**Atmospheric $CO_2$, $CH_4$ and $N_2O$ mixing ratios in the China sea-shelf boundary layer during the spring 2017 campaign**

Lingxi Zhou, Yunsong Liu, Kunpeng Zang, Siyang Cheng and Lin Xu

Chinese Academy of Meteorological Sciences (CAMS), Beijing 100081, China
zhoulx@camscma.cn, zhoulx@cma.cn

High-accuracy and continuous ship-based cavity ring-down spectroscopy (CRDS) was used to simultaneously measure mixing ratios of atmospheric $CO_2$, $CH_4$ and $N_2O$ in the China sea-shelf boundary layer from 26 March to 15 April, 2017. The CRDS analysers (G2401 and G5101i, Picarro Inc., USA) and $CO_2$, $CH_4$ and $N_2O$ high pressure reference gas cylinders (29L, Scott-Marrin, USA) together with two-stage gas regulators (CGA-590, Scott Specialty Gases, USA) were carried by a specially designed marine survey vessel named “Dongfanghong II”, which provided an atmospheric observation laboratory and related facilities. The vessel was also equipped with ship-borne meteorological sensors. Air inlet was placed at the front and the highest position near the ship-borne meteorological sensors, ca 15 m above sea surface. Dry air or reference gas flowed through an eight port multi-position valves (Valco Instruments Co. Inc. USA) into the CRDS analysers.

Latitude and longitude data were used for locating the atmospheric mixing ratio data measured by the CRDS system. Meteorological data were used for excluding abnormal data and verifying air mass transport analysed by models. The observed atmospheric $CO_2$, $CH_4$ and $N_2O$ data showed latitudinal distributions between 36°N and 25°N. The distribution was not only resulted from air mass transport from the Asian continent and the Pacific Ocean induced by winter monsoon and trade winds, but also by air-sea exchange and atmospheric chemical processes. Moreover, mixing ratios of atmospheric $CO_2$, $CH_4$ and $N_2O$ showed temporal and spatial correlation, this was possibly due to the influence of long-range air mass transport and various mixed status. Next ship-based campaign has been scheduled in the autumn 2017.