Validation of OMPS Ozone Profile Data with Expanded Dataset from a Brewer and Automated Dobson Network

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The first NPOESS satellite is scheduled to be launched in 2010 and will carry the Ozone Mapping and Profiler Suite (OMPS) instruments for ozone monitoring. Prior this, the OMPS instruments and algorithms will be tested by flight on the NPOESS/NPP satellite, scheduled for launch in 2008. Pre-launch planning for validation, post launch data validation and verification of the nadir and limb profile algorithm are key components for insuring that the NPOESS will produce a high quality, reliable ozone profile data set. The heritage of satellite instrument validation (TOMS, SBUV, GOME, SCIAMACHY, SAGE, HALOE, ATMOS, etc) has always relied upon surface-based observations. While the global coverage of satellite observations is appealing for validating another satellite, there is no substitute for the hard reference point of a ground-based system such as the Dobson or Brewer network, whose instruments are routinely calibrated and intercompared to standard references. The normalization of measurements at different solar zenith angle (SZAs) to the measurement at the smallest SZA cancels out many calibration parameters, thus providing a "self-calibrating" technique in the same manner relied upon by the occultation sensors on satellites. Moreover, the ground-based Umkehr measurement is the only technique that provides data with the same altitude resolution and in the same units (DU) as do the UV-nadir instruments (SBUV-2, GOME-2, OMPS-nadir), whereas occultation instruments measure ozone density with height. The newly developed Umkehr algorithm (Petropavlovskikh et al, 2005) will enhance the information content of the retrieved profiles and extend the applicability of the technique. Automated Dobson and Brewer instruments offer the potential for greatly expanded network of Umkehr observations once the new algorithm is applied. We will discuss the new algorithm development and present results of its performance in comparisons of retrievals between co-located Brewer and Dobson ozone profiles measured at Arosa station in Switzerland.

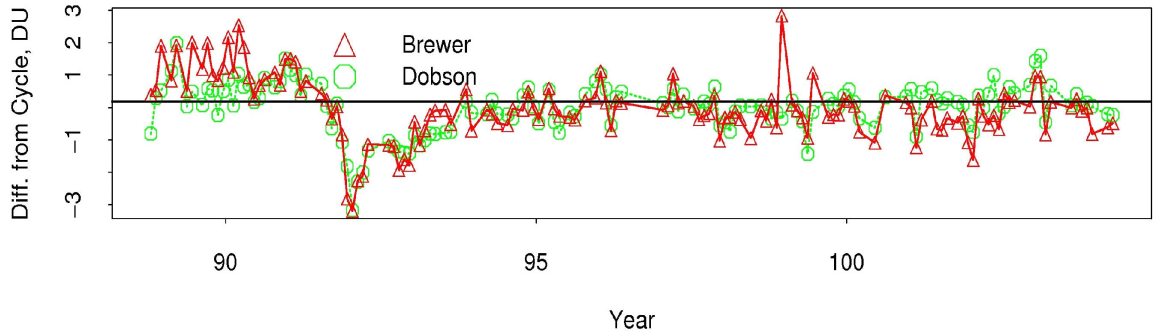

Figure 1. Time series of the ozone at 40 km retrieved from co-incident Dobson and Brewer data at Arosa station. Nearly the same inter-annual ozone variability is observed by the two systems in both the lower and upper atmosphere.