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Development of absorbing aerosol index simulator based on TM5-M7

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Aerosols alter the Earth's radiation budget directly by scattering and absorbing solar and thermal radiation, or indirectly by perturbing clouds formation and lifetime. These mechanisms offset the positive radiative forcing ascribed to greenhouse gases. In particular, absorbing aerosols such as black carbon and dust strongly enhance global warming.
To quantify the impact of absorbing aerosol on global radiative forcing is challenging. In spite of wide spatial and temporal coverage space-borne instruments (we will use the Ozone Monitoring Instrument, OMI) are unable to derive complete information on aerosol distribution, composition, etc. The retrieval of aerosol optical properties also partly depends on additional information derived from other measurements or global atmospheric chemistry models.
Common quantities of great interest presenting the amount of absorbing aerosol are AAOD (absorbing aerosol optical depth), the extinction due to absorption of aerosols under cloud free conditions; and AAI (absorbing aerosol index), a measure of aerosol absorption more directly derivable from UV band observations than AAOD. When comparing model simulations and satellite observations, resemblance is good in terms of the spatial distribution of both parameters. However, the quantitative discrepancy is considerable, indicating possible underestimates of simulated AAI by a factor of 2 to 3.
Our research, hence, has started by evaluating to what extent aerosol models, such as our TM5-M7 model, represent the satellite measurements and by identifying the reasons for discrepancies. As a next step a transparent methodology for the comparison between model simulations and satellite observations is under development in the form of an AAI simulator based on TM5-M7.