

## C-130H 輸送機で観測された自由対流圏中における温室効果ガスの季節変動 Seasonal variations of greenhouse gases observed in the free-troposphere using a C-130H cargo aircraft

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Atmospheric measurements of greenhouse gases (GHGs) are conducted mostly at ground-based stations. Therefore, spatial and temporal variations of GHGs in the free-troposphere are not fully understood. Since February 2011, Japan Meteorological Agency has operated air flask sampling measurements of carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) using a C-130H cargo aircraft in cooperation with the Ministry of Defense. The aircraft flies from Kanagawa to Minamitori-shima over the western North Pacific once a month, collecting about 20 and 4 air samples during cruising and descending sections respectively. The cruising altitude is about 6 km, where all the measurements represent free-tropospheric concentrations. It was well captured that the seasonal cycle of the observed CO<sub>2</sub> concentration shows a maximum during April-May and a minimum in September. However, detailed seasonal patterns are apparently different in vertical from the surface to 6 km altitude. Especially, the steep vertical gradients of CO<sub>2</sub> are prominent during winter and spring seasons. It was also found that high-concentration events of CO appeared in the mid free-troposphere during the spring season. These characteristic features strongly suggest a large impact of Asian continental outflow on the greenhouse gases distributions in the free-troposphere. By comparing three-dimensional simulation results with the aircraft measurements, the East Asian emissions and structures of the Asian continental outflow are examined.

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