Detecting Changes in Essential Ecosystem and Biodiversity Properties: Towards a Biosphere Atmosphere Change Index: BACI

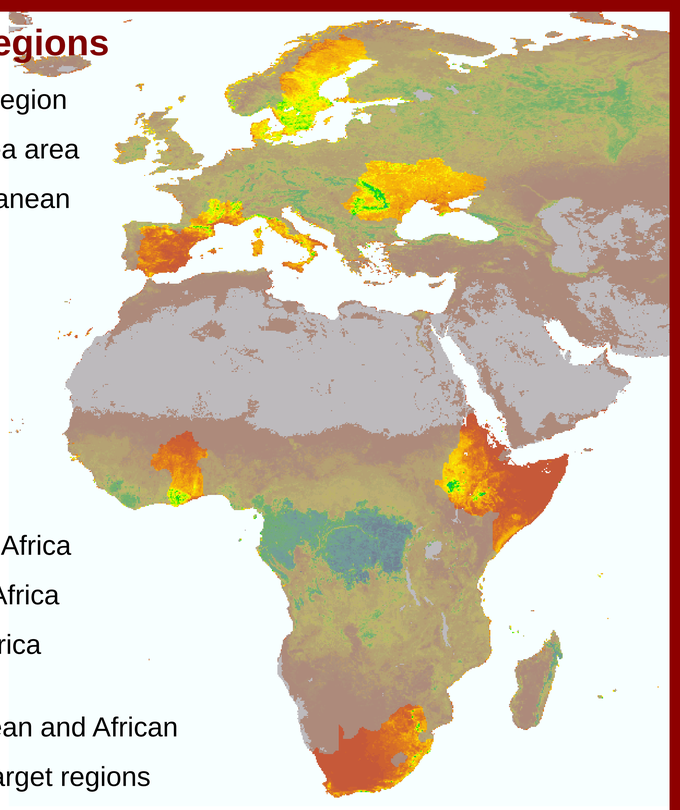
A H2020 project coordinated by the Max-Planck-Institute for Biogeochemistry, Jena, Germany in collaboration with a Pan-European Consortium

Introduction

- **Space data archives and novel space-borne Earth observations (EOs)** are playing an essential role in **monitoring the state and transformation of land ecosystems and anthropo-genic impacts.**
- The key is to **integrate optical and radar space data with ground observations** for **deriving novel downstream products.**
- The new EU funded project “BACI” takes up this challenge and **translates space data to novel “essential ecosystem variables”** not directly observable from space.
- Modern **machine-learning tools** will be employed to **reveal new and fundamental relationships between space observations and ecosystem status.**

Focus regions

- Boreal Region
- Black Sea area
- Mediterranean
- Western Africa
- Horn of Africa
- South Africa

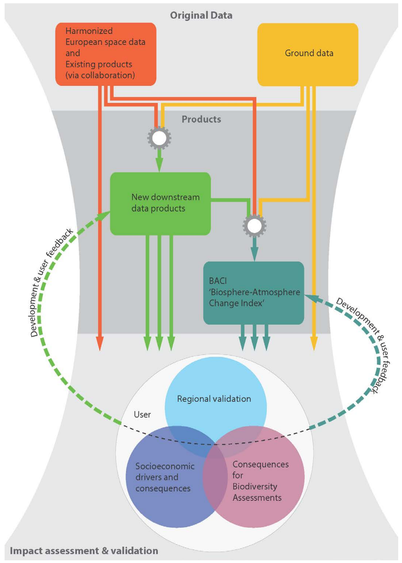


The European and African validation target regions

Approach

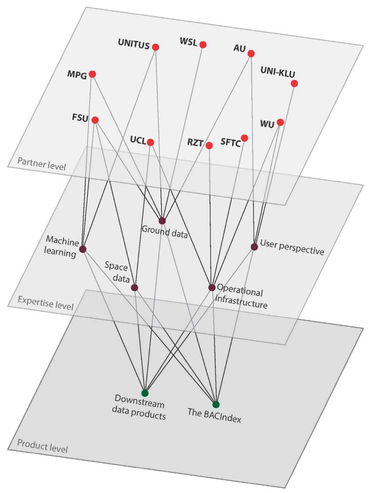
I.Assembling original data of a variety of origins towards an **“Earth state vector”** including an accurate uncertainly char-acterization.

II.Integration of ground and space observations leads to a series of new **downstream products** (light green) that can be either directly interpreted by the user community, or ingested to a general **index of change**.



III. Assessing the suitability of the new products for **regional impact assessment** activities and **new biodiversity monitoring strategies**.

Consortium structure and expertise



- Social ecology
- Land use change
- Biodiversity research
- Land-atmosphere exchange
- Ecosystem research
- In-situ monitoring
- Space observations
- Environmental Data Archival
- Machine learning

Partners (1st level) and the key expertise provided to BACI (2nd level) toward BACI´s objectives. **Synergies emerge from common and complementary expertise** towards the expected products (3rd level).

Overarching goals

- To **trace transient/abrupt changes** in biodiversity and eco-system states.
- To **co-interpret the index** of change based on state-of-the-art machine learning.
- To **attribute hotspots of change** to climate drivers, bio-physical variation of the land-surface, and socio-ecological transformations.
- To **develop a biodiversity early warning system** that combines observations of ecosystem change with an assessment of biodiversity vulnerability.

Collaboration

The Consortium bring together **10 leading academic institutions and SMEs from six EU countries and Switzerland.**

Project

BACI: 2015-2019

Further information at: http://baci-h2020.eu

Contact

Max Planck Institute for Biogeochemistry
Dr. Miguel D. Mahecha (Coordinator)
E-mail: mmahecha@bgc-jena.mpg.de

Funded by the EU's Horizon 2020 research and innovation programme. Grant agreement Nº 640176
Project duration: 2015-2019