5.095 The mutual regional features in the seasonal cycle of surface O3 simulated in the global chemical models.

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Abstract:

The seasonal cycle of surface O_3 is one of the basic features which should be properly represented by the atmospheric chemical models. It can be said that the current forefront atmospheric chemical models consider and include the processes which are essential to calculate the concentration of tropospheric O_3 such as the emissions of precursors, transport by various kinds of atmospheric motions, chemical reactions, and deposition onto the Earth's surface. However, it has been reported in several literatures that the seasonal cycle of O_3 simulated with global chemical models can not necessarily well capture the observed seasonal cycle in several regions on the globe. Here, we compared the seasonal variations of surface O_3 simulated by global chemical models which have been submitted to several international Model Inter-comparison Projects (MIPs) with those observed in many different locations widely spread on the globe. The aim of this comparison is evaluating the ability of global chemical models to simulate the observed seasonal cycle of surface O_3. We have performed this kind of comparison before by using HTAP-Phase1 (HTAP-1) model inter-comparison outputs and found a characteristic regional differences in the peak season of surface O_3 concentration: Five distinctive regions each of which has different peak season of surface O_3 were found, which were common to almost all participating models. We also found that many models failed to simulate the spring peak observed in several European and North American sites. This time, we have extended the analysis with using the output of other MIPs including ACCMIP, CCMI, and HTAP-2 to examine whether the distinctive regional features in surface O_3 peak season found in HTAP-1 models can be seen in the other MIPs, and how much the shortcomings in the HTAP-1 outputs have been improved in the latest MIPs.