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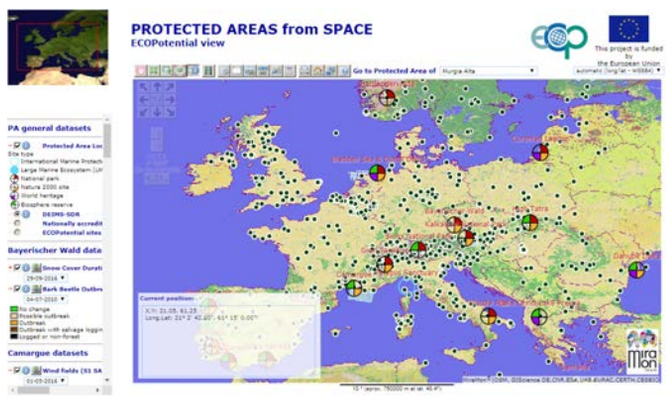
EO data products and time-series analysis for Protected Areas managers: the Protected Area from Space map browser

Protected Areas from Space map browser

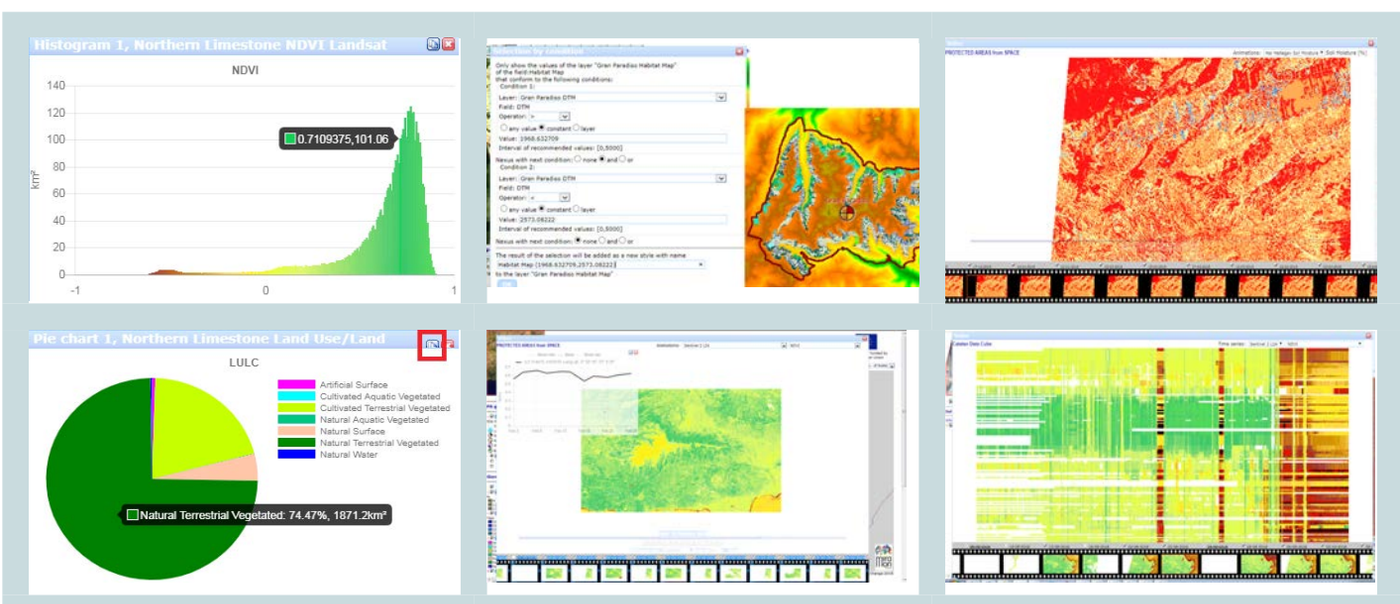
ECOPOTENTIAL Protected Areas have benefited from the potential of monitoring through Earth Observation. Many bio-geophysical variables have been derived from several satellites such as Landsat, Sentinel, MODIS, RadarSat etc. Among many, users can find products such as tree cover density, vegetation height, vegetation phenology, above ground biomass, digital elevation models, soil moisture, NDVI, NDWI, Lands surface temperature, sea surface temperature, Chlorophyll-a, hydroperiod, wind fields…. The data produced is accessible and displayed through a web interface that allows easy viewing, querying, animating analysing and downloading such data or its time series: the Protected Areas from Space map browser.



Main characteristics

The Protected Areas from Space map browser functions fulfil different management needs by offering several analytical tools that will help on the monitoring and decision making:

- Visualization of each single satellite product: The legend panel shows the list of layers available and a description of the categories of each layer that can be switched on and off
- Area of interest location
- User can enhance contrast parameters and change colour palettes
- Generation of data statistical histograms or pie charts: graphical representation of the distribution of the values or categories seen in the current view
- Application of spatial filters (e.g. type of vegetation at elevation greater than 400 m)
- Complex band calculations involving more than one product such as selection by condition between two layers or layer calculator
- Animated time-series functionality
- Temporal statistics at pixel level such as mean, mode and standard deviation resulting in a new image
- Space-time analysis resulting in a 2D graph
- Detailed time evolution graph for a given point by generating time profiles of the given position
- Linked to DEIMS (Dynamic Ecological Information Management System - Site and dataset registry)



Data quality

Data quality indicators are available for those layers for which data quality has been quantified by the producer. This type of information has been carefully documented using QualityML. Essentially, producer can report the dimension of the data quality measured, the indicator used, the type of measurement done, the uncertainties used to compute the numeric result (the domain) and the statistical expression (the metrics) used to summarize it. Data usually presents quality data at product or dataset level such as reports associated to product specifications resulting in quality metrics common for the whole products or, in some cases, at pixel level. The Map Bowser exposes the quality information in a dedicated window (http://maps.ecopotential-project.eu/). Additionally, all layers available through the map browser can be evaluated by the users through the user feedback option which is implemented using the feedback catalogue. The system implements the Geospatial User Feedback standard developed in the OGC www.opengeospatial.org/standards/guf. The user feedback allows to provide comments, ratings and questions associated to a given geospatial dataset, in this case, the selected layer.

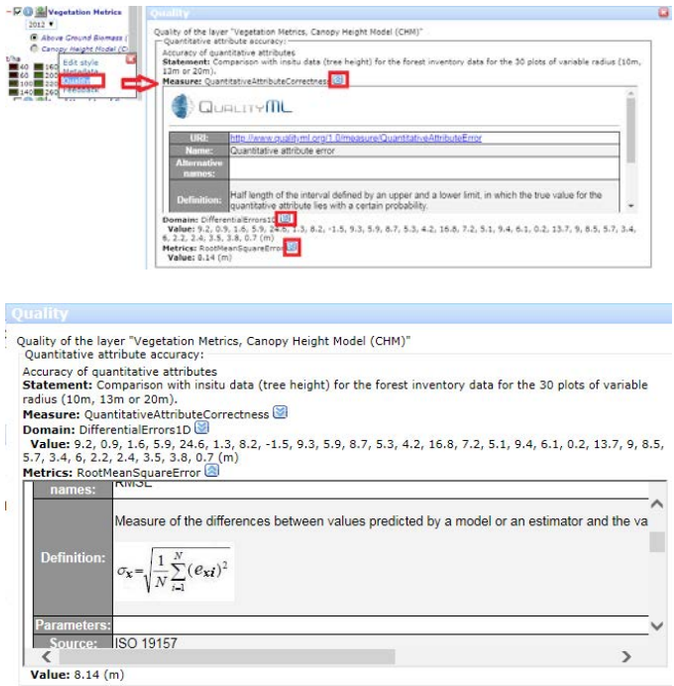


Fig 2. Data Quality documentation based on Quality ML

Technology, Interoperability and Accessibility

The map browser is an interoperable technology resulting in a combination of a client written in JavaScript and a server written in C. It has been created using technologies that comply with international standards, namely Web Map Service (ISO 19128) and Web Coverage Service, approved by the Open Geospatial Consortium (OGC) and the ISO. This makes it interoperable with other applications, especially with the ECOPotential Virtual Laboratory (https://vlab.geodab.eu/), and allows the browser to incorporate information from a variety of other servers provided by other partners in the project. It is developed by CREAF based on a previously existing MiraMon technology that has been enriched for this project and integrates the Ecopotential Data Cube (ECP - DC) (Fig.3) based on a set of Phyton libraries and PostGreSQL database. The ECP-ODC is a system developed to easy access, manage and analyse a multidimensional cube (x, y and t bands) of Earth Observation data, so to organize and analyse long time-series.

It is accessible through **maps.ecopotential-project.eu** although accessibility is also available through the own client with WMS standards. The app runs on modern web browsers, desktops, mobiles phones and LGC smart TVs.

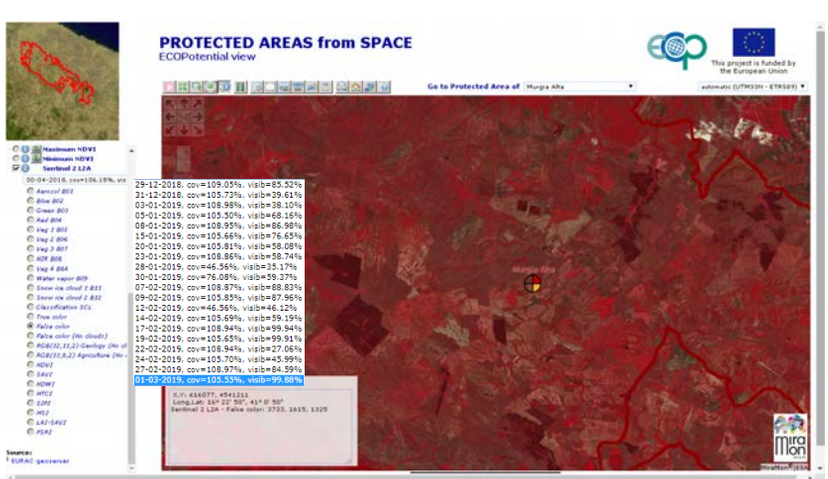


Fig 3. Ecopotential Data Cube

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