



A linkage of satellite data and digital camera images in phenological monitoring – a case study

F. Fontana (1), H. E. Ahrends (1), R. Stöckli (2), S. Wunderle (1), W. Eugster (3)

(1) Institute of Geography, University of Bern, Switzerland, (2) Institute for Atmospheric and Climate Science, ETH Zürich, Switzerland, (3) Institute of Plant Sciences, ETH Zürich, Switzerland (fontana@giub.unibe.ch / Phone: +41-316318552)

In recent decades phenology has become recognized as an important method for assessing the impact of climate variability on ecosystems. Since photosynthesis (and thereby the water and carbon cycles) is closely linked to vegetation phenology, the knowledge and understanding of phenological processes is of great importance for climate research.

Satellite remote sensing has repeatedly been used to monitor vegetation phenology on large spatial scales. Ground validation of satellite data is an important research topic. However, phenological ground observations are often observer-biased and not representative of entire areas at satellite remote sensing scale (typically > 1 km). Additionally, there is a constant decline in the number of long-term phenological ground observations due to a lack of volunteers.

Our study will investigate the application of ground-based commercially available digital cameras for the improved interpretation of satellite-based phenological data. A standard digital camera was mounted on a flux tower at the Lägeren FLUXNET site (Switzerland), providing hourly digital images of a mixed forest. Parameter estimation of phenological stages is based on red, green and blue channel colour brightness. Phenological transition dates from ground-based digital images are compared to daily AVHRR (1 km spatial resolution) as well as MODIS (250 m) Normalized Difference Vegetation Index (NDVI) time series. Phenological transition dates from the satellite data are determined using the threshold method and compared to the ground-based

data. Uncertainties of both methods are analysed and the combined use of both data sets for the improvement of traditional phenological observations is investigated.

The linkage of both approaches will provide accurate and objective phenological data that are required for the derivation of GCOS products for future climate impact studies. Digital camera images will help us to better understand and interpret satellite phenological information.