

Neural Network based Ozone Profile Retrieval Using Combined UV/VIS and IR Satellite Data

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The Neural Network Ozone Retrieval System (NNORSY) was developed during the last years for total ozone and ozone profile retrieval from UV/VIS spectra (ERS2-GOME) and total ozone column retrieval from IR satellite data (NOAA-TOVS). Information content of UV/VIS satellite data for tropospheric ozone profile retrieval is very low for nadir satellite instruments (e.g. GOME) restricting the use of resulting products for environmental and air quality monitoring. Recent studies and assessments within the ESA project CAPACITY (<http://www.knmi.nl/capacity>) referring to future Operational Atmospheric Chemistry Monitoring Missions proofs that for air quality assessment with a combined retrieval using UV-VIS and IR nadir viewing satellite instruments significant improvements in data quality and accuracy can be achieved. With the upcoming launch of MetOp-1 satellite including GOME-2 and IASI instrument first time UV/VIS and IR soundings will be available on one satellite platform.

In preparation of the application of combined one step ozone profile retrievals with NNORSY, a study was undertaken combining ERS2-GOME and TOVS NOAA-14 satellite data in order to show the feasibility and capabilities of this new approach. Advantage of neural network technique for this approach is that no RTM models for the different spectral regions are necessary and that the neural networks are able to exploit the full information content of both spectral regions in order to improve the accuracy of resulting ozone profile retrievals. For training of neural networks WOUDC and SHADOZ ozone sonde measurements as well as satellite ozone profile data from SAGE, HALOE and POAM are used. After training and testing of neural networks multi-year GOME/TOVS data are processed yielding global ozone profile product with improved accuracy compared to GOME retrievals only. Comparisons with independent ground truth data will be presented as well, showing the improvements of the combination of UV/VIS and IR spectral data especially in the troposphere.