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Evaluation of Global Model Simulation of Tropospheric Ozone from ECHAM6-HAMMOZ1 with Surface Measurements over the Mediterranean Region

Najmeh Kaffashzadeh (1,2), Martin G. Schultz (1,2), Olga Lyapina (1), Sabine Schröder (1), Scarlet Stadtler (1,2)

(1) Institute for Energy and Climate Research, Troposphere IEK(8), Forschungzentrum Jülich, 52425, Germany. (n.kaffashzadeh@fz-juelich.de) , (2) Meteorological Institute, University of Bonn, 53121 Bonn, Germany.

Current chemistry transport models are generally successful in describing the principle features of the present-day global tropospheric ozone (O_3) distribution, but they exhibit large differences of ozone concentrations over the Mediterranean region. The Mediterranean region can be perturbed by long-range pollution import from Northern Europe, North Africa and Asia, in addition to local emissions, which may all contribute to ozone concentrations in this area. Identifying the main drivers for Mediterranean ozone concentrations and understanding the reasons for the inter-model differences remain scientific challenges.

To investigate the geographical distribution of tropospheric ozone over the Mediterranean, we analyze hourly surface ozone measurements from more than 1000 stations in the Tropospheric Ozone Assessment Report (TOAR) database and compare these to hourly model outputs from the global chemistry climate model ECHAM6-HAMMOZ1 for the year 2012. The daily maximum 8-hour running mean value of ozone mixing ratios is calculated for both model and observation and compared.

The preliminary results show that the model captures many features of the ozone and its precursor concentrations in many regions of Europe throughout the year. However, it substantially underestimates ozone in the Po Valley region in summer and overestimates ozone over much of the Mediterranean region during spring. The reasons for this behavior will be investigated through detailed sensitivity studies with respect to VOC emissions, anthropogenic emissions, ozone deposition, specific chemical reactions, and long range-import of ozone and precursors.