[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG41]Biogeochemical linkages between the ocean and the atmosphere during phytoplankton blooms

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Multi-scale vertical and horizontal ocean mixing processes can strongly influence the distribution of dissolved and suspended substances including macro- and micro-nutrients, and may impact on phytoplankton bloom formation. The changes in nutrient dynamics generally affect the abundance, composition and metabolic activity of marine organisms such as phytoplankton and bacteria during the bloom. Marine phytoplankton can produce volatile organic compounds (VOCs) and marine atmospheric aerosols, which strongly influence on atmospheric chemistry. Primary and secondary organic and inorganic components produced via marine phytoplankton activity can contribute to the Earth's radiative forcing, and in turn marine ecosystems including biogeochemical processes directly or indirectly. Therefore, the biogeochemical cycles have a tight linkage between the ocean and the atmosphere. In order to understand physical, chemical and biological processes relevant to phytoplankton bloom formation in the ocean, dynamics of VOCs and marine aerosols in the atmosphere, and the biogeochemical linkage between the ocean and the atmosphere, we welcome new interdisciplinary presentations and active discussions on physical, chemical, and biological sciences both from ocean and atmospheric fields in this session. Studies linked to the Surface Ocean-Lower Atmosphere Study (SOLAS) project are good examples, but other related studies are also invited.

[ACG41-P03]Production of organic gases associated with phytoplankton growth and death

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Ocean is a main source of natural organic gases (organic sulfur gases, non-methane-hydrocarbon, and halocarbons) in the atmosphere. High concentrations of organic gases in seawater are found in high productive area. Marine microorganisms (mainly phytoplankton) are thought to produce these organic gases. Previous culture experiments demonstrated that isoprene (C5H8) is produced by phytoplankton associated with their photosynthesis, and that organic iodine gases (methyl iodide and ethyl iodide) are also produced by phytoplankton. However, we don’t know the factors to determine the spatial-temporal distributions of oceanic organic gases in seawater. We conducted time-series observation of organic gases in the Funka-bay, Hokkaido, Japan, in 2014 – 2017.Isoprene concentration in seawater started to increase in spring bloom period (March). The highest concentration was found in post bloom period (June – August). The concentration maximum of vertical profile was found below the mixed layer in euphotic zone. It is suggested that isoprene was produced by phytoplankton associated with photosynthesis, and accumulated in seawater below mixed layer from spring bloom to post bloom period. In the bottom layer water (90m depth) below the euphotic zone, isoprene concentrations increased in post bloom period. The concentrations of methyl iodide (CH3I) and ethyl iodide (C2H5I) also increased in the bottom layer water. We should focus on the phytoplankton productions of organic gases in the dark.