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Linear Long-term Trend of Aerosol Optical Thickness from Satellite Retrievals using BAER over Several Regions

Jongmin Yoon, Wolfgang von Hoyningen-Huene, Marco Vountas, and John P. Burrows
University of Bremen, Environmental Physics, Bremen, Germany (yoon@iup.physik.uni-bremen.de, +49 (0)421 218 4555)

Aerosol has been investigated by many scientists due to its potential effects on climate system. However, Aerosol Optical Thickness (AOT) retrieval over land is difficult because of high variability of surface reflectance. BAER (Bremen AErosol Retrieval) among well-developed algorithms has retrieved AOT successfully over land with different satellite data in previous studies. In this study, the long-term and seasonal trends of AOT over several regions has been studied by using BAER with SeaWiFS (Sea-viewing Wide Field-of-view Sensor) L1b data from late 1997 to May 2008. The EU CityZen project requested investigations in specific regions of interest, as these are BeNeLux, Po Valley, Eastern Europe, Eastern Mediterranean in Europe, and Pearl River Delta in South China because they are densely populated and mostly influenced by terrestrial aerosol sources (e.g. mineral dust, industrial pollutant, and biomass burning). AERONET level 2.0 (cloud-screened and quality-assured) data in 443 and 555 nm were used for the validation process. Furthermore, long-term trend of retrieved AOT was verified at AERONET sites (Forth Crete, Ispra, and Venise) located within the regions of interest. In general, negative tendencies in AOT were observed in most of European regions influenced by industrial pollutants, and the magnitude is up to -0.0039 per year. However, the AOT trend in the Pearl River Delta shows positive tendency because it is a fast developing region. The magnitude is up to +0.0065 per year. For more reliable analysis of long-term trend of AOT, further studies are necessary with other satellites, ground-based measurements, and numerical models.