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The Innsbruck Atmospheric Observatory (IAO) for Environmental Research in Alpine and Urban Terrain

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The IAO project aims to investigate atmospheric chemistry, mircometeorology and mountain meteorology in a synergistic fashion. A new measurement site has been established, allowing to study urban exchange processes of momentum, energy, trace gases and aerosols in an Alpine environment. Further, remote sensing techniques and a network of operational weather stations are available to characterize the three dimensional distribution of valley winds and key air pollutants. The remote sensing techniques include a dual Doppler LIDAR enabling to obtain vertical turbulent quantities and aerosol backscatter, a DOAS system (Pandora) measuring trace gas (e.g. NO_2, O_3) column amounts based on direct sun and sky radiance observations, a microwave sounder for water vapor profiles, and a four channel precision filter radiometer allowing to obtain AOD and Angström coefficients. A number of in-situ instruments (CO_2, H_2O, NMVOC, NO_2, NO, NOX, CO) allow fast measurements necessary for the eddy covariance technique, and complement existing concentration measurements at air quality networks along the Inn valley. The Inn valley represents one of the strategically most important Alpine crossing points for the transport of goods between Northern and Southern Europe. Each year approximately 6 million vehicles (1) pass through the east-west facing valley, which is about 10 km wide surrounded by mountain ridges about 2.5 km high. As a consequence the Inn valley as well as the urban area of Innsbruck regularly exceed air quality standards for NO_2 and are considered in non-attainment. We present first results from a concerted effort to characterize a comprehensive set of urban trace gas fluxes in Innsbruck. Results show the importance to evaluate emission inventories used for air quality modeling on local to regional scales.

(1) EUROSTAT, “Energy, transport and environment indicators” (Tech. Report 201, European Commission, ec.europa.eu, ISBN 978-92-79-49471-0, doi: 10.2785/547816, 2015)