SIGMA project

Overview
Background
SIGMA - Facts

- Start 1 November 2013 – 30 March 2017
- Agriculture AND Environment
- 22 partners in 17 countries
SIGMA - Facts

- Start 1 November 2013 – 30 March 2017
- Agriculture AND Environment
- 22 partners, 17 countries
  - VITO, CIRAD, JRC, IIASA, Alterra, RADI, NMSC, DEIMOS, GeoSAS, RCMRD, Aghrymet, RCMRD, Sarvision, Sarmap, INTA, Geoville, UCL, EFTAS, FAO, ITC, GISAT, IKI, SRI
- Argentina, Ukraine, China, Russia, Africa, USA, Brazil, Vietnam, Belgium, ...
- 9 M EUR
- GEO! (& GEOGLAM)
Challenge

- 2050 – 70% increase in agricultural productivity?
- Sustainable *intensification of agriculture*:
  - Agricultural Expansion
  - Agricultural Intensification
SIGMA Concept

Existing monitoring systems

- Monitoring Agricultural production
  - Satellite, ancillary, farmer declarations and Meteo data

"Short term" perspectives of agricultural productivity

- Agro-met models & statistics
- Crop Mask
- "Anomaly" detection

Current Yield, Area, Production estimates & forecasts

“Longer term” perspectives of agricultural productivity

- Impact Assessment of Crop land Dynamics on the Environment
  - Crop land Change
  - Shifts in Agricultural systems

- Impact assessment on other land uses, natural resources and future scenarios

Cross-season Assessment of Crop land expansion and intensification

SIGMA Partners Coordinated by

GeoSAS

vito vision on technology
Activities

- Land cover & crop land assessment (UCL)
- Agricultural Productivity (Alterra)
- Env. Impact Assessment of Land use change (IIASA)

Sites: IKI RAN, SRI, RADI, CIRAD, INTA, VITO, UCL, GEOSAS, AGRHYMET
Global?
Dataset Coordination

- With JECAM Coordination office & GEO Sec
- Baseline data sets
  - Sites
    - Field data
    - Satellite data (SAR, Landsat, Sentinel, DEIMOS, DMC, VHR, ..)
  - Regional, Global. Time series of:
    - FY-3
    - PROBA-V
    - MODIS / VIIRS
    - Sentinel-3
    - Metop
    - ...
Variety of data sources

- FY-3, DEIMOS-1, PROBA-V, Operationally available since November 2013
- To come: Sentinel 1-2-3
- Very High Resolution
- CEOS through GEOGLAM
Select from any JECAM study site in the world to learn more.
Field data collection

- **A priori information: maps, statistics, crop calendars**
  - Topography, soil (texture, type, rooting depth), climatic data (rainfall, radiation, temperature), yields (5 years)

- **Survey:**
  - GPS coordinates
    - Points: Road, stratified grid
    - Field boundaries
  - Landcover information:
    - Land cover;
    - Crops: crop type
    - Crops: ancillary
      - rainfed, irrigated, partially irrigated
      - Main cropping practise (tillage management, rotation, multi-cropping, use of chemicals / fertilizers, mechanization, sowing/flowering/harvesting dates, livestock)
Data management

- GEOSS standards

SIGMA Product Inputs & Outputs

SIGMA Data Management Components

Agro-environmental Monitoring Community
Land cover & crop land assessment

- **Challenge:**
  - Diversity of systems
  - Variable field sizes, scale
  - Landscape fragmentation

- **Approach**
  - Agro-env stratification
  - Reference data
  - Method benchmarking
  - Site, Regional, global, hotspots
  - Agricultural statistics
Agricultural Productivity

- **Challenge:**
  - Agricultural systems dynamics & management practices

- **Approach**
  - Trend analysis of environmental parameters
    - Multiple data sets & Compatibility
    - Soil Moisture, evapotranspiration
    - High resolution + Low resolution
    - Change detection
  - Agricultural systems analysis
    - Characterization
      - Cropping system, species, rotation
  - Analyze Yield gaps using crop models & EO
Agricultural Productivity

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Env. Impact Assessment of Landuse Change

- **Challenge**
  - Methodology

- **Approach:**
  - Local
    - Impact analysis of land use and management changes
    - Identify stress factors of yield gap analysis
  - Projections
    - Projections of cropland and major systems for 2030, 2050
    - Assess impacts on agricultural productivity
  - Global
    - Impact of crop land changes on other land cover types, water use and nutrient balances
Capacity building

- Capacity needs assessment
  - Agricultural Statistics
  - Global/national Agricultural land use and crop yield assessments

- Design curriculum
  - Modules

- Training and E-learning materials

- 4 international workshops / seminars
Expected output

- **Scientific Products**
  - Global agro-environmental stratification Database
  - Multi-resolution annual cropland maps
  - Country Land cover analysis database for selected areas
  - Time series of satellite derived parameters
  - Hotspot maps identifying zones with high variability and agro-environmental changes and description
  - Maps of potential/actual yield and gaps
  - Training materials
  - SIGMA Data Management Portal
Thank You!

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