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DISDRODB: a global data base of raindrop size distribution observations

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The drop size distribution (DSD) describes the number and size of raindrops in a volume of air. Knowledge of the DSD is key to model the propagation of microwave signals through the atmosphere (crucial for telecommunication and radar remote sensing), to improve microphysical schemes in numerical weather prediction models, and to understand rain-related land surface processes (rainfall interception, soil erosion).

Despite its importance, the spatial and temporal variability of the DSD remains poorly understood. This has motivated scientists all around the globe to deploy DSD recording instruments known as disdrometers, in order to collect DSD observations in various climatic regions. However, only a small fraction of these data is easily accessible by the research community. Data are stored in disparate formats with poor documentation, making them difficult to share, analyze, compare and re-use. Additionally, very limited software is currently publicly available for DSD processing.

This presentation introduces the DISDRODB project, which addresses these challenges by establishing a decentralized disdrometer remote data archive, a public station metadata repository hosted on GitHub, and an open-source Python software for retrieving raw station data and generating quality-controlled analysis-ready L1 and L2 products.

Disdrometer data from hundreds of public stations from various institutions (including NASA, NCAR, ARM, NCEP, NERC, INPE, EPFL, TU Delft) are used to characterize global DSD variability, derive rainfall scaling laws at short spatio-temporal scales, and simulate radar polarimetric variables across multiple frequency bands.

By consolidating and mobilizing existing data archive, the envisioned publicly-accessible global database of standardized disdrometer measurements and derived products aims to accelerate and advance precipitation research as well as foster international collaborations.

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