



Measuring Greenhouse Radiation Profiles and the Radiation Budget in the atmosphere

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Solar shortwave and thermal longwave irradiance at the Earth surface and at the top of the atmosphere is measured at surface radiation stations and from satellites. Here we show for the first time radiative flux profiles and the radiation budget in the atmosphere measured with radiosondes ascending from the Earth's surface to 35 km in the stratosphere. During two-hour flights solar shortwave and thermal longwave irradiance, downward and upward, is measured with four individual sensors at one-second resolution, along with standard PTU radiosonde profiles. Nighttime longwave radiation measurements are contrasted to daytime measurements and 24 hours means of radiation budget- and total net radiation profiles are shown. Most interesting however, are in situ measured longwave greenhouse radiation profiles and their vertical variations related to temperature-, cloud-, water vapour- and greenhouse gas changes, allowing direct observations and investigations of the Earth greenhouse effect.