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Influence of regionally produced ozone on the photochemistry of the Grenoble valley during the heat wave of 2003

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The city of Grenoble experiences every summer important ozone events. Grenoble is located in a Y-shape valley at the meeting point of the Drac and Isère valley. This very particular topography causes the formation during large anticyclone of stagnant atmospheric conditions that prevent dispersion of the emitted pollutants. The local production of ozone is under such conditions very effective. During the heat wave of 2 to 15 August 2003 that affected whole Europe the threshold of 180 μg/m^3 of ozone was exceeded several hours every day in Grenoble area. As a response local authorities limited during 10 days the speed down to 70 km/h on the major highways of the valley to reduce the emissions of ozone precursors. To provide the authorities with a scientific basis on the impact of such local actions mesoscale modelling is applied. The aim of this study is to determine to what extent an emission reduction at the city scale limits exceedance of air quality threshold on the following days. A chain of existing mesoscale models is driven by global meteorological analysis from ECMWF. At continental and regional scale meteorological MM5 model is applied at 18 and 6-km resolutions and is offline coupled to the chemistry transport model CHIMERE. At the local scale the Meteorological and Photochemistry Model (MetPhoMod) performs calculation of dynamics and chemistry at a 2-km resolution. Simulations realized during the period 2-15 August 2003 with various emission sets exhibited that the regional level of ozone represent a predominant part of the total ozone in the Grenoble valley. Simulations also highlighted that recirculation of air masses within the valley and formation of reservoir layers of ozone during the night had a strong impact on ozone peaks of the following days. The same chain runs every day in prediction and model

outputs can be found at http://www.legi.hmg.inpg.fr/∼Alpes/Internet/realtime.