Removal of noise by Wavelet method to generate the high-quality time series of terrestrial MODIS products

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Time series data such as Normalized Difference Vegetation Index (NDVI), Leaf Index Area (LAI) and albedo derived from TERRA or AQUA/MODIS have proven to be appropriate for many researches regarding the detection of long-term vegetation cover changes, deriving biophysical parameter for other models, assessing crop yield and extracting phenology information. But these time series are often suffered from noise shows as large fluctuations. The noise impedes further analysis and precludes the use of these time-series data in many earth science research and modeling projects. In reducing noise, it is important to maintain the real pattern of time series. Wavelet transform has the ability of multi-resolution analysis and can get the optimal approximation of the original signal. A new method based on wavelet has been proposed to smooth out noise in time-series data. We apply the new proposed method to remove noise in NDVI, LAI and albedo time series and compare the performance of it with other existing denoising methods. Our results indicate that the newly developed method can remove noise effectively and at the same time it can also keep characteristics of original time series well.