is why it is very important to investigate the numerous WCs. **The aim of the present project is to collect available information about the selected kinds of extreme events in Poland from the 11th to 18th century describing thermal conditions (e.g. severe frost, cold and warm waves, cold and warm winters and summers), and then to analyse them in depth (e.g. describe the main features of spatiotemporal occurrence and coverage, duration and intensity)**. This new database of the WCs planned to be collected in the project will allow for the first time to calculate e.g. (i) the range of natural variability, (ii their temporal repeatability, and (iii) long-term tendencies over centuries. Knowledge gained over such a long period will also enable the assessment of whether the occurrence and characteristics of WCs in the study period were significantly different from the modern day. In this era of global warming, with its increasing occurrence of WCs in certain parts of the globe, this new knowledge about these phenomena in history, especially warm periods, may be extremely useful for forecasting the future occurrence and scale of such phenomena.

Detailed research tasks and harmonogram:

1. Construct a GIS database of selected studied WCs gathered in the project for the area of Poland in current borders using documentary evidence and early instrumental observations, **1-4 months**.

2. Calibrating information about the occurrence and intensity of some types of WCs identified using historical sources against early instrumental measurements carried out in the 18th century, **5-8 months.**

3. Analysing the frequency and intensity of various types of WCs in the period from the 11th to the 18th century and determining trends across centuries, spatial coverage, synoptic causes and socio-economic consequences. Describing in detail particular extreme (catastrophic) events and reconstructing their temporal and spatial coverage, **9-18 months**.

4. Identifying similarities and differences between the historical and modern-day occurrence and character of analysed WCs in Poland and comparing historical results from Poland with analogous ones available for Europe, and in particular for Central Europe, **19-24 months**.

IPCC, Climate Change 2007: The Physical Science Basis. IPCC Working Group I Contribution to Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2007.

IPCC, Climate Change 2013: The Physical Science Basis. IPCC Working Group I Contribution to Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013