Filling the gap of observing precipitation over the Alps: a pilot study for GPEX.

The World Climate Research Programme highlights gaps in observing, understanding, and modeling precipitation, particularly over mountainous terrain. Motivated by the need to fill these gaps, the Global Precipitation Experiment is a new cross-World Climate Research Programme (WCRP) initiative centered around the WCRP Years of Precipitation (YoP) and associated activities before and after.

With this contribution, we want to introduce and promote a field campaign initiative supported by the IDEA-S4S network as part of the TEAMx observational campaign under the umbrella of the GPEX working group 1, which will take place over the Alps from 15 September 2024 to 15 September 2025. As part of the TEAMx observational summer extensive observation period, two identical measurement sites formed by one scanning microwave radiometer, one micro rain radar, and one disdrometer will be deployed along an altitudinal transect in the Alps. Specifically, the sites will be located at approximately 1000 m and 2000 m elevation along the slope of the Ritternhorn, Bolzano, Italy, during the extended summer period 2025. They are nested in a network of sites and supersites like KITcube that surround the mountain and can monitor the dynamical flow on a larger scale. The overarching aim is to 1) characterize moist convection initiation by monitoring the variability of temperature and humidity, to 2) statistically characterize raindrop size distribution and rain rate variability with elevation, and to 3) understand which factors influence rain variability the most.

The observations will facilitate to characterize moist dynamical processes, such as convection initiation over complex terrain , and to identify how such processes interact with larger-scale flow conditions as detected from satellite observations and/or regional model and reanalysis products. Moreover, the dataset that will be collected will provide a valuable validation dataset for satellite precipitation retrievals and upcoming new MTG cloud and precipitation retrieval products over orography**.**

Finally, training activities for students and a master course at the University of Cologne connected with the campaign will contribute to building capacity for precipitation observations in the new generations of scientists. This observational effort can be envisioned as a pilot study for future precipitation-focused measurement campaigns within the context of the years of precipitation to come.