



## **Inverse modeling for Jungfrauoch: model tests with a synthetic data set**

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The Swiss high Alpine station Jungfrauoch (3580 m asl) is ideally located to monitor a significant part of central European air pollutant emissions. On the one hand, the station is close enough to major European emission sources. On the other hand, Jungfrauoch is remote enough (high elevation) that it is reached not only by polluted boundary layer air but also, occasionally, by clean background air. The main disadvantage of Jungfrauoch is the complex surrounding topography.

The long term goal of our work is to derive from Jungfrauoch measurement data emission maps for halocarbons for central Europe. The tool to reach this goal is inverse modeling. Residence time maps are used to link emission maps and modeled concentrations. The emission maps are then adjusted such that the measured data is best reproduced. For the residence time maps we use a backward Lagrangian Particle Dispersion Model (LPDM). Originally from the German Weather Service (DWD), we adapted the model to our purposes. The numerical wind fields we get from the alpine model (aLMo) of MeteoSwiss, which has a grid spacing of 7km x 7km.

Two challenges come immediately to mind: the quality of the residence time maps and the quality of the inversion itself. Here we focus on the latter, assuming that the residence time maps are correct. For this purpose, we first assume a source scenario over Europe. The modeled residence time maps then are used to transform this scenario into a synthetic time series of measured concentrations at Jungfrauoch. This synthetic time series and the residence time maps we use as input for our inversion. We compare the resulting output with the initial source scenario and discuss possible reasons for the differences.