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### CONTINUOUS MEASUREMENTS OF THE ATMOSPHERIC O<sub>2</sub>/N<sub>2</sub> RATIO AT NY-ÅLESUND, SVALBARD

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Simultaneous observations of atmospheric O<sub>2</sub> (defined as O<sub>2</sub>/N<sub>2</sub> ratio) and CO<sub>2</sub> concentrations provide valuable information about the global land and ocean carbon exchanges. For a better understanding of the global carbon cycle, several laboratories have developed precise measurement systems for the O<sub>2</sub>/N<sub>2</sub> ratio and carried out systematic observations since the early 1990s. To elucidate the variations of the atmospheric O<sub>2</sub>/N<sub>2</sub> ratio and to understand role of the Arctic region on regional and global carbon cycle, we developed a continuous measurement system using differential fuel-cell O<sub>2</sub> analyzer, and initiated continuous observation at Ny-Ålesund (78°55'N, 11°56'E), Svalbard in November 2012, which is the first such observational system operated from the Arctic region. We will report results based on the first two years of measurement.

The O<sub>2</sub>/N<sub>2</sub> ratio observed at Ny-Ålesund shows a clear seasonal cycle with peak-to-trough amplitude of about 120 per meg, which reaches a minimum in late March to early April and a maximum in August. On the other hand, the CO<sub>2</sub> concentration varies seasonally in opposite phase with the O<sub>2</sub>/N<sub>2</sub> ratio, showing a seasonal amplitude of 16 ppm. Short-term variations on time scales of several hours to several days are also clearly observed. In spring to summer, irregular fluctuations of O<sub>2</sub>/N<sub>2</sub> ratio reaches 50–60 per meg (corresponding to about 10–13 ppm). Similar fluctuations of CO<sub>2</sub> are also found in opposite phase with O<sub>2</sub>/N<sub>2</sub> ratio. However, their amplitudes are 5 ppm at most. The comparison of backward trajectories of air parcels with the distributions of marine biotic net primary production suggests that such fluctuations of O<sub>2</sub>/N<sub>2</sub> ratio are closely related to O<sub>2</sub> emission due to marine biological activity near Norwegian Sea.