

## 2 PhDs winter thunderstorms – linking cold and convection, atmospheric science and statistics

Be part of a team interfacing atmospheric science with statistics in order to advance the understanding of cold-season thunderstorms and the risk they pose to wind farms.

### Background

The statistical weather applications team at the University of Innsbruck consists of experts from the statistics and the atmospheric science departments. It is an environment where pure research and important applications reinforce each other in a stimulating and productive cycle. To get a taste for our work, please see the PI's publication list.

We have teamed up with OVE Services GmbH, one of the leading lightning research groups worldwide and simultaneously a provider of operational lightning data, to shed light on a phenomenon about which surprisingly little is known but which affects renewable energy generation. Damage to wind turbines from lightning exceeding regulatory thresholds occurs predominantly during winter thunderstorms. Their meteorological mechanisms, however, are largely unknown in Europe. Knowing them would help to limit setting higher protection thresholds only for affected regions and thus avoid costs for turbines in other regions.

Project goals are the study of meteorological characteristics of winter thunderstorms in Europe, especially of upward lightning flashes, which are triggered from tall objects such as wind turbines. We will use unique lightning measurements from the lightning tower at Gaisberg (Austria), data from the European lightning detection network EUCLID, newly available meteorological reanalysis data, and measurements from weather radar and weather stations. Advanced methods from the fields of statistics and machine learning will be used, such as the ones developed during our previous lightning research project: <https://doi.org/10.5194/asmo-5-1-2019>, <https://doi.org/10.1175/MWR-D-17-0366.1>, <https://doi.org/10.5194/nhess-17-305-2017>.

We are looking for two PhD students: one with a background in atmospheric science or related fields to focus on the meteorological aspects and interfacing the meteorological data with the statistical models; the other one with a strong statistics and mathematical background intrigued by applications to focus on the development and application of the statistical methods.

Your application should include the course transcript for your degree along with a letter of recommendation. Especially evidence of proficiency in programming, statistical modeling, or mathematics is of interest.

### Responsibilities

- Extend and implement flexible regression models for lightning observed at a measurement tower and with lightning location system (LLS).
- Perform meteorological process studies of cold season lightning events measured by tower and LLS.

## Qualifications

- Degree (MSc) either in atmospheric science (with solid statistical background) or statistics, machine learning, data science, etc.
- Experience in data handling and coding in one or more computing languages.
- Interest and ability to learn R (if not already expert).
- Working proficiency and communication skills in verbal and written English; German optional.

## Application details

- Current CV.
- Cover letter including a statement on why you think you would be great for the winter thunderstorms project.
- Transcripts from your most recent degree and abstract of your most recent thesis.
- Letter of recommendation (one letter; second one upon request). Letters should be sent directly to [synstat@gmail.com](mailto:synstat@gmail.com).
- Links to papers and/or blogs and/or software projects (e.g., on GitHub), if any.

Review of applications will begin on August 20, 2019, and may continue until the positions are filled. Send applications to [synstat@gmail.com](mailto:synstat@gmail.com). The project will start in fall 2019.