



Keynote talk: Current issues in atmospheric radiative processes

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The radiative processes in the atmosphere depend on the gasses, hydrometeors and aerosols present. Here the hydrometeors can be separated into liquid cloud droplets, cloud ice, snow, graupel, hail and rain, and the aerosols can be classified either as bulk aerosol groups or as aerosol types depending on their primary chemical composition. Furthermore, the aerosols can be divided into size bins or the full aerosol size distributions can be accounted for. Both for hydrometeors and aerosols their radiative impact depend on their spectral inherent optical properties. Given these, the radiative forcing can be computed with a radiative transfer algorithm. In almost all current meteorological and climate models the two-stream approximation to radiative transfer is applied. In this both solar (shortwave) and infrared (longwave) irradiances are divided into upward and downward diffuse irradiances at each model level. Additionally, the direct shortwave irradiance from the direction of the sun is computed. Here the impact of delta-scaling will be discussed. For all the above processes the uncertainties will be discussed.

The biggest difficulty in meteorological modelling today is the issue of forecasting clouds and fog. Mostly the reasons for failures in cloud and fog forecasts come from other approximations than the radiative approximations, but measurements of both shortwave and longwave irradiances provide information about the nature of cloud (and aerosol) forecasting errors. For this reason, and due to the need of solar resource monitoring, we in the meteorological community need to upgrade our current irradiance measurement practices and to increase the focus on quality control of such measurements.