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Impact of aerosol feedbacks on total solar radiation based on the on-line coupled climate model GEM-AC for current climate conditions

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The GEM-AC climate and chemistry model takes into account feedbacks between dynamics, chemistry and radiation which allows for the unique methodology to study feedback mechanisms among different components of the climate system. The vertical extent of the model (up to 65 km) ensured a comprehensive representation of the global circulation patterns and ozone layer in the stratosphere.

The model was run for current climate condition in two ways:
without feedbacks: only meteorological model in the climate mode, with prescribed climatological properties for aerosol,O_3 and H_2O
with feedbacks: with on-line chemical and aerosol module and interaction with radiation parameterization.
The CCCMARAD radiation parameterization (Li and Barker, 2005) used in the GEM-AC model is based on the correlated-k distribution (CKD) method. The scheme uses 9 frequency intervals for long wave (LW) and 4 for short wave (SW) regions and extra minor intervals are used when the model top extends above 1hPa. The method can be used up to an altitude of 100 km.

We will present the differences of modelled total solar radiation near the surface in terms of annual sum and seasonal sums (DJF / MAM/ JJA /SON) obtained in the simulation with and without aerosol feedbacks. Also, a comparison with available measurements will be shown.