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Impact of mixing height estimation on heterogeneous terrains with different algorithms and instruments on atmospheric transport models.

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Abstract:

The retrieval of mixing height [MH] is a common target of several scientific community all over the world. A strong effort is needed to the fact that modeling of MH generally fails introducing strong errors in the estimate of the concentrations of pollutants and green house gasses within the boundary layer. In Europe local meteorological services and international projects are implementing networks of instruments that can provide atmospheric profiles of different quantities. These networks will continuously provide data which could be used to constrain MH values. The current availability of atmospheric profiles of different nature, such as radiosondes, ground based lidar and ceilometers as well as satellites over Europe grant a spatial coverage that allow to estimate the impact of the knowledge of MH on transport models at synoptic scale of quantities as CO_2 and CH4 mixing ratios.

In this study we apply several algorithms to retrieve MH from different data sources: the ceilometers network installed by the German Weather Service; the data from CALIPSO satellite and all the WMO radio-soundings available over Europe during the IMECC (Infrastructure for Measurements of the European Carbon Cycle) in 2009.

The values obtained from the optical instruments are validated using as reference the estimation retrieved by the virtual potential temperature profiles obtained by the radiosondes where co-location occurs and using statistical interpolation to evaluate the estimates from satellite and non co-located stations..

The impact of this estimates of MH on CO_2 mixing ratios will be evaluated with the Stochastic Time Inverted Lagrangian Transport model (STILT) driven by WRF meteorology in comparison with in-situ measurements.