

PhD position: Effect of climate change on observed weather and its extremes in Northern Europe

Host institution: Institute of Atmospheric and Earth System Research (INAR), University of Helsinki

Location: Department of Physics, Gustaf Hällströmin katu 2, Helsinki

Beginning: 1st September 2024, or later as agreed

Duration: until 31 August 2028

Main supervisor: Jouni Räisänen

Background

The ongoing climate change manifests itself in changes in both average weather conditions and various types of extremes – most notably exceptionally high temperatures. To efficiently adapt to the changing conditions, society needs the best possible quantitative information on these changes. The project CLAIMS (*From climate change to attribution of extremes and their impacts in Finland and northern Europe*) aims to fulfill this need by combining information from observations, global climate models and very high-resolution regional climate model simulations for northern Europe. This 4-year project is a co-operation between the Finnish Meteorological Institute (FMI) and Institute of Atmospheric and Earth System Research (INAR) at University of Helsinki.

Some of the questions that CLAIMS strives to answer are the following:

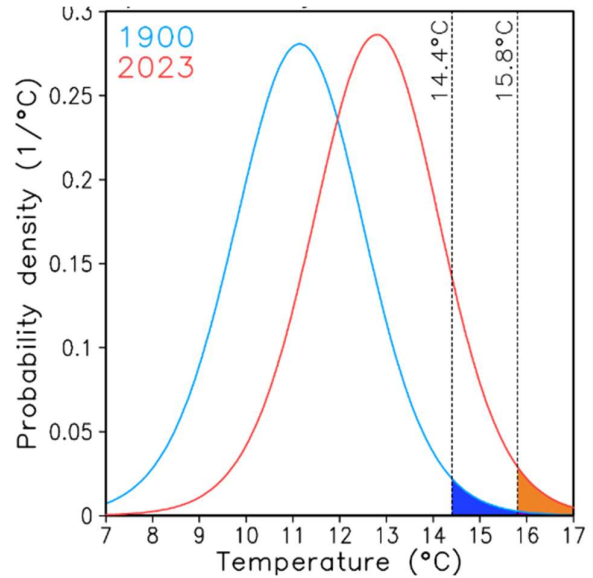
1. How does the ongoing climate change affect climate, as described by the mean values, variability and extremes, in Finland and northern Europe?
2. How can we best estimate the true present-day climate by combining information from observations and model simulations?
3. How is the changing climate affecting climate-related impacts, particularly in the forestry sector, where windstorms, heavy snow loads, and bark beetle invasions are major concerns?

Scope of this PhD position

Your work will focus on questions (1) and (2) above. Using global and regional climate model simulations together with observations, you will work to quantify the effect of climate change of weather conditions in the present climate and in the future. You will build on earlier work such as that in Rantanen et al. (2024)¹ (see also Figure 1 on the next page), testing, improving and extending the already existing methods. Another aim of your work is improved physical understanding of ongoing changes in weather extremes, for example, separating the effect of atmospheric circulation changes from the thermodynamic global warming effect. Although positioned at the University of Helsinki, you will also work in close collaboration with the FMI team.

¹ Rantanen, M., J. Räisänen and J. Merikanto, 2024: A method for estimating the effect of climate change on monthly mean temperatures: September 2023 and other recent record-warm months in Helsinki, Finland. *Atmospheric Science Letters*, 25(6), e1216. <https://doi.org/10.1002/asl.1216>

Figure 1. Probability distribution of September mean temperature in Helsinki in the near-preindustrial climate in year 1900 and in the actual present-day climate in year 2023, based on the Rantanen et al. (2024) method. The observed record-warm September mean of 15.8°C is estimated to have a probability of about 1.8 % in the present climate (orange area), in contrast to only 0.2 % in the year 1900. Under otherwise similar weather conditions but excluding climate change since year 1900, a mean temperature of ca. 14.4°C would have been observed in September 2023.



What is expected from you

- A MSc degree, preferably in meteorology, atmospheric sciences or statistics. However, MSc students near the completion of their degree are also encouraged to apply.
- Willingness to pursue a PhD degree in meteorology
- Some previous skills in programming (e.g., Fortran or python) and statistical analysis of scientific data. Previous experience from working with meteorological data sets (e.g. CMIP6 climate models, reanalysis data and station observations) is an advantage
- Sufficient skills in written and spoken English
- Interest in doing research and ability to independent creative thinking, combined with good self-discipline and reasonable communication skills.

What we can offer

- A four-year PhD student position
- Starting salary of ca. 2715 € per month, assuming a completed MSc degree.
- A multi-disciplinary research environment at the University of Helsinki Kumpula Campus, which also hosts the FMI headquarters
- Desk space and sufficient computing resources, including access to the Center for Scientific Computing (CSC) supercomputers
- Flexibility between on-site and remote working

If you are interested in this position, send your application to Jouni Räisänen (jouni.raisanen@helsinki.fi). The application should include:

- Your CV
- Publication list
- Names and contact details of 1-2 references

Deadline for applications: ** 26 August 2024 **, or until a suitable candidate is found.