A Collection Of Data Analytics For Earth Observation Time Series Analysis

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#EO #OpenScience
Copernicus European Programme activated the generation of freely available large harmonized spatio-temporal datasets, for the analysis of spatial features and temporal patterns as well as the monitoring of changes and anomalies. Earth monitoring using EO time series took advantage from the analysis of spatial features and temporal patterns.
PROBLEMS

- increasing number of available Earth Observation datasets (Sentinel, Copernicus Core Services, etc)
- demanding need for data analytics to extract information from large EO product datasets
- still few open tools are collecting available techniques
- many techniques can not directly handle raster time series
- many techniques can not deal with incomplete time series (gap-filling methodologies required)
SOLUTION!

We present the newly developed 'rtsa' (Raster Time Series Analysis) package for R programming language providing a collection of analytics to perform spatio-temporal analysis from raster time series.

It acts as a front-end to already available functions in various R packages, designed to handle geographic datasets provided as raster time series.

Available on GitHub: github.com/ffilipponi/rtsa
Main features:

- use of raster time series as direct input to functions
- explicit temporal dimension in raster
- memory optimization using raster mask
- parallel processing using multiple CPUs
- gap-filling procedures

**rtsa**: R package for Raster Time Series Analysis

**analysed time series**

*(spatial and temporal patterns)*
Supported gap-filling methods:
- DINEOF
- gapfill
- linear interpolation
- spline interpolation
- stine interpolation

The following analytical methods are supported:
- Empirical Orthogonal Function
- Empirical Orthogonal Teleconnections
- Self Organized Maps
- Seasonal Trend Decomposition using Loess
- Breaks For Additive Season and Trend
- X-11
- X-13-ARIMA seasonal adjustment
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