

Name of research institute or organization:

---

**Federal Office of Meteorology and Climatology MeteoSwiss, Payerne**

Title of project:

---

Global Atmosphere Watch Radiation Measurements

Part of this programme:

---

GAW

Project leader and team:

---

Dr. Laurent Vuilleumier, project leader

Dr. Giovanni Martucci

Mr. Gilles Durieux

Project description:

---

The goal of the Global Atmosphere Watch Radiation Measurement program at Jungfraujoch is to provide long-term monitoring of surface downward radiation fluxes. It is conducted in the framework of the GAW Swiss Alpine Climate Radiation Monitoring program (SACRaM), which applies operational guidelines similar to those of the international Baseline Surface Radiation Network, except for the daily maintenance requirements due to the remote nature of the site. As for previous years, a high degree of data availability was achieved in 2014, especially considering the challenging conditions at Jungfraujoch. In average, the data availability for radiation parameters reached 97%. Such continuous monitoring implies a constant effort to sustain the highest achievable accuracy, stability and continuity in the measurements.

The measurement program includes short-wave (solar spectrum) and long-wave (infrared thermal) broadband measurements as well as UV broadband measurements. Short- and long-wave measurement series are important for climate research, while UV measurements are of interest for both public health and for exploring the relationship between the evolution of the ozone layer and radiation. Broadband radiation is measured both as global downward hemispheric irradiance and as direct sun irradiance. In addition, direct spectral irradiance is also measured, which allows the total column of several atmospheric constituents to be determined.

In collaboration with and under the lead of the Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center (PMOD/WRC), cloud information such as cloud cover and cloud type were derived from all-sky camera imagery and compared with similar information derived from long-wave radiation observations, Meteosat imagery, ceilometer and visual observations. Relatively good agreement was found (65-85% of cases within  $\pm 1$  octa). Concerning cloud type recognition, a mean success rate of 80 - 90% could be achieved for images showing clouds of only one type (all clouds of the same class) but dropped to 50% for cases with multiple cloud classes.

Key words:

---

Solar irradiance, ultraviolet, visible, infrared, spectral irradiance, precision filter radiometer (PFR), pyranometer, pyrhelimeter, UV biometer, total aerosol optical depth (AOD), integrated water vapor (IWV)

Internet data bases:

---

<http://wrdc-mgo.nrel.gov/> (World Radiation Data Centre – WRDC)

Collaborating partners/networks:

---

Radiation data submitted to the World Radiation Data Centre (WRDC, St. Petersburg, Russian Federation) within the framework of the Global Atmosphere Watch. Study of solar photometry (aerosol optical depth) and long-wave infrared radiative forcing in collaboration with the "Physikalisch-Meteorologisches Observatorium Davos" (PMOD) World Radiation Center (WRC).

Scientific publications and public outreach 2014:

---

**Refereed journal articles and their internet access**

Wacker, S., J. Gröbner, C. Zysset, L. Diener, P. Tzoumanikas, A. Kazantzidis, L. Vuilleumier, R. Stöckli, S. Nyeki, N. Kämpfer, Cloud observations in Switzerland using hemispherical sky cameras, *J. Geophys. Res.*, in press, doi: 10.1002/2014JD022643, 2015.  
<http://dx.doi.org/10.1002/2014JD022643>

Address:

---

Office fédéral de météorologie et de climatologie MétéoSuisse  
Station Aérologique  
Ch. de l'Aérologie  
CH-1530 Payerne

Contacts:

---

Dr. Laurent Vuilleumier  
Tel.: +41 26 662 6306  
Fax: +41 26 662 6212  
e-mail: [laurent.vuilleumier@meteoswiss.ch](mailto:laurent.vuilleumier@meteoswiss.ch)  
URL: <http://www.meteoswiss.admin.ch/home/research-and-cooperation/international-cooperation/gaw.html>