Multi-decadal variations of aerosols and possible impacts on surface radiation: Results from AeroCom II hindcast experiments and observations

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I will present the multi-decadal variations of aerosols from 1980 to 2008 from the AeroCom phase II hindcast model experiments, and compare the model simulated AOD with the available satellite data from AVHRR, TOMS, SeaWiFS, MODIS, and MISR and ground-based sunphotometer measurements from AERONET. Model simulated shortwave downward radiation fluxes at the surface are compared with the measurements from GEBA, BSRN, and CMA networks over many locations in the globe. Aerosol trends in different world regions are analyzed. There are large model "diversity" of AOD, aerosol composition, and water vapor fraction. Although models seem to converge on the "normalized anomaly" of total radiation change at the surface, the aerosol effects on the radiation are difficult to assess, because the clear sky shortwave fluxes with direct/diffuse radiation separated are not available from many long-term observation sites as well as from a majority of models. This presentation should lead to discussions on the near future actions on these model experiments.