

Semester or Master project – DISDRODB: analysis of a global dataset of raindrop size distributions

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The raindrop size distribution (DSD) describes the concentration of raindrops of a given size in a typical volume of rainy atmosphere. The DSD is a crucial piece of information to describe the microstructure of rainfall, which in turn is essential for many applications in environmental sciences and engineering, such as atmospheric remote sensing, mobile and satellite communication and soil erosion. The DSD is measured by sensors called disdrometers, which usually record the size and fall velocity of drops crossing a sampling area over a certain duration.

DISDRODB is an innovative decentralized data archive gathering DSD observations collected all around the world by various groups and institutions. It has been designed and built at the Environmental Remote Sensing Lab (LTE) at EPFL and is now in the final development stage (see <https://disdrodb.readthedocs.io/en/latest/>).

The proposed project is related to DISDRODB and aims to demonstrate its potential for DSD related research. The main objectives are:

1. Implement a (simple) processing routine in order to convert raw data into ready-to-use data for scientific analysis. This step will build upon previous work conducted at LTE as well as on existing Python libraries for DSD processing.
2. As a following step, this routine will be employed to process a set of DSD observations collected in various regions of the world in order to prepare a data set for statistical analyses.
3. This processed data set will then be analyzed using various statistical tools. For instance, the geographical and temporal/seasonal variability of the DSD and parameters of the radar reflectivity rain rate power law are all topics of interest to investigate.

This project will be co-supervised by A. Berne and G. Ghiggi at LTE.

Pre-requisites: good command of Python is necessary, as well as being familiar with standard statistical tools.