

6TH GEO EUROPEAN PROJECTS' WORKSHOP



ROME, 7 & 8 MAY 2012

HEALTH Splinter Session
(Including Impact Assessment of
Human Activities)





EO2HEAVEN

Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks

Overview of the EO2HEAVEN contribution to GEOSS
6th GEO European Projects' Workshop (GEPW-6)
Rome, May 7-8, 2012

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FP7 244100 (2/2010 - 1/2013)

Concept

EO2HEAVEN will develop a better understanding of the complex relationships between **environmental factors**, **population exposure**, and **health impacts**





Multi-Disciplinary Approach



- Health
- Epidemiology
- Microbiology
- Geo-informatics, ICT
- Modelling and Statistics

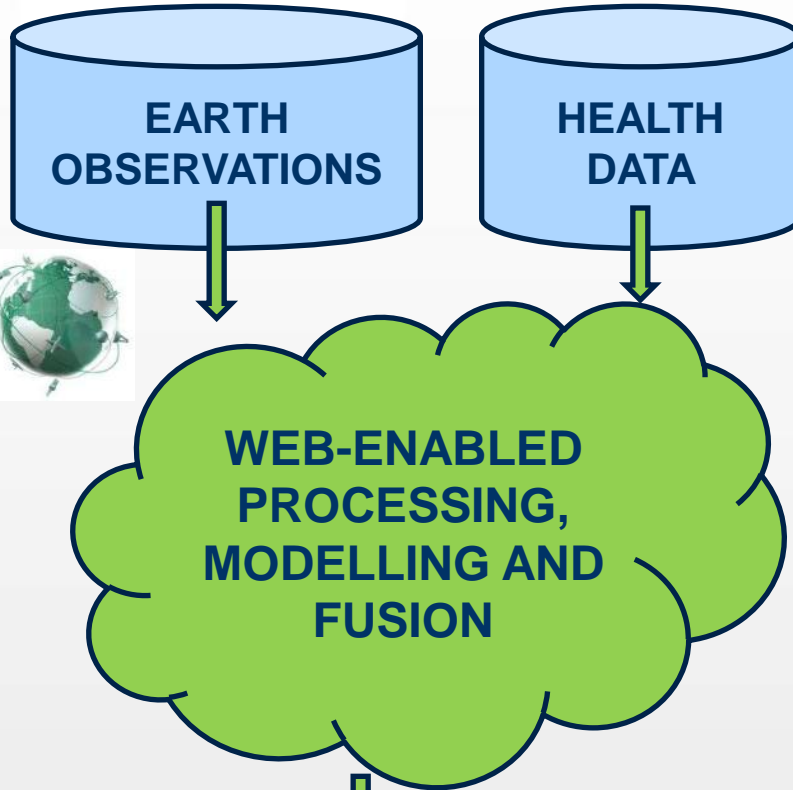


Makerere University College
of Health Sciences



Royal Tropical Institute





Air Quality and/or Aeroallergens



Image: UKZN

Durban,
Saxony

Water borne disease cholera



Image: S. Woodborne, CSIR

Uganda

RISK MAPS
ALERTING
TOOLS

Contributions to GEO Workplan 2012-2015

- HE 01 Tools and Information for Health Decision Making. Co-leader of Components C1 and C2:
 - C1 Air-borne Diseases, Air Quality and Aeroallergens
 - C2 Water-borne Diseases, Water Quality and Risk
- EO2HEAVEN will continue to contribute to the GEO Health and Environment Community of Practice Workshops

Contribution to AIP-4

- Several servers and data sets with priority earth observation data
 - Public health data
 - Aerosol and air temperature
- A tutorial on SWE SOS* available on the GEOSS best practice wiki

(*) OGC Sensor Web Enablement, Sensor Observation Service

Contribution to AIP-5

- EO2HEAVEN leads the threads
 - *SBA Health: AQ and Waterborne* thread
 - *Mobile clients*
- proposes a number of components and data sets to be used in the *SBA Health* and in *Mobile Clients*
- Tutorials and best practice guides will be provided

Presented at AIP-5 Kickoff: May 3-4

Case Study I: Dresden / Saxony, Germany

- Environmental effects on allergies and cardiovascular diseases
- Environmental parameters:
 - Meteorological conditions, e.g. temperature
 - Air pollutants, e.g. O₃, Particular Matter (PM₁₀), SO₂, NO₂



- **Online** information and alerting system: provide general risk maps and individual health-related response recommendations based on current environmental conditions
- Estimate and deliver via Internet air quality and population health risk maps to competent authorities
- Later: personalized messages (e.g. via SMS) to susceptible individuals

Case Study I Air Quality: Dresden / Saxony, Germany

- **Components in AIP-5:**
 - SOS to provide in-situ air pollution data
 - Model to generate a spatial map of temperature, ozone, and PM10 data
 - Model to produce an air quality index based on pollutant concentrations
 - WPS to aggregate air pollution and air quality index data on zip code or municipality level
 - WMS to provide maps of aggregated pollutant concentrations or air quality indices
 - Client application to display the WMS data

Data Type	Data	Data Source
Health data	Medical diagnosis and prescription data	AOK (German statutory health insurance)
	Child health data	Dresden Local Office for Health
	Morbidity and mortality statistics	Research Data Centres (RDC)
Environmental data: Remote Sensing Data	parameter: temperature	GLDAS data: NOAH025SUBP_3H
	parameter: aerosol optical depth	MODIS data: MOD04 and MYD04
	parameter: ozone profile	OMI data: OMO3PR
Environmental data: In-situ data	Spatial reference data: elevation, administrative units, buildings and transport network	Corine Landcover and local land surveying offices (reference data provided by official topographic cartographic info system in German the so-called ATKIS)
	measurement values from in-situ stations in Dresden /Saxony (parameters: temp, PM10, O3, SO, NO2)	in-situ stations in Dresden /Saxony (Saxon State Ministry of the Environment and Agriculture)
	data sets with administrative boundaries / regional categorization for the municipalities	Municipalities and postal codes for Saxony / Federal Institute for Research on Building, Urban Affairs and Spatial Development

Case Study 2 Durban: Environmental challenges to health due to air pollution



- The relationship between industrial pollutant exposure and adverse respiratory effects
- Open access remote sensing data
- Performing relevant pre-processing
- Calibrate using in-situ observation data
- Generate model to predict ground-level pollution

Goal

- Develop a system which provides end-users with ability to make decisions about environmentally related adverse respiratory outcomes among residents
- Internet based (where practical)
- Usable by non-experts
- Consider dispersion models if available
- Consider integration of additional health data

Case Study 2 Air Quality: Durban, South Africa

- **Components in AIP-5:**
 - Mobile apps to display air quality index maps on smart phones and tablets. The apps will address the various needs of health managers (rich information set) and the general public (reduced information set)
 - Web client application to display the mobile app information with additional data overlays
 - Air quality index (based on WHO standard) and health index (developed by EO2HEAVEN) information for the region of Durban, South Africa
 - SOS with in-situ air pollution data
 - WMS-T(ime) to display PM, NO, NO₂, SO₂ air quality index, meteorological parameters (windspeed, air temperature, air pressure), EO2HEAVEN health index data

Case Study 3: Uganda

- Investigating the impact of environmental and climatic variables on cholera outbreaks
- Goal: Better understand the underlying processes causing cholera disease outbreaks
 - Run a water **sampling campaign**
 - Analyse cholera bacteria abundance
 - Analyse EO data
 - Fuse with health data
- **Environmental parameters:**
 - Meteorological conditions, e.g. temperature, rainfall
 - Water surface temperature
 - Chlorophyll concentration

Case Study 3: Cholera, Uganda

- **Components in AIP-5 (1):**
 - WFS, WMS, and WCS services to provide base data sets to calculate an environmental vulnerability index
 - A data dissemination tool presenting datasets useful for scientists to progress knowledge of the disease and its ecology as well as its public health impact. This tool allows visualization, download and upload of datasets
 - Data upload tool on mobile assets to submit cholera case information (with a simple validity check and localization of the user)

Case Study 3: Cholera, Uganda

- **Components in AIP-5 (2):**
 - A data visualization tool presenting research and modeling results, and an environmental vulnerability index, to enable decision makers and local authorities to better understand the environmental risk and the level of vulnerability of communities to potential cholera outbreaks.
 - integration in a Scientific Workflow environment (e.g. Vistrails) to meet needs of researchers in the environment/health domain.

Current gaps and issues

- Controlled access to data and services
 - esp. health related
- Interoperability with existing systems
- Fusion of EO and in-situ data
- Extendibility to other contexts
- Diverse requirements of decision makers and scientists
- Mobile clients for field work where connectivity is low
 - data visualization
 - data upload, also of health data
- Exploitation of crowd sourcing

EO2HEAVEN and GEOSS

- EO2HEAVEN follows **system of systems** approach
- **EO2HEAVEN services** will become part of the **GEOSS** infrastructure
- Close cooperation with **GEO health threads**
- All essential **specifications** of the Spatial Information Infrastructure will be **publicly available**
- All core **components** will be **open source**
- Methodological guidelines and tools for the development of additional **environment and health applications** will be provided

Upcoming major events and dissemination activities

- EO2HEAVEN Stakeholder Workshop in Uganda, Kampala, 21st - 22nd May 2012
- EO2HEAVEN Stakeholder and Training Workshop in Dresden, 13th June 2012
- Hosting of the next GEO Health and Environment CoP Meeting (Karlsruhe, July 25th - 27th 2012)
- 2nd EO2HEAVEN Stakeholder and Training Workshop in Durban and Pretoria, 5th - 9th November, 2012



Thank you for your attention

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