3.017 The simulations of the long-range transport of aerosols emitted from the Siberian forest fire in September 2016.

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Abstract:

The large and continuous forest fire emission occurred around Lake Baikal in September 2016. The surface concentration of black carbon (BC) was observed at the “R/V Mirai” from August 2016 to September 2016 in Arctic Cruise (MR16-06), and the maximum BC concentration was detected in 25–26 September around Aleutian Islands. We perform aerosol transport simulations using the Nonhydrostatic Icosahedral Atmospheric Model (NICAM) - SPRINTARS with mesh size about 56 km to determine the forest fire impacts on the long-range transport of BC and organic carbon (OC) from Lake Baikal to Aleutian Islands. This model consistently calculates the emission, transport, and deposition of the aerosols, by relaxing the meteorological fields (horizontal wind, temperature) of the model to those of the reanalysis data. We use daily fire flux of BC, OC, and SO_2 of the CAMS Global Fire Assimilation System (GFAS). One noticeable advantage was achieved by replacing the model’s injection height of forest fire events by the observational injection height using GFAS dataset, while the emission scheme of previous model used constant injection height about 3 km. We successfully reproduce the maximum of carbon concentration in 25–26 September around Aleutian Islands, in agreements with the MR16-06 observation. Since the injection height of this events was about 2 km around Lake Baikal, the carbon concentration of new model is smaller than that of previous model (injection height about 3 km). In addition, we compared the simulated results with Himawari-8 data provided from JAXA, and found that the NICAM-SPRINTARS captured the high aerosol optical thickness (AOT) area moving from Lake Baikal (21 Sep.) to Aleutian Islands (25-26 Sep.) through Northeast China (22-23 Sep.) and the Sea of Okhotsk (23-24

Sep.) consistent with the observation. These results indicate that the NICAM-SPRINTAR is capable of simulating fine scales transport processes of carbon.