GEOLAND Overview of Interacting parts and future plans

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GMES priorities addressed by geoland

- A- Land Cover Change in Europe
- B- Environmental Stress in Europe
- C- Global Vegetation Monitoring

### Policies / Directives / Conventions
- Habitats
- ESDP, ESPON
- Natura 2000
- Wetland Directive
- Water Framework Directive
- Soil Thematic Strategy
- Sustainable Development
- Fight against Poverty
- Global Change
- Kyoto
- Global Environment Protection

### Service Portfolio

#### Services
- upstream exploitation of synergies

#### Observatories
- downstream customization
Core Services & Observatories

Co-ordination

Operational Scenario

Regional

Global

Generic Land Cover

Biogeophysical Parameters

Directives Implementation

Policy Support

Core Services

Observatories

Nature Protection
Spatial Planning
Water & Soil

Natural Carbon Fluxes
Food Security & Crop Monitoring
Land Cover & Forest Change

Food Security & Crop Monitoring

Land Cover & Forest Change
geoland System Layout

Space Segment
Operational availability of sensor families

Ground Segment
Co-ordinated multi-sensor ordering to optimise use of space resources

Service Segment
Up-stream exploitation of Synergies (Core Services)
Down-stream customisation (Observatories, service provider networks)

User Segment
Integration of services into user infrastructure

EO Multi Mission ordering & data access

EO instruments

low resolution
medium resolution
high resolution

PADF
PADF
PADF

EO Multi Mission ordering & data access

geoland core services

geoland specific thematic services

National Organisations (e.g. nat. spatial data infrastructures, EESDI)

Internat. Organisations (Infrastructure e.g. FAO GeoNetwork)

Meteo Organisations (Infrastructure e.g. Eumetnet)

In-situ Data

low resolution
medium resolution
high resolution

CSP
CSL

PADF
PADF
PADF

...
Interactives parts within HALO

Main Interacting Parts within HALO

Co-ordination

Operational Scenario

Regional

Global

Core Services

Generic Land Cover

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Observatories

Nature Protection

Spatial Planning

Water & Soil

Natural Carbon Fluxes

Food Security & Crop Monitoring

Land Cover & Forest Change

Directives Implementation

Policy Support

Main Interacting Parts within HALO

2nd HALO Workshop, ECMWF, Reading, 12-13 December 2005
### geoland Data Flow: Interacting, Internal

<table>
<thead>
<tr>
<th>Data flow</th>
<th>Source</th>
<th>Destination</th>
<th>Delivery Mode</th>
<th>Theme/Product</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meteorological forcing fields for land surface models</strong></td>
<td>ECMWF</td>
<td>Geoland-ONC</td>
<td>Regular</td>
<td>Air temperature/humidity, wind speed, precipitation, incoming radiation (short and longwave)</td>
</tr>
<tr>
<td><strong>Geoland Global products</strong></td>
<td>Geoland-CSP</td>
<td>GEMS</td>
<td>Regular + On-demand</td>
<td>Generic Land Cover (300 m – 1 km resolution)</td>
</tr>
<tr>
<td><strong>Geoland CSP-OLF vegetation CO2</strong></td>
<td>GEOLAND-CSP-OLF</td>
<td>GEMS</td>
<td>to be checked, initially research mode  only</td>
<td>Land use change and forest fires</td>
</tr>
<tr>
<td><strong>geoland ONC vegetation CO2</strong></td>
<td>GEOLAND-ONC @ ECMWF</td>
<td>GEMS</td>
<td>to be checked, initially research mode  only</td>
<td>Vegetation data as input for emission models (biogenic and fires): CO2 fluxes, above-ground biomass, stomatal conductance</td>
</tr>
<tr>
<td><strong>GEMS global aerosol products</strong></td>
<td>ECMWF</td>
<td>geoland retrieval centres</td>
<td>to be checked, initially research mode  only</td>
<td>Atmospheric Aerosol data for atmospheric corrections in retrieval</td>
</tr>
<tr>
<td><strong>Geoland Global Gobal products</strong></td>
<td>Geoland-ONC @ ECMWF</td>
<td>GEMS @ ECMWF</td>
<td>Regular + On-demandTo be checked, initially research mode  only (TBC)</td>
<td>Biogeophysical Parameters (Rainfall for water cycle, burned area, active fire and LAI for trace gas emission)Vegetation data as input for emission models (biogenic and fires) (TBC)</td>
</tr>
<tr>
<td><strong>Satellite forcing fields for land surface models</strong></td>
<td>Geoland-CSP</td>
<td>Geoland-ONC</td>
<td>Regular</td>
<td>Improved precipitation fields and incoming radiation (short and longwave)</td>
</tr>
</tbody>
</table>
Future views: the post-geoland era

Land Surface Monitoring

Regional / Europe

Global
surface-atmosphere
surface

- Land Surface Monitoring has two components:
  - global
  - regional over Europe
- The Regional part is starting (Fast-Track Service)
- The Global part should also start
  - technical & scientific maturity sufficient
  - two thematic areas
    - surface-atmosphere interactions (→ “meteorology”)
    - land surface properties per se (→ “environment”)
  - “unifying factors”
    - similar space products in input
    - public funding
The future of GEOLAND is a GMES Global Land Monitoring Service, consisting of

- a single Core Service
  - standardized products
  - large geographical coverage

- a series of Downstream Services
  - customized products
  - tightly connected to the Core Service, from which they receive generic information
## Core Service Products

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Sub theme</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>EO-based, low level</td>
<td></td>
<td></td>
<td>Surface reflectance, Backscattering coefficient, Brightness temperature</td>
</tr>
<tr>
<td>EO-based</td>
<td>Biogeophysical parameters</td>
<td>Vegetation</td>
<td>LAI, fAPAR, fCover, phenology, burnt areas, active fires, land cover, vegetation indices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiation</td>
<td>Albedo, downwelling flux, surf. temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water</td>
<td>Water bodies, soil moisture, water level</td>
</tr>
<tr>
<td>Data assimilation in process models</td>
<td>Natural Carbon Fluxes</td>
<td></td>
<td>Carbon flux, water flux, carbon storage, LAI, biomass, soil moisture</td>
</tr>
</tbody>
</table>
## Downstream Services

<table>
<thead>
<tr>
<th>theme</th>
<th>downstream service</th>
<th>operator</th>
<th>user segment</th>
<th>status</th>
</tr>
</thead>
<tbody>
<tr>
<td>land cover change</td>
<td>African observatory for sustainable development / environment</td>
<td>JRC</td>
<td>DG DEV, AIDCO, ENV, RELEX</td>
<td>mandate for development</td>
</tr>
<tr>
<td></td>
<td>Boreal Eurasia observatory</td>
<td>TBD</td>
<td>DG ENV, TRADE, Min. Forestry Russia</td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td>national &amp; regional env. Monit system in Africa</td>
<td>national multi-disciplinary network</td>
<td>National ministries (planning, environment, forest,...)</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>UNEP/DEWA</td>
<td>UNEP/DEWA</td>
<td>UNEP reporting process</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td>crop monitoring</td>
<td>MARS-STAT (Europe)</td>
<td>JRC</td>
<td>DG AGRI</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>MARS-FOOD component in African observatory for sustainable development</td>
<td>JRC</td>
<td>DG DEV, AIDCO, RELEX, ECHO, FAO, WPP, nat govs, NGOs</td>
<td>mandate for development</td>
</tr>
<tr>
<td></td>
<td>MARS-FOOD (global)</td>
<td>JRC</td>
<td>DG DEV, AIDCO, RELEX, ECHO, FAO, WPP, nat govs, NGOs</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>national food early warning systems</td>
<td>i.a. national EWS teams, agromet service, etc</td>
<td>National ministries (agriculture, ...)</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td>natural carbon fluxes</td>
<td>Atmosphere and Climate</td>
<td>ECMWF</td>
<td>DG Env, National env. Agency</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>Kyoto protocol reporting team</td>
<td>EEA</td>
<td>DG Env, National env. Agency</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>agriculture survey</td>
<td>National agromet services</td>
<td>National ministries, DG Agri</td>
<td>operational mandate exists</td>
</tr>
<tr>
<td></td>
<td>Initial conditions for hydrological modelling</td>
<td>National flood forecast services</td>
<td>national water agencies, watershed agencies, civil protection</td>
<td>operational mandate exists</td>
</tr>
</tbody>
</table>
For EO-based products,

- The SAF model is well adapted to the issue of biogeophysical parameter provision
  - formal link between R&D and services
  - mandate over the long term
  - centralized management, helps overall efficiency
  - flexible funding scheme

- The existing service providers for remote sensing products should join their forces to face the increasing needs in GMES
  - extension in product types and levels and geographic coverage
  - coverage of various satellite programmes

- MoU under construction between IM, VITO, and Medias-France/POSTEL
For data assimilation in models,

ECMWF and NMS seem the most natural candidates for coordinating this activity

• Global scale (25-50 km resolution): ECMWF has the capability to operate it

• Europe (5-10 km resolution): National Meteorological Services (NMS) could cooperate in the framework of Eumetnet
Several downstream services are at a sufficient maturity level to start rapidly

- The existing MARS-STAT and MARS-Food service at JRC
- « African Observatory for Sustainable Development » at JRC
- Atmosphere & Climate Service to be run at ECMWF as a follow-up of GEMS

Possible onset of downstream services at NMS (improvement of weather forecast models + agrometeorological applications).
Implementation Plan

Implementation of an operational « Global Land Monitoring » GMES Service by 2008 is possible and should be the target.

Technically, the Core Service products and the network of Service Providers in Europe are at a sufficient maturity level to start an operational production of limited scope (« Pilot Service ») in 2008.

At institutional level, the MoU initiated between biophysical parameter service providers in Europe should be extended to other actors, including ECMWF, NMS and JRC.

To this end, a specific meeting will be held in Brussels on Feb. 16-17 2006.

Improvements of the product portfolio (R&D actions) and operationality can be envisioned during the FP7 period 2008-2013.
Technical Action Plan

Operational service starts in 2008
- limited product portfolio
- differed time
- downstream services based on MARS-Food, MARS-STAT, Africa Observatory, ECMWF / Atmosphere & Climate

R&D actions 2008 – 2013
- funding FP7 Action 6 Environment
- product portfolio improvement

Service improvement 2008 – 2013
- funding FP7 Action 9.2 Space, + national
- deploy large network of downstream services
- operational carbon service at fine resolution over Europe
- improve timeliness, delivery frequency, interoperability between service components
Integrated GMES Project on Landcover and Vegetation

Thank you for your attention!

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