



Shift of growing season length in China from satellite and ground-based data

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Tracking vegetation responses to climate variability on continental scale rely on continuous satellite observational data. A number of methods exist to derive start-of-season (SOS) from time series of reflectance data, but different methods often generate conflicting results. So a comprehensive intercomparison and assessment of SOS methods against ground-based phenology is critical for remote sensing phenology. In this study, we assess five SOS methods for Chinese temperate zone area from 1982 to 2006 using the 8 km Global Inventory Modeling and Mapping Studies (GIMMS) Advanced Very High Resolution Radiometer (AVHRR) dataset, and ground-based first leaf date (FLD) of 12 species at 12 sites of Chinese Phenology Observation Network (CPON). Compared with an ensemble of the five SOS methods, we found that SOS anomalies of individual methods can reach up to more than 60 days. The latitudinal patterns of SOS extracted by five methods are similar but vary with the ground phenology. The variability of SOS estimates, measured as the standard deviation of 1982-2006 SOS time-series, is stronger than ground phenology except Polyfit method. The frequent significant correlations exist among five satellite-derived SOS. More common significant correlations among FLD series of various species also detected. But when ground phenology and satellite SOS are compared, there are few significant correlations. The Midpoint method show significant correlation with ground phenology in maximum cases (47.1%) and can explain 45% of interannual variability of ground-measured phenology. Using Midpoint, significant later SOS trends could be detected for only 5.2% of natural vegetation in the study area. Oppositely, 49.9% of the natural vegetation show significant earlier trends from 1982 to 2006.

Keywords: satellite phenology, first leaf, climate change, start of season, China