EAGLE

Exploitation of AnGular effects in Land surfacE observations from satellites

APPLYING MULTI-ANGULAR VIEWS IN LAND OBSERVATION

The accuracy of the geophysical products derived from remote sensing generally does not meet the requirements of user communities concerned with, for example, climate change issues. With the new generation of global imaging spectroradiometers capable of acquiring simultaneous multi-angle observations, both the new approaches and quantitative improvements in accuracy can be now achieved to exploit the multi-angle signals as unique and rich sources of diagnostic information.

The objectives of the EAGLE project were:

- *Evaluation and correction*: To evaluate and to reduce the uncertainty associated with the angular effects in the historical and current sensors.
- *Modelling*: To propose improved algorithms that permit generating sensor independent bio-geophysical products.
- *Demonstration*: To provide a demonstration of improvements in biophysical parameters obtained with the proposed algorithms.
- Validation: To validate models and products using in situ field data.
- *Application*: To provide a dynamic biophysical map of Europe that will be continuously updated by comparing modelling results with actual observations from the various sensor systems.
- *Recommendation*: To indicate new algorithms and configurations that could be considered in the future for improved estimations of the biophysical parameters.

MAIN ACHIEVEMENTS

- Several experiments were carried out in Spain, France and Netherlands, and field measurements were collected simultaneously with satellite and aircraft overpasses. This has allowed building excellent high quality databases. The data provided by these experiments will provide an important support to the analysis of the impact of the angular effect in remote sensing data. Moreover the benefits of building these databases are available to a wider scientific community interested in the angular aspects.
- A software package to compute biophysical parameters from satellite images has been developed during the project.
- Maps of NDVI (Normalized Difference Vegetation Index), surface temperature, surface emissivity and albedo (i.e. fraction of solar energy reflected from the Earth back into space) have been calculated from PAL data. A land surface temperature map of Europe has been produced with data from March 2000 to 2006 which can be used to study land surface phenology in Europe.
- A methodology to derive surface albedo from hyperspectral model simulations has been developed. Albedo maps have been produced from using the dynamic vegetation mapping facility available.
- A method has been proposed to perform the atmospheric corrections in the visible and near infrared channels at two view angle observations. Fractional vegetation coverage has been obtained for the AATSR images of the EAGLE campaigns.

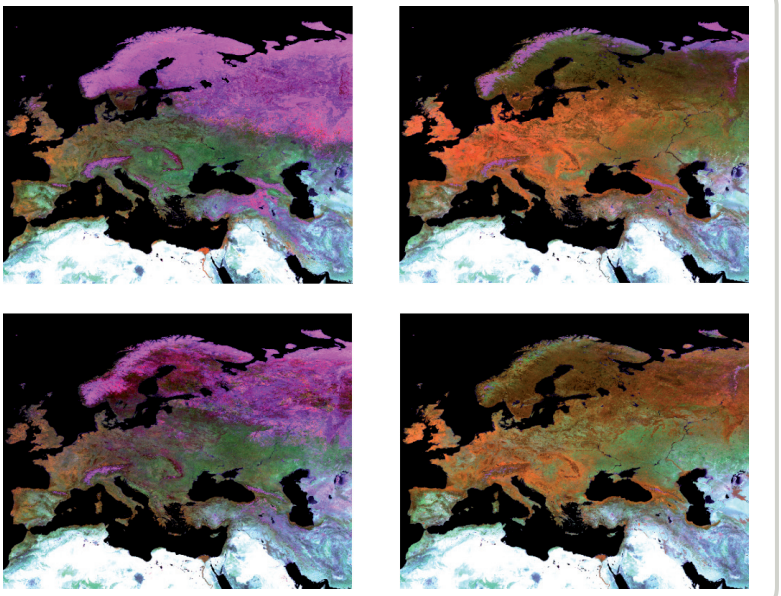

Illustration of vegetation growth dynamics (red colours) and snow cover (purple colours) for the year 2002 obtained from SPOTVGT data and the HANTS algorithm. Upper left shows the end of February (maximum snow cover), upper right the end of May, lower right the end of August (minimum snow cover), and lower left the end of November. Greenish and white colours indicate bare soils. (Source: EAGLE).

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PROJECT INFORMATION

EAGLE: Exploitation of AnGular effects in Land surfacE observations from satellites
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GLOBAL MONITORING FOR ENVIRONMENT & SECURITY