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Abstract

We present two new products from near-infrared GOSAT observations: lower tropospheric (LMT, from 0-2.5 km) and upper tropospheric/stratospheric (U, above 2.5 km) carbon dioxide partial columns. We compare these new products to aircraft profiles and remote surface flask measurements and find that the seasonal and year-to-year variations in the new partial columns significantly improve over the ACOS-GOSAT initial guess/a priori, with distinct patterns in the LMT and U seasonal cycles which match validation data. For land monthly averages, we find errors of 1.9, 0.7, and 0.8 ppm for retrieved GOSAT LMT, U, and XCO₂; for ocean monthly averages, we find errors of 0.7, 0.5, and 0.5 ppm for retrieved GOSAT LMT, U, and XCO₂. In the southern hemisphere biomass burning season, the new partial columns show similar patterns to MODIS fire maps and MOPITT multispectral CO for both vertical levels, despite a flat ACOS-GOSAT prior, and CO/CO₂ emission factor consistent with published values. The difference of LMT and U, useful for evaluation of model transport error, has also been validated with monthly average error of 0.8 (1.4) ppm for ocean (land). The new LMT partial column is more locally influenced than the U partial column, meaning that local fluxes can now be separated from CO₂ transported from far away.