(53-220415-C) **Long-term Measurements of CO_2, CH_4, and Isotopic Ratios of CO_2 in the Western Pacific: Trends, Variations, and Implications**

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This study demonstrates the long-term behaviors of CO_2, CH_4, $\delta^{13}C$ and $\delta^{18}O$ of CO_2 measured at a high-altitude site (Lulin Atmospheric Background Station, LLN, 23.47°N, 120.87°E, 2862 m ASL) and a sea-level maritime site (Dongsha Island, DSI, 20.70°N, 116.73°E, 8 m ASL) in the western Pacific as being participated in the NOAA/CCGG network since April 2006 and March 2010, respectively. Our data suggest that the mean growth rates at LLN and DSI are close to those at MLO over the monitoring period. However, significantly elevated acceleration rates of CO_2 (0.166 ppm yr^{-2}) and CH_4 (1.321 ppb yr^{-2}) are found at DSI compared to those at LLN (0.098 ppm yr^{-2} for CO_2 and 0.558 ppb yr^{-2} for CH_4) and MLO (0.072 ppm yr^{-2} for CO_2 and 0.227 ppb yr^{-2} for CH_4). Cluster analysis of backward trajectories has been performed at both sites, indicating distinct influence features between the free troposphere and surface in the western Pacific over a year.

Continuous measurements of CO_2 and CH_4 were also performed at LLN using a CRDS since December 2010, showing coherent trends and seasonal variations with the CCGG flask air samples. By comparing to the concentrations in the air masses from the Pacific, the impact of biomass burning on CO_2 and CH_4 from continental Southeast Asia are calculated to be approximately 1.9 ppm and 24.3 ppb, respectively, based on the nighttime CRDS data in spring (mid-February to mid-April). This estimation excluded 2015-2018 due to the majority of springtime air masses arriving at LLN were not originated from this region in these years.

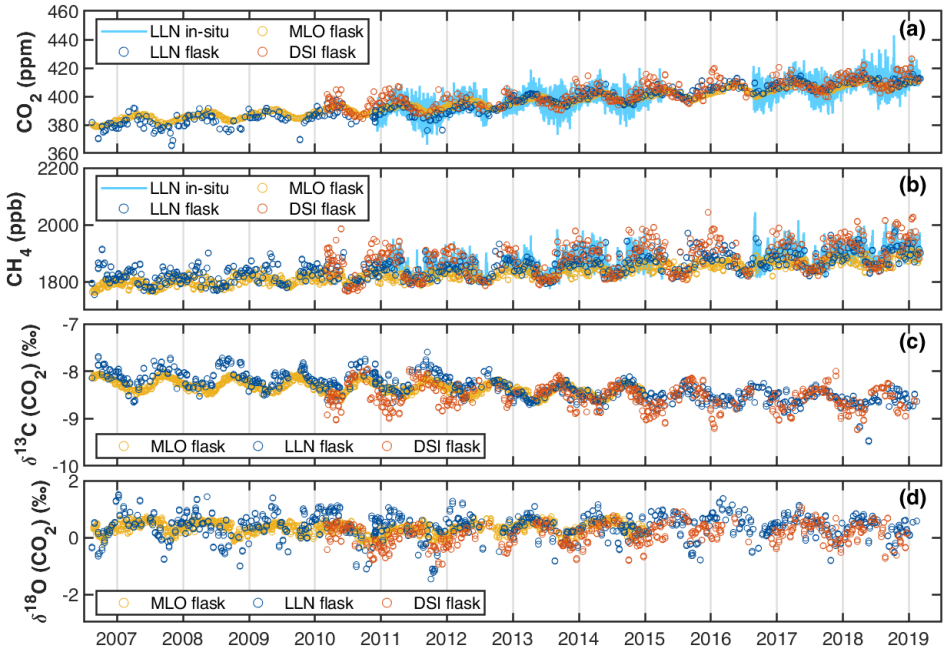

Figure 1. Temporal variations of (a) CO_2, (b) CH_4, (c) $\delta^{13}C$ and (d) $\delta^{18}O$ of CO_2 measured at LLN, DSI and MLO.