THE OMI-INSTRUMENT AND ITS SCIENCE OBJECTIVES

Pieternel Levelt
KNMI, De Bilt, The Netherlands
levelt@knmi.nl

The Ozone Monitoring Instrument (OMI) is a Dutch-Finnish contribution to NASA's EOS-Aura satellite now scheduled for launch in January 2004. OMI is an imaging spectrometer that will measure the back-scattered Solar radiance in the wavelength range of 270 to 500 nm. The instrument provides near global coverage in one day with a spatial resolution of 13×24 km^2. OMI is a new instrument, with a heritage from the European satellite instruments GOME, GOMOS and SCIAMACHY. OMI's unique capabilities for measuring important trace gases with a small footprint and daily global coverage, in conjunction with the other Aura instruments, will make a major contribution to our understanding of stratospheric and tropospheric chemistry and climate change. OMI will provide data continuity with the TOMS instruments and will be essential to continue the 23-year ozone record of TOMS.

Total columns of trace gases like ozone, NO_2, BrO, OClO, HCHO and SO_2 will be derived from the back-scattered solar radiance using differential absorption spectroscopy (DOAS). The ozone profile will be derived using the optimal estimation method. The spectral aerosol optical depth will be determined from wavelengths between 340 and 500 nm. This will provide information on aerosol concentration, aerosol size distribution and aerosol type will be derived from the wavelengths range between 340 and 500 nm. Using this wavelength range makes it possible to retrieve aerosol information over land and sea. Besides trace gases and aerosols, also the cloud coverage and cloud height will be determined from the OMI data.

During the timeframe of EOS-Aura the predicted ozone layer recovery should start and OMI's global ozone measurements should indicate if this is indeed the case, or if the climate-chemistry interaction is delaying this recovery. Moreover, the aerosol, ozone and cloud measurements by OMI will provide important information for calculation of the radiation balance and thus climate change. OMI's unique capability to "look in between the clouds", will provide daily global information on tropospheric trace gases which is unprecedented. Combining the OMI column measurements with the limb-viewing Aura-instrument MLS and HIRDLS will be one of the methods to improve on tropospheric information by OMI.