Generation of long-term time series of remote sensing data using ESA's GPOD system

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Several authors have shown that the analysis of time series of remote sensing data is able to characterize the properties of different earth systems. They have used different techniques, ARIMA, Fourier Analysis and others, to estimate cyclical and trend variations from the information stored in the time series.

Most systems in earth cycle due to seasonal changes in the flow of energy and/or matter, ecosystems cycle due to seasonal changes in evapotranspiration, day length and temperature. Time series analysis can characterized the period, amplitude and offset of the cycle. Trend analysis, on the other hand, can be used to detect permanent changes in certain systems. Changes in sea surface temperature or the artic ice pack due to climate change would belong to this category.

Performing this analysis requires data with a good temporal resolution, usually in the range of days and a good temporal extent, usually in the multiyear timescale. As a result users have to process a big set of satellite images, sometimes in the order of thousands, to extract the information required. This processing consumes a great amount of time and resources due to the big amount of data and computer power involved.

To facilitate the generation of long-term time series of remote sensing data the European Space Agency has developed a system able to extract all the information available for a small area from the MEdium Resolution Imaging Spectrometer (MERIS) onboard ENVISAT in an easily accessible format.

This service allows the user to specify an area of interest of rectangular or circular shape giving its geographical location and its size, specify the period of time that he is interested in and obtain several files with all the information available from the MERIS sensor for this location.

For each MERIS product the information is given in two formats. One is highly portable following the XML standard. Output is also given in Google Earth and Excel formats allowing for a fast and easy analysis of the data recovered. The service generates also several summaries of all the products processed and stores them in easily usable formats.

This service is able to generate year long time series processing several terabytes of data in the order of a couple of hours. It has already been used by several research groups proving its utility. The European Southern Observatory (ESO) used it to survey potential sites for the deploying of ESO's next generation of very large telescopes (E-ELT). Currently it's being used by the Max Planck Institute to characterize their two telescope sites at Mount Graham (US) and Calar Alto (Spain)

The system is powered by ESA's GRID Processing on Demand infrastructure. This is a GRID-based operational environment able to process large amounts of remote sensing data in an efficient way. The access to ESA data catalogue coupled with high-performance and sizeable computing resources managed by GRID technologies, enables the user to develop applications that were not feasible till now.