

CO₂ flux variation in Southeast Asia for 2015 estimated by in-situ aircraft measurements

*丹羽 洋介¹、澤 庸介¹、町田 敏暢²、松枝 秀和¹、梅澤 拓²、三枝 信子²

*Yosuke Niwa¹, Yousuke Sawa¹, Toshinobu Machida², Hidekazu Matsueda¹, Taku Umezawa², Nobuko Saigusa²

1. 気象庁気象研究所、2. 国立環境研究所

1. Meteorological Research Institute, 2. National Institute for Environmental Studies

The global carbon cycle changes in response to climate changes. However, our understanding of the mechanisms underlying those carbon cycle changes is still not enough and an earth system model with climate-carbon cycle feedback included has significant uncertainties in its global warming prediction. Observations of CO₂ mole fractions in the atmosphere has revealed significantly large impacts of El Nino-Southern Oscillation (ENSO) on the carbon cycle. Anomalous climate events associated with ENSO, such as high/low temperatures, dry/wet conditions and fires, may induce CO₂ flux changes at the earth surface and consequently CO₂ mole fraction changes in the atmosphere. In order to quantitatively estimate spatiotemporal variations of CO₂ fluxes from atmospheric observations, one uses an inversion analysis, which employs an atmospheric transport model to link surface fluxes with atmospheric mole fractions. However, the sparseness of the global CO₂ observation network has limited the reliability of the flux inversion analysis, specifically for tropical areas, where surface fluxes seem to have significant sensitivities to ENSO. In recent years, an in-situ aircraft measurement project named CONTRAIL (Machida et al., 2008) has extended the global CO₂ observation network; especially, the extension to Southeast Asia is noteworthy. In 2015, the year of the biggest El Nino since 1997, a number of fire events in Southeast Asia were clearly captured by satellites, suggesting that significant amount of CO₂ was released into the atmosphere. In this study, we have conducted an inversion analysis using an inversion system named NICAM-TM 4D-Var (Niwa et al., 2016a,b) and estimated CO₂ fluxes in Southeast Asia with a focus on changes related to the El Nino.

キーワード：炭素循環、データ同化、航空機、エルニーニョ

Keywords: Carbon Cycle, Data assimilation, aircraft, El Nino