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Representative alpine climatology for erythemal UV (RACE-UV)

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A project about the development of a UV climatology for Switzerland will be presented. This project is part of a European coordinated study (COST 726) and is focusing on the relationships and interactions between erythemal UV and a complex topography such as found in the Swiss Alpine region. The continuous downward trend of total ozone and, more importantly, the changes in the leisure activities of our society lead to stronger UV exposure. Because this is a well known risk factor to human health, it is of great interest to increase the present state of knowledge about UV-doses regarding different meteorological conditions and geographic regions.

The Swiss Atmospheric Radiation Monitoring CHARM provides continuous erythemal UV measurements by broadband instruments at four different stations. Additionally, spectral UV data for one site in the Swiss Alps (Arosa) is available. These measurements, in combination with a radiative transfer model, enable us to derive semi-empirical relationships between erythemal UV and ancillary data such as modeled clear-sky UV, global solar radiation, and snow coverage for various climatologic conditions. A key factor of this project is the evaluation of the generalization and transferability of these relationships permitting an area-covering UV climatology for Switzerland including regions where UV is not measured. Switzerland is covered with a very dense meteorological network measuring the necessary ancillary data and is therefore very suitable for such an analysis. In a recent study, a comparison of such semi-empirical relationships of two locations in Finland and Switzerland showed how promising the chosen approach is.

The methods and data used for this project will be presented as well as preliminary

results. We found good correspondence of modeled erythemal UV and measurements by spectral and broadband instruments for clear-sky conditions. First comparisons show a correlation coefficient larger than 0.99 between model calculations and erythemally weighted and integrated spectral measurements. Preliminary estimates lead to differences of around -3.5% between measured and modeled data. Results of these comparisons during clear-sky periods for different locations will be presented. Further, the methods for assessing broadband and spectral instrument stability at MeteoSwiss by means of measurement-to-model ratios and calibration techniques in combination with standard lamps and a traveling standard instrument will be explained.