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Intensive time series data exploitation: the Multi-sensor Evolution Analysis (MEA) platform

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The monitoring of the temporal evolution of natural phenomena must be performed in order to ensure their correct description and to allow improvements in modelling and forecast capabilities. This assumption, that is obvious for ground-based measurements, has not always been true for data collected through space-based platforms: except for geostationary satellites and sensors, that allow providing a very effective monitoring of phenomena with geometric scale from regional to global; smaller phenomena (with characteristic dimension lower than few kilometres) have been monitored with instruments that could collect data only with a time interval in the order of several days; bi-temporal techniques have been the most used ones for years, in order to characterise temporal changes and try identifying specific phenomena.
The more the number of flying sensor has grown and their performance improved, the more their capability of monitoring natural phenomena at a smaller geographic scale has grown: we can now count on tenth of years of remotely sensed data, collected by hundreds of sensors that are now accessible from a wide users' community, and the techniques for data processing have to be adapted to move toward a data intensive exploitation.
Starting from 2008, the European Space Agency has initiated the development of the Multi-sensor Evolution Analysis (MEA) platform (https://mea.eo.esa.int), whose first aim was to permit the access and exploitation of long term remotely sensed satellite data from different platforms: 15 years of global (A)ATSR data together with 5 years of regional AVNIR-2 data were loaded into the system and were used, through a web-based graphic user interface, for land cover change analysis. The MEA data availability has grown during years integrating multi-disciplinary data that feature spatial and temporal dimensions: so far tenths of Terabytes of data in the land and atmosphere domains are available and can be visualized and exploited, keeping the time dimension as the most relevant one (https://mea.eo.esa.int/data_availability.html). MEA is also used as Climate Data gateway in the framework of the FP7 EarthServer Project.
In the present work, principles of the MEA platform are presented, emphasizing the general concept and the methods that have been implemented for data access (including OGC standard data access) and exploitation. In order to show its effectiveness, use cases focused on multi-field and multi-temporal data analysis are shown.