

Performance of radiocarbon analysis using NIES-CAMS and initial results for air samples obtained in Indonesia.

Yumi Osonoi^{1*}, Yukio Terao¹, Hitoshi Mukai¹, Masahide Nishihashi¹ and Toshiyuki Kobayashi²

¹ Center for Global Environmental Research, NIES (*osonoi.yumi@nies.go.jp)

² Center for Environmental Measurement and Analysis, NIES

Radiocarbon (¹⁴C) measurements are useful to estimate fossil carbon contribution on atmospheric carbon dioxide (CO₂) concentrations. In 2014, compact carbon AMS (CAMS, NEC 1.5SDH) were introduced into NIES. NIES-CAMS system is based on a 0.5MV tandem pelletron accelerator. The NIES-CAMS is specialized to analyze ¹⁴CO₂ in the atmosphere, and then to provide information on fossil carbon contribution in the variations of CO₂, which are measured by various methods and platforms, including satellite (e.g. GOSAT).

It is said that CO₂ flux in Asian region gives considerably large impacts to global CO₂ budget. Therefore atmospheric ¹⁴CO₂ monitoring over Asian region is important to reduce uncertainties in carbon budget, however, there are few data on Asian region. NIES have collected air samples from the western Pacific and two monitoring stations in Japan (Cape Ochi-ishi and Hateruma Island) for many years. Recently we added air sampling sites on Malaysia, Indonesia, and Tokyo megacity. We extract CO₂ gas from whole air samples into glass ampoules and have archived them for ¹⁴CO₂ analysis.

In this study, we show the performance of atmospheric ¹⁴CO₂ analysis using NIES-CAMS and initial results of CO₂ isotope ratio observed at Bogor, Indonesia. We have tried to find best condition of beam quantity, stripper gas pressure, and measurement sequence of NIES-CAMS then the stability and accuracy of measurement was improved. Measurement error in $\Delta^{14}\text{C}$ of modern samples might be 2.4 permil in average. We prepared two reference cylinders and simultaneously measured air samples with two references to check the wheel-to-wheel variations. Furthermore, we newly developed volume-adjusted system in the graphitization line. It made equalize amount of graphite produced from CO₂ gas sample. We expect these will help high precision ¹⁴C measurements.