



A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service

AfWCCI Workshop, Morocco, 4-5 February 2013

GLowasis

GLOBAL WATER SCARCITY INFORMATION SERVICE

W <http://www.glowasis.eu>
E info@glowasis.eu

Coordinator: rogier.westerhoff@deltares.nl



GLOWASIS general info

January 2011 – March 2013

Project budget 3 MEUR

List of participants:

Participant no. *	Participant organisation name (short name)	Country
1 (Coordinator)	Stichting Deltares (Deltares)	Netherlands
2	Consiglio Nazionale delle Ricerche (CNR)	Italy
3	European Centre for Medium-Range Weather Forecasts (ECMWF)	United Kingdom
4	Commission of the European Communities Directorate General Joint Research Centre (JRC)	EU
5	Netherlands Geomatics and Earth Observation B.V. (NEO)	Netherlands
6	Universiteit Utrecht (UU)	Netherlands
7	Technische Universitaet Wien (TU Wien)	Austria
8	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO)	Netherlands
9	Universidade de Santiago de Compostela (UCS)	Spain
10	Instytut Meteorologii i Gospodarki Wodnej (IMGW)	Poland
11	University of KwaZulu Natal (UKZN)	South Africa



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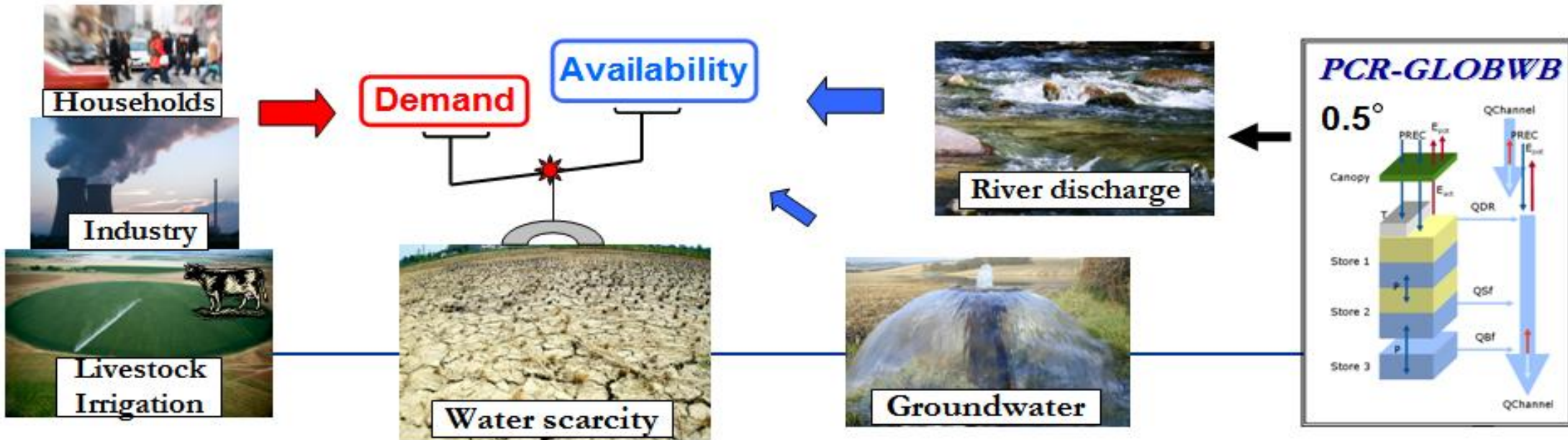
Project Overview

- 1) Improve seasonal forecasting of water scarcity and drought (EO, in-situ, model-based data)
- 2) Explain the complexity of water scarcity forecasting (incl. awareness and policy briefs EC)
- 3) Deliver open data on drought and water scarcity





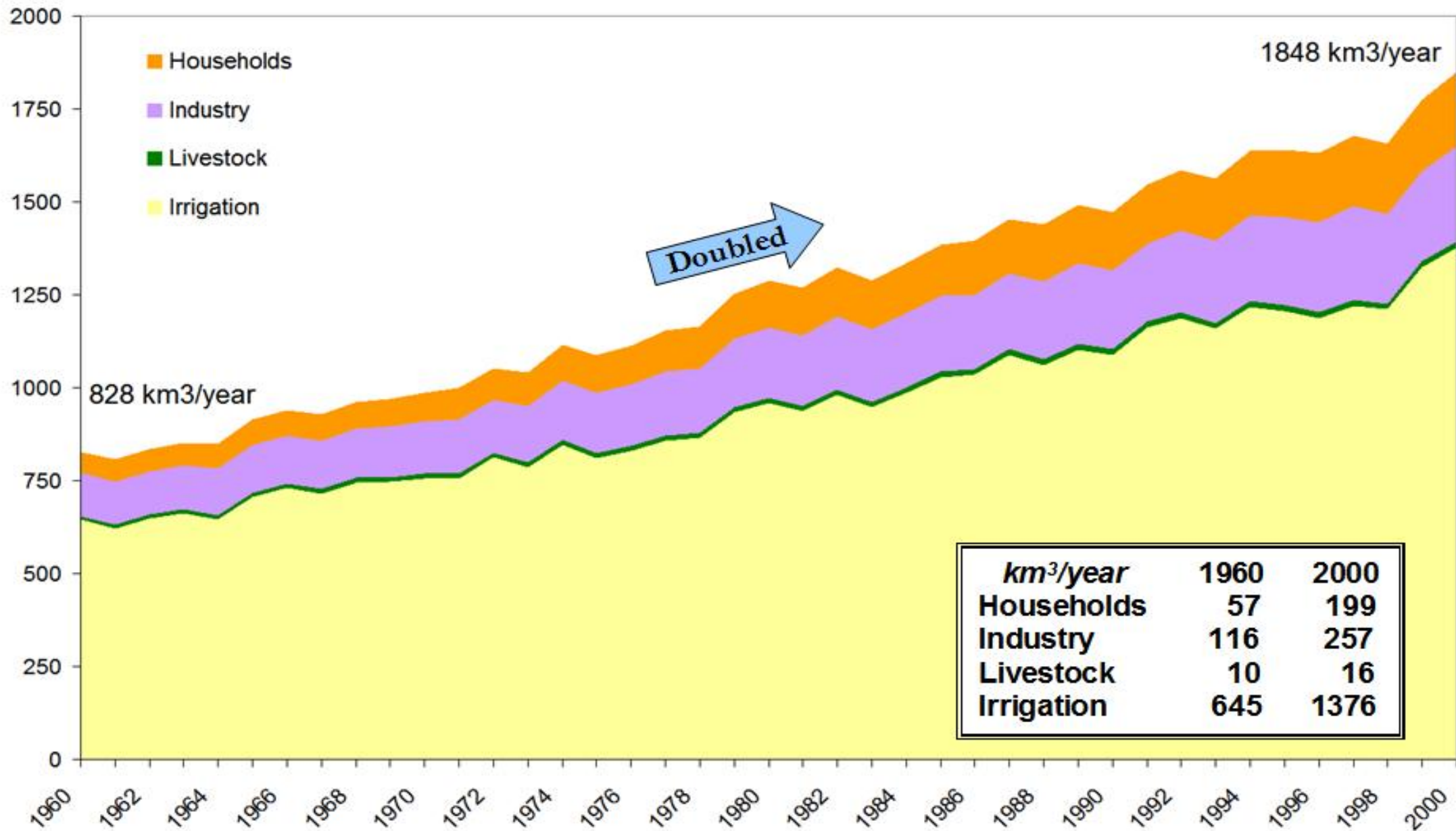
WATER SCARCITY vs DROUGHT



when the water demand outstrips the supply

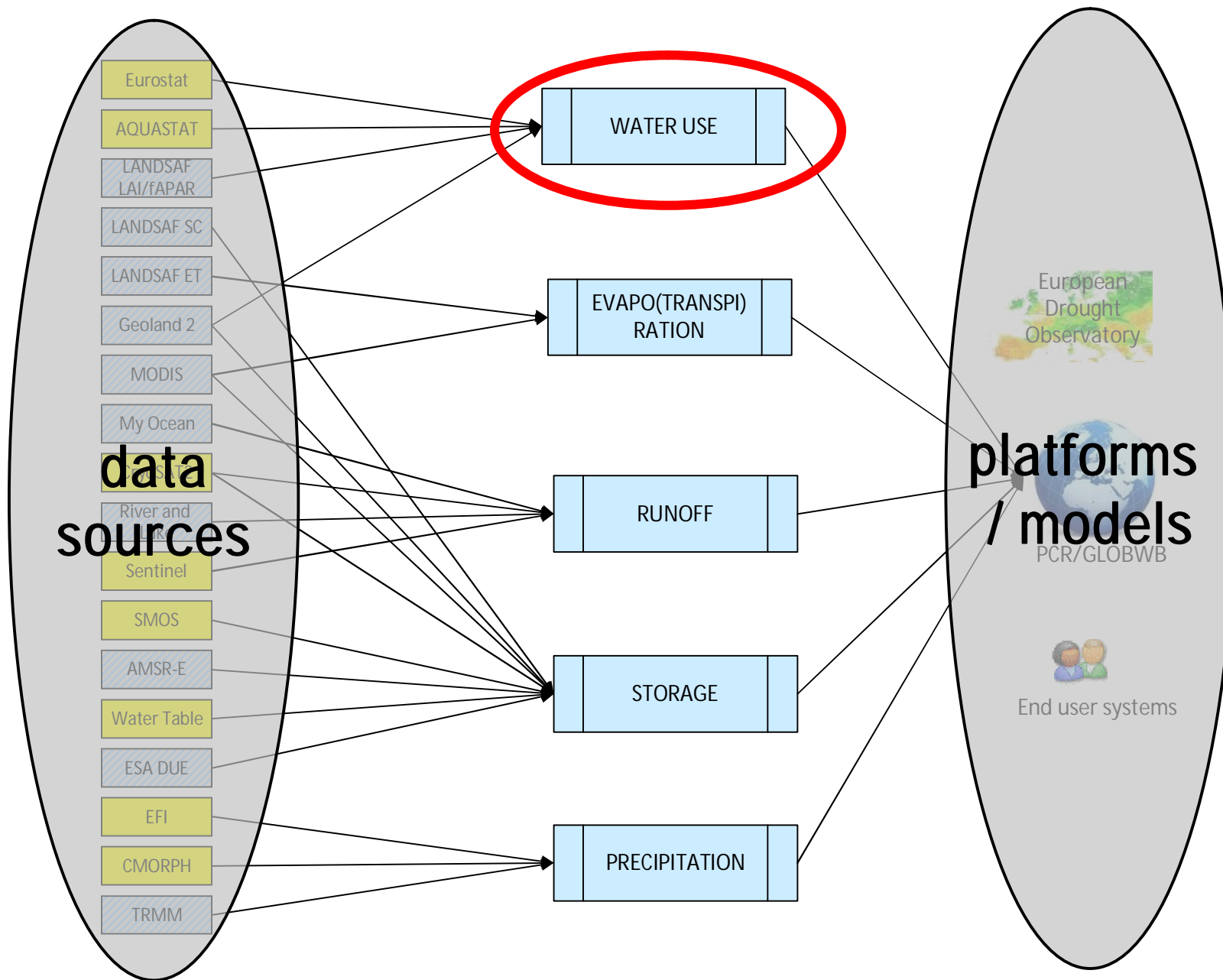
Historical Trends

- Global water demand more than doubled during the period 1960-2000





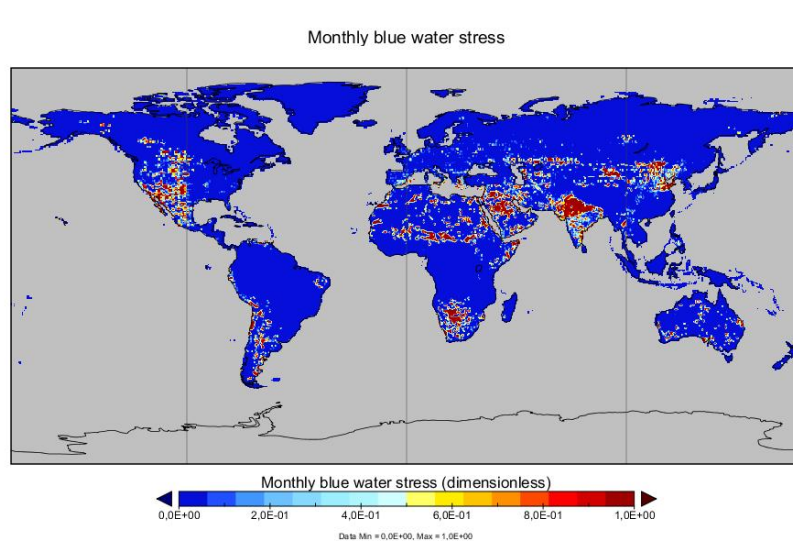
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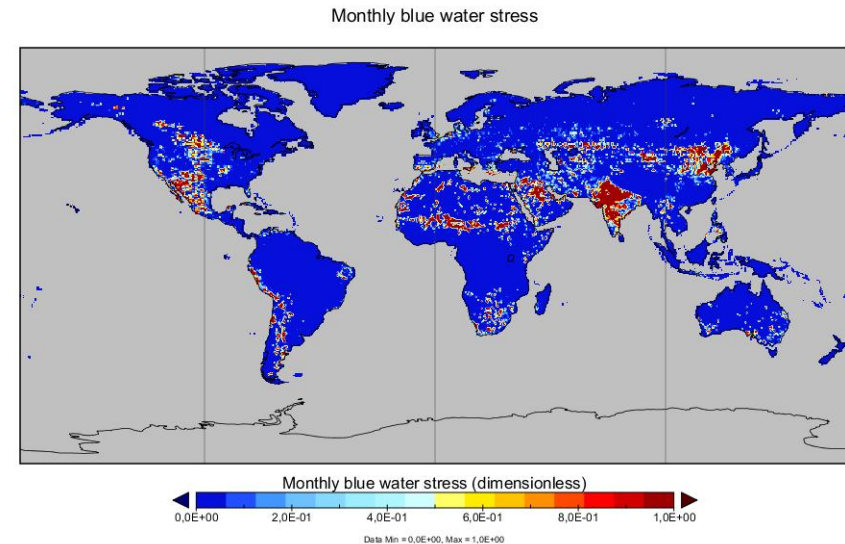


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GLOBAL WATER SCARCITY INDICES (0.5x0.5 deg, 1960-2010)



May 1960



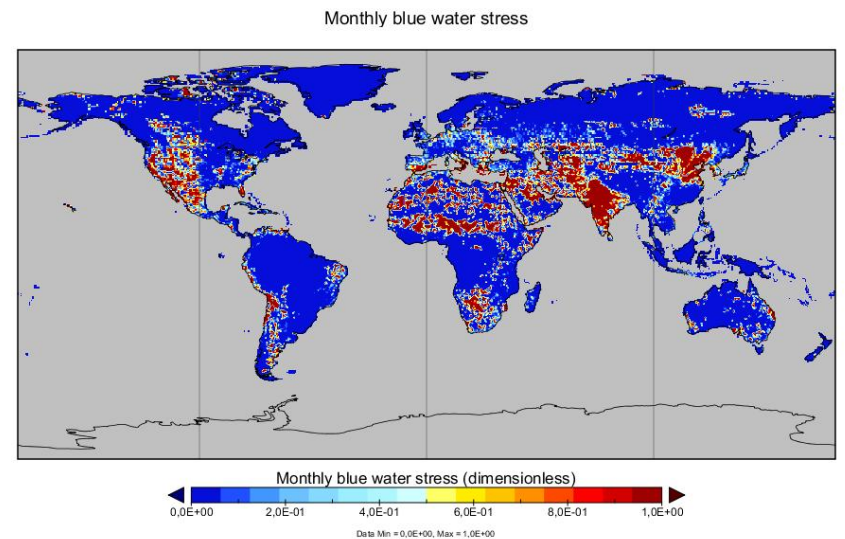
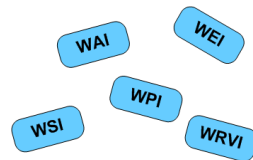
May 1980

WSI

Water Stress Indicator, (Falkenmark, 1989)

Total net water demand/water availability

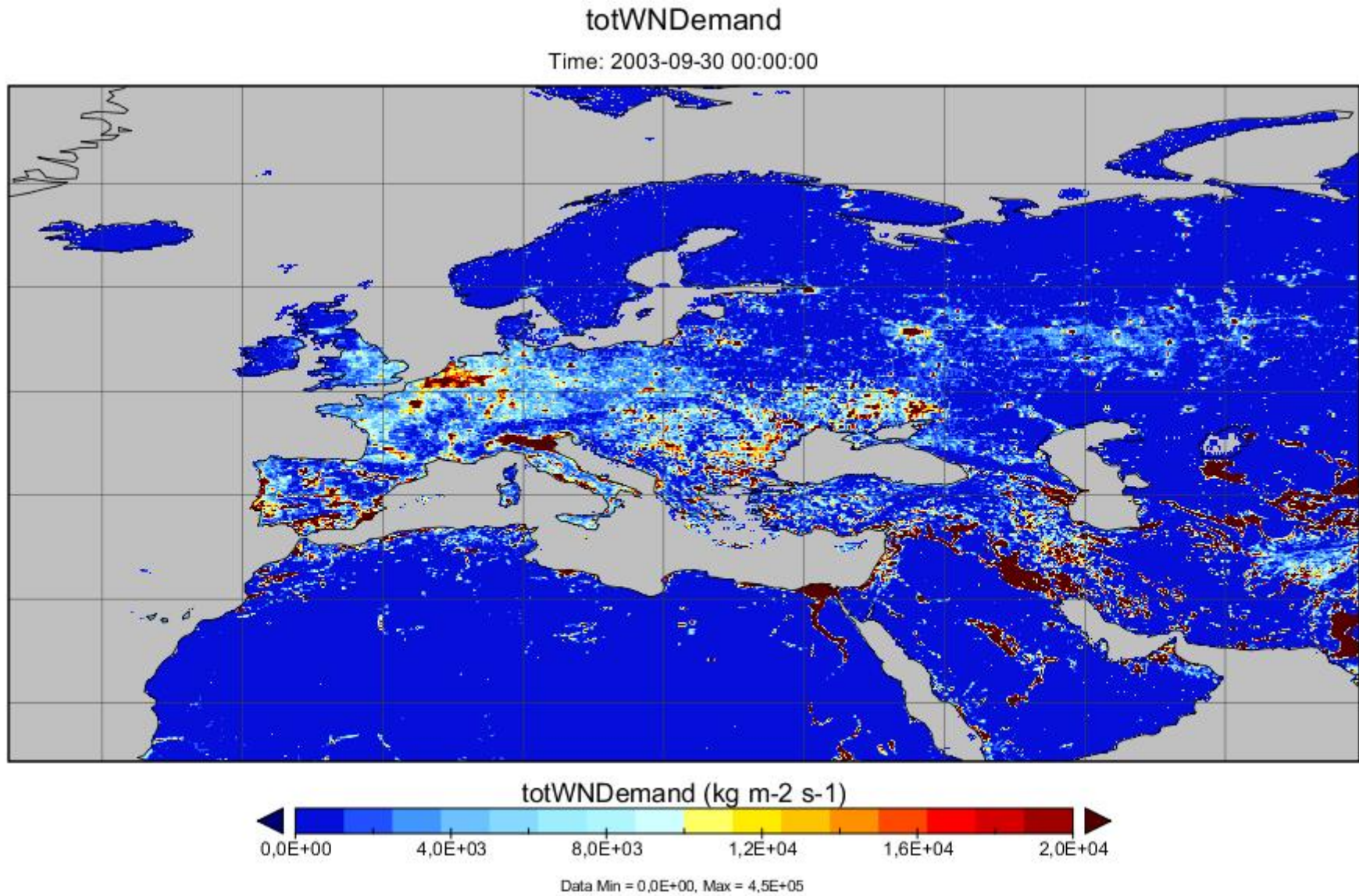
Net demand: gross demand - return flows

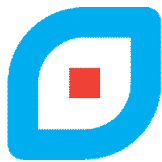


May 2001



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0.1x0.1 deg (6 arcmin, ~10x10km), up to 2010

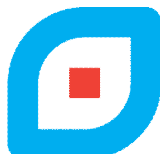




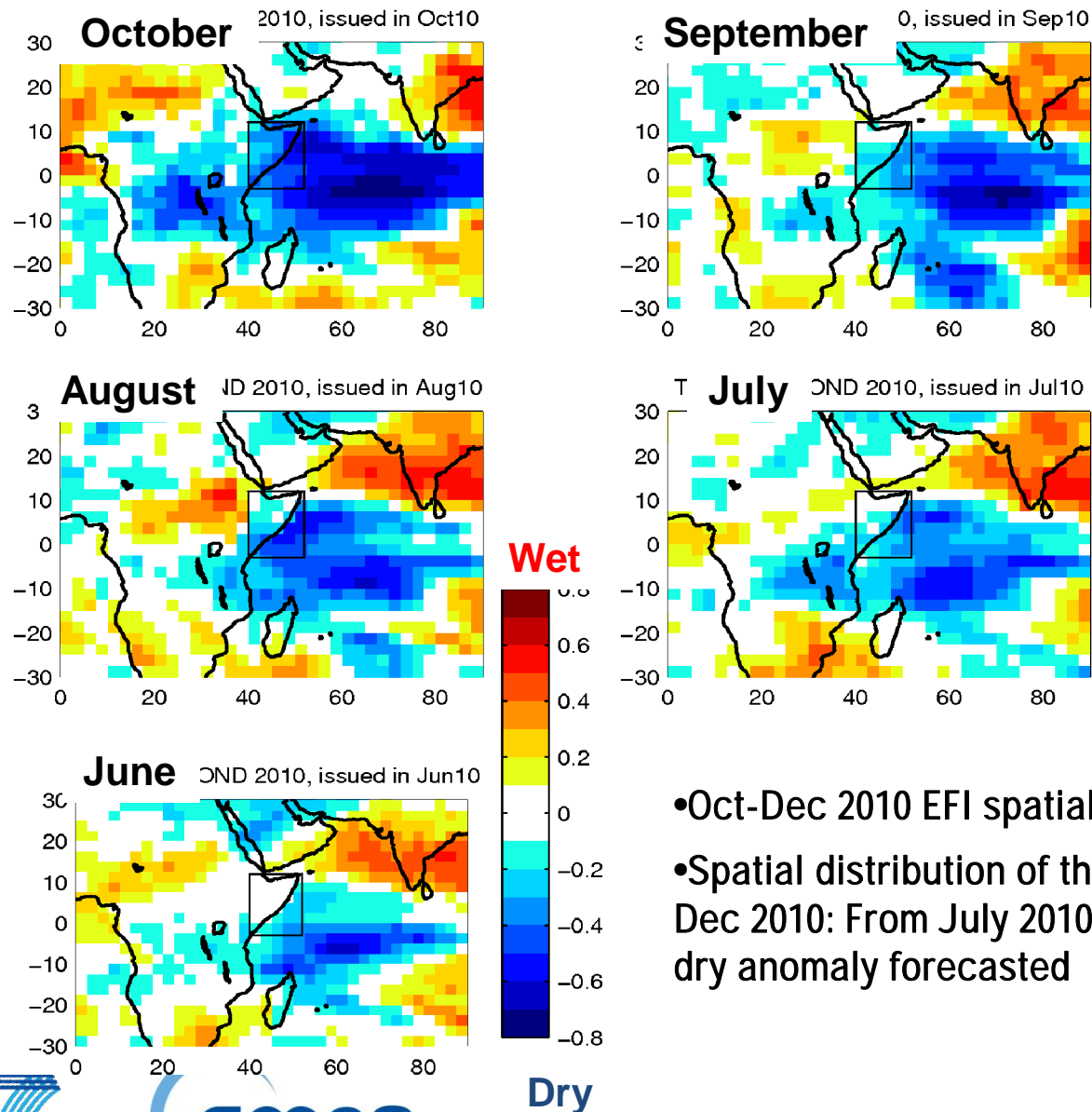
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Where do we want to be at the end of the project?

- Forecast seasonal water scarcity and drought with a smaller and better known uncertainty
- Add value for decision making
- Add value to JRC's European Drought Observatory
- Have a popular portal that is used many times by many users
 - Make sure users can really use the data and not only look at it
- Show the complexity of water scarcity research (climate vs human causes and impacts)



Policy: Towards warning indicator



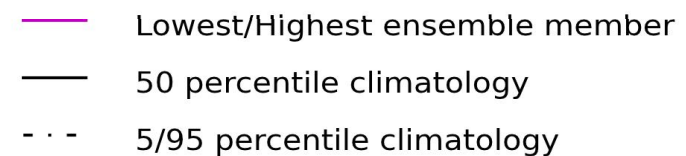
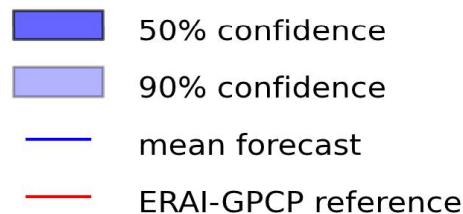
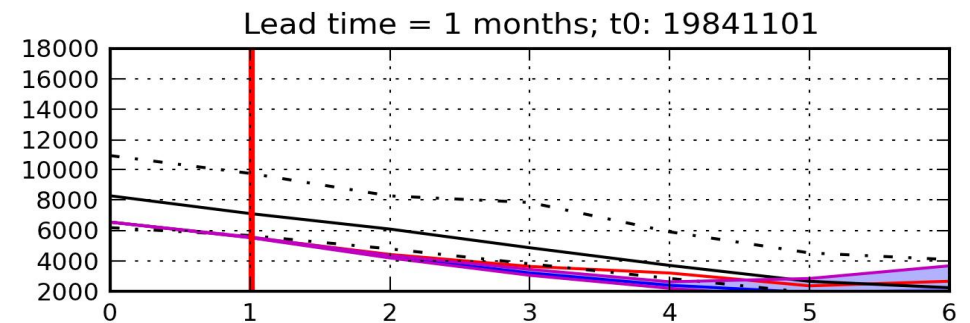
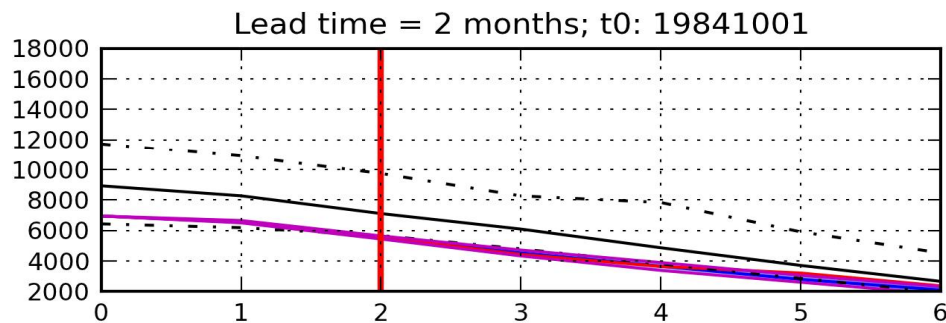
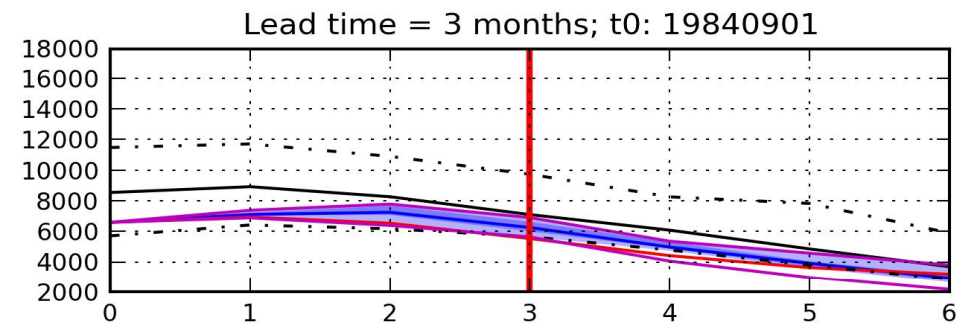
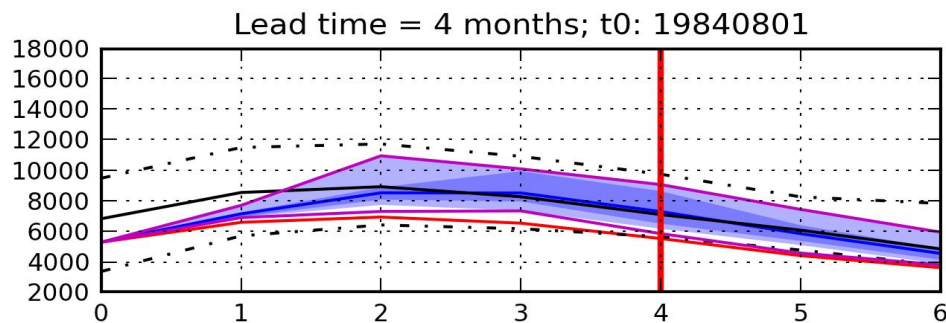
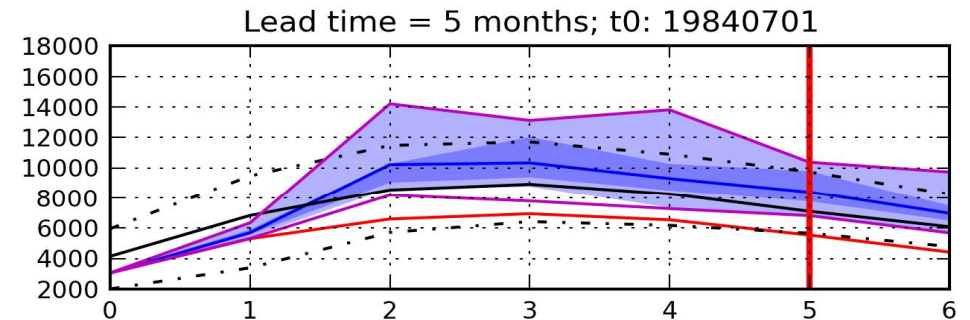
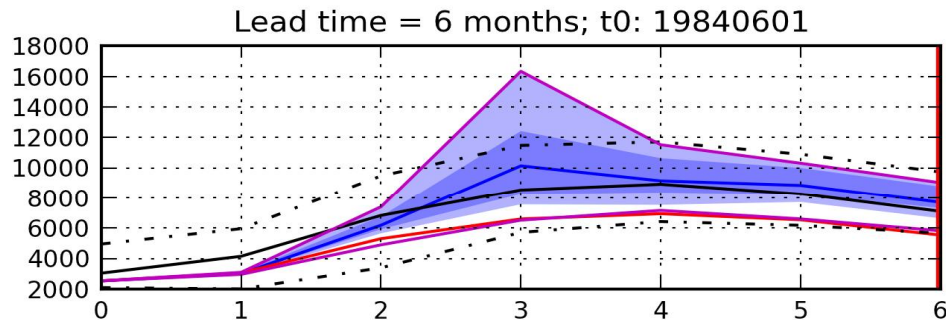
- Oct-Dec 2010 EFI spatial maps issued in different dates
- Spatial distribution of the precipitation EFI valid for Oct-Dec 2010: From July 2010 onwards there was a consistent dry anomaly forecasted



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Nile discharge december 1984 near Khartoum – ECMWF bias corrected

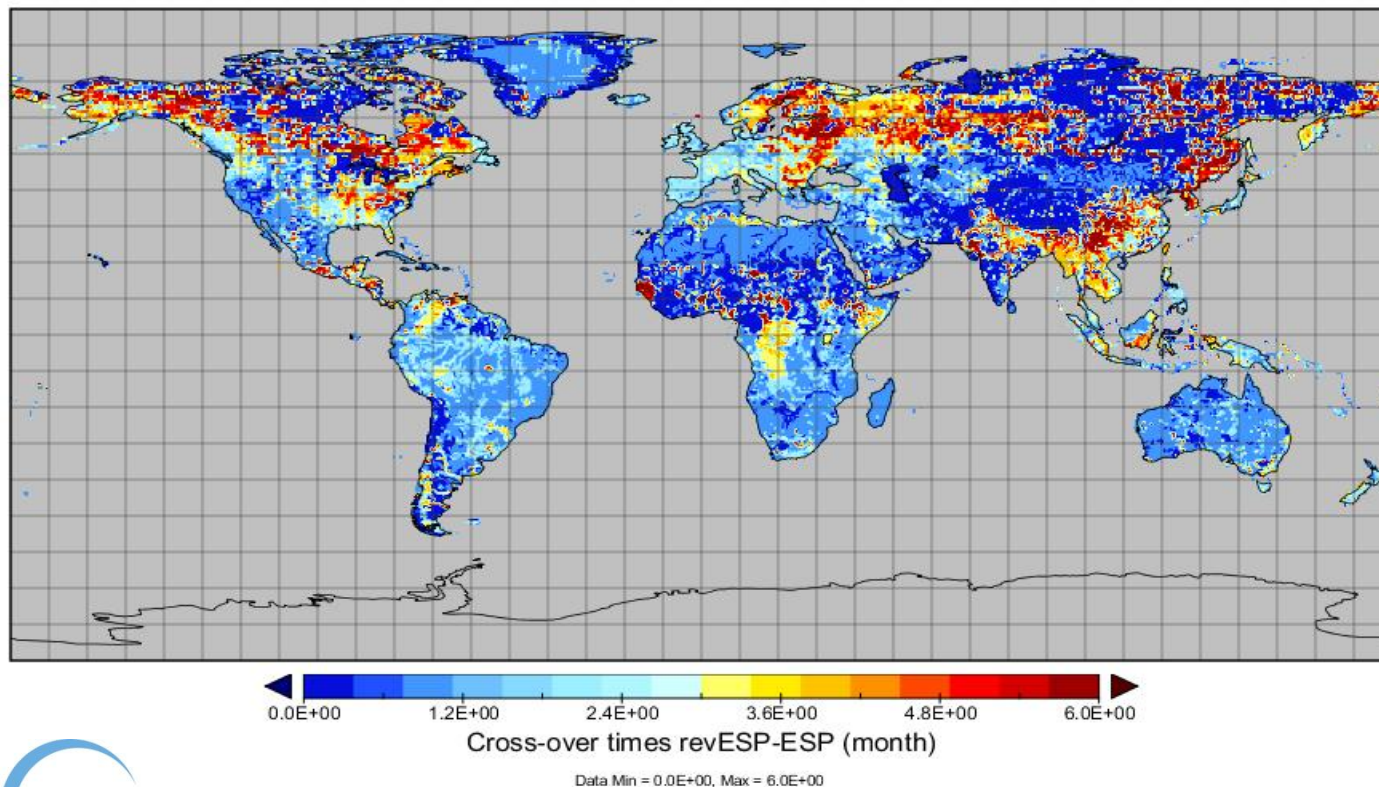
Policy: Towards warning indicator





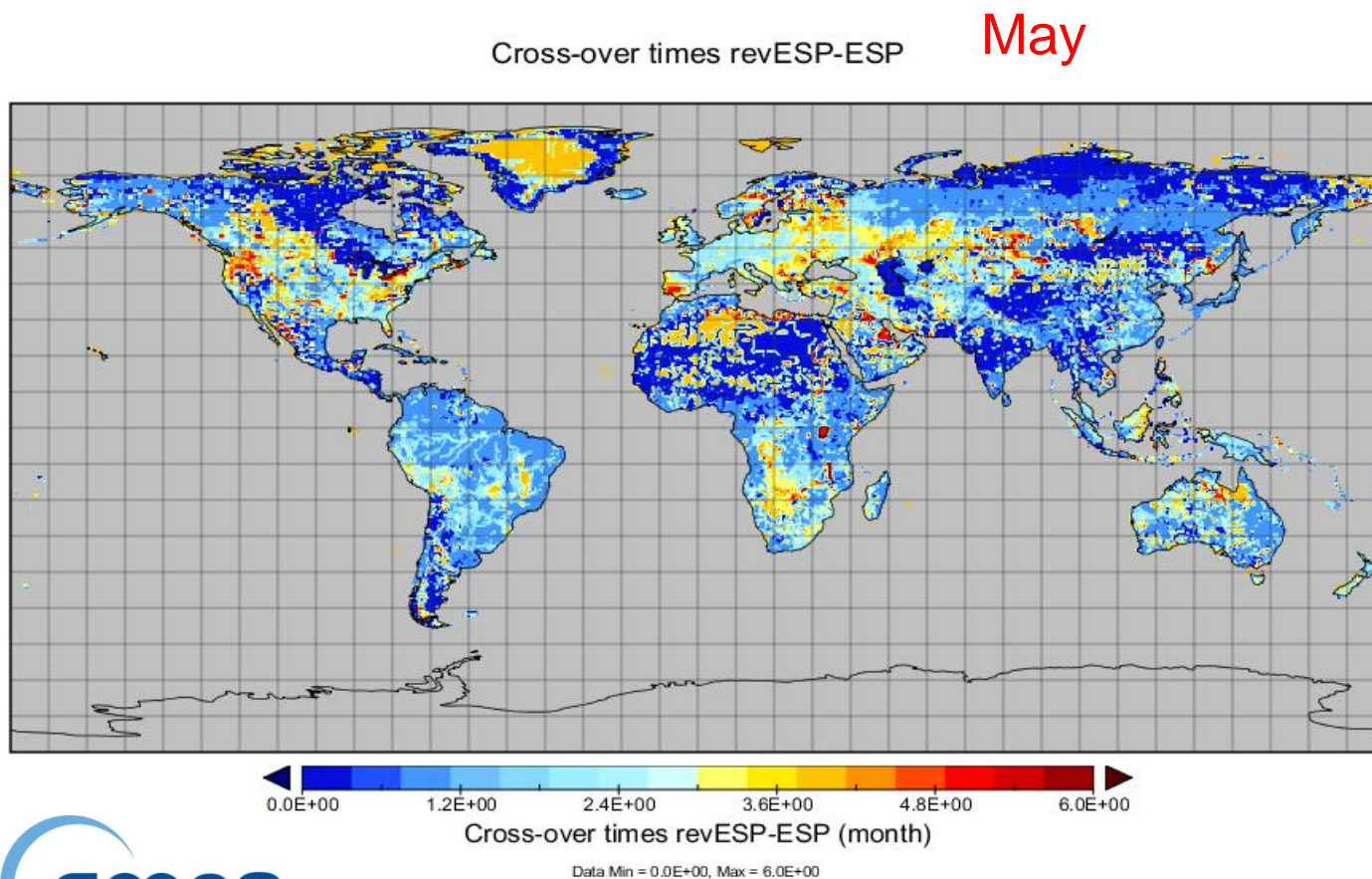
- For each parameter for each month (discharge, water scarcity, soil moisture, ...) we calculate a 'critical lead time'*.
- This more or less tells whether your meteorology or hydrological initial settings are important for your drought forecast

Cross-over times revESP-ESP **February**





- For each parameter for each month (discharge, water scarcity, soil moisture, ...) we calculate a 'critical lead time'*.
- This more or less tells whether your meteorology or hydrological initial settings are important for your drought forecast





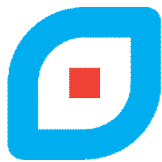
- In case studies (Europe 2003, Australia 2006, Horn of Africa 2010-11 (1984-1985)) we have shown to predict drought 1-2 months and sometimes 3 months in advance
- Per region in the world and per season we put a theoretical skill indicator on the forecast. In other words, we are pointing whether to invest in meteorological or in hydrological input for improvement in drought forecasting for each these regions.
- All project datasets available on open data portal



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Vision in all workpackages

Open data

GLOBAL WATER SCARCITY INFORMATION SERVICE



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What will be on the data portal?

Open data (so everyone can view and download the data)

- Demonstrator outputs
 - Seasonal water scarcity forecast (at the end of the project)
 - 1960-2010 water scarcity model output datasets
 - Water demand datasets 1960-2010 (0.5x0.5 and 0.1x0.1)
 - Global meteorological Seasonal Extreme Forecast Index (precipitation, 2m temp)
 - Global Groundwater Table
 - Global hydrological seasonal forecasts (discharge, soil moisture, ...)

- 2000 – 2010 case study outputs
 - Water Scarcity forecasts (hindcast)
 - Global hydrological forecasts (hindcast, discharge)
 - Critical Lead Times
 - 2000-2010 global and optimized satellite data sets:
 - Rainfall (snowfall)
 - Soil moisture
 - ...



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GLOWASIS | Get Data! - GLC x Catalog http://glowasis.delt x

glowasis.eu/getdata/

Customize Links Other bookmarks

GLOWASIS

GLOBAL WATER SCARCITY INFORMATION SERVICE

HOME BLOG ABOUT RESULTS **GET DATA!** CONTACT

GET DATA!

TWEETS

Daily water scarcity & drought news is out! <http://t.co/ulQxXabk> › Top stories today via [@gesagua](#) [@Deep_Drip](#) [@familiesneed](#) about 10 hours ago

Daily water scarcity & drought news is out! <http://t.co/ulQxXabk> › Top stories today via [@EasyPools](#) [@and_basso](#) [@sebpalmer](#) 09:16:09 AM February 02, 2013

[Follow @Glowasis](#) 164 followers

OPEN DATA

All the datasets resulting from the GLOWASIS are **open**: they can be viewed and downloaded by everyone on the [GLOWASIS Data Portal](#). The viewer in this portal connects to a data core server and creates visual maps in popular and commonly used formats, including a Google Earth plugin. These maps can be used by the public, media and policy makers.

Only recommended for scientific use, data can be directly downloaded through the OPeNDAP framework through our [GLOWASIS data core server](#). This requires in-depth knowledge to transfer the data for further use.

Although it is not mandatory, we kindly ask you to **register** for the portal. Having done that you will be sent a manual on how to use the data, you will be notified on the foreseen frequent updates, and finally you will be asked to fill in a short user survey in the coming months.

We kindly ask you to register by filling in the form below.

The GLOWASIS data portal will be finalized in March 2013. At this moment the portal is still under construction. The available functionality is not yet finalized and will be improved over time. Thank you for your interest in the GLOWASIS data portal. Any feedback now or at a later stage is very welcome!

REGISTRATION FORM

I am a public user

I am a policy maker or water manager

I am a scientist

In which region/country/city do you live?

(opt) for which country/continent do you intend to use the data (or global)?

SEARCH

IN OUR BLOG

- [World Water Development Report by United Nations World Water Assessment Programme](#)
- [The Real Water Footprint of Food](#)
- [Last 50 years of global water scarcity in a 1 minute movie](#)
- [Dealing with the Curse of Droughts](#)
- [Innovative monthly blue water scarcity indicator](#)

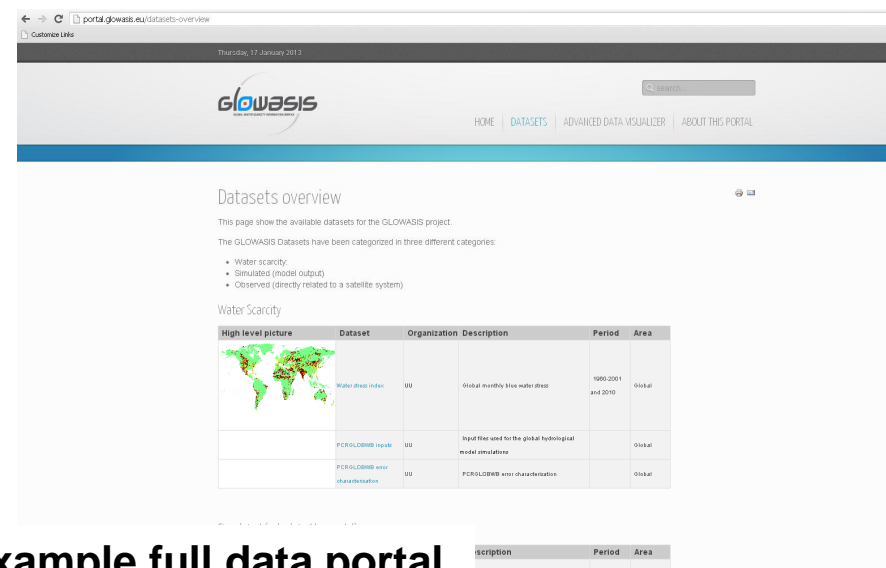


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- A homepage viewer showing a popular water scarcity map on main page.
- Full data portal
 - data core (thredds)
 - open source viewer
- NOTE: viewing and downloading



popular viewer on website <http://glowasis.eu>



Example full data portal.



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GLOWASIS | Get Data! - GLC x Catalog http://glowasis.delt... x
https://glowasis.deltares.nl/thredds/catalog/opensdap/opensdap/catalog.html
Customize Links Other bookmarks

Catalog http://glowasis.deltares.nl/thredds/catalog/opensdap/opensdap/catalog.html

Dataset	Size	Last Modified
opendap		--
Water_Stress/		--
Water_Demand/		--
Soil_Moisture/		--
Precipitation/		--
PCRGLOBWB_model_files/		--
Extreme_Forecast_Index/		--
Equilibrium_Water_Table/		--



Datasets overview

This page show the available datasets for the GLOWASIS project.

The GLOWASIS Datasets have been categorized in three different categories:

- Water scarcity:
- Simulated (model output)
- Observed (directly related to a satellite system)

Water Scarcity

High level picture	Dataset	Organization	Description	Period	Area
	Water stress index	UU	Global monthly blue water stress	1960-2001 and 2010	Global
	PCRGLOBWB Inputs	UU	Input files used for the global hydrological model simulations		Global
	PCRGLOBWB error characterisation	UU	PCRGLOBWB error characterisation		Global

Simulated (calculated by model)

High level picture	Dataset	Organization	Description	Period	Area

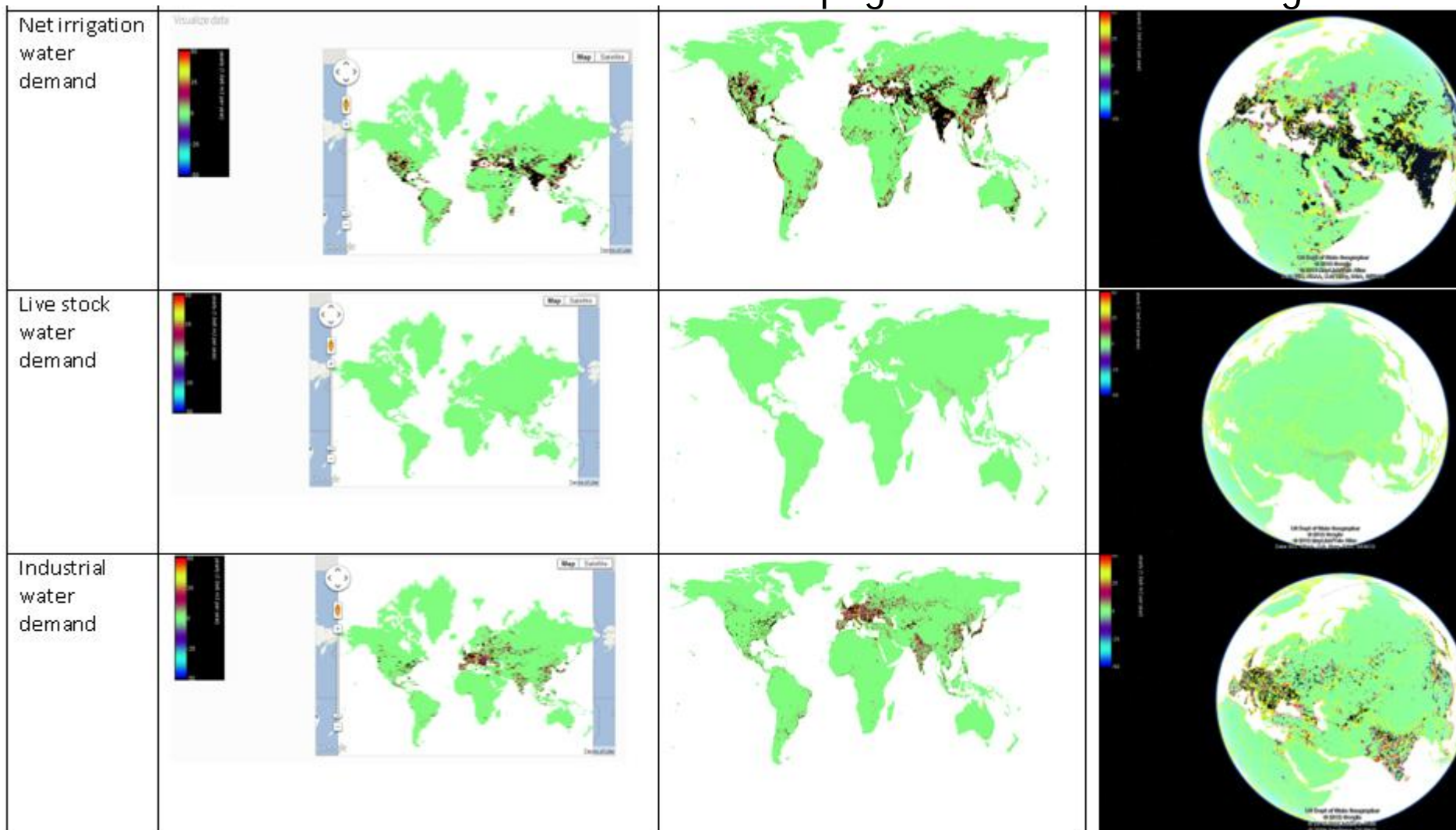
The screenshot shows the GLOWASIS website interface. At the top, there is a navigation bar with 'HOME', 'DATASETS', and 'ADVANCED DATA VISUALIZER'. Below this, the 'Water Stress' section is highlighted with a red box. It includes a 'Simple visualization' of a world map for the year 2010, with a search bar and a date selector set to '1-2010'. The map shows water stress levels across the globe. Below the map, there is a detailed metadata table for the 'Water Stress' dataset, also highlighted with a red box. The table includes sections for 'Identification', 'Quality and validity', 'Conformity (to INSPIRE standard)', 'Constraints related to access and use', 'Responsible organization', and 'Metadata on metadata'. The 'Water Stress' dataset is listed as a global monthly blue water stress index from 1960-2001 and 2010, provided by the University of Utrecht (UU).



webview

.png

Google Earth





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Simple and more advanced visualisations

Water Stress
Sample visualization
Water Stress for 2010

31-12-2010

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2013 Google
© 2009 GeoBasis, DE/BK

Dataset metadata

Identification	
Data set title	Monthly Blue Water Stress 1960-2002
Abstract describing	Monthly blue water stress determined as the ratio of net demand, decreased by abstractions from alternative resources (ground

Google Earth

Water Stress 2010, raster
Monthly water scarcity index
http://124.211.202.71:8080/try

Google Earth galerij

Primaire database
Grenzen en labels
Plaatsen
Fot's
Wegen
3D-gebouwen
Ocean



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More advanced:

- create spatial subsets
-
- create animations from timeslice ranges

Layer: FP7 GLOWASIS > Water stress 2010 > rws
Units: dimensionless

Date/time: 01 Dec 2010 00:00:00 UTC [first frame](#) [last frame](#)

[Fit layer to window](#)

December, 2010						
Today						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Select date

1.050

0.6833

linear

auto

lock

0.3167

[User guide](#)

GLOWASIS
GLOBAL WATER SCARCITY INFORMATION SERVICE

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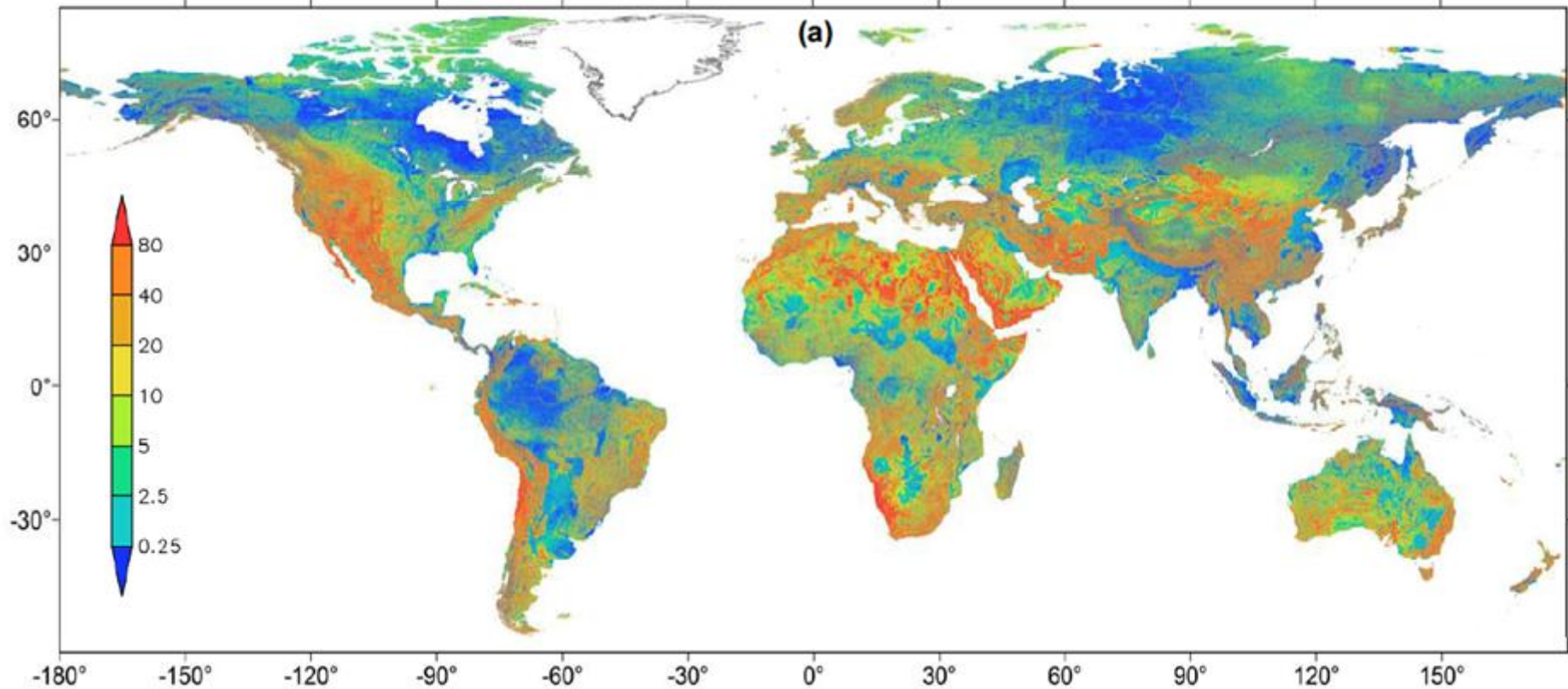
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Some datasets

Some datasets...

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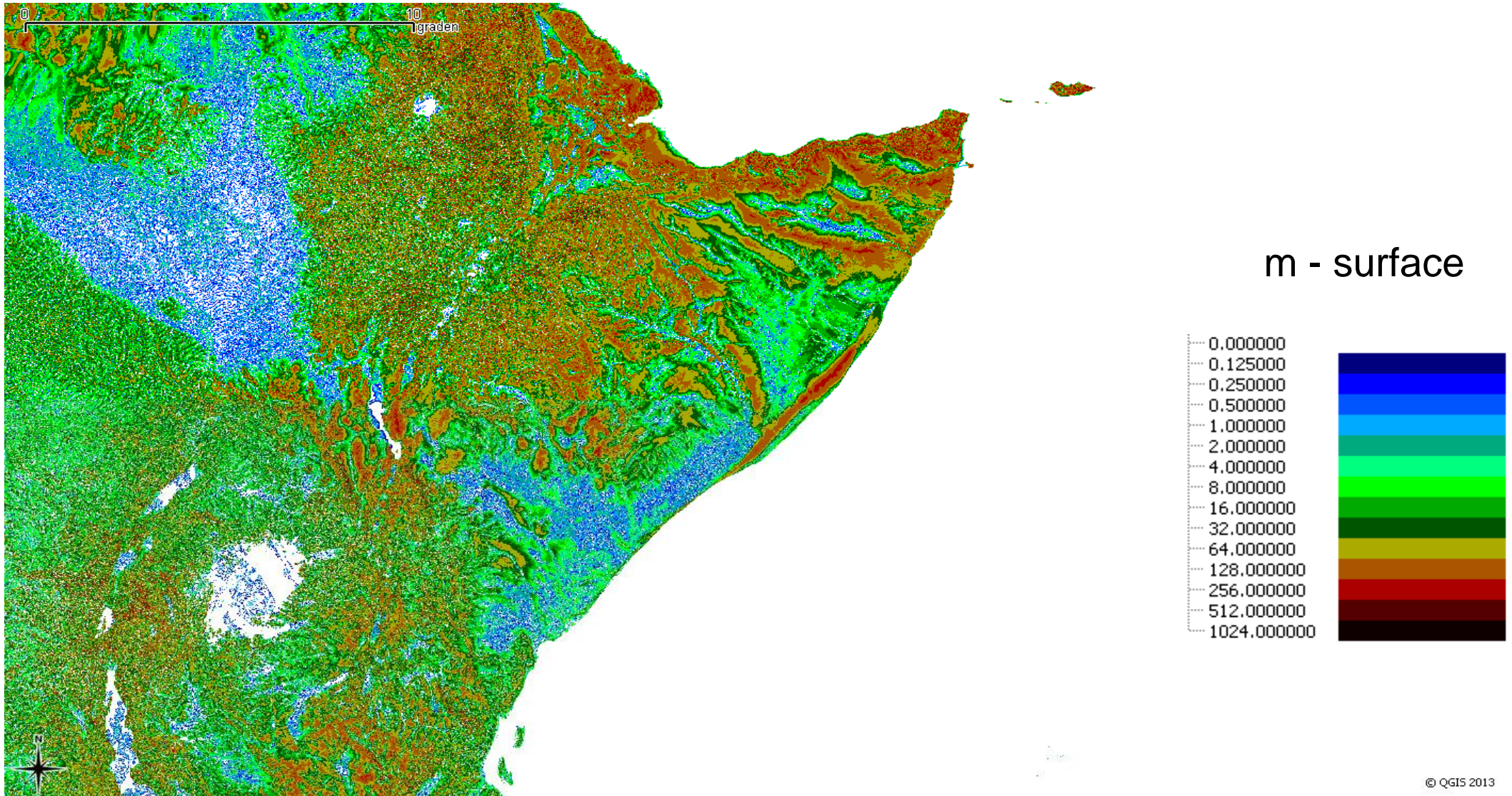
SIMULATED GLOBAL EQUILIBRIUM WATER TABLE at 30 arc-sec lat-lon (~1 x 1 km)



- The water table is shallow in many areas. It will modulate soil moisture dynamics and possibly land-surface fluxes there.
- In some of those areas recharge is not very large, groundwater withdrawals for irrigation or other uses can cause a significant depression of the water table
- Sources: recharge estimates derived from 3 GLDAS (CLM, NOAA, Mosaic), GTOPO30, soil texture FAO, etc...)



A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service Equilibrium Water Table

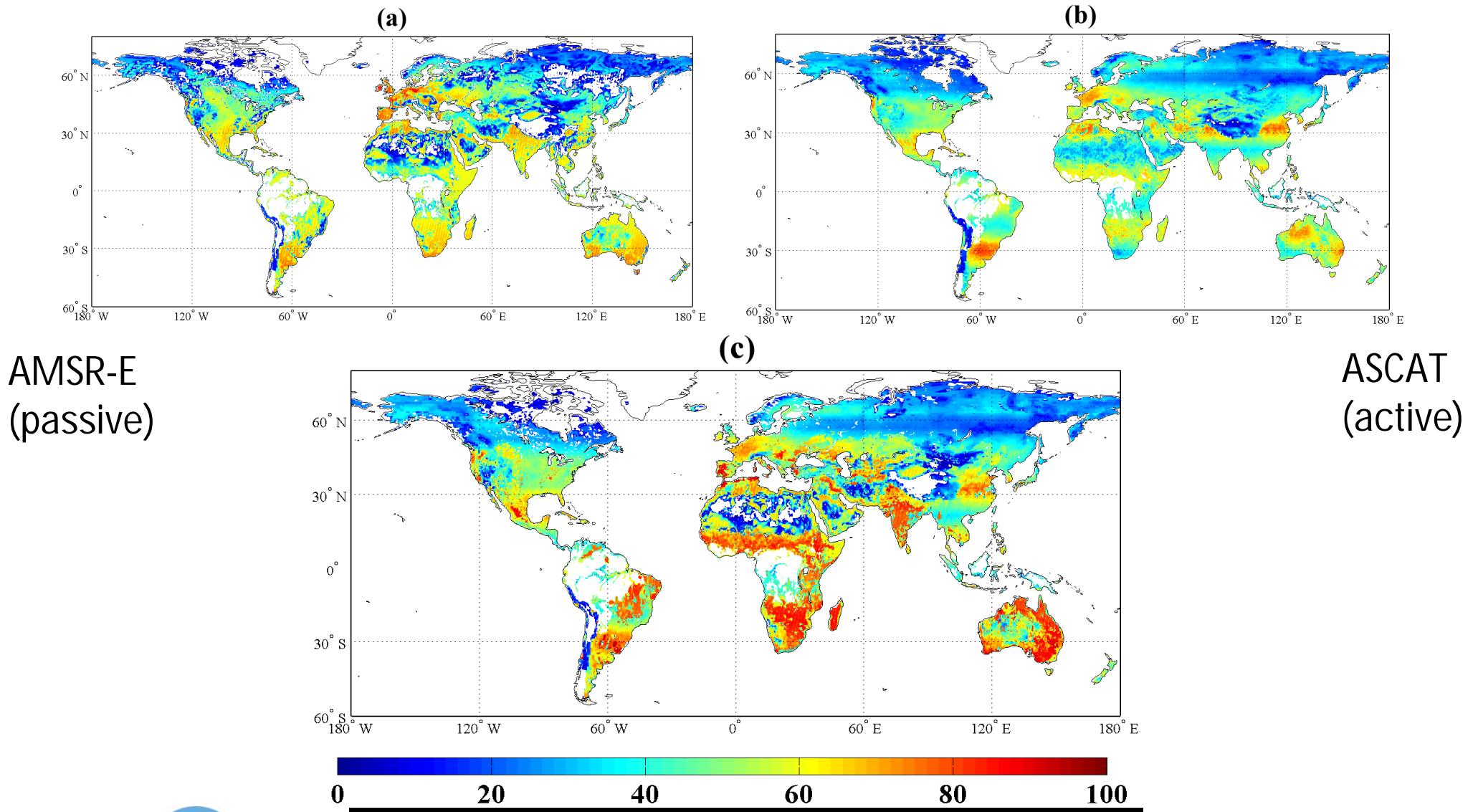


© QGIS 2013



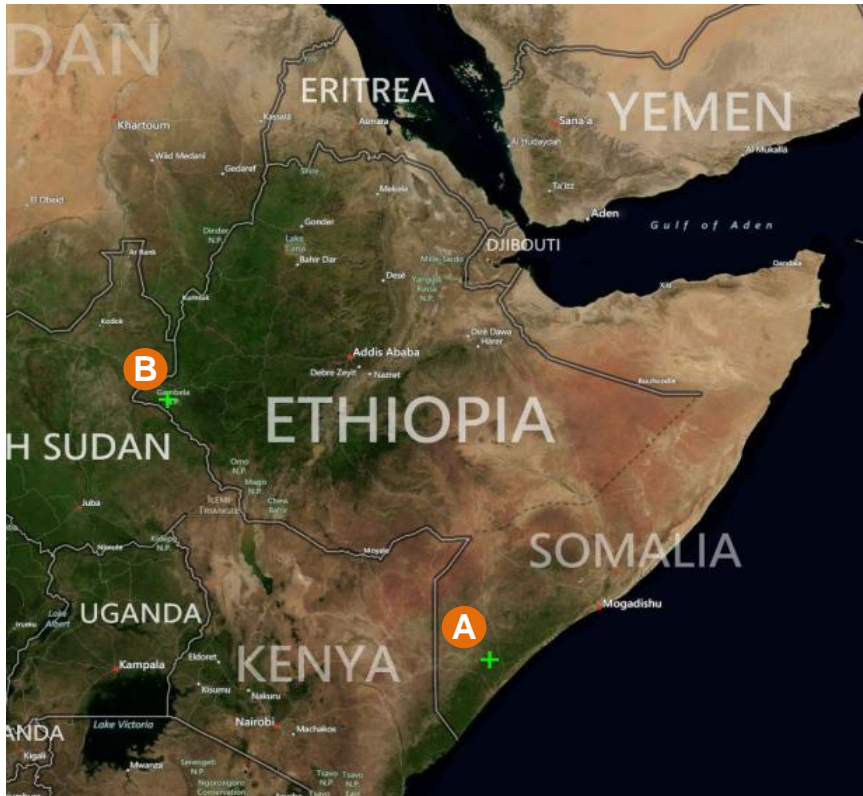
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Satellite Soil Moisture: Improved Temporal Coverage and consistent error characterisation

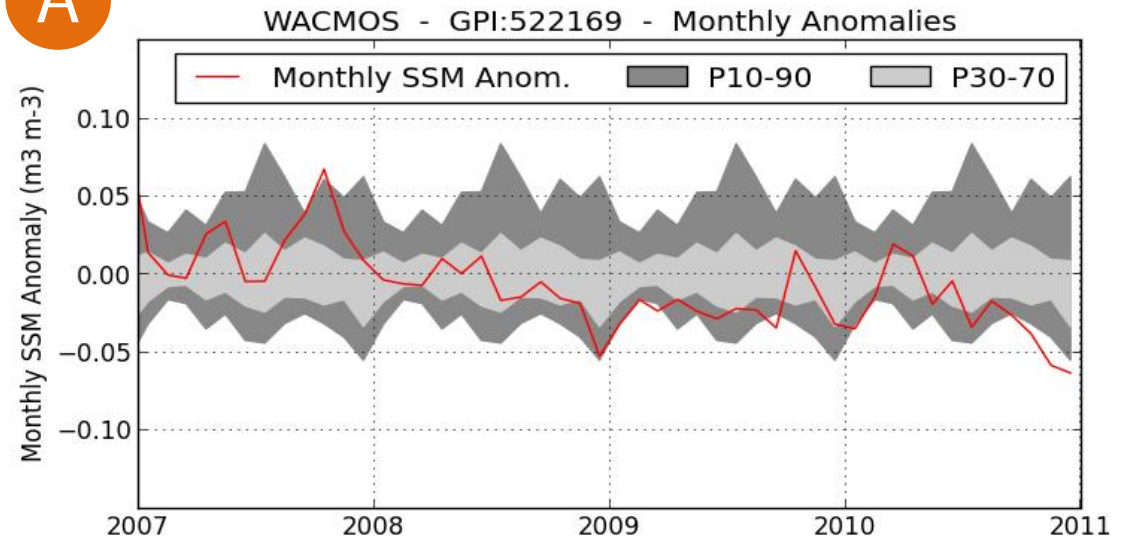




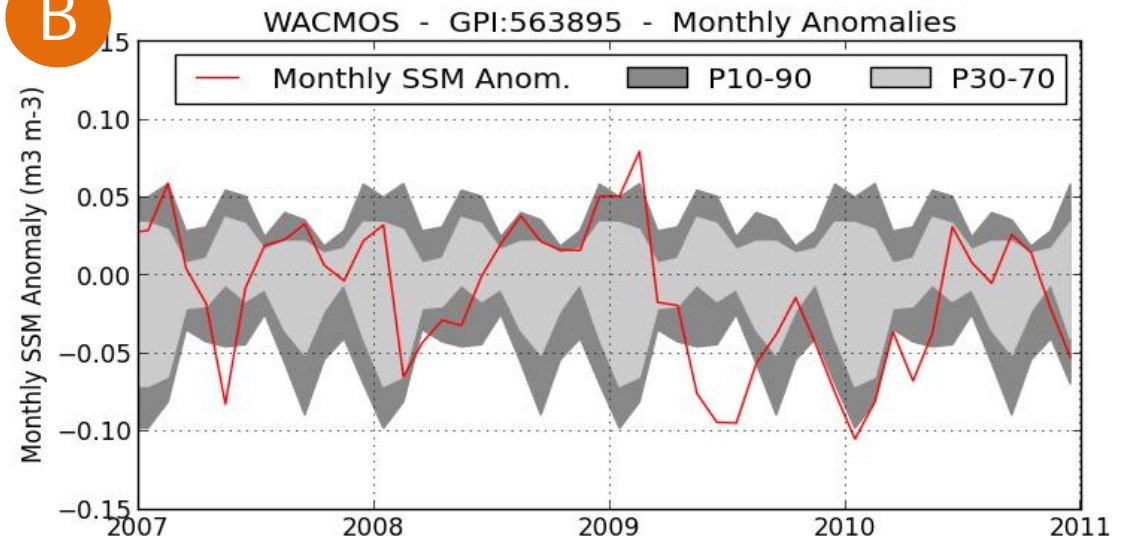
A collaborative project aimed at pre-validation of a GMES Global Water Scarcity Information Service Satellite Soil moisture time series - Horn of Africa 2010/2011



A

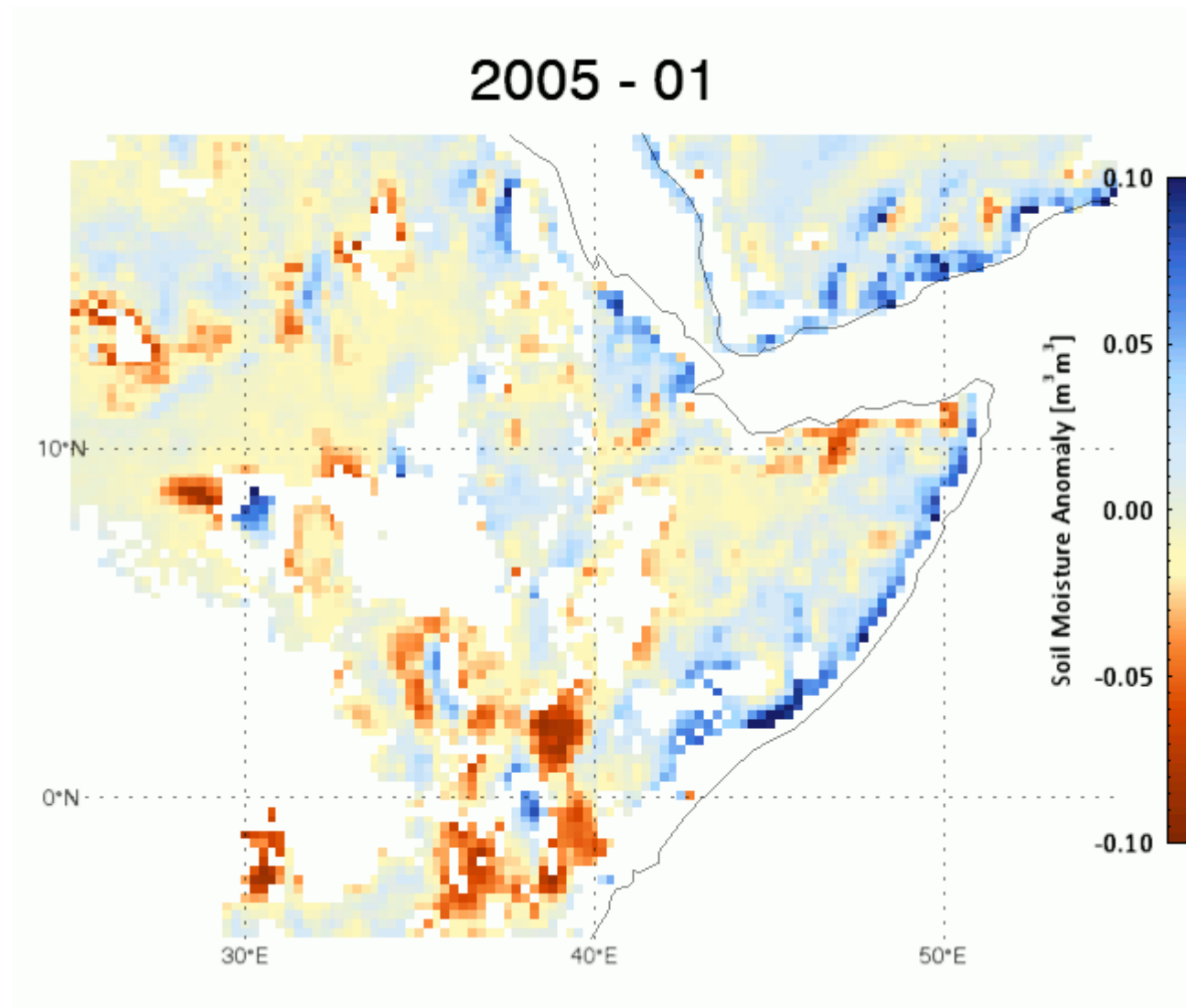


B





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Satellite Soil Moisture Anomaly 2005 to 2011





- ~ 25 peer reviewed papers (Nature, Science, BAMS, HESS, GRL, ...)
- ~ 30 international workshops, conferences, presentations, etc.
- Blog with expert's views
- Daily newspaper on water scarcity and drought



The screenshot shows the GLOWASIS website interface. At the top, there is a navigation bar with the GLOWASIS logo and the text "GLOBAL WATER SCARCITY INFORMATION SERVICE". Below the logo, there are navigation links: "HOME", "BLOG" (highlighted in red), "ABOUT", "RESULTS", "GET DATA!", and "CONTACT". The main content area is titled "BLOG" and features a large image of a person walking through a field of cracked, dry earth. Below the image is the title "DEALING WITH THE CURSE OF DROUGHTS" and a paragraph of text. To the right of the main content, there is a sidebar with a search box, a "CATEGORIES" list, and a "RECENT COMMENTS" section.

SEARCH

CATEGORIES

- [BLOG](#) (17)
- [AFRICA](#) (4)
- [ASIA](#) (4)
- [AUSTRALIA](#) (3)
- [EUROPE](#) (3)
- [GLOBAL](#) (11)
- [MIDDLE EAST](#) (2)
- [NORTH AMERICA](#) (2)
- [SOUTH AMERICA](#) (1)
- [NEW ZEALAND](#) (1)

RECENT COMMENTS

Indika Herath on [Dealing with the Curse of Droughts](#)

DEALING WITH THE CURSE OF DROUGHTS

This weblog was written by Dr Jayasuriya (Jaya) Dasarath, who works as the A/Deputy Director Climate and Water at the [Australian Bureau of Meteorology](#).

Recently I returned from Sri Lanka, which is grappling with the consequences of failed monsoon rains resulting in severe drought. Primary production is down, which leads to high food prices affecting the cost of living. The price of the staple food rice increases rapidly. The US drought and the impact on the cost of wheat in the world market have also adversely affected lives in Sri Lanka, as bread is the cost effective alternative to the locally produced rice. Sri Lanka also relies heavily on hydropower. With high country reservoirs reaching record low levels (some reaching 20% of supply), increased reliance on thermal supplies have eroded the balance of payment and foreign currency reserves. All of these factors contributed to a toxic cocktails of events, creating a tense political environment which erodes business confidence, shakes political stability



Daily water scarcity & drought news

HOME TOPICS VIDEOS

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Monday, Oct. 08, 2012 | Next update in about 17 hours | Archives

Time for West Texas to Face Long-Term Water Needs - NYTimes.com

Shared by Dave Loewen



nytimes.com - "Who wants to pull up to a hotel and it's dead?" said Bob Banskter, general manager of the Rodeway Inn in San Angelo, referring to the state of the landscaping. It was late September, a day after C...

Despite Rain, West Texas Water Woes Continue — Water Supply

Shared by Texas Tribune



texastribune.org - SAN ANGELO — With its pretty rivers and lakes, this city of 95,000 people is sometimes called the oasis of West Texas. But San Angelo recently came within a year of running out of water, as it face...

Texas Drought: No One Wants To Connect The Dots

Shared by

Water Shortages Hitting Record-Dry B.C.

Shared by Karen Messier



huffingtonpost.ca - Southwestern B.C.'s long spell of dry weather is having serious effects on water supplies from the Sunshine Coast, to the Gulf Islands and beyond. On the Sunshine Coast, northwest of Vancouver, a l...

Drought, low water levels in river force cowichan tribes to halt salmon fishery

Shared by john weise



timescolonist.com - Cowichan Tribes have stopped fishing for chinook salmon because

FROM THE EDITOR



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HEARD ON TWITTER



glowasis Daily water scarcity & drought news is out!
bit.ly/rFEWJQ • Top stories today via @Bharatserials @350_UAE @lance458



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