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New radiosonde techniques to measure radiation profiles through the atmosphere

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Solar and thermal radiation fluxes are usually measured at Earth's surface and at the top of the atmosphere. Here we show radiosonde techniques that allow measuring radiation flux profiles and the radiation budget from the Earth's surface to above 30 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. Daytime and nighttime shortwave and longwave radiation measurements, and 24 hours surface measurements, allow determining radiation budget- and total net radiation profiles through the atmosphere. We use a double balloon technique to prevent pendulum motion during the ascent and to keep the sonde as horizontal as possible. New techniques using auto controlled airplanes are now investigated to retrieve the sonde after release at a certain altitude and to land it if possible at the launch station.