

Name of research institute or organization:

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**Physikalisch-Meteorologisches Observatorium Davos, World  
Radiation Center**

Title of project:

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Longwave Infrared radiative forcing trend assimilation over Switzerland (LIRAS)

Project leader and team:

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Eugene Rozanov

Project description:

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The measurements of the atmospheric boundary layer (ABL) temperature are obtained from concurrent measurements of two pyrgeometers: One standard pyrgeometer sensitive to the 3  $\mu\text{m}$  to 50  $\mu\text{m}$  wavelength range and one modified pyrgeometer sensitive only in the atmospheric window, e.g. from 8  $\mu\text{m}$  to 14  $\mu\text{m}$ . By combining the two measurements we retrieve the effective temperature of the saturated atmospheric water vapor from the radiation emitted by the atmosphere in the wavelength range 3  $\mu\text{m}$  to 8  $\mu\text{m}$  and 14  $\mu\text{m}$  to 50  $\mu\text{m}$ . The radiation in this wavelength range is emitted from the lowest layers of the atmosphere closest to the Earth's surface which form the ABL. The temperature derived from these measurements can be considered as an effective temperature of the saturated atmospheric water vapor, which depends directly on the profiles of humidity and temperature. This effective saturated water vapor temperature is a powerful indicator for the state of the ABL when it is compared to the synoptic temperature measured at the surface. The measurements at Jungfraujoch (JfJ) do not show any systematic diurnal variation of the atmospheric temperature relative to synoptic temperature which is due to the absence of a stable boundary layer at JfJ. This is consistent with observations that the JfJ at 3580 m.a.s.l. is located in the free troposphere.

Key words:

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Infrared radiation, Climate change

Collaborating partners/networks:

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Meteoswiss, Univ. Bern - Institute of Applied Physics (IAP)

Scientific publications and public outreach 2009:

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Gröbner, J., S. Wacker, L. Vuilleumier, and N. Kämpfer (2009), Effective atmospheric boundary layer temperature from longwave radiation measurements, *J. Geophys. Res.*, **114**, D19116, doi:10.1029/2009JD012274.

<http://www.agu.org/journals/jd/jd0924/2009JD012349/>

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