Group on Earth Observation for Quantitative Biosphere Dynamics

We develop models for assessing, monitoring and forecasting Earth surface processes. This encompasses the dynamics of forest and agricultural environments, including water resources and the effect of climate change. The group has a strong background in data science and analysis at different levels of details. The information that we use ranges from different types of field data to remote sensing long time series.

A significant synergy is derived from the interdisciplinary character of the group, which includes professors of statistics, thermodynamics, remote sensing, and forest and agricultural management among others.

Our approach is to develop models and methodologies easily transferable to industry. Thus, we try to develop models that are quantitative, automatic, intuitive for users and based on the principle of parsimony. To fulfill all these requirements the Big Data concept and the Artificial Intelligence methodologies are always present in our work.

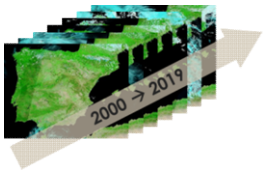
Facilities and infrastructures

- LAI-2200 Plant Canopy Analyzer equipment (LI-COR Inc., Lincoln, NE, USA) to mesure Leaf Area Index.
- RT-1 and 10HS sensors (Decagon Services Inc., WA, USA) and Em5b Analog Data Loggers (Decagon Services Inc., WA, USA) to gather soil moisture and soil temperature data.
- Big capacity computers.

Research areas associated with Big Science

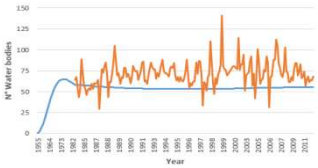
DATA

Remote sensing Drones, Satellites

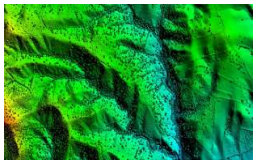


Field data of soil, vegetation, radiometry, water quality

Climatic data time series

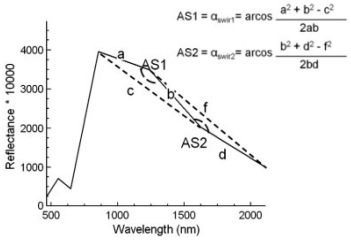


Thematic maps: land use, relief, soil



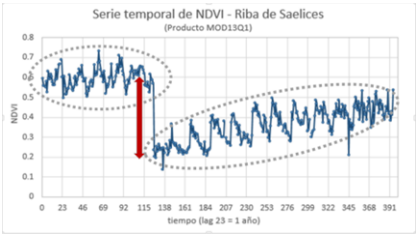
METHODS

Remote sensing indexes development

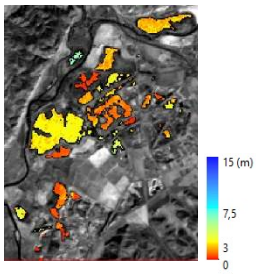


Artificial intelligence algorithms

Time Series Analysis and Forecasting

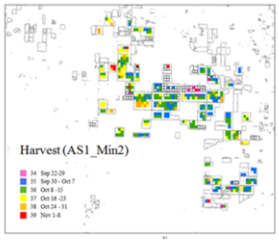


Spatial Analysis



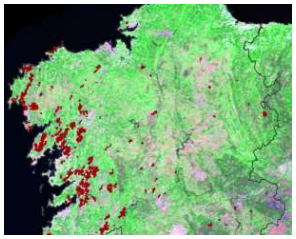
APPLICATIONS

Agricultural management

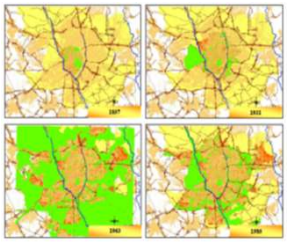


Ecosystem stability assessment

Forest fires



Urban green space assessment



Main projects in Big Science

- *Dynamic mapping of bare soil and crop residues in Mediterranean agricultural areas using remote sensing time series.*
- *FORWARD "FORWARD" Operational monitoring and FOrecasting system for Resilience of agriculture and forestry under intensification of the WAteR cycle: a big Data approach.*
- *Generation of an observatory of vegetation dynamics at different scales from remote sensing images.*

Collaboration with Large European Scientific Facilities

- ***Potsdam Institute for Climate Impact Research (PIK)**. Generation of a forest database. Gathering and processing of remote sensing data from MODIS (Cost action PROFOUND).*
- ***The SIAR meteorological Network (TragsaTec)**. Forecasting evapotranspiration based on statistical time series analysis.*
- ***Instituto Nacional de Técnica Aeroespacial "Esteban Terradas"**. Support in hyperspectral data analysis.*
- ***The European Facility for Airborne Research (EUFAR)**. Participation in: "Soil Erosion Detection within MEDiterranean agricultural areas using Hyperspectral data (SEDMEDHY)" and evaluator of proposals.*
- ***SEOSAT**. Membership of the Ingenio Mission Advisory Group (IMAG).*

Software, tools or licenses to be applied to Big Science

- *ArcGIS, QGIS, Rstudio, SAS, Eviews, Statgraphics, Phyton, ENVI.*

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