







Home ▶ All Journals ▶ Geography ▶ International Journal of Remote Sensing ▶ List of Issues ▶ Volume 28, Issue 12 ▶ Stabilizing high-order, non-classical ha ...

International Journal of Remote Sensing >

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Original Articles

Stabilizing high-order, non-classical harmonic analysis of NDVI data for average annual models by damping model roughness

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Abstract

Fourier series and related harmonic methods have been demonstrably effective for identifying and characterizing the seasonal behaviour, or phenology, of a variety of terrestrial vegetation communities using Normalized Difference Vegetation Index (NDVI) time series from Earth-orbiting satellites. The ultimate temporal resolution of such applications has been limited, however, by the common practice of truncating, or low pass filtering, harmonic series to relatively low order terms, in order to suppress spurious oscillations in the model results. The temporal resolution of these techniques can be significantly improved if, along with a weighted minimization of the sum of the squared data residuals tracking the upper envelope of observed data, we also enforce an expectation of minimum model roughness to dampen spurious oscillations in

predicted values. The resulting annual models have resolutions consistent with the application of special transcendental forms, such as asymmetric Gaussian and logistic (sigmoidal) functions, recently reported in the literature.

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Related Research Data

Mapping agroecological zones and time lag in vegetation growth by means of fourier analysis of time series of NDVI images

Source: Advances in Space Research

Savitzky-Golay Smoothing Filters

Source: Computers in Physics

Improved monitoring of vegetation dynamics at very high latitudes: A new method using MODIS NDVI

Source: Remote Sensing of Environment

The 1 km AVHRR global land data set: first stages in implementation

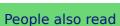
Source: International Journal of Remote Sensing

A curve fitting procedure to derive inter-annual phenologies from time series of noisy satellite NDVI data

Source: Remote Sensing of Environment

Extracting Phenological Signals From Multiyear AVHRR NDVI Time Series: Framework

for Applying High-Order Annual Splines With Roughness Damping



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