

3.104 Contributions of commercial aircraft for researching atmospheric greenhouse gases.

Presenting Author:

Toshinobu MACHIDA, National Institute for Environmental studies, 16-2 Onogawa, Tsukuba 305-8506, Japan, tmachida@nies.go.jp

Co-Authors:

Yosuke SAWA, Meteorological Research Institute, 1-1 Nagamine, Tsukuba 305-0052, Japan

Yosuke NIWA, National Institute for Environmental studies, 16-2 Onogawa, Tsukuba 305-8506, Japan

Taku UMEZAWA, National Institute for Environmental studies, 16-2 Onogawa, Tsukuba 305-8506, Japan

Kazuo TSUBOI, Meteorological Research Institute, 1-1 Nagamine, Tsukuba 305-0052, Japan

Hidekazu MATSUEDA, Meteorological Research Institute, 1-1 Nagamine, Tsukuba 305-0052, Japan

Abstract:

Aircraft is one of the most promising platforms to investigate atmospheric chemical constituents (or physical parameters) in the upper air. Chartered aircraft plays an important role for atmospheric measurements especially for specific area and time according to research interests. In spite of the inflexibility in flight scheduling, observations based on commercial aircraft have great advantages such as 1) high frequency to find seasonal or more short-term variations, 2) wide coverage to elucidate inter-hemispheric or inter-continental differences in the upper troposphere, and 3) long continuity to detect decadal changes in the atmosphere. In addition to the above advantages, a lot of vertical profiles provide strong constraints for estimating global cycles of atmospheric trace gases .

The project named CONTRAIL (Comprehensive Observation Network for Trace gases by Airliner) is one of the noble project started in 2005, which have been observing atmospheric greenhouse gases by using the airliners operated by Japan Airlines (JAL). The Continuous CO₂ Measuring Equipment (CME) has been producing plenty of CO₂ data in the troposphere and those data have been used to estimate CO₂ fluxes at the earth surface, to understand atmospheric transport processes by utilizing CO₂ as an atmospheric tracer and to validate remote observation products such as ground-based FTS and satellite. The Automatic air Sampling Equipment (ASE) provides us data not only for CO₂ mole fractions but also CH₄, CO₂, N₂O, SF₆, CO and H₂ mole fractions and isotope ratios of CO₂ and CH₄ on the routes between Japan and Australia, Europe, Hawaii, Guam and Bangkok.

A number of studies have used the CONTRAIL data, but we believe the CONTRAIL data have more possibilities to contribute atmospheric sciences. We welcome researchers not only from the carbon-cycle community but also from other atmospheric chemistry research to use CONTRAIL data.

CONTRAI-CME data are available at <https://doi.org/10.17595/20180208.001>.