



## **Phenopix: a R package to process digital images of a vegetation cover**

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Plant phenology is a globally recognized indicator of the effects of climate change on the terrestrial biosphere. Accordingly, new tools to automatically track the seasonal development of a vegetation cover are becoming available and more and more deployed. Among them, near-continuous digital images are being collected in several networks in the US, Europe, Asia and Australia in a range of different ecosystems, including agricultural lands, deciduous and evergreen forests, and grasslands. The growing scientific interest in vegetation image analysis highlights the need of easy to use, flexible and standardized processing techniques.

In this contribution we illustrate a new open source package called “phenopix” written in R language that allows to process images of a vegetation cover. The main features include: (i) define of one or more areas of interest on an image and process pixel information within them, (ii) compute vegetation indexes based on red green and blue channels, (iii) fit a curve to the seasonal trajectory of vegetation indexes and extract relevant dates (aka thresholds) on the seasonal trajectory; (iv) analyze image pixels separately to extract spatially explicit phenological information.

The utilities of the package will be illustrated in detail for two subalpine sites, a grassland and a larch stand at about 2000 m in the Italian Western Alps.

The phenopix package is a cost free and easy-to-use tool that allows to process digital images of a vegetation cover in a standardized, flexible and reproducible way. The software is available for download at the R forge web site ([r-forge.r-project.org/projects/phenopix/](http://r-forge.r-project.org/projects/phenopix/)).