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The main target of the Japanese hyperspectral sensor, Hyperspectral Imager SUIte (HISUI) which has been borne on the International Space Station (ISS) since 2019 is to observe minerals and vegetation by taking advantage of its wide spectral region (400-2500nm), many hyperspectral bands (185), high SNR (>300) and with a sufficient spatial resolution (30 x 20m) for mapping of such objects. The aim of this work is to study the possibility of CO2 column-averaged mole fractions (XCO2) derivation from hyperspectral data acquired by HISUI. Since the wavelength resolution of HISUI in the SWIR region is moderate at 12.5nm, not only each line spectrum is not resolved, but also envelopes of adjoined spectral bands of other constituents like H2O are overlapped. To estimate XCO2 from such an unresolved spectrum, the estimation of instrumental line function (ILS) width and H2O density from the spectrum by itself is crucially important. We developed XCO2 retrieval algorithms based on MODTRAN which can retrieve ILS width, H2O density, and XCO2 simultaneously. The algorithm was adopted to HISUI hyperspectral data acquired in that area which involved a coal-fired plant as a local emission source located on the east coast of Japan. HISUI observed the area by 2 times in 2021, and prominent enhancement of XCO2 of 468.8 [ppm] on April 9 and 485.6 [ppm] on August 10 were found exactly above the stack, and the plume feature was coincident with wind direction on the time of the day. We hope to apply this approach to power plants around the world. In addition, we will discuss the concept of a small hyperspectral sensor on board a nano-satellite constellation as a future plan to increase the frequency of observations.
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