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Combined measurments of water vapor over Vipava Valley, Slovenia

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Water vapor is known as Earth's most abundant greenhouse gas and plays a critical role in hydrological cycles on all scales from climatologic to meteorological phenomena. Its concentration in the atmosphere can vary from barely traceable amounts to about 4%. The extent of water vapor contribution to global warming is still not completely understood and remains an important unresolved issue. A step towards better understanding of the role water vapor plays in atmospheric processes is real time temporal and spatial monitoring of its distribution.

In 2012, we performed a dedicated monitoring campaign of water vapor and aerosol content in the atmosphere above the land-sea transition zone between Otlica Observatory and the Adriatic sea, where its distributions are expected to vary rapidly due to the changes in the wind direction and different effects of the heat flux on the sea and land surface. The monitoring was performed combining lidar, dual band GPS receiver and radiosonde measurements. Spatial distributions of aerosols and clouds in the investigated area was monitored using a long-range scanning Mie lidar.

This contribution presents the details of the monitoring campaign. The comparison of Raman lidar and radiosonde mixing ratio profiles shows a good agreement between the two and the total water vapor content agrees well with the values obtained by GPS monitors. We also observed cases with strong correlation between distinct aerosol layers identified from Mie lidar scans and elevated water vapor concentration values at corresponding heights, which implies high aerosol hygroscopicity.