Vertical Information Content in CO2 Retrievals from IASI

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ABSTRACT

Previous work on measurements of carbon dioxide (CO2) concentrations derived from space-borne hyperspectral infrared spectrometers indicated that such retrievals could not provide information on the CO2 vertical distribution. This has limited the use of sensors such as IASI for studying anthropogenic contributions to the terrestrial carbon cycle, especially because lower tropospheric CO2 could not be estimated.

Here, we present results from our Piece-Wise Linear Regression (PWLR) algorithm for CO2, including evidence of some vertical information content. PWLR is a machine learning inversion scheme that we have trained on model profiles from the Copernicus Atmospheric Monitoring Service paired with principal components of full IASI spectra in the 3.6 – 15.5 um range, along with auxiliary data such as collocated microwave soundings. We discuss the retrievals with a focus on their ability to resolve CO2 concentrations vertically and compare them to independent datasets.