



Estimating AOD using a Quad-Modal Size Distribution

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A method has been developed to estimate Aerosol Optical Depth (AOD) and Single Scattering Albedo (SSA) over land surfaces using high spatial resolution, hyperspectral, multi-angle CHRIS/PROBA images. The Compact High Resolution Imaging Spectrometer (CHRIS) instrument is mounted aboard the Project for On Board Autonomy 1 (PROBA-1) satellite, and provides up to 62 bands. The PROBA satellite was launched by ESA in October 2001 and allows pointing to obtain imagery from five different view angles within a short time interval. The method uses inversion of a coupled surface/atmosphere radiative transfer model, and includes a general physical model of angular surface reflectance. An iterative process is used to determine the optimum value of the aerosol properties providing the best fit of the corrected reflectance values for a number of view angles and wavelengths with those provided by the physical model. This method of estimating AOD has previously been demonstrated on data from the Advanced Along-Track Scanning Radiometer (AATSR), and is extended here to the spectral and angular sampling of CHRIS/PROBA and the additional aerosol property. The values obtained from these observations are validated using ground based sun-photometer measurements. Results from 23 image sets show an RMS error of 0.09 in AOD at 550nm using standard 6S models. Results from 19 image sets show an RMS error of 0.21 in SSA for the estimates at 868 nm, an RMS error of 0.21 at 672 nm and 0.18 at 442 nm. Estimates of AOD from the extended method using a quad modal size distribution show an RMS error of 0.07.