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

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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 corrected 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 grass 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 Δ14C 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.