ENDORSE

ENergy DOwnstReam SErvices

Status Dec. 2012 - 2 slides per services

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ENDORSE, in one slide

Measures and observations

10 services

CUSTOMERS

Pre-market downstream services in renewable energies

Ten partners

- Energy experts:
  - Transvalor (fr)
  - Flyby (it)
  - Hochschule ULM (de)
  - ENTPE
  - 3E
  - JRC
- Research centers:
  - ARMINES (fr)
  - DLR (de)
  - University of Genova (it)
- User interaction experts:
  - iCons (it)

Earth observation inputs

GMES MACC products

Irradiance (HC3, SOLEMI)
RAD cloud properties (APOLLO)
Aerosols and TCWV
AER (aerosol) forecast
McClear (clear-sky)

GMES space components

MSG (HRV, vis-2, thermal bands)
MERIS (fPAR, NDVI, level1B)
SPOT-4 and -5

Other products

CORINE land cover (EEA)
GlobCover (ESA)
GeoLand (LAI)
Eumetsat CLM
SRTM -> TerraSAR DTM

Meteo data

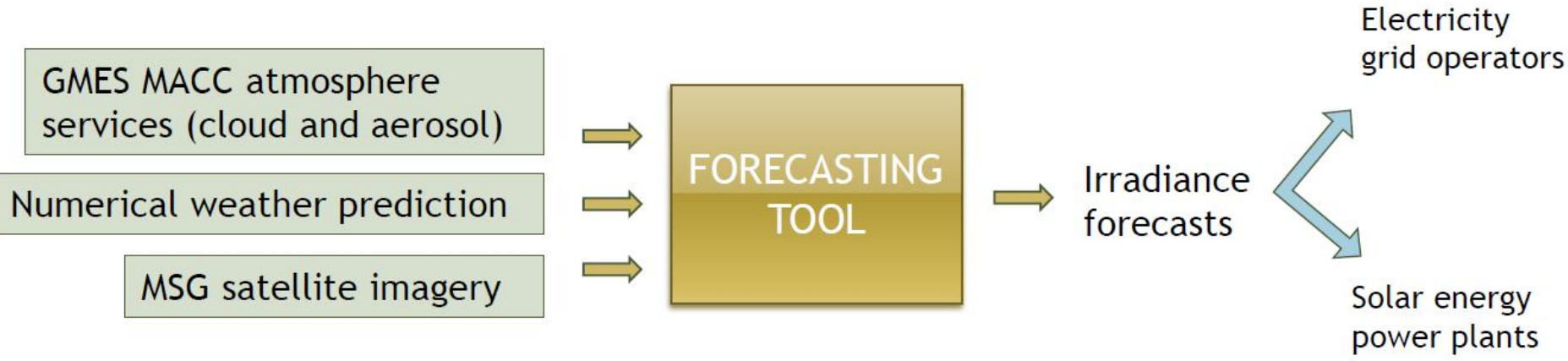
Numerical weather model
Ground station measurements

S3: « Irradiance forecasts »

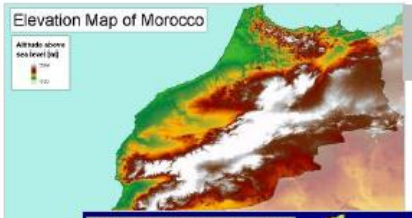
Objective: Providing forecast of direct irradiance with a horizon of up to 48 h.

© *DLR*

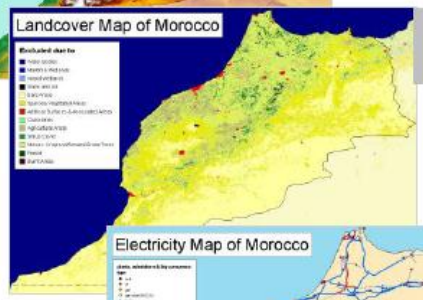
State of the art: Solar energy production forecast was so far based on numerical weather prediction providing global irradiance in a 3 hour interval only



S5: « CSP GIS for Morocco »

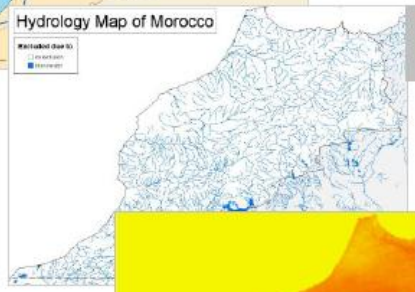


Elevation



Landcover

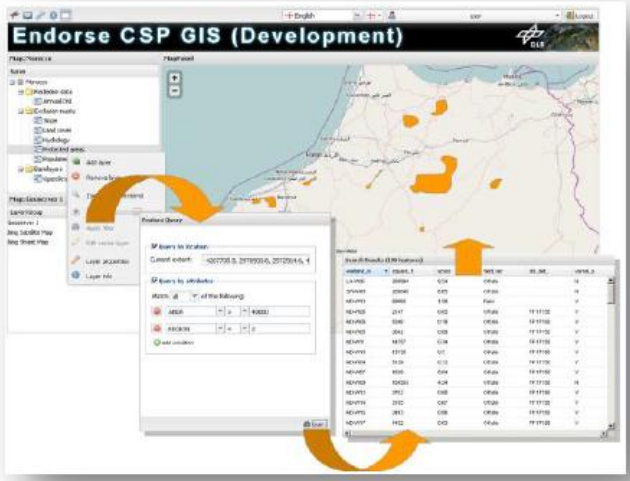
Electricity network



Hydrology

Irradiation DNI

Web-based
Geographical Information System
© *DLR*



Maps of potentials

\+ Exclusion maps

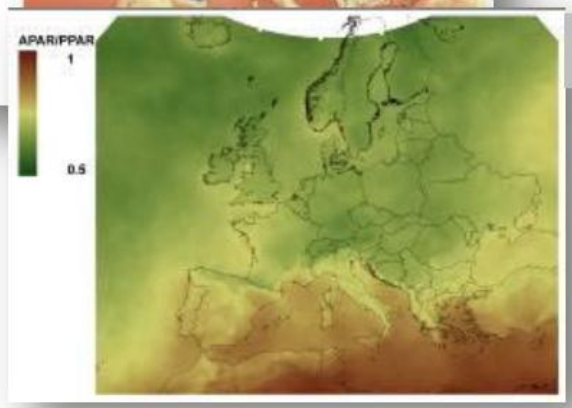
= Maps of opportunities

S8: « Mapping biomass potential »

Inputs: Pre-processing (quality check and harmonization) of the input data

Landcover

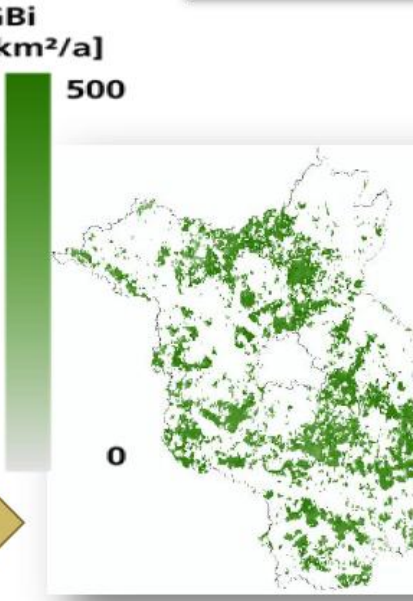
Wind speed



Temperature

BETHY/DLR

Biosphere
Energy
Transfer
Hydrology

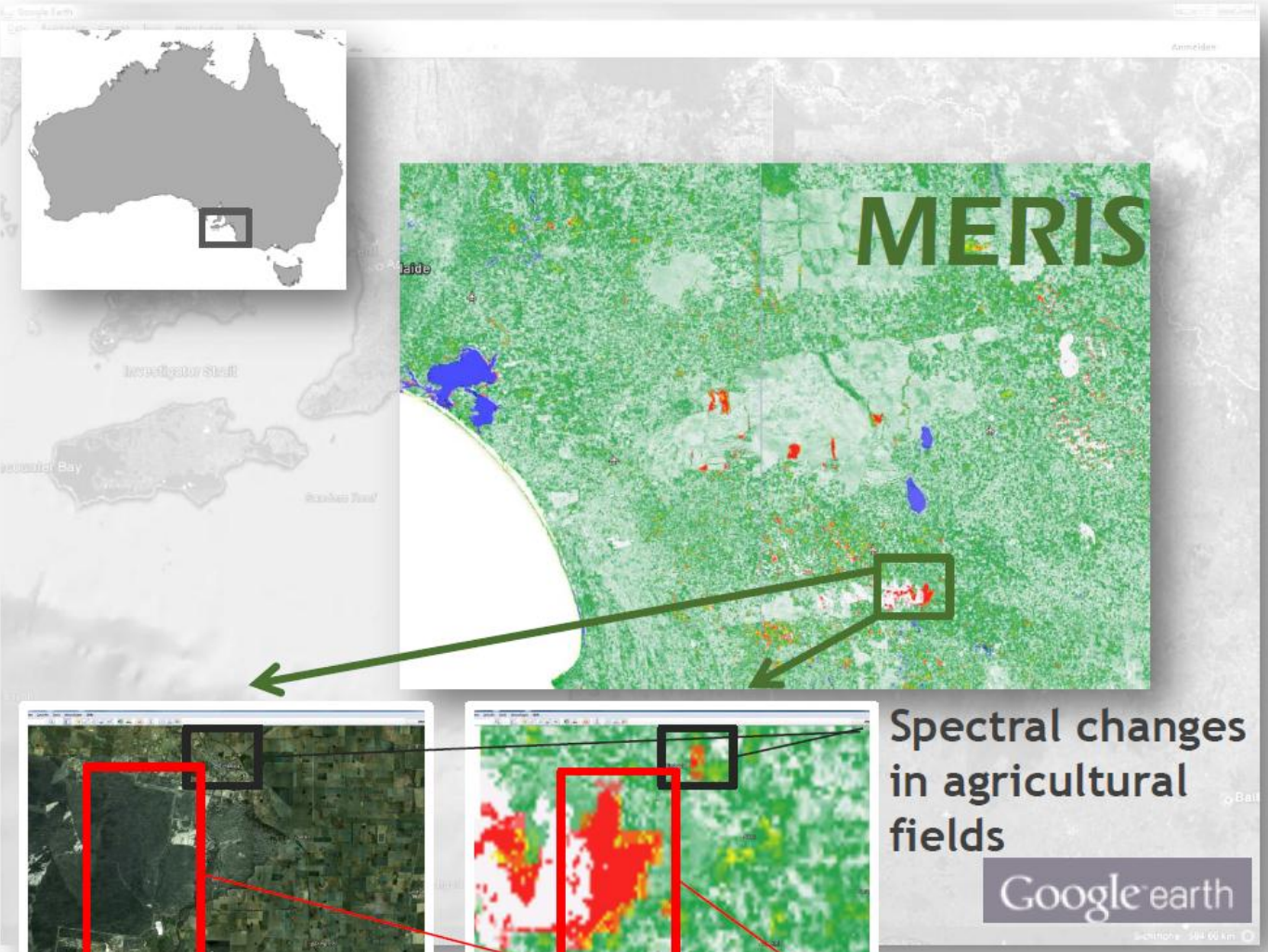


Output:

GIS-compatible layers of forest biomass

in tons per hectare
Spatial resolution: 1 km
Temporal res.: every year

S9 : « certification of sustainable bioenergy use »



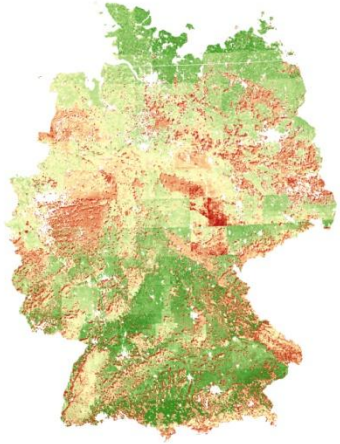
Purpose of the service:

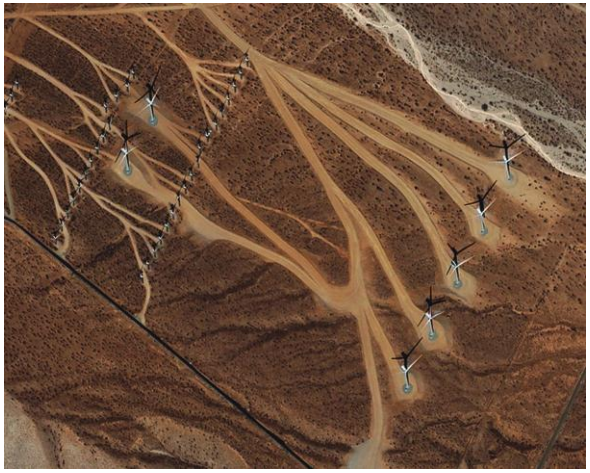
Develop a cost-effective tool to detect and identify spectral changes in MERIS images to support certification of sustainable bioenergy use

Validation:
using Landsat ETM+ images

EnerGEO

Earth observation for monitoring and assessment of the environmental impact of energy use





Earth observation for monitoring and assessment of the environmental impact of energy use

Version 03

AGH ARMINES BMT ARGOSS DLR IIASA iuta rsa Research Studios Austria Forschungsgesellschaft mbH SRON SUPARCO TNO innovation for life UNIVERSITÄT SALZBURG ZGIS UNIRESEARCH

Project overview

Seventh Framework Programme
Theme 6 - Environment
FP7-ENV-2008-1
GA No. 216364

- 12 partners from 6 countries
- Project duration: 11/2009 – 10/2013
- EC contribution: € 6 010 930
- Coordinator: Dr. Menno Dillen, TNO
- Website: http://www.energeo-project.eu

Project objectives

EnerGEO develops a strategy for a **global assessment** of current and future **impacts of the exploitation of energy resources on the environment and ecosystems** based on the use of the *Global Earth Observation System of Systems (**GEOSS**)* capacities. This strategy is demonstrated for a variety of energy resources worldwide (fossil fuels, biomass, solar and wind energy).

EnerGEO combines:

1. **Existing energy system models** and models capable of assessing and forecasting environmental impacts and costs of energy exploitation
2. **Existing global earth observation datasets** from which environmental indicators are derived in order to quantify changes to freshwater systems, biosphere, ecosystems, atmosphere and oceans

Project objectives

4 Pilots were selected for testing and demonstrating the observation system and developed scenarios:

Fossil fuels: impact on atmospheric composition and land degradation

Biomass: impact on ecosystems, biodiversity and food security

Solar energy: select optimum power plant locations and support electricity grid integration

Wind: assess the potential (net) energy, assess environmental impacts of the substitution of fossil energy by wind power

→ all pilot outputs will be converted into **Environmental Impact Assessments** and tentatively **integrated through the Platform Integrated Assessment (PIA)**

GEO Context

EnerGEO represents a major contribution of the European Commission to **GEOSS**, in particular to the Societal Benefit Area (SBA) **Energy** and the **GEO-tasks**

- **EN-07-02** (Energy Environmental Impact Monitoring) and
- **EN-07-03** (Energy Policy Planning)

(or any GEO Workpackage derived from these).

By developing a distributed system based on the recommendations of the **GEO-Architecture and Data Committee (ADC)**, global collection and dissemination of data relating to the impact of energy use on the environment will be supported.

-The SBAs of GEOSS

Fossil Fuels – Energy Transition

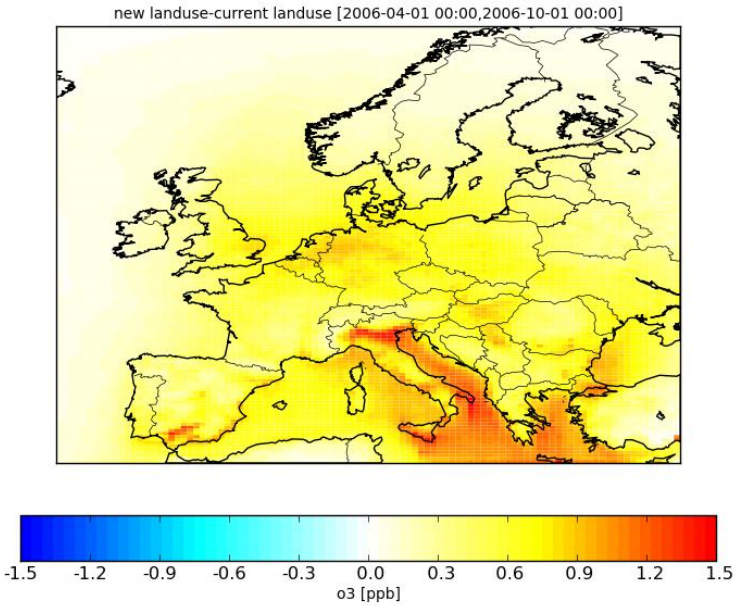
Large scale energy transitions have a significant impact on air quality.

Generally air quality will benefit from less emissions, but there are some issues:

- Large-scale reductions of emissions will change the chemical regime in the atmosphere
- Large-scale use of biomass will be accompanied by large scale biomass production and potentially additional air pollutant emissions
- Because solar and wind energy revenue is dependent on meteorology, the timing of emissions from the back-up fossil fuel combustion will change as well. This may significantly alter the regional distribution of the impact of fossil fuel use.

-**Model used:** air quality model LOTOS-EUROS

-**Study areas:** Europe



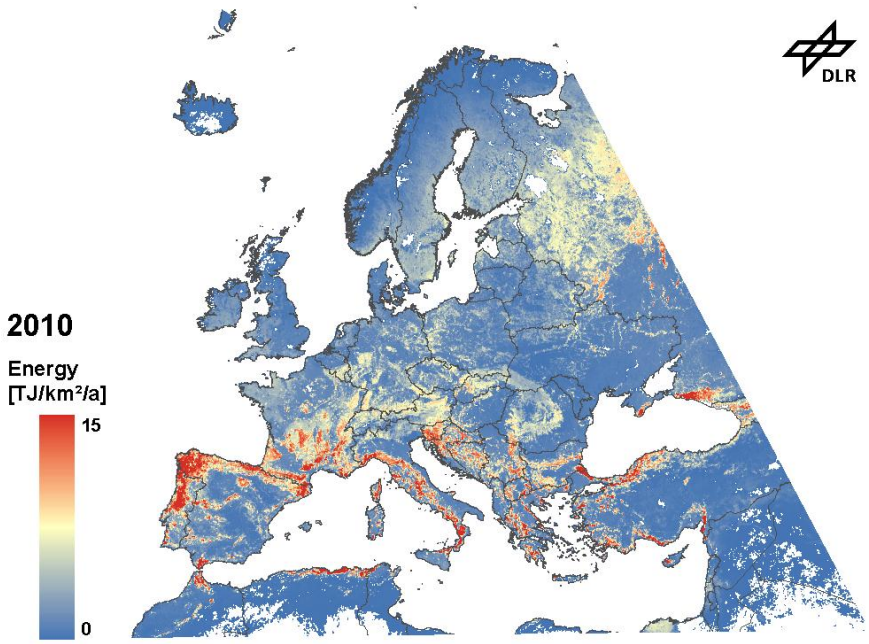
-Example: increase in summer surface ozone when 5% of the European agricultural land is converted into poplar for biomass production

Biomass - Energy potentials

The BETHY/DLR model is driven by **remote sensing data** (time series of Leaf Area Index and land cover classification) and **meteorological** data.

The output is annual **Net Primary Productivity** (NPP) which is transferred to theoretical **energy potentials** using conversion factors.

-**Sustainable management** and **food security** are prerequisites for deriving theoretical energy potentials from NPP

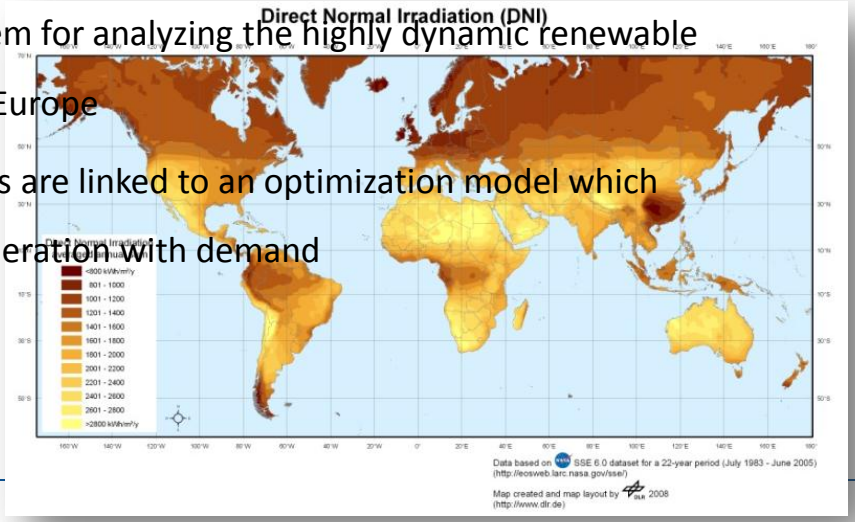


-Theoretical energy potential for 2010 as computed with BETHY/DLR, including forest, agriculture and grassland.

Solar energy

- **TASES (Time And Space resolved Energy Simulation)**
  - performs geographic explicit energy scenario analysis on a global scale for discrete points in time
  - modelling and optimisation tool for future energy systems
  - estimates potentials, costs and environmental impacts
  - models base-and peak load of solar power on different spatial scales

- **REMix (Renewable Energy Mix for Sustainable Electricity Supply in Europe)**
  - uses a geographic information system for analyzing the highly dynamic renewable electricity generation potentials in Europe
  - electric power generation potentials are linked to an optimization model which balances renewable electricity generation with demand
  - calculates the least cost electric power supply option at given constraints such as renewable energy share and import

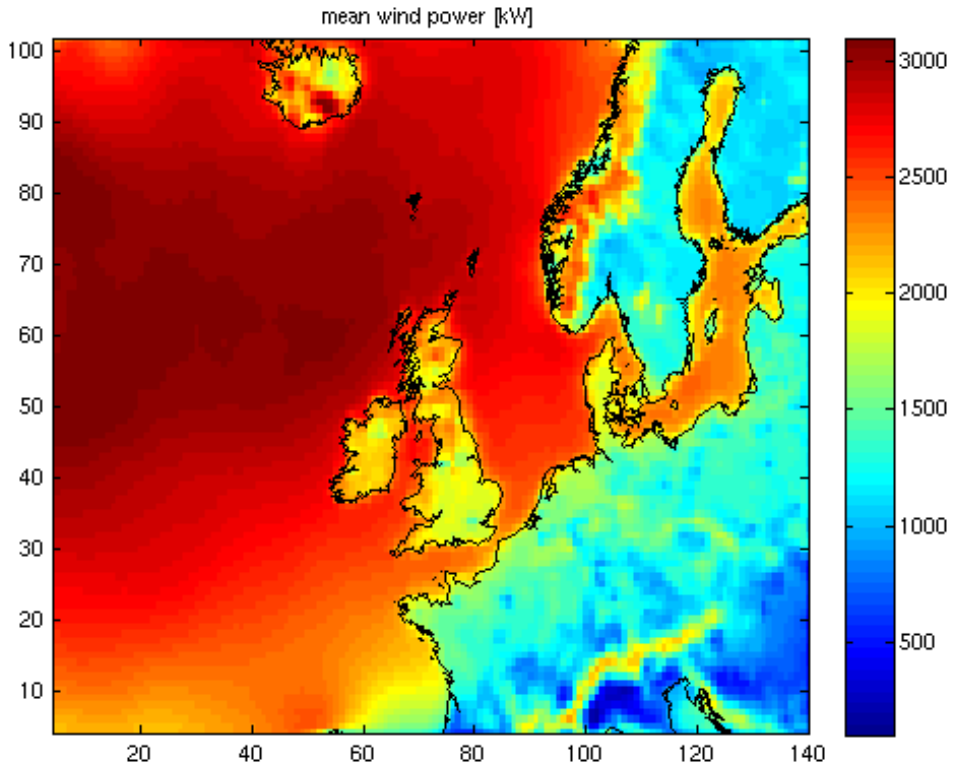


Solar Energy Resource Assessment

Wind - Potential wind energy

High-resolution meteorological models are used to analyse potential energy yields. These models are calibrated and validated using in-situ and satellite measurements. Studied aspects are:

- Wind energy potential in Europe;
- Model accuracy;
- Energy production predictability;
- Energy production intermittency
- MetOcean statistics for turbine maintenance



Results and Outputs

- **Linking Energy Use and Environmental Impact** by making use of state of the art environmental, energy and scenario models
- **Collecting the necessary datasets** and deriving **indicators** from them by connecting to current GEO-contributions and state-of-the-art in-situ global networks
- Enabling the collection of and access to EnerGEO-data by building a **portal** within the context of GEO and based on GEO-ADC-recommendations
- Testing the EnerGEO approach through dedicated **pilots** making our approach viable and supportive
- **Proposing perspectives from Pilot-scale to Global Scale** enabling to run global scenarios on energy use and environmental impact

Bio Energy Atlas

Bio Energy Atlas Project
Markus TUM, DRL-DFD

- GMES Project
  - Proposed
  - Energy Mix (solar – bio – wind – fossile)
  - Development tool for decision makers

- Countries:
  - Kenya
  - Uganda
  - Egypt
  - South Africa

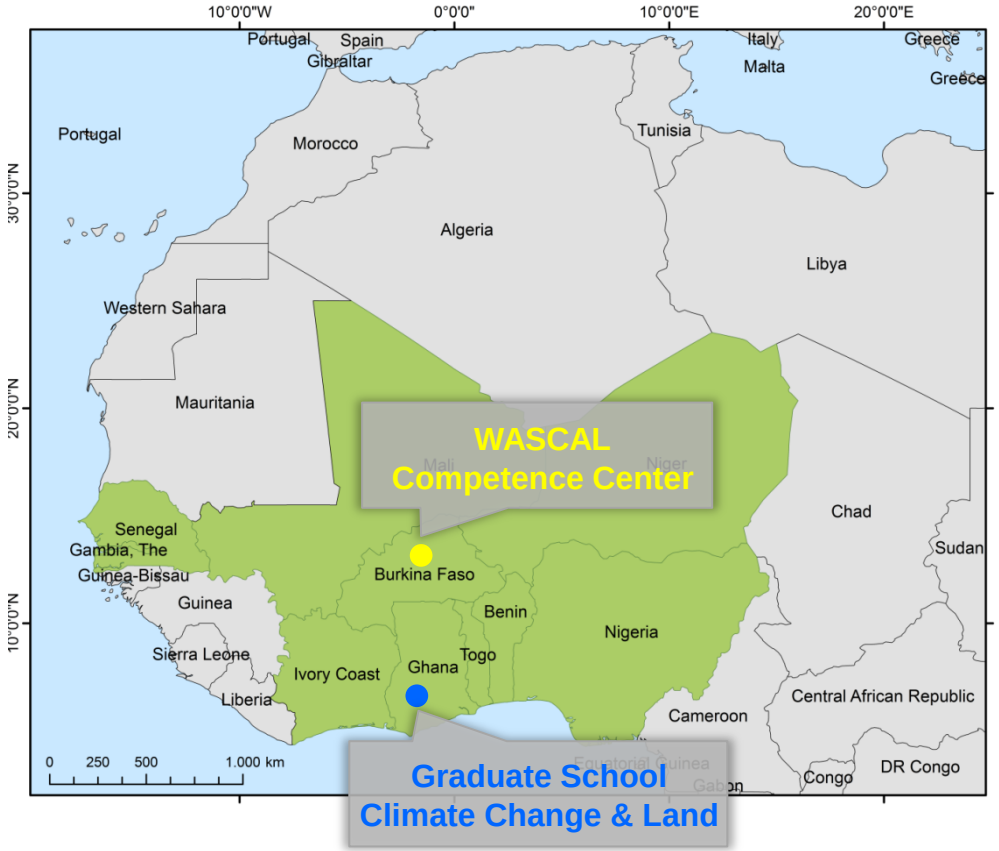
- RCMRD Service Host

- March 2013: Summer School
  - in Uganda
  - Financed by ENERGEO Project

WASCAL

West African Science Service Center on Climate Change and Adapted Land Use

FUNDED BY:
Bundesministerium für Bildung und Forschung



Competence Center

- data reception, maintenance & access
- research & provision of science-based advice to stakeholders

Core Research Program

- joint West African – German research
- interdisciplinary research on climate change and adapted land use

Graduate Research Program

- 10 Graduate Schools at West African universities in collaboration with German universities, training of PhD students

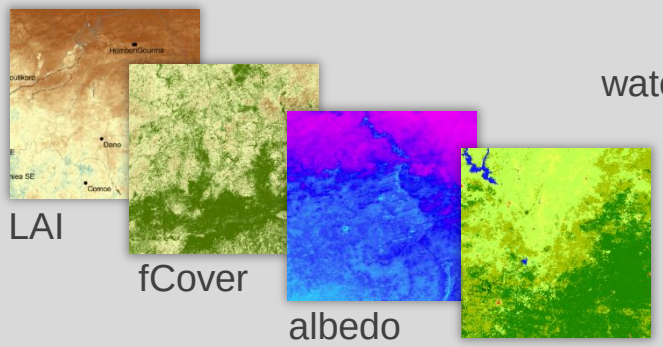
www.wascal.org

DLR

WASCAL - Activities at DLR

Satellite Receiving Infrastructure
Competence Center, Ouagadougou

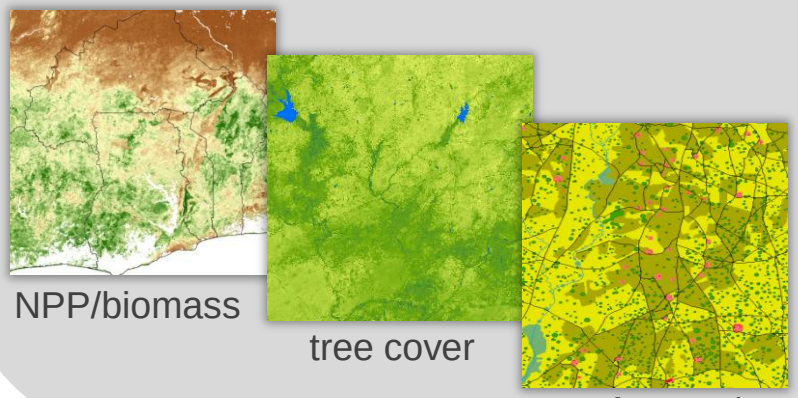
Interactions Land-Atmosphere
Terrestrial Essential Climate Variables



partner:
Universität Augsburg University

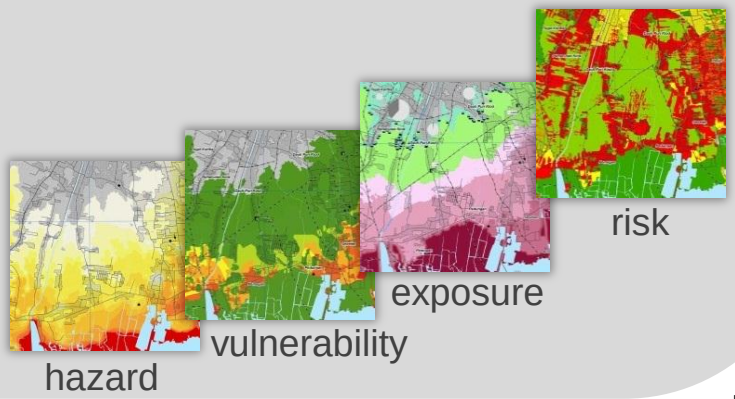
partner:
Center for Development Research, (ZEF) Bonn

Income from Carbon Markets



partner:
UNITED NATIONS UNIVERSITY
UNU-EHS
Institute for Environment and Human Security

Risk Assessment
for Floods and Droughts



www.wascal.org

DLR

SASSCAL

SASSCAL

(Southern Africa Science Service Centre for Climate Change and Adaptive Land-use)

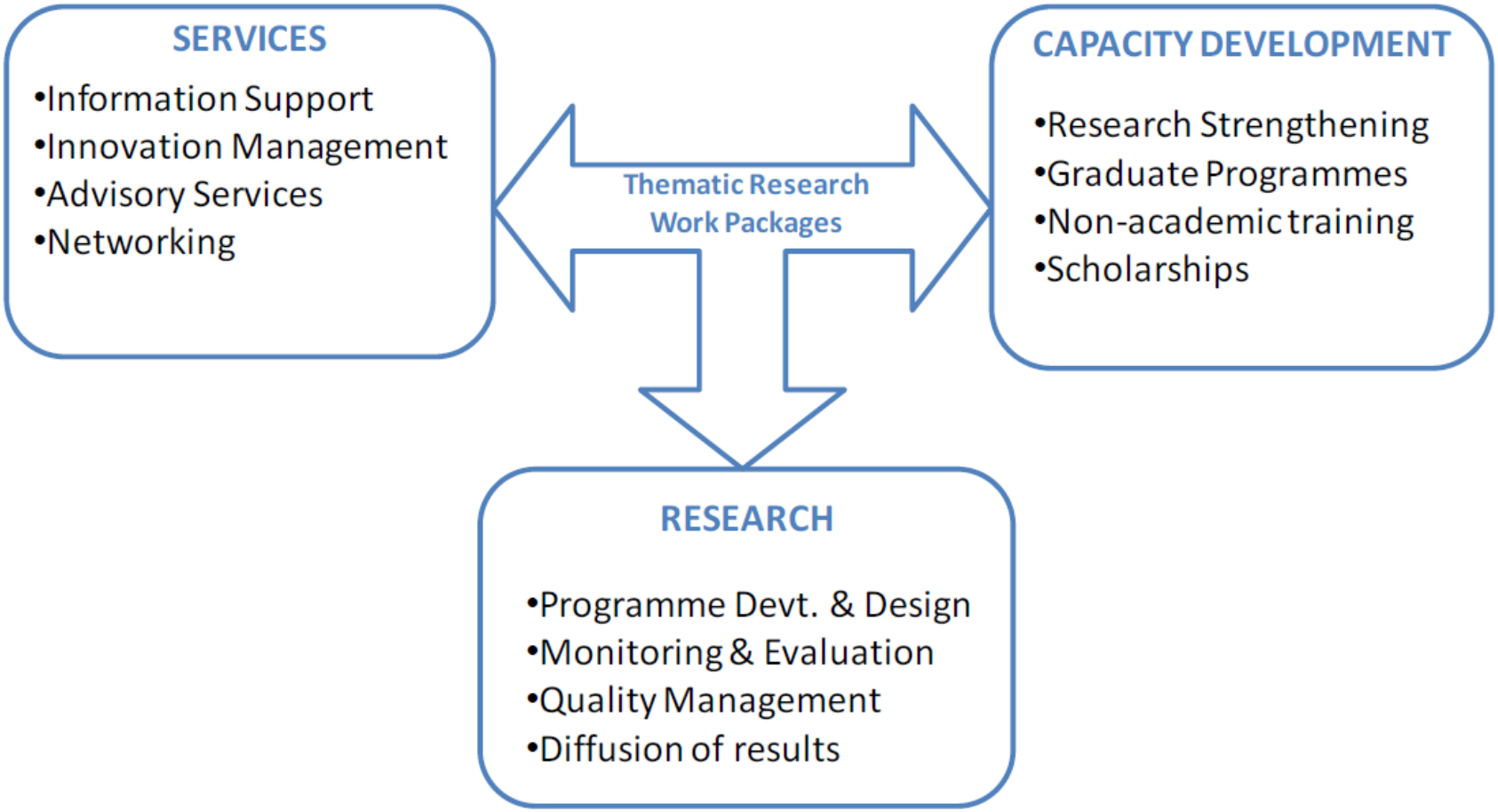
Vision*: SASSCAL is the REGIONAL driver for innovation and knowledge exchange to enhance adaptive land use and sustainable economic development in Southern Africa under global change conditions

Mission*:

- To establish a network of science service centres in the southern African region, thereby strengthening the regional scientific capacity and existing initiatives,
- to support adaptation by the participating countries to cope with climate change and land use change and the resulting impact on ecosystem functions and services, and
- to generate and provide scientifically sound, relevant and timely information for policy and development planning processes that will promote the improved livelihoods of the broader society.

* Based on the actual version of the SASSCAL business plan, not yet finally approved

SASSCAL – Product portfolio overview



SASSCAL – DLR contribution

(Bewilligungszeitraum 01.11.2012 – 31.10.2016)

Topic: Remote Sensing applications for flood risk management

Development of applicable and transferable methods for flood detection and monitoring and regular low-resolution flood mapping, in order to implement an exemplarily flood mapping service for a specific test area. Furthermore a risk assessment concept is worked out and tested in one area to support flood management. Gained mapping products serve as crucial input parameter for local and regional flood risk management, flood forecasting and early warning.

Bilateral Research Workshop between South African National Space Agency (SANSA) and German Aerospace Center (DLR)

Oberpfaffenhofen, 12/13 July 2012

Final Programme

SANSA Participants

Mr Sandile Malinga – Chief Executive Officer (CEO)

Ms Bulelwa Melissa Pono – Chief Financial Officer (CFO)

Mr Raoul Christopher Hodges – Managing Director Space Operations

Ms Jane Mukarugwiza Olwoch – Managing Director Earth Observation

Ms Lee-Anne McKinnell – Managing Director Space Science **(Thu, 12/07 only!)**

Mr Eugene Avenant – Manager Space Operations

Mr Paidamwoyo Mhangara – Manager EO, Research Development and Applications

Ms Nichola Maria Knox – Earth Observation, Research Development and Applications

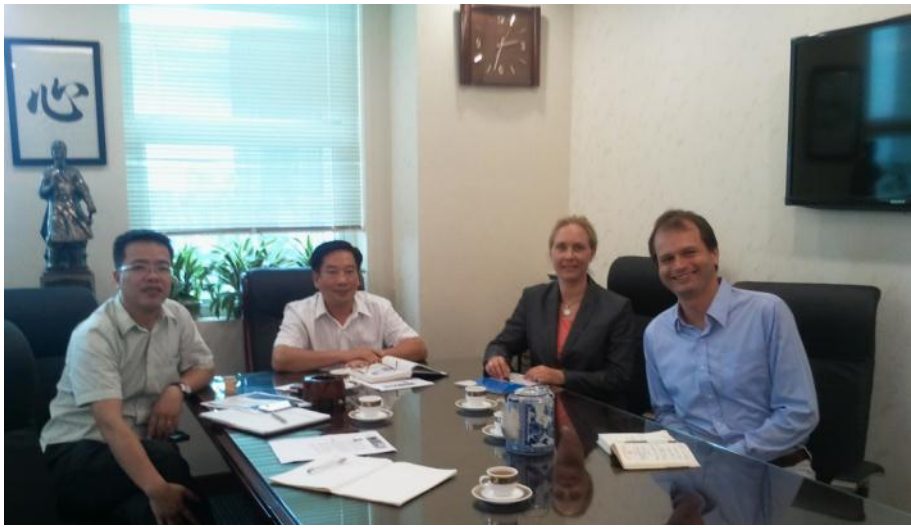
WISDOM : Water related Information System for Sustainable Development of the Mekong Delta

Capacity Building Activities

Dr. Claudia Künzer

WISDOM facilitates frequent contacts "bottom up as well as top down", so ministerial contacts in Hanoi, as well ….

- ….as local stakeholders and student groups in the Mekong Delta
- In last 6 years about 100 trainings workshops on topics such as GIS, remote sensing, Geo-IT, Knowledge Management, Laboratory analyses, field surveying etc. have been conducted



Right: with the Ministers of Environment and Agriculture

Capacity Building specially for Information System Design

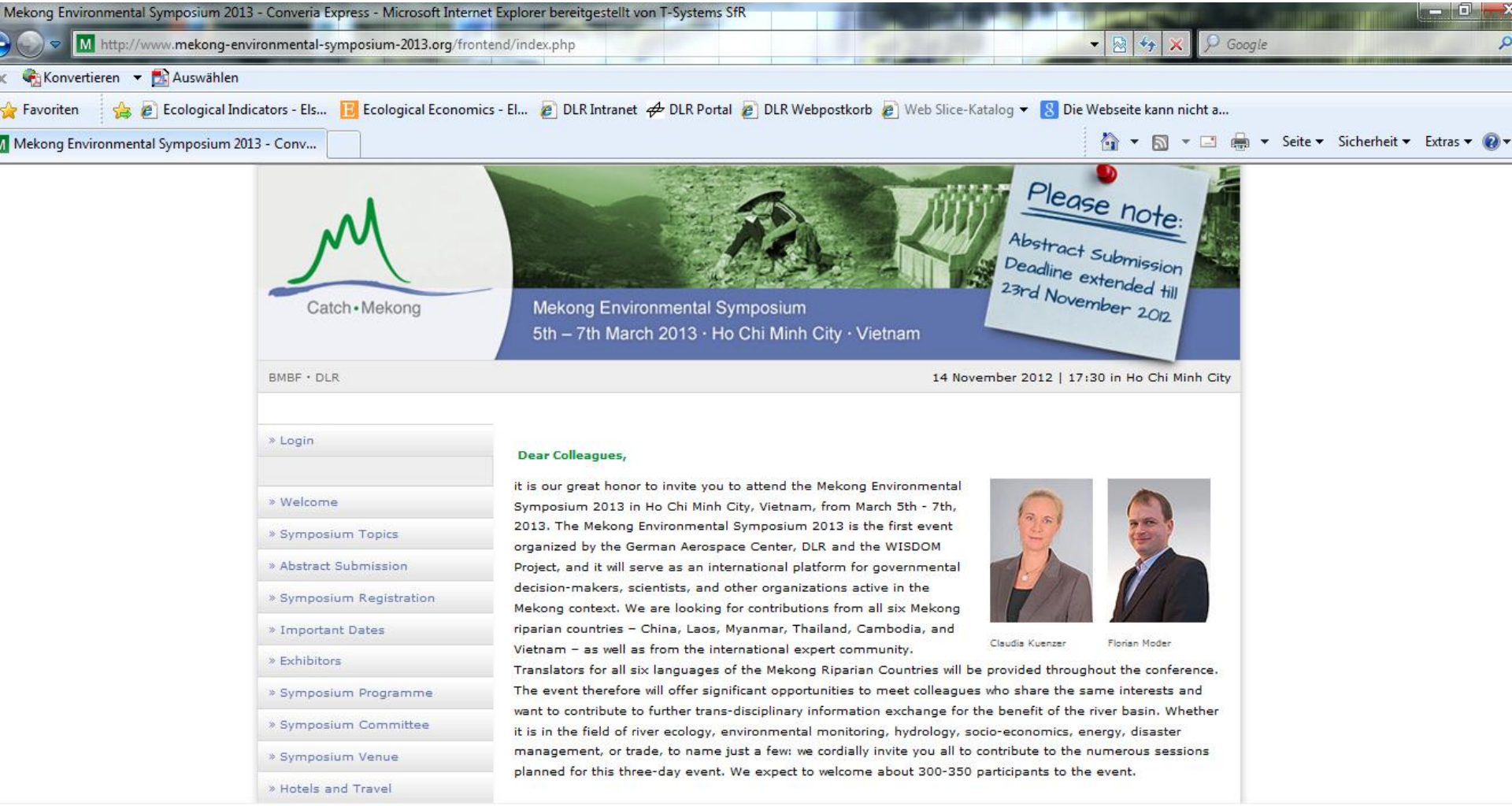
- Mekong Delta Workshops / **December 2011, April , July and September 2012**

➔ so far 180 persons in the Mekong Delta participated in the Capacity Building Measures

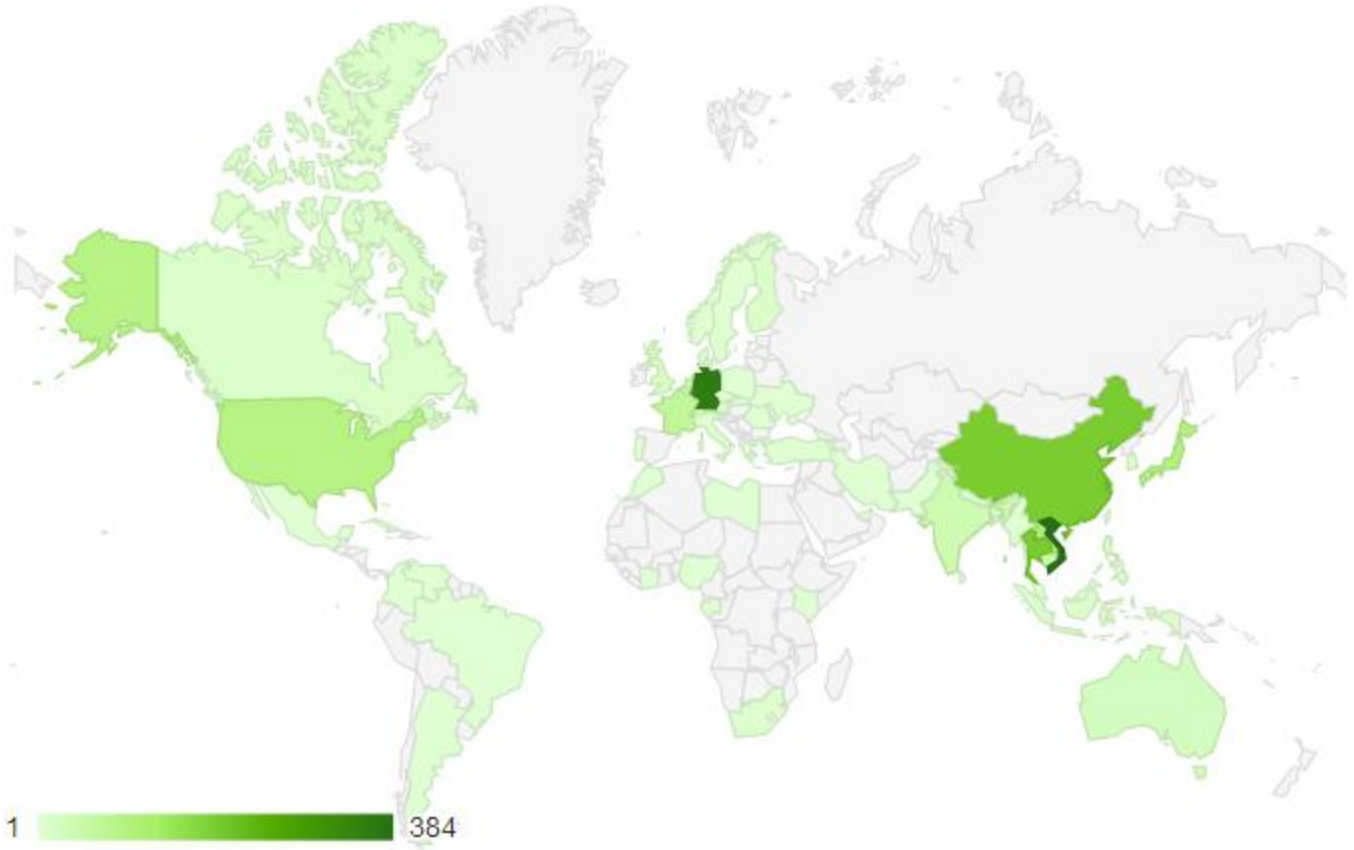
- Performance improved within the last workshops, lessons have been learned
- Strong consent amongst all participants that an information system such as the WISDOM IS is needed for daily operations

-Lots of Outreach Materials generated

Mekong Environmental Symposium 2013; 5-7 March 2013



The Symposium will have 400 Participants from 20 countries; each day over 1500 Visits at the Website



Visits	Pages / Visit	Avg. Visit Duration
1,854	**5.19**	**00:06:28**
% of Total: **100.00%** (1,854)	Site Avg: **5.19** (0.00%)	Site Avg: **00:06:28** (0.00%)

Project has a tri-lingual Website (English, Vietnamese, Chinese) and has also published numerous Films

www.wisdom.eoc.dlr.de

http://www.dlr.de/eoc/

http://www.wisdom.eoc.dlr.de/en/content/wisdom-water-information-system-mekong

http://www.youtube.com/watch?v=Bvd3TOd1LGw

Outline

1. **DLR – Agency Profile 2013**

2. **DEM Data: SRTM &TanDEM**
   - Sensor & Missions
   - Data

   a. SRTM X-SAR
   b. TanDEM-X (90 m/30 m/12 m)

3. **Applications, Data Products & Services**
   - Software
   - Models
   - Applications
   - Data Products
   - Services

   c. NPP/BETHY
   d. ENERGO
   e. ENDORSE
   f. Bio Energy Atlas
   g. WASCAL/SASSCAL
   h. WISDOM

4. **Education Programs Synergies**

   i. DLR – ESA (#11)

Summary & Outlook

- DLR provides free access to **SRTM X-Band DEM data** @30m resolution. **Global TanDEM-X** data will be available @90m resolution in 2014 and, restricted in area and for non-commercial applications, also @30m and @12m resolution.
- DLR is active in several international **capacity building projects** in Africa and Asia, aiming to provide high level data products and services for the development and implementation of the corresponding knowledge, access to EO information & image-processing software, dissemination models, and capacity building and training programmes.
- All these activites will be **continued and/or enhanced in the future**.
- Furthermore, DLR has developed new **education concepts** in order to attract secondary school students to aerospace S&T – a typical example is the DLR_School_Lab Oberpfaffenhofen. In close cooperation with ESA, this concept has been further developed to a **practical EO education and training facility** which could be useful especially for developing countries.