Global Land. Uptake of Global Land Biophysical Parameters for Junta de Andalucía. Erosion Risk . REDIAM.

Abstract: Soil erosion is one of the main issues directly affecting the productive system of countries bordering the Mediterranean. The conventional method most employed is Wischmeier and Smith's Empirical Soil Loss Model (USLE). The current operational line of work in Andalusia (REDIAM) calculates the protection factor of vegetation (Factor C) from MODIS. The aim is to integrate satellite imagery in the soil loss model (USLE) for operational estimates of soil erosion risk. In this study we propose to directly integrate the Copernicus FCover product into the model as the Factor C of the model, removing several steps of the current operational workflow.

Book Captain: F. Camacho. Earth Observation Laboratory (EOLAB).
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 Regional Ministry. Consejería de Medio Ambiente y Ordenación del Territorio. Junta de Andalucía. Environmental Information Network of Andalusia (REDIAM).
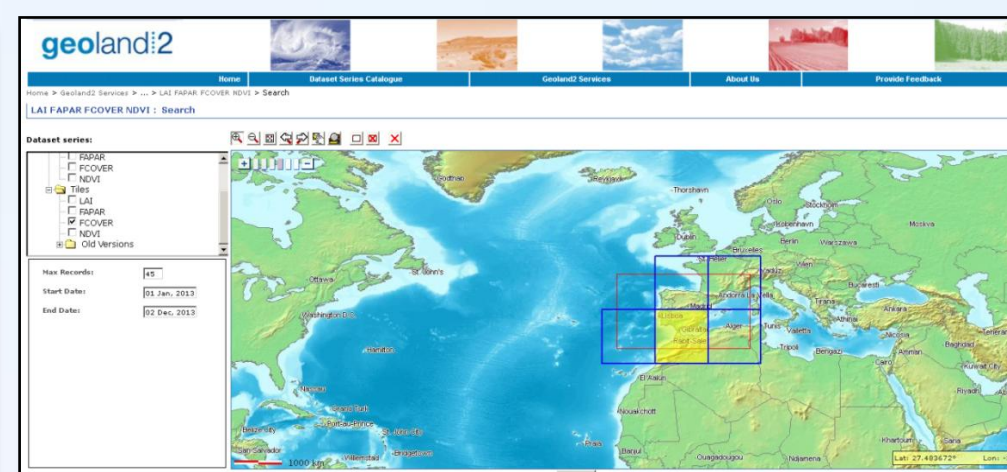
I. COPERNICUS DATA ASSIMILATION (ACCESS AND PREPROCESSING STEPS).

Available Data from Copernicus

http://land.copernicus.eu/
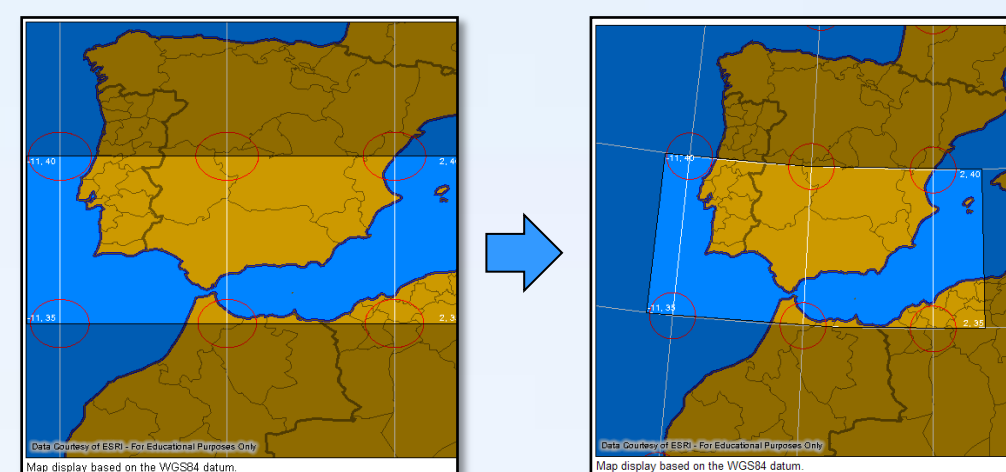http://www.ign.es/PNT/
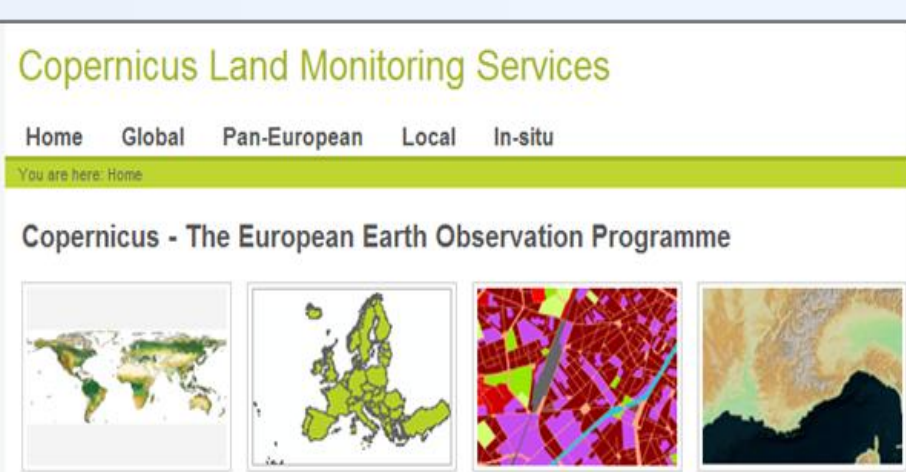
Global Spatial Coverage

10°x10° tiles and continental tiles.

Reference Systems and Reprojection.

WGS84 Platé Carrée -> ETRS89 UTM Zone30

FCOVER: Physical Values

PhyVal = (DN/Scaling Factor) – Offset

|	FCOVER	NDVI
Minimum value	0	-0.1
Maximum value	1.0	0.9
Maximum DN value	250	250
Scaling factor	250	250
Offset	0	0

Factor C Estimation

FactorC = 1 - FCover

FCover: Vegetation Cover fraction (green leaves). Copernicus
Factor C: soil loss that each crop type or land use allows for a specific land plot compared to one of similar characteristics but without the protection provided by either natural or cultivated vegetation covers.

## II. IMPLEMENTATION PROCCESS. CURRENT OPERATIONAL LINE IN REDIAM.

The REDIAM currently calculates the Vegetation Protection Factor (Factor C) from low resolution MODIS images (250m).

The aim is to integrate satellite imagery in the model thereby including spatial and temporal dynamics of vegetation covers and obtaining Factor values for Vegetation Cover soil protection.

The use of the Copernicus FCover product could benefit this Factor C calculation process. This study proposes that the **Copernicus FCover** product be directly assimilated **into the USLE model as Factor C**.


FCover (from SPOT/VGT Copernicus)

Factor C (from TERRA MODIS)
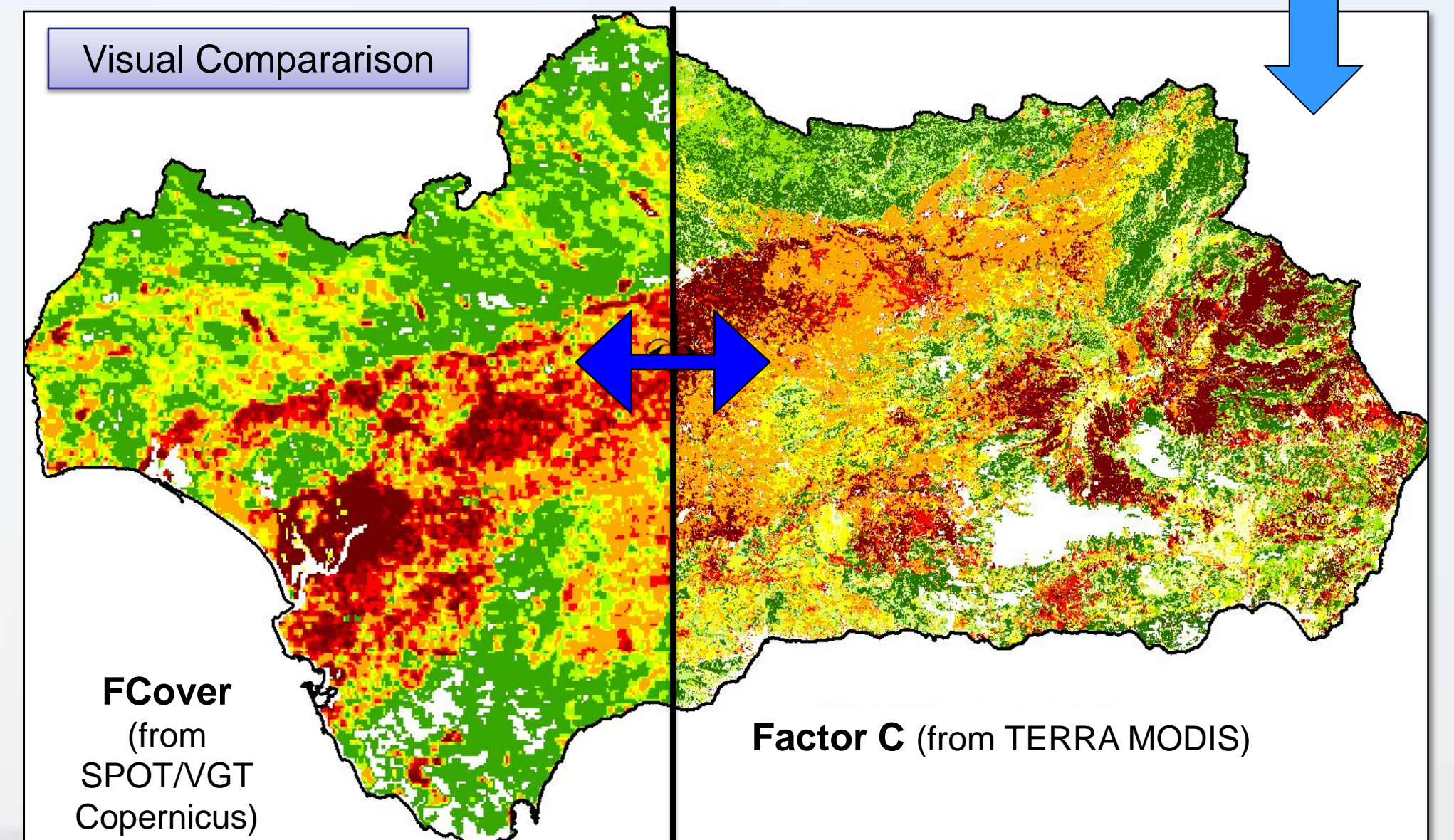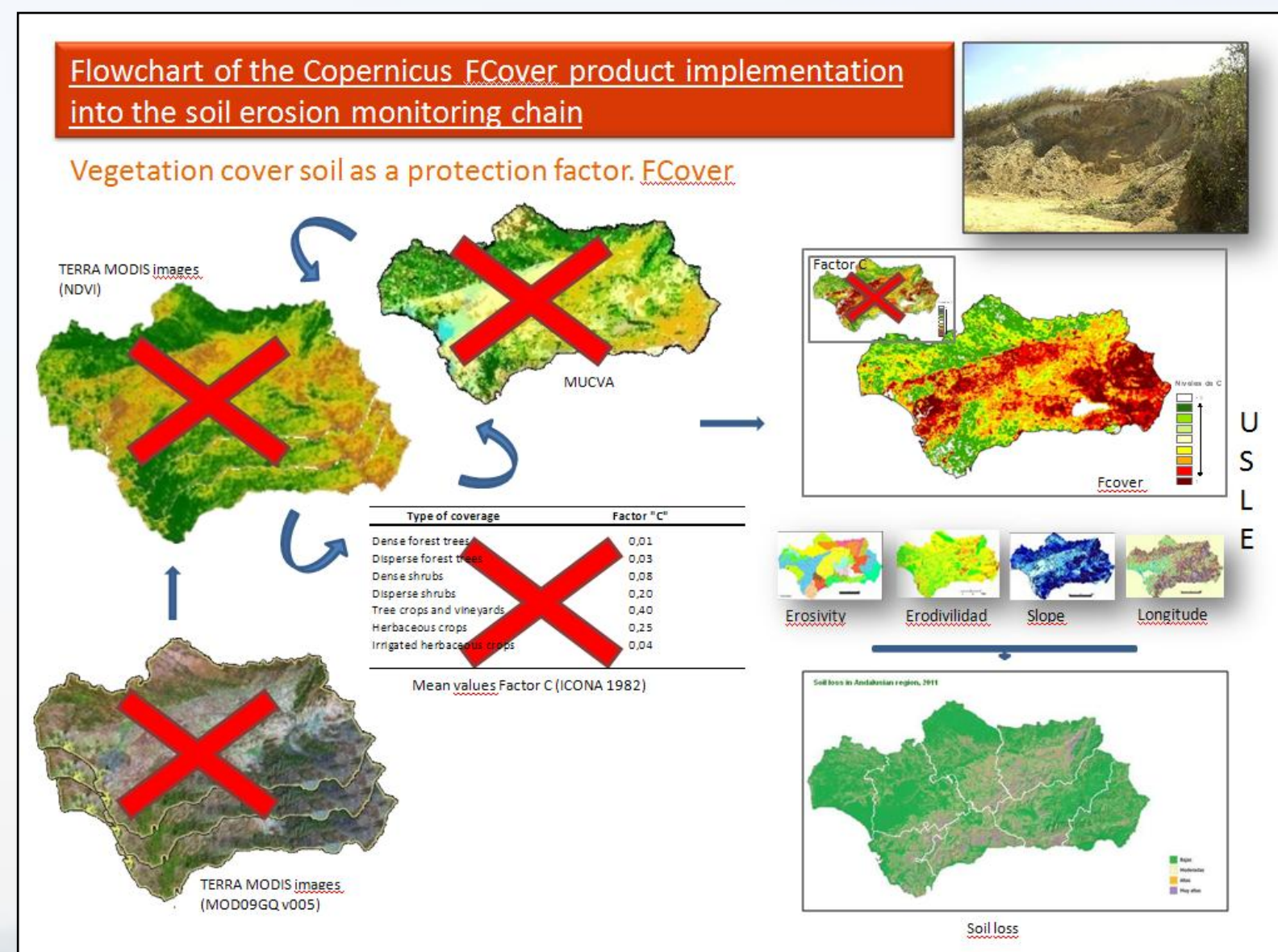
III. MAINSTREAMING RESULTS. SPATIAL AND TEMPORAL CONSISTENCY.
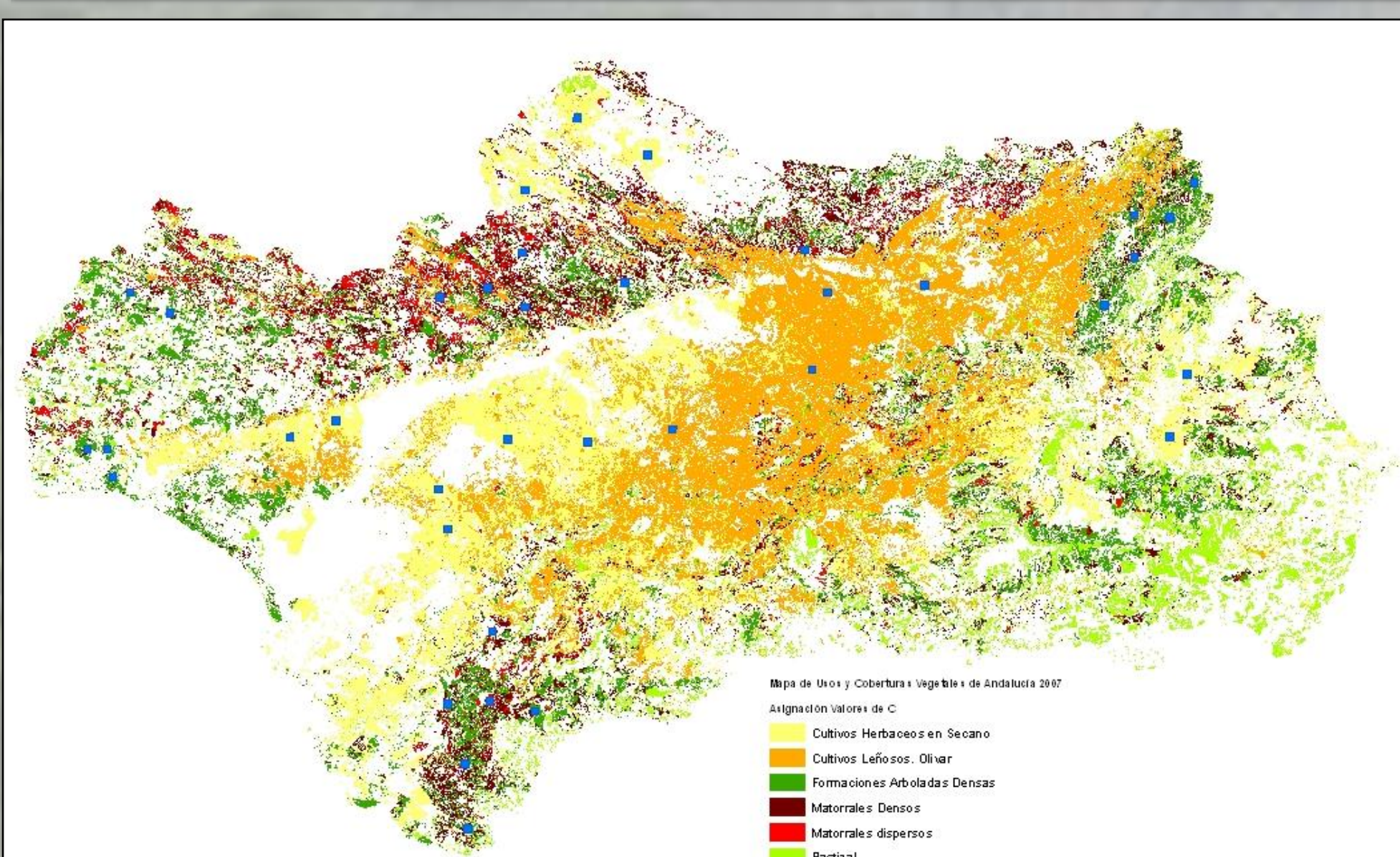

Id	LAND USE	C*	Location
411	Non - irrigated herbaceous crops	0,01-0,8	Sevilla, Córdoba y Granada
500	Dense forest trees	0,003-0,09	Cazorla, Sierra de Cádiz y Sierra de Huelva
415	Non-irrigated tree crops. Olive trees	0,1-0,6	Olivares de Jaén
600	Dense shrubs whit trees	0,01-0,1	Sierra de Sevilla y Córdoba

2011 May. Plot: 31, 32, 33.
Sierra Norte y Hornachuelos
Dense Shrubs with trees.

Plot Nº31
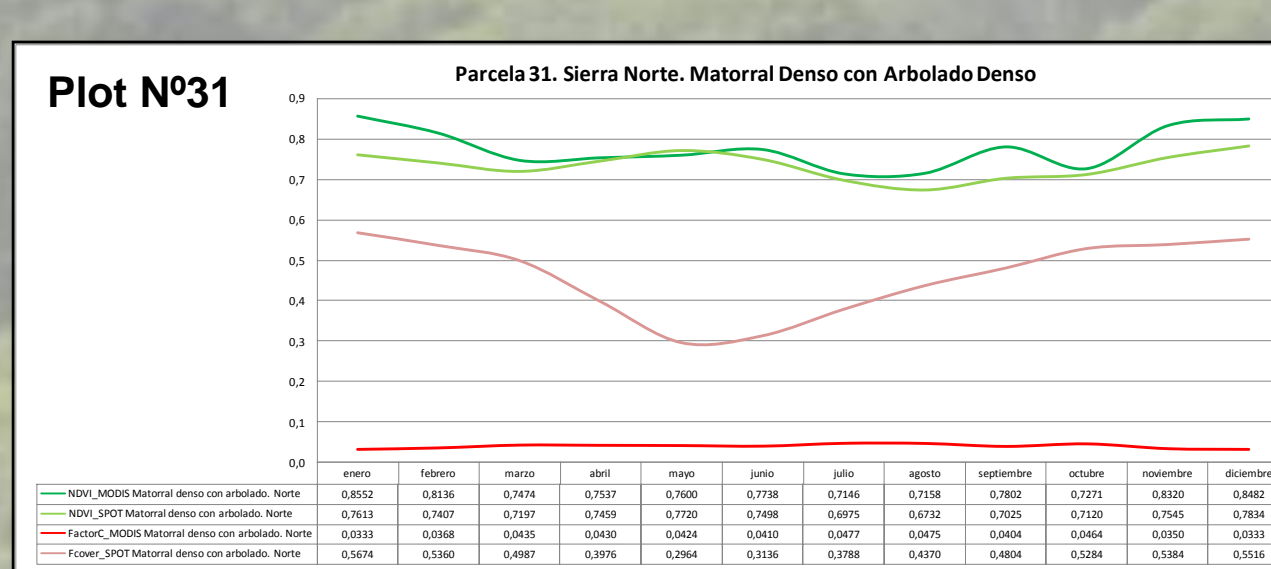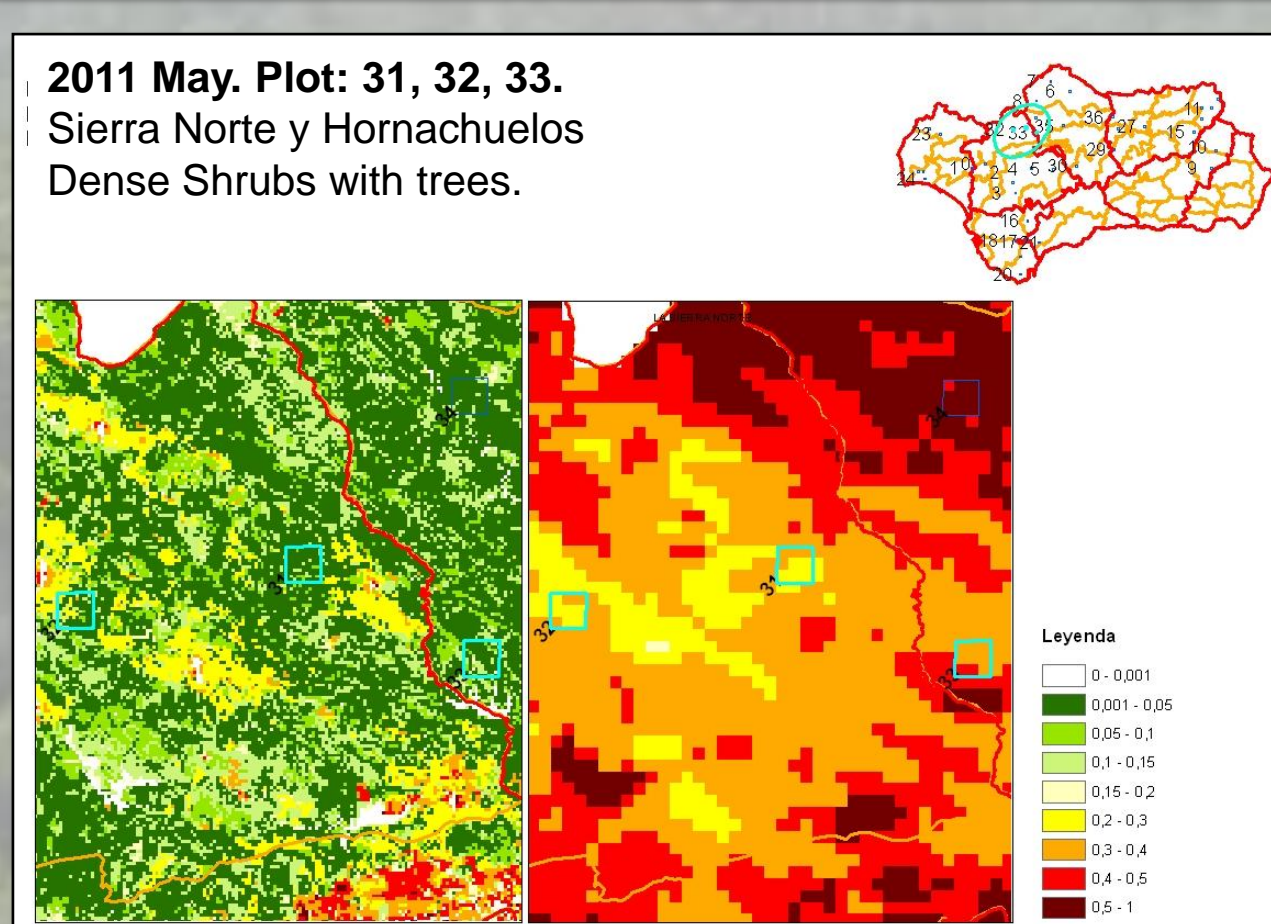
The evaluation of the spatial and temporal consistency of the product derived from SPOT / VGT for 2011 is carried out on a homogenous network of 36 sites, globally analyzing the results obtained.
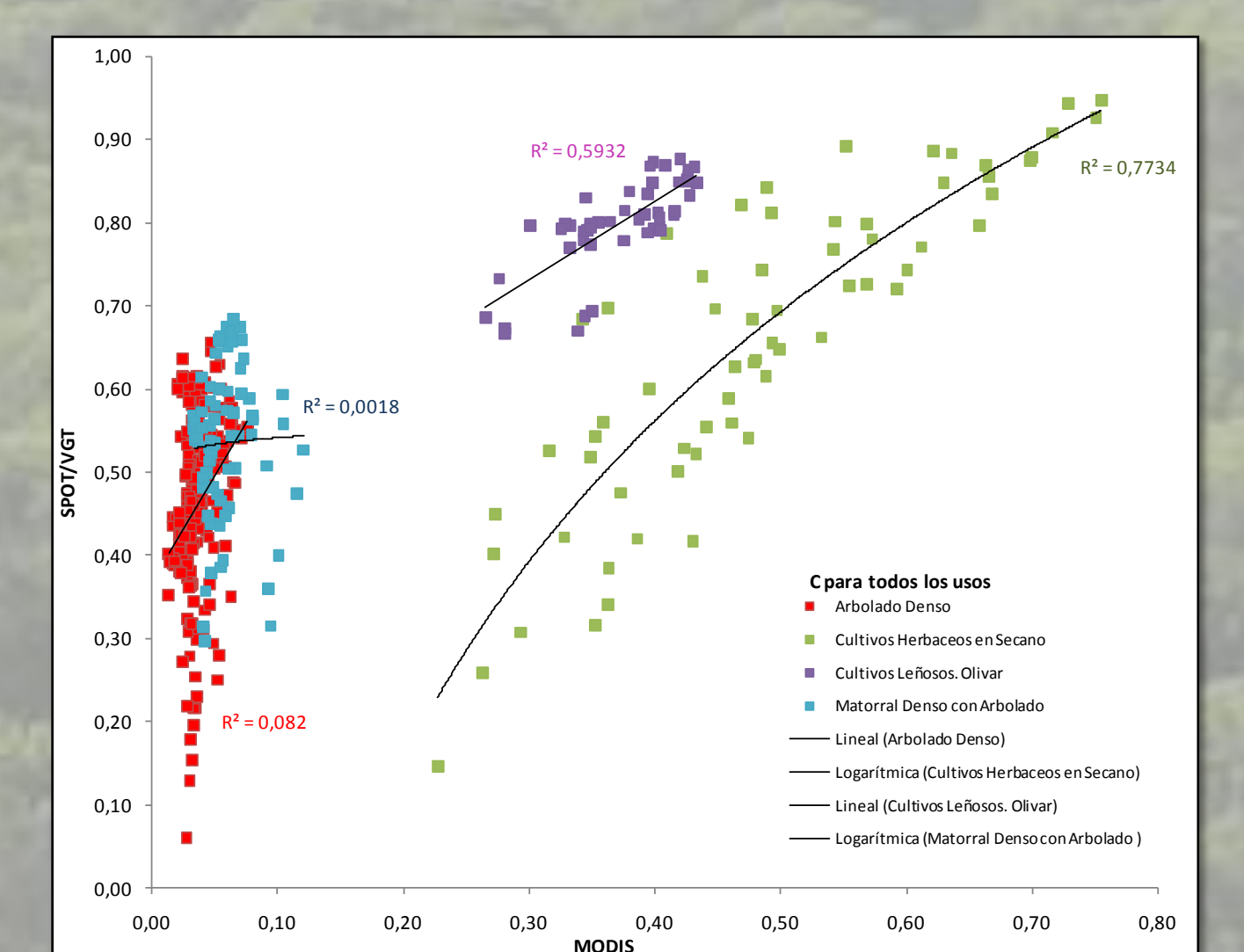

IV. APLICATION TO THE USLE MODEL.

Classical Methodology
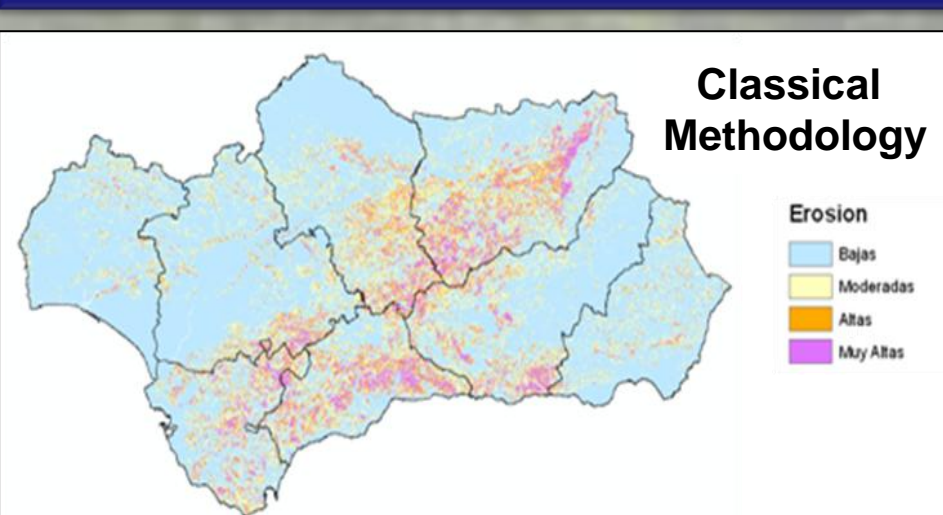
PERDIDAS EN % SOBRE SUPERFICIE REGIONAL			
	CALCULO CON C TRADICIONAL	CALCULO CON C MODIS	CALCULO CON C SPOT
BAJAS	69,69	66,16	39,11
MODERADAS	18,2	21,04	24,33
ALTAS	6,15	7,11	13,78
MUY ALTAS	5,96	5,69	22,78

MODIS

Accumulated annual soil loss (%) by using the monthly Factor C from:
❑ Tabulated values (Wischmeier, 1978) Classical Methodology.
❑ Calibrated MODIS values.
❑ Direct SPOT/VGT FCover product.

SPOT/VGT
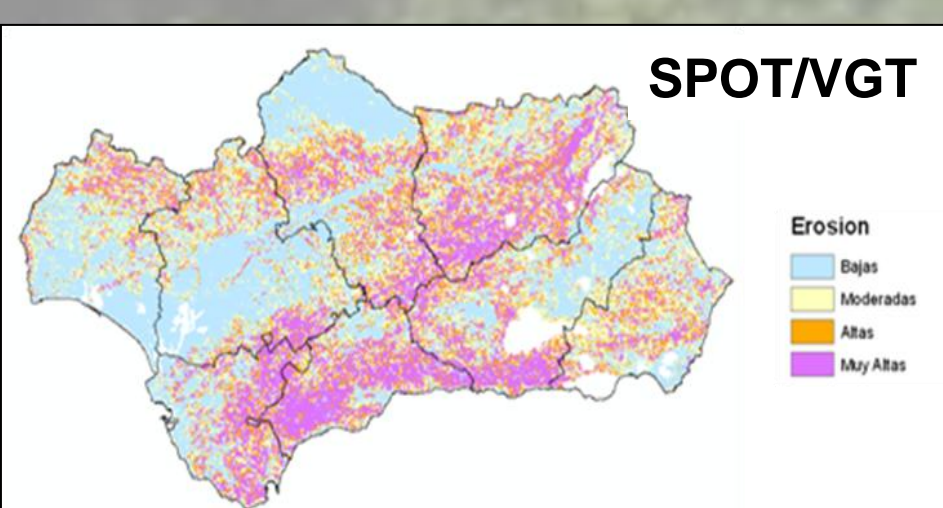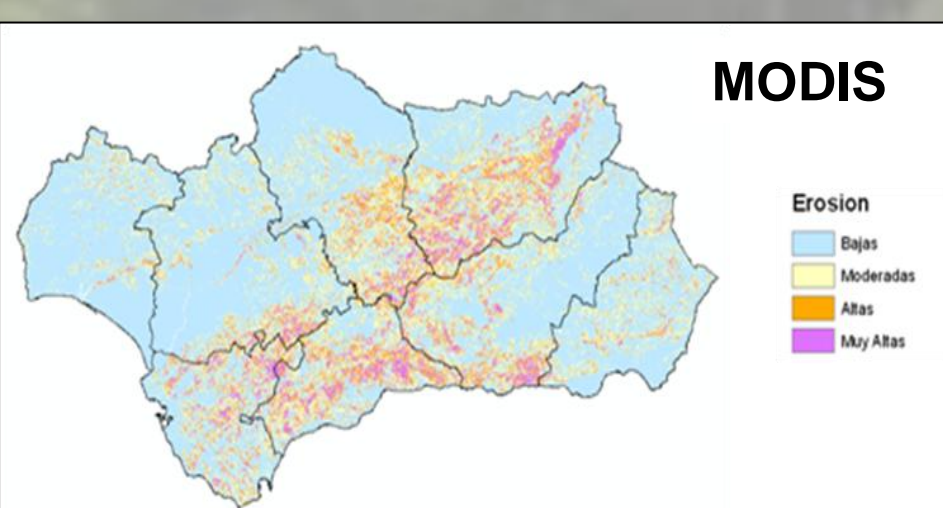
V. BENEFITS OBTAINED AND PROPOSED IMPROVEMENTS

❑ *BENEFICTS:*
* *Access to the Products Catalogue:* Full description of the requested information. Access to historical datasets and availability of their complete information (algorithm, validation reports, user manual,...) through an interactive web viewer.
* *Selection of a region of interest:* For the evaluated products the viewer takes into consideration the geographical area of interest (AOI).
•*Products and Metadata* providing very complete and useful information.

❑ *PROPOSED IMPROVEMENTS:*
* *Selection of an area of interest.* The user will only view the geographical area of interest (with it's own Metadata).
* *Access to products.* To facilitate http direct access to selected products.
* *Grid and Projection.* Add a service of common transformations between the Global Land reference system and projection and most frequently employed by users.
* *Image format.* Introduce the possibility to choose different formats, and provide for each product the physical value of the variable, allowing its direct use.
* *Viewer an OGC products.* Implement a web viewer service in the Global Component just as the in other components, allowing the user to assimilate the Global Land products and understand its according to its historical series without having to download the product (OGC Copernicus products service could be displayed).
* *Spatial Resolution.* The next generation of products based on PROBA-V, can introduce important improvements as compared to the current SPOT/VGT products for local or regional characterization of the territory.

VI. CONCLUSIONS.

Due to the overestimation of the Factor C by directly using FCover, this product is not operational for REDIAM quantitative assessments, but can be used for qualitative assessment to understand soil loss at larger scales, allowing for the comparisons of soil loss at regional, national or continental scales. Although the Surface Reflectance products from SPOT/VGT may be employed in the same fashion as we the MODIS products. The current spatial resolution is not optimal for regional assessment; however, with the improved spatial resolution of PROBA-V the products will be suitable for our regional assessment. It is thus necessary to carry out a new analysis with this improved resolution. In addition, this systematic approach using satellite products for periodic information on the assessment of erosion is extremely useful in the management of reforestation actions that are being carried out on a regional level.

Copernicus User Awareness and Training Event.
Lisbon, Portugal
13th and 14th February 2014

www.juntadeandalucia.es/medioambiente/rediam