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Use of timesat to estimate phenological parameters in Northwestern Patagonia

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Under a global change context, ecosystems are receiving high pressure and the ecology science play a key role for monitoring and assessment of natural resources. To achieve an effective resources management to develop an ecosystem functioning knowledge based on spatio-temporal perspective is useful. Satellite imagery periodically capture the spectral response of the earth and remote sensing have been widely utilized as classification and change detection tool making possible evaluate the intra and inter-annual plant dynamics. Vegetation spectral indices (e.g., NDVI) are particularly suitable to study spatio-temporal processes related to plant phenology and remote sensing specific software, such as TIMESAT, has been developed to carry out time series analysis of spectral indexes. We used TIMESAT software applied to series of 25 years of NDVI bi-monthly composites (240 images covering the period 1982-2006) from the NOAA-AVHRR sensor (8 x 8 km) to assessment plant pheonology over 900000 ha of shrubby-grasslands in the Northwestern of Patagonia, Argentina. The study area corresponds to a Mediterranean environment and is part of a gradient defined by a sharp drop west-east in the precipitation regime (600 mm to 280 mm). We fitted the temporal series of NDVI data to double logistic functions by least-squares methods evaluating three seasonality parameters: a) start of growing season, b) growing season length, c) NDVI seasonal integral. According to fitted models by TIMESAT, start average of growing season was the second half of September ($\pm$ 10 days) with beginnings latest in the east (dryer areas). The average growing season length was 180 days ($\pm$ 15 days) without a clear spatial trend. The NDVI seasonal integral showed a clear trend of decrease in west-east direction following the precipitation gradient. The temporal and spatial information allows revealing important patterns of ecological interest, which can be of great importance to environmental monitoring. In this work we also show as utilizing TIMESAT to characterize the plant phenology at regional scale.