

**EC-ESA Earth System Science Initiative:
Joining Forces to Advance Science for a
Green and Sustainable Society**

Land Science

Jose Moreno

Laboratory for Earth Observation

Dept. Earth Physics and Thermodynamics

Faculty of Physics, University of Valencia, Spain

Jose.Moreno@uv.es

What are the main “high-level” scientific challenges and opportunities in front of us?

In the Land domain, key science topics:

Carbon / climate

- ✓ need for a better capability to predict future trends under variable scenarios
- ✓ anthropogenic emissions, environmental forcing conditions, and socio-economical / management practices in the administration and usage of natural resources
- ✓ feedback loops in carbon, water, energy, nutrients (vegetation stress not well represented)

Agriculture / food security

- ✓ Quite common aspects in carbon cycle research and agriculture / food security applications
- ✓ Carbon cycle research transferred to agriculture and vice versa, knowledge from applications transferred to science. Applications sometimes are more demanding (there is a good validation)

Biodiversity / ecosystems

Water resources / water quality

Topics are clear, tools are the ones that need more elaboration

- a) Large improvements in models: integration / feedbacks of all (most) processes, better spatial/temporal resolution, more predictive
- b) Multidisciplinary coordinated field experiments and systematic large-scale field data collection

How this collaboration between ESA and the EC can help?

- ✓ European scientists are the same for both ESA and EC, same community
- ✓ Capitalize on Europe leadership in Earth Observation data and scientific research on these topics
- ✓ Accommodate different expertise in communities that sometimes do not talk to each other: **EO data providers versus EO data users**, modelling groups and experimentalists to work together, share datasets.
- ✓ Access to complete sets of field data (networks) and cartographic digital databases is critical but can be accessible through EC together with ESA: combine EO satellite data with in-situ / citizen observations in a systematic consistent way using advanced modelling capabilities National-level implication is also necessary because many field data infrastructures are managed at national level.
- ✓ Interdisciplinary research, using new technologies, to address the key issues **from all the sides**

Coordination is the key. A single large project is probably not the most appropriate solution, and then coordination of a network of individual projects is necessary

General recommendations to ESA and EC to ensure this initiative will be a success

- Remote sensing (from satellites to UAV) as providers of thematic maps in high spatial resolution (land cover maps or simple qualitative indicators like spectral indices or ratios) is well recognized, but we can do much more with EO data. New EO data are not fully exploited in all the potential, we need to prepare for the coming years.**
- Applications are now more demanding, more quantitative. It is just a matter of finding the right solution for the open needs to satisfy emerging applications.**
- Guidance is needed. User community large but sometimes using data in the wrong way or coming to wrong conclusions. A general COORDINATION in the sense of GUIDANCE is needed. Open science is quite adequate, but there is a risk in the lack of proper guidance.**