



Validation of MODIS aerosol optical depth retrieved over the Po Valley (Northern Italy) by using ground-based sun-photometer measurements performed at AERONET and QUITSAT sites

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Validation tests of aerosol optical depth AOD evaluations retrieved from MODIS radiance data over the Po Valley (Northern Italy) were carried out during the QUITSAT (Air Quality Assessment Through the Fusion of Earth Observation, Ground-based and Modelling Data) pilot project, supported by the Italian Space Agency. For this purpose, use was made of the data-sets recorded at the two AERONET sites of Ispra and Venice from 2004 to 2007 using the Cimel sun-photometers, and at the San Pietro Capofiume and Bologna QUITSAT stations in 2007 and 2008 using an example of PREDE/POM-02L sun/sky-radiometer and an example of MFRSR-7/Yankee Inc. shadow-band radiometer, respectively. The comparison between the MODIS retrieved AOD values and the corresponding ground-based ones measured at the overpass times of Terra and Aqua satellites, yielded good regression lines for each annual data-set, with:

- (1) values of intercept a varying between -0.03 and $+0.01$, of slope coefficient b between $+0.89$ and $+0.95$, and of regression coefficient R between $+0.89$ and $+0.94$, at Ispra;
- (2) values of a between -0.01 and $+0.05$, of b between $+0.73$ and $+0.95$, and of R between $+0.79$ and $+0.90$ at Venice;
- (3) values of a between -0.01 and $+0.06$, of b between $+0.83$ and $+1.17$, and of R between $+0.88$ and $+0.95$ at San Pietro Capofiume; and
- (4) values of a between -0.01 and $+0.01$, of b between $+0.72$ and $+0.94$, and of R between $+0.74$ and $+0.92$ at Bologna.

Compared with the AOD errors made in retrieving the MODIS radiance data and with those affecting the sun-photometer measurements of AOD, the present results appear to be of good quality, allowing confidence in their correct use for estimating the particulate mass concentrations at the surface, for appropriate assumptions of the optical properties and vertical distribution features of columnar aerosols.