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20+ year satellite record of ozone profiles: from GOME-1 through to the Sentinels

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RAL's ozone profile retrieval scheme for the GOME-class of solar uv/vis backscatter spectrometer has unique sensitivity to tropospheric ozone, which led to its selection for nadir ozone profile retrieval from this class of sensor in ESA's Climate Change Initiative. The JASMIN/CEMS computing facility at RAL has enabled the production of full-mission global data sets from GOME-1, SCIAMACHY, OMI and GOME-2A & 2B, resulting in over 20 years of height-resolved dataset for ozone from 1995-2016, spanning both stratosphere and troposphere. Work is underway to reconcile these data time series.

We present some highlights of this dataset, including comparisons with coupled chemistry climate models, chemical transport models and MACC/CAMS analyses.

The RAL ozone profile scheme has been transferred to a near-real time chain for MetOp on the JASMIN/CEMS facility, and data are under assessment at ECMWF for the Copernicus Atmospheric Monitoring Service and for other users. An in-house version of Eumetsat's operational scheme to retrieve ozone, along with temperature and humidity profiles and surface spectral emissivity from MetOp IASI/MHS & AMSU is being incorporated into the NRT MetOp chain as pre-processor for GOME-2 ozone. In the coming year, it is intended to apply the RAL scheme to Sentinel-5 Precursor and CrIS data, to compare with ESA's operational S5P scheme and with our concurrent retrievals from GOME-2/IASI.

Land surface reflectivity is higher and Rayleigh scattering lower in the visible (Chappuis) band than the uv (Hartley-Huggins) bands, offering a potential increase in near-surface sensitivity. There are however challenges to overcome to exploit the visible band, due to ozone absorption features being shallower and broader than those in the Huggins bands and therefore less easily separated from surface spectral reflectance features and instrumental artefacts. We shall discuss progress on the addition of the visible band to GOME-2 retrievals, in anticipation also of NASA's TEMPO mission.