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Modelling photochemistry in alpine valleys

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Abstract. Road traffic is a serious problem in the Chamonix Valley, France: traffic, noise and above all air pollution worry the inhabitants. The big fire in the Mont-Blanc tunnel made it possible, in the framework of the POVA project (POllution in Alpine Valleys), to undertake measurement campaigns with and without heavy-vehicle traffic through the Chamonix and Maurienne valleys, towards Italy (before and after the tunnel re-opening). Modelling is one of the aspects of POVA and should make it possible to explain the processes leading to episodes of atmospheric pollution, both in summer and in winter. Atmospheric prediction model ARPS 4.5.2 (Advanced Regional Prediction System), developed at the CAPS (Center for Analysis and Prediction of Storms) of the University of Oklahoma, enables to resolve the dynamics above a complex terrain. This model is coupled to the TAPOM 1.5.2 atmospheric chemistry (Transport and Air POllution Model) code developed at the Air and Soil Pollution Laboratory of the Ecole Polytechnique Fédérale de Lausanne. The numerical codes MM5 and CHIMERE are used to compute large scale boundary forcing.
This paper focuses on modelling Chamonix valley using 300-m grid cells to calculate the dynamics and the reactive chemistry which makes possible to accurately represent the dynamics in the Chamonix valley (slope and valley winds) and to process chemistry at fine scale. The summer 2003 intensive campaign was used to validate the model and to study chemistry. NO_y according to O_3 reduction demonstrates a VOC controlled regime, different from the NO_x controlled regime expected and observed in the nearby city of Grenoble.

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