

1.126 Insufficient representation of summertime surface ozone minimum in the East Asian maritime region by chemical transport models.

Presenting Author:

Tatsuya Nagashima, National Institute for Environmental Studies, Tsukuba, Ibaraki, Japan, nagashima.tatsuya@nies.go.jp

Abstract:

Seasonal variation of surface O₃ observed in many locations in the maritime region in East Asia shows distinct springtime maximum and summertime minimum. The chemical transport models (CTMs) such as participated in several model inter-comparison projects (MIPs) have roughly simulated this seasonal transition, however, the summertime minimum has been overpredicted in many cases, although most of the models consider the processes essential to simulate the seasonal march of the concentration of surface O₃ such as the emissions, transport, chemical reactions, and deposition. Here, we compared the observations of surface O₃ in East Asian maritime region with the model output from several MIPs in order to describe the special and temporal features of the overprediction in summertime surface O₃ concentration in this region.

Comparison of monthly mean surface O₃ concentration observed at maritime remote sites around Japan and Korean Peninsula (observations from EANET and WDCGG database) with those simulated by models participated in a MIPs with global CTMs (HTAP2) revealed that the HTAP2 models overpredicted about 10-20 ppbv in summer particularly south of 40N including the sites like Ogasawara and Minamitorishima located in open ocean area far away from the Asian continent. From the comparison of one hourly O₃ concentration observed and simulated at Cape Hedo located in the southernmost part of Japan, it was shown that most of the HTAP2 models could simulate the temporal variations corresponding to the meteorological perturbations but tended to overestimate in the events that the observed O₃ concentration went below 20 ppbv. In the northern part (north of 40N), the O₃ concentrations in summer was relatively well simulated by HTAP2 models, but winter to spring O₃ concentration was clearly underpredicted about 5-10 ppbv which made the simulated summertime minimum quite unclear.