Geophysical Research Abstracts,
Vol. 11, EGU2009-13969-1, 2009
EGU General Assembly 2009

The retrieval of land surface pressure from MERIS measurements in the oxygen *A* band

R. Lindstrot, R. Preusker, and J. Fischer

Institut fuer Weltraumwissenschaften, Freie Universitaet Berlin, Berlin, Germany (rasmus.lindstrot@wew.fu-berlin.de)

Measurements of MERIS (Medium Resolution Imaging Spectrometer) on ENVISAT (Environmental Satellite) are used for the retrieval of surface pressure above land and ice surfaces. The algorithm is based on the exploitation of gaseous absorption in the oxygen *A* band at 762nm. The strength of absorption is directly related to the average photon path length, which in clear sky cases above bright surfaces is mainly determined by the surface pressure with minor influences from scattering at aerosols. Sensitivity studies regarding the influences of aerosol optical thickness and scale height and the temperature profile on the measured radiances are presented. Additionally, the sensitivity of the retrieval to the accuracy of the spectral characterization of MERIS is quantified. The algorithm for the retrieval of surface pressure (SP_{FUB}) is presented and validated against surface pressure maps constructed from ECMWF sea level pressure data in combination with digital elevation models. The accuracy of SP_{FUB} was found to be within 10hPa above ice surfaces at Greenland and 15hPa above desert and mountain scenes in Northern Africa and Southwest Asia. In a case study above Greenland the accuracy of SP_{FUB} could be enhanced to be better than 3hPa (0.3%) by spatial averaging over areas of 40 km * 40 km. These results are of interest for the upcoming CO_2/CH_4 missions OCO and GOSAT, as an accurate determination of air mass using measurements in the oxygen *A* band is crucial to achieve the accuracy needed to quantify sources and sinks of CO_2/CH_4.