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## Detection of regional scale sea-to-air oxygen emission related to spring bloom near Japan by using in-situ measurements of the atmospheric oxygen/nitrogen ratio

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**Abstract.** We have been carrying out in-situ monitoring of atmospheric O<sub>2</sub>/N<sub>2</sub> ratio at Cape Ochi-ishi (COI; 43°10' N, 145°30' E) in the northern part of Japan since March 2005 by using a modified gas chromatography/thermal conductivity detector (GC/TCD). The standard deviation of the O<sub>2</sub>/N<sub>2</sub> ratio is estimated to be about ±14 per meg (≈3 ppm) with intervals of 10 minutes. Thus, the in-situ measurement system has a 1σ precision of ±6 per meg (≈1.2 ppm) for one-hour mean O<sub>2</sub>/N<sub>2</sub> ratio. Atmospheric potential oxygen (APO≈O<sub>2</sub>+1.1 CO<sub>2</sub>), which is conserved with respect to terrestrial photosynthesis and respiration but reflects changes in air-sea O<sub>2</sub> and CO<sub>2</sub> fluxes, shows large variabilities from April to early July 2005. Distribution of satellite-derived marine primary production indicates occurrences of strong bloom in the Japan Sea and the latitudinal band between 30° and 40° N in the western North Pacific in April and in the Okhotsk Sea and northeastern region near Hokkaido Island in the North Pacific in June. Back trajectory analysis of air masses indicates that high values of APO, which last for several hours or several days, can be attributed to the oxygen emission associated with the spring bloom of active primary production.

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