



## Cloud and radiation products for energy and water balance studies

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Accurate information on the distribution of clouds in the atmosphere is essential for water and energy balance studies. The effect of clouds on the hydrological cycle is highly variable, depending on height, type and optical properties of clouds, and the occurrence and intensity of precipitation. Studying the effect of clouds on the hydrological cycle requires information on cloud properties, surface solar irradiance and precipitation over large areas sampled at high temporal frequency. Such data can only be derived by combining observations from both polar and geostationary satellites.

This presentation gives an overview of the cloud products that are part of the WACMOS project funded by ESA, which are Cloud Water Path, Surface Solar Irradiance and Precipitation. The methods to derive these products rely on information of cloud micro- and macrophysical properties retrieved from passive imagers or spectrometers. The surface shortwave irradiance is retrieved from information on cloud optical thickness and atmospheric water vapour, whereas the occurrence and intensity of precipitation is determined from the liquid water path, particle effective radius, thermodynamic phase, cloud top height and atmospheric water vapour. Information on Cloud Water Path and Surface Solar Irradiance is derived once a day on a global scale from a combination of SCIAMACHY/Envisat and SEVIRI/MSG observations, whereas information on Surface Solar Irradiance and Precipitation is derived every 15 minutes over Europe and Africa from a combination of SEVIRI and MERIS/Envisat observations.

The use of above described cloud products in water and energy balance studies is justified through numerous validation studies. Comparison between surface shortwave irradiance retrievals and observations from the Baseline Surface Radiation Network (BSRN) indicate high accuracies. For precipitation the combined SEVIRI and MERIS retrievals agree well against weather radar or rain gauge observations over Land, and TRMM/TMI observations over Ocean.

In conclusion, polar and geostationary satellites are very well capable to provide high quality cloud products for water and energy balance studies. SCIAMACHY can provide information on cloud properties and solar irradiance at a global scale. Although SEVIRI observes only part of the globe, its unprecedented sampling frequency (15 minutes) makes the solar irradiance and precipitation retrievals from this instrument, combined with the water vapour product from MERIS, an essential ingredient for water balance studies.