

Seasonal Variations of Brown Carbon Aerosols from The Asian Outflow: Light Absorption Properties, Organic Tracers and Diverse Sources

Chunmao Zhu

Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan

Author list (excluding presenting author)

Takuma Miyakawa, Fumikazu Taketani, Bhagawati Kunwar, Dhananjay Kumar Deshmukh, Kimitaka Kawamura, Yugo Kanaya

Abstract

Light-absorbing organic aerosols (BrC) play a significant role in Earth's climate by affecting atmospheric radiative forcing. In this study, we investigated the seasonal variations and source-specific contributions to BrC in the Asian outflow region, focusing on Fukue Island, Japan, which receives air masses from continental Asia. We conducted year-long parallel analyses of BrC light absorption and organic aerosol composition over November 2019 to November 2020. BrC levels were markedly higher during winter-spring, coinciding with air masses influenced by anthropogenic emissions from Asian sources, particularly fossil fuel combustion as indicated by the specific molecule marker phthalic acid. Biomass burning also contributed to BrC levels, especially in spring. Notably, the fraction of BrC soluble in methanol increased in summer, suggesting potential contributions from additional sources, such as local biogenic emissions in this period. The results from this study shed light on the interaction between seasonal changes in the dominant emission sectors along the shift of footprint and the resulting BrC dynamics, with implications for understanding the impact of BrC on regional and global climate.

Early Career Scientist

NO, I am not an early career scientist.

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