Introduction of the NIMS Activities on a Carbon Cycle Study

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The National Institute of Meteorological Sciences (NIMS) has made effort to describe the feature of carbon cycle by means of various kinds of measurements and numerical simulation. In particular, the NIMS has operated a regional Global Atmosphere Watch (GAW) station as well as a designated operational station of Total Carbon Column Observing Network (TCCON) at Anmyeondo, Korea. Total column abundances of carbon dioxide (CO_2) and methane (CH_4) during 2015 are estimated by using GGG v14 and compared with ground-based *in situ* CO_2 and CH_4 measurements at the height of 86 m above sea level. The seasonality of CO_2 is well-captured by both Fourier Transform Spectrometer (FTS) and *in situ* measurements while there is considerable difference on the amplitude of CO_2 seasonal variation due to the insensitivity of column CO_2 to the surface carbon cycle dynamics in nature as well as anthropogenic sources. In addition, the NIMS has a plan for regular CO_2 profile observations by aircraft. The Cavity Ring-Down Spectroscopy (CRDS) analyzer will be used to measure CO_2, CH_4, carbon monoxide (CO) and water vapor (H_2O) up to 5 km once or twice a month. It is expected that the aircraft-based profiling measurements will be used to validate remotely-based column measurement. CO_2 measurements from the various observing instruments are also compared with simulated CO_2 from the CarbonTracker-Asia. Although the feature of CO_2 seasonality is well-captured by both measurement and simulation, the CO_2 amplitudes of pick to pick are considerably different in time and space.

Figure 1. World Meteorological Organization (WMO) regional Global Atmosphere Watch (GAW) station at Anmyeondo, Korea.

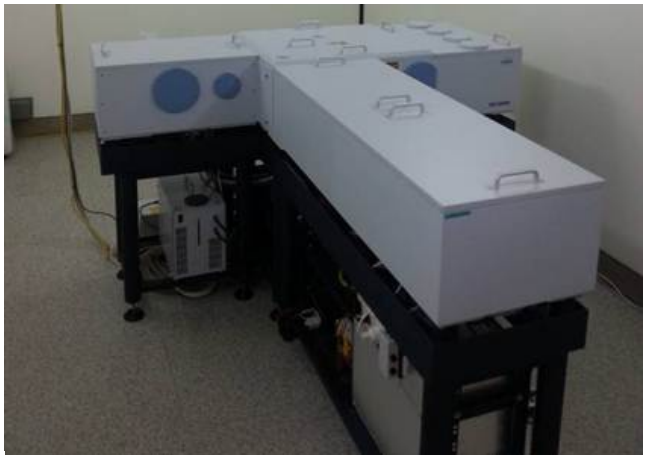

Figure 2. Ground-based Fourier Transform Spectrometer (FTS) at Anmyeondo site of Total Carbon Column Observing Network (TCCON).