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Oral
(Virtual Talk)
After the launch of the first Chinese greenhouse gas monitoring satellite mission (TanSat) in 2016, GF5-01 and GF5-02 have taken a new path to measure CO2 and CH4 based on a new spatial heterodyne spectroscopy (SHS) technology, which is compared with the assessment spectrum on board TanSat. In this presentation, some new results of XCO2 and XCH4 from GF5-01 and GF5-02 in the period 2018 to 2023 will be presented.

DQ-1 (DC-Atmosphere) satellite, on the other hand, uses an active detection lidar to measure CO2. To improve nocturnal and polar measurements, DQ-1 and DQ-2 will be equipped with a greenhouse gas lidar called ACDL (Aerosol and Carbon dioxide Detection Lidar), and the coordinated measurement with a passive instrument will provide more accurate results in highly aerosol-polluted areas. DQ-1 was launched in April 2022 and ACDL has been operating continuously for almost two years. The global XCO2 measurement from 82° N to 82° S over land and sea during day and night was carried out. The ACDL XCO2 measurements are compared with the TCCON XCO2 data, and the RMSE of less than 1 ppm has been confirmed.

To improve measurement coverage and repetition frequency, the TanSat-2 mission can be built in medium Earth orbit so that each satellite observes the Earth in an orbit more than 800 km wide with 2x2 km pixels. The NIR/SWIR hyperspectral measurement of the sunlight backscattered by the spectrometers on board TanSat-2 covers the bands 0.69 µm (O2B), 0.76 µm (O2A), 1.61 µm (CO2) and 2.06 µm (CO2). Instruments for monitoring air pollution (NO2) and the optical properties of aerosols will be on board TanSat-2. TanSat-2 will measure atmospheric CO2 and CH4 at least twice a day over a wide area, which will be useful for studying the daily fluctuations of the greenhouse gas.
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