THE PROJECT AT A GLANCE

Title: GLOBAL EARTH OBSERVATION FOR INTEGRATED WATER RESOURCES ASSESSMENT
Instrument: FP7 COLLABORATIVE PROJECT
Total Cost: 11,327,917 €
EC Contribution: 8,869,787 €
Duration: 48 MONTHS
Start Date: 1/01/2014
Consortium: 27 partners from 15 countries
Project Coordinator: Stichting Deltares
Project Web Site: http://www.earth2observe.eu/
Key Words: Water resources, Earth observation, Global hydrological models, Land surface models, Water quality, Water scarcity, Floods, Drought

THE CONSORTIUM

The project consortium consists of 27 partners (23 European, and 4 non-European) representing 15 countries from 4 continents. The project works in close cooperation with CSIRO in Australia and GNS Science in New Zealand.

Stichting Deltares (Deltares) – Coordinator
http://www.deltares.nl/en
European Centre for Medium-Range Weather Forecasts (ECMWF)
http://www.ecmwf.int
Universität Kassel (UNI KASSEL)
http://www.usf.uni-kassel.de/cesr/
Universiteit Utrecht (UU)
http://www.uu.nl
Universita Degli Studi di Roma la Sapienza (SUR)
http://en.uniroma1.it/sapienza
METEO-FRANCE (MF)
www.cnrm.meteo.fr
Stichting VU-VUmc (VUA)
http://vu.nl/nl/
Consiglio Nazionale delle Ricerche (CNR)
http://www.isac.cnr.it/
Ambiotek Community Interest Company (Ambiotek)
http://www.policysupport.org/
Innovative Technologies Centre S.A (KKT ITC)
http://itcnet.gr/
Tartu Ülikool (UT)
http://www.sea.ee/en/
United Nations Educational, Scientific and Cultural Organization (UNESCO-IHE)
http://www.unesco-ihe.org/
Addis Ababa Institute of Technology (AAiT)
http://aait.edu.et/
Natural Environment Research Council, UK (NERC)
http://www.ceh.ac.uk/
National University of Colombia (UNAL)
http://www.unal.edu.co/english/
Joint Research Centre (JRC)
http://ies.jrc.ec.europa.eu/
I-MAGE CONSULT
http://i-mage.be/index.php/en/
Centre national de la recherche scientifique (CNRS)
http://www.cnrs.fr/
SEVEN Engineering Consultants (SEVEN)
http://www.seven-solutions.eu/
Technische Universität Wien (TU-Wien)
http://rs.geo.tuwien.ac.at/
Institute for Water Modelling (IWM)
http://iwmbd.org/index.php
PML APPLICATIONS LTD Applications Ltd (PMLA)
http://www.pml.ac.uk/
ESTELLUS
http://www.estellus.fr/
GISAT s.r.o.
http://gisat.cz/content/en
Observatori de l'Ebre (OBSERVATORIO DEL EBR)
http://www.obsebre.es
Universidade de Santiago de Compostela (USC)
http://www.usc.es
International Center for Agricultural Research in Dry Areas (ICARDA)
www.icarda.org

Contact

Project-coordinator: Dr. Jaap Schellekens
Stichting Deltares, Rotterdamseweg 185
2629 HD Delft, Delft, The Netherlands
Telephone: + 31 88 335 8273
E-mail: E2O-contact@seven-solutions.eu
Website: http://www.earth2observe.eu/

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eartH$_2$Observe

GLOBAL EARTH OBSERVATION FOR INTEGRATED WATER RESOURCES ASSESSMENT

THE CHALLENGE

Available global water resources are under pressure due to demographic, land use and climatic changes, and the increasing demands from the various economic sectors, all contributing into driving more regions into water stress and insecurity. Yet, the availability and quality of water resources, as well as their changes and trends over time, are still not fully accounted for in different regions of the world. Moreover, globally, many countries lack basic information or observation and monitoring of the required meteorological and hydrological variables.

A consistent global reanalysis dataset of water resources, robust and long enough to capture current climate variability and provide better insight into the aforementioned pressures, is currently lacking. At the same time, many tools are available, as well as a multitude of Earth Observations (EO) at a global scale, suitable for supporting water resources quantification if holistically coupled and integrated. The accurate mapping and estimation of global water resources remains a major challenge. It requires the use of many sources of earth observations (such as satellite and ground-based remote sensing, in situ measurements, vertical profiles, etc.), combined with state-of-art earth system modelling components that are developed for hydrometeorological and environmental applications. Together these enable the provision of continuous maps of present and past conditions, characterising not only the global water resources status through all its compartments (soil, snow, inland water bodies, rivers), but also trends over time and the severity of water-cycle extremes. This information is vital to provide support for water related actions and planning in an informed decision-making process, and constitutes the main objective of the eartH2Observe project.

THE EARTH2OBSERVE CONTRIBUTION

EartH2Observe will integrate available earth observations from different satellite missions, in-situ datasets from various sources, and state-of-art models to construct a consistent and robust Global Water Resources Reanalysis (WRR) dataset of sufficient length (at least 30 years). The resulting reanalysis will enhance the availability of information on freshwater resources worldwide, and will allow for improved insight into the status and existing pressures on global water availability in all components of the water cycle (precipitation, soil moisture, evapotranspiration, runoff, and groundwater), subsequently supporting efficient water management and decision making.

The WRR will support a range of applications, at various scales and settings (i.e. from local and regional to the pan-European and global levels; from data-rich to data-poor areas of the world), significantly enhancing the capabilities of the research, policy and business communities to assess water resources availability and quality across catchments all over the globe, identify water stress and vulnerability hotspots, support trans-boundary catchment water resources planning, determine water related risks (floods, droughts, water pollution) and plan targeted actions. The usability and operational value of the developed outputs will be verified and demonstrated in a number of case-studies across the world, covering multiple continents, with a variety of hydro-climatic, geomorphological, water use/management and governance conditions: Spain, Morocco, Estonia, Ethiopia, Colombia, Australia, New Zealand and Bangladesh.

THE EARTH2OBSERVE CONTRIBUTION

EXPECTED RESULTS

EartH2Observe cuts across the scientific themes of both earth observation and water resources management, and addresses the scientific, policy and business communities concerned with sustainable water resources management. Different products will target a range of groups and will be tailored to their identified needs. It is expected that the project will have an impact on:

1 Earth observation research

- Improve the overall retrieval, resolution and reliability of earth observation data (EO) by testing new EO data sources, extending existing processing algorithms and combining data from multiple satellite missions. [GRACE, Cryosat-2, SMOS, ASCAT, EUMETSAT, Envisat ASAR & MERIS, ERS-1/2, COSMO-SkyMed X-SAR, TerraSAR-X and Tandem-X, Meteosat SEVIRI, MODIS, LandsatTM, GPM, TRMM, Megha-Tropiques, AMSU-A/B, AMSR-E, AMSR-2, SSMIS, ATMS, MetOp-B, AVHRR, Topex/Poseidon, Jason-1 and 2, VIIRS, AATSR, Sentinel-1, -2, -3].
- Assess the performance of the EO products, based on error metrics developed in connection with end-users' criteria, using high-resolution/high-quality ground validation datasets from different hydro-climatic regimes, and provide an overall understanding of the uncertainty in the EO products.
- Make better use of European and international environmental satellite missions to increase the space-time coverage of satellite sensors for monitoring the atmospheric and terrestrial components of the water cycle.

2 Global water resources evaluation

- Build long time series of water cycle observations through a synergic use of observations from various satellite sensors that are normally used separate and in-situ data, and contribute to better define the errors and uncertainties of the existing datasets for their use in monitoring and forecasting of the terrestrial water cycle.
- Produce a multi-model ensemble-based advanced Global Water Resources Reanalysis (WRR) with associated error and uncertainty estimates, as a tool for assessing global water resources availability across the different components of the water cycle at various spatiotemporal scales.
- Bridge the scale and the context on water resources evaluation, from global to local, from science to society.

3 Open access data infrastructure

- Provide a freely accessible web-based data portal with improved functionalities for data retrieval alongside advanced visualization and analysis components as a contribution to the GEO Water Cycle Integrator initiatives.

4 Water resources management & planning

- Evaluate the applicability of the new EO data and the global water resources reanalysis outputs for water management at river basin level
- Combine the global products with river basin scale hydrological models (using downscaling and nesting procedures) in order to improve assessment and prediction of water resources variability and availability in eight pilot areas (in Spain, Morocco, Estonia, Ethiopia, Colombia, Australia, New Zealand and Bangladesh). Particularly, this dataset will support development of integrated water management strategies (reservoir operation, irrigation and hydropower planning) and improved early flood warning and drought forecasting systems.
- Contribute to science-policy interfacing by bridging existing gaps, facilitating exchange among stakeholders through interactive workshops and dedicated forums, and promoting a participatory approach in water management, decision and policy making.
- Support the EU policy review by providing tailored products and maps at the pan-European level, identifying the state of water resources, the prevailing pressures, hotspots, etc.
- Support local stakeholders by providing state-of-art operational tools, alongside a rich data infrastructure

5 Awareness raising, education, business creation

- Raise awareness on the availability and pressures on the freshwater resources across the globe.
- Improve the understanding of the links between the components of the water cycle and the existing knowledge on the integration and use of EO products by providing targeted workshops, training, e-learning courses.
- Evaluate opportunities arising for new business and job creation by matching the eartH2Observe products with innovative ideas for capitalization, helping SMEs to improve and develop services and products in the domain of environmental assessment and monitoring using EO technology.