



Detection of the *Larix Decidua* phenological cycle in the alpine environment by using MODIS data

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In this contribute we present the results of the REPHLEX experiment (Remote sensing of Phenology Larix Experiment). The main aim is to evaluate the interannual variability of the phenological cycle of Larch (*Larix decidua*) in the Alpine region of Valle d'Aosta (Northern Italy) by combining field observations, phenological models and satellite remote sensing.

Ground observations and field measurements were weekly collected in 8 test sites during 2005 in order to determine the budburst, senescence and the length of the growing season (GSL). Moreover, in each site it was measured leaf area index, chlorophyll fluorescence and structural parameters.

Two different models of phenology were used: a Spring Warming model (SW) aimed to estimate the dates of budburst and the Growing Season Index model (GSI) for the estimation of GSL. The calibration of the models was performed by means of their numerical inversion against field data collected in 2005, in order to determine the uncertain parameters. Models parameterisation was then validated against data collected in 2006. Results of SW model show a good agreement of the modelled budburst with the observed data (RMSE = 4 days).

MODIS 250 16-days composite NDVI data (Product MOD13Q1) acquired from TERRA platform for the 2000-2005 time period were downloaded from the EOS data gateway and used to reconstruct high-quality vegetation index time series with a method based on the MODIS Quality Assurance flags and on the recursive applica-

tion of a Savitzky-Golay filter.

The extraction of budburst and senescence dates were conducted by exploiting different methods based on the NDVI time series analysis. Best results were achieved by fixing an empirical threshold on NDVI that identify budburst and senescence (EF=0.6; RMSE=5.2 days). This method was applied to derive phenological parameters for the time period 2000-2005 in order to evaluate the interannual variability of the Larch phenological cycle.

The analysis of the interannual variability shows different responses of the vegetation as a function of elevation and climatic conditions. It was observed a divergent response during the 2003 heat wave between sites positioned at high and low elevation. In particular, there are evidences of an earlier senescence for sites at low elevation and a delay for those at high elevation. It was also observed a delayed budburst in all monitored sites during 2004 that may be due to the effect of the water stress experienced in the previous year.