EGU23-13101, updated on 23 Apr 2024
https://doi.org/10.5194/egusphere-egu23-13101
EGU General Assembly 2023


# Assessing the performance of a Combined Water Vapor / Temperature / Aerosol Raman Lidar within the TEAMx pre-campaign in the Inn Valley (Innsbruck, Austria) during Summer 2022

**Hannes Vogelmann**[1], Maria Federer[1], Johannes Speidel[1], and Alexander Gohm[2]
[1]Karlsruhe Institute of Technology, IMK-IFU, Garmisch-Partenkirchen, Germany (hannes.vogelmann@kit.edu)
[2]University Innsbruck, Department of Atmospheric and Cryospheric Sciences

A newly available Raman lidar (Purple Pulse Lidar Systems) for vertical profiling of atmospheric water vapor, temperature and aerosols was evaluated during the TEAMx pre-campaign (TEAMx-PC22) in summer 2022 in the Inn Valley (Austria). TEAMx (*Multi-scale* **t***ransport and* **e***xchange processes in the* **a***tmosphere over* **m***ountains – programme and e***x***periment)* is an international research program addressing exchange processes in the atmosphere over mountains and their parametrization in numerical weather models and climate models. Prior to the multi disciplinary measurement campaign, planned in 2024/2025, the pre-campaign 2022 was rather performed for testing (new) instruments and measurement sites and finding synergies between certain devices.

The Raman lidar system is capable of profiling water vapor and temperature throughout the entire planetary boundary layer (typically 3 km to 4 km agl. on summer days) continuously with a basic temporal resolution of 10 s and a reasonable vertical resolution of 30 m to 100 m. Depending on conditions and temporal averaging, water vapor profiles could even be obtained up to ~7.5 km agl. during nighttime. The lidar system was located at the University of Innsbruck (downtown). It was operated side by side with a vertically staring Doppler wind lidar and a nearby (50 m) scanning Doppler wind lidar on the rooftop of the university building, which provide vertical profiles of the vertical wind component at a 1-s interval and vertical profiles of the three-dimensional wind vector at a 10-min interval, respectively. During the measurement period (Aug 2022 to Sep 2022), operational radiosondes were launched in close proximity, at Innsbruck Airport, roughly 3 km to the west of the lidar site. In addition to the daily ascent at 2 UTC, radiosondes were launched at about 8, 14 and 20 UTC on selected days with potentially complex meteorological conditions. We present a first assessment of the Raman lidar measurements through comparisons with the radiosonde data. Together with data from the wind lidars, we also present an interpretation for significant meteorological situations and events, such as foehn, a passing front, a thunderstorm and the formation of a convective boundary layer during a warm period.