

Vortrags-Session 3

Remotely sensed trends in European spring phenology for 1989-2007

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Abstract

Various studies assessed the vegetation response to modified temperature patterns by extracting phenological metrics from satellite observations. While assessments based on ground observations reveal a trend to earlier green-up results of corresponding studies relying on remotely sensed data have been ambiguous. This work integrates and evaluates most commonly used methods to compute green-up dates based on satellite imagery. Effects of those methods on trends of computed green-up dates are subsequently analysed. In contrast to previous studies, NOAA AVHRR daily NDVI observations and 8-day composites of 1 km - rather than 8 km, resolution (1989-2007) of Central and Western Europe were used.

For each method we tested a number of local and global threshold values determining green-up. Local thresholds relate to pixel-specific NDVI maximum and minimum values, i.e. they can vary between years for a single pixel and also between neighbouring pixels. Global thresholds refer to fix NDVI values over all pixels and years. Computed green-up days were evaluated against an extensive phenological ground network and also a phenological model driven by temperature and day length for the area of Germany.

Results reveal substantial differences between applied methods when single years are analysed. For most methods results are closer to ground observations when using local, not global thresholds. Differences between daily and composite products are only minor. For the first time we can show a trend towards an earlier greening up (between 0.5 - 3 days/year) across all implemented methods. The trend magnitude depends mostly on the applied threshold, not the method used. Local thresholds indicate a slight spring advancement. Global thresholds, in contrast, suggest a more pronounced trend towards earlier green-up. Again, differences in trend do not greatly differ when using the daily or composite products. Trends based on local thresholds are in line with observed trends on the ground and modelled trends for the area of Germany.