

Model analysis of atmospheric concentrations and depositions on the Eastern Indian Ocean observed by R/V Hakuho Maru

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Recently, significant air pollution over South Asia has been attentions from the globe. Especially in the dry season (from October to February), the pollution level has gone bad at mega-cities in India due to enhanced anthropogenic emissions and changed meteorological conditions. On the same season, additionally, it is concerned that the continental pollution transport due to changing air-mass flow coming from the ocean breeze to the land breeze will affect the marine ecosystem in the Bay of Bengal and the Indian Ocean.

On-board atmospheric observations over the Bay of Bengal and the Southeast Indian Ocean during the R/V Hakuho Maru KH-18-6 cruise performed in the early dry season succeeded to capture the heavily polluted air-masses likely including atmospheric pollutants (Iwamoto et al, 2019, 2020). Their aerosol and rainwater samples also provided the possibilities of continental nitrogen deposition into the Ocean.

We tried to investigate the sources and reasons observed enhanced concentrations of gas and aerosol species and these depositions by using a regional chemical transport model, WRF/CMAQ.

CMAQ generally captured well changing of the observed gas and aerosol concentrations in the Bay of Bengal. The increased concentrations of gaseous and particulate pollutants after the Cyclone passing was simulated well in the model, although the model sometime could not reproduce concentrations of individual species. Both observed and simulated relative high concentrations at around 5N might be associated with not only transports from the South part of India, but the Middle East ship route.

Keywords: regional chemical transport model, South Asia, the Bay of Bengal, the Indian Ocean, gaseous pollutants, particulate pollutants