4.047 An 8-year record of atmospheric trace gases and aerosols in Southeast Asia based on shipboard observation.

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Abstract:

The National institute for Environmental Studies has performed long-term atmospheric monitoring over the Pacific Ocean using a commercial cargo vessel since 1994. Currently we conduct the monitoring work along three shipping routes: North Pacific (Japan–United States/Canada), Oceania (Japan–Australia/New Zealand), and Southeast Asia (Japan–Southeast Asian countries). The monitoring work was first implemented along the routes of North Pacific (Japan–United States/Canada) and Oceania (Japan–Australia/New Zealand), but was augmented by the monitoring work in the Southeast Asia region in September 2007. Along the Southeast Asia route, we observed climatically important trace gases and aerosols based on in-situ measurements (gases: CO_2, CH_4, CO, and O_3; aerosols: PM2.5, SPM, and black carbon) and flask sampling (CO_2, CH_4, N_2O, CO, H_2, SF_6, and O_2/N_2) followed by the laboratory analysis. Here we present analysis of the 8-year record (2007–2015) of CO_2, CO, and O_3 based on the in-situ measurements, examining the time-series variation of these three gases in respective 7 defined areas: off the east and west coast of Indochina and Malay Peninsula, and off the coast of Philippines, Borneo, and Indonesia along the shipping route. The analysis revealed different distribution features of CO_2, CO, and O_3 in each area that were controlled by the seasonal change of transport patterns driven by the Asian monsoon with strong disturbance by large-scale tropical biomass burnings.