GRoW status conference, Frankfurt
February 21, 2019

GRoW
WATER AS A GLOBAL RESOURCE

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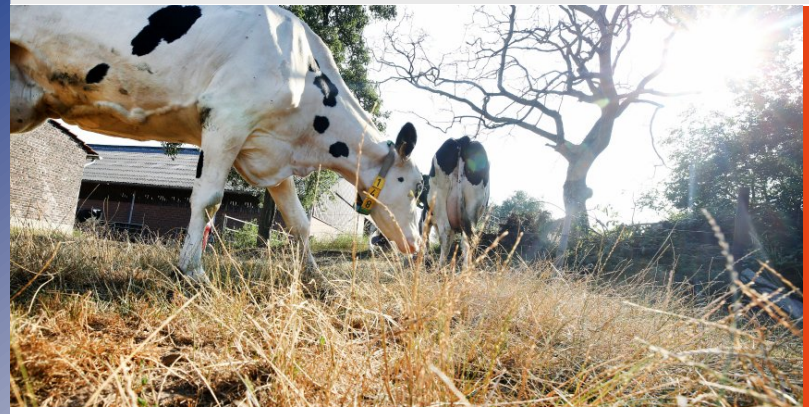

Stefan Siebert (Division Agronomy, University of Göttingen)

GlobeDrought

A global-scale tool for characterizing droughts and quantifying their impact on water resources, crop productivity, trade in food products, and the need for international food aid

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UNIVERSITÄT BONN
GOETHE UNIVERSITÄT FRANKFURT AM MAIN
UNITED NATIONS UNIVERSITY
UNU-EHS Institute for Environment and Human Security
RSS Remote Sensing Solutions GmbH
welt hunger hilfe
For a world without hunger

Background - Objectives

(FAO, 2013)

- Since 1900 more than 11 million people have died as a consequence of drought and more than 2 billion have been affected by drought
- Investigating drought risk means studying water resources in critical periods

Overall objectives:

- To develop a **web-based drought (hazard and risk) information system** (global & regional)

Contribution to national agendas

Contribution to the SDGs (SDG 2, SDG 6)

Contribution to understanding & managing drought risk (Sendai Framework, etc.)

Project partners

GlobeDrought - project partners

University of Göttingen
University of Bonn
Goethe University Frankfurt am Main
United Nations University (EHS)
Remote Sensing Solutions
Welthungerhilfe

Regional partners - stakeholders

- University of Zimbabwe (IES)
- University of the Free State, RSA (DiMTEC)
- Indian Institute of Technology Bombay (CSRE)
- National Institute of Hydrology, Roorkee, India
- National Drought Mitigation Centre (NDMC), University of Nebraska, Lincoln, USA
- Fundação Cearense de Meteorologia e Recursos Hídricos – FUNCEME, Fortaleza, Brazil
- Joint Research Center of the EU, Ispra, Italy

Drought risk assessment

Methodology

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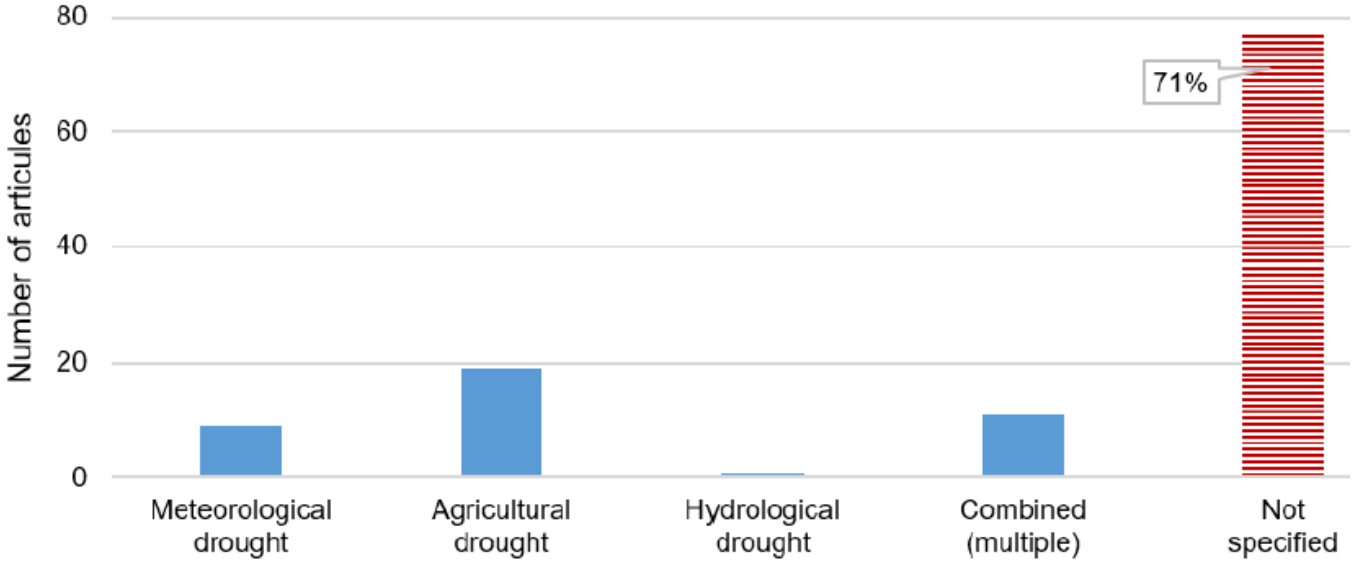
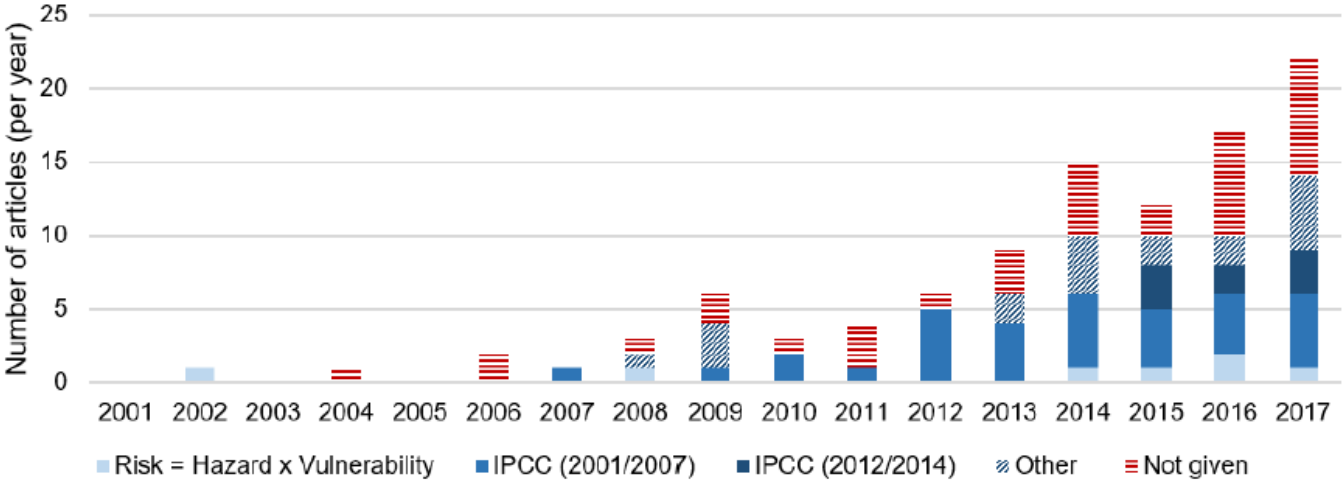
Main results of a comprehensive literature review on drought risk assessment methodology





- No agreement in scientific literature about drought risk analysis methods
- Even type of investigated drought often not mentioned
- Indicators used to quantify drought risk differ across analyzed drought impacts

Hagenlocher et al., under review

Drought risk assessment

Methodology

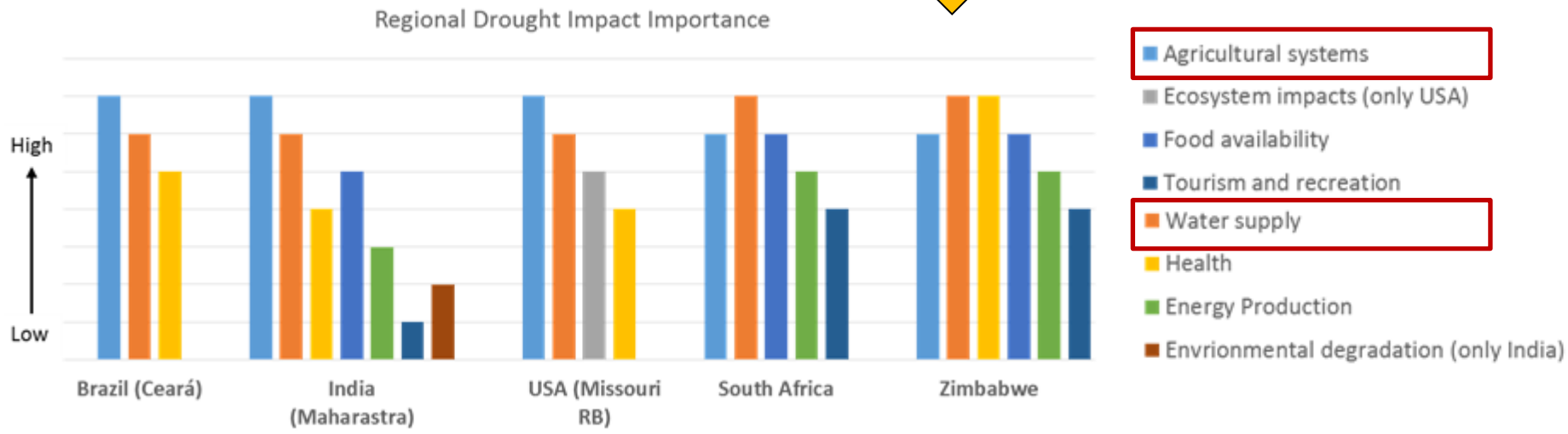
A new drought risk analysis framework, which will integrate hazard, vulnerability and exposition is developed for the GlobeDrought project – test phase has started

Co-Design process

Identification of relevant drought impacts

GlobeDrought
1st Stakeholder/Expert Workshop

May 3-4, 2018
UN Campus, Bonn



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Impact-specific indicator sets **can be selected by the users** of the Drought Information System

DROUGHT IMPACT ON RAINFED AGRICULTURAL SYSTEMS

HAZARD	EXPOSURE	VULNERABILITY
Standardized Precipitation Index	Extent of irrigated crops	Literacy rate
SPEI	Extent of rainfed crops	Gender Inequality Index
Accumulated Soil Moisture Deficit	Pasture extent	Rural population total
Standardized Irrigation Index	Livestock affected	GINI index
Standardized Streamflow Index	People affected	Average land degradation
Accumulated Discharge Deficit	Infrastructure affected	Total dam capacity
…	…	…

Integration and weighting

INTEGRATED DROUGHT RISK

Drought risk assessment

Drought hazard – April 2015

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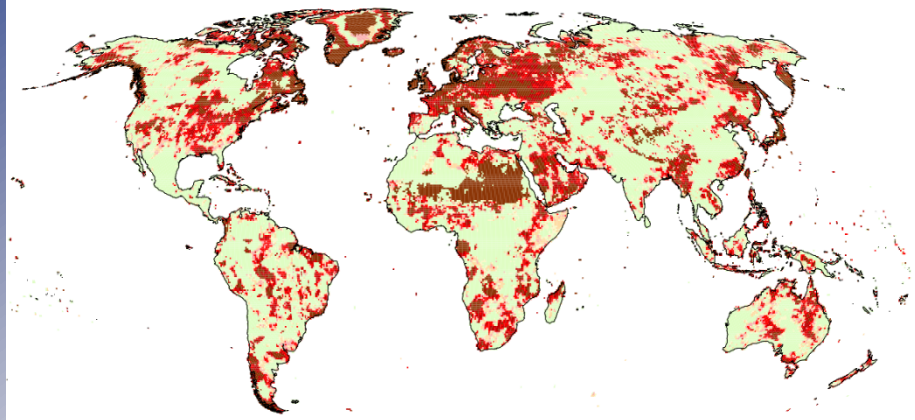
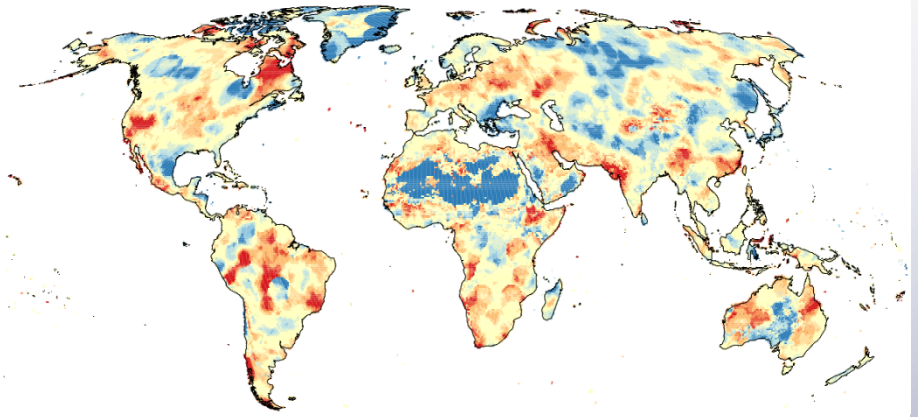
Rainfed agricultural systems

Accumulated soil moisture deficit - AMDI

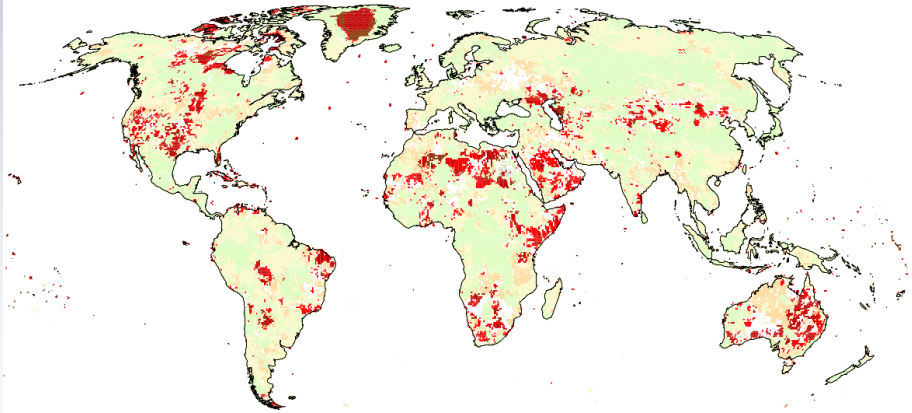


SPEI6

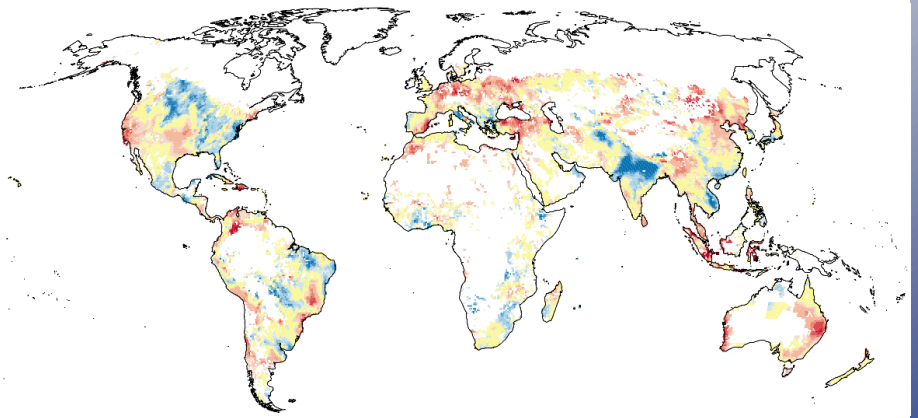


Irrigated agricultural systems

Accumulated river discharge deficit - ADQI



Standardized Irrigation Index – SII6



Drought Normal N.A.

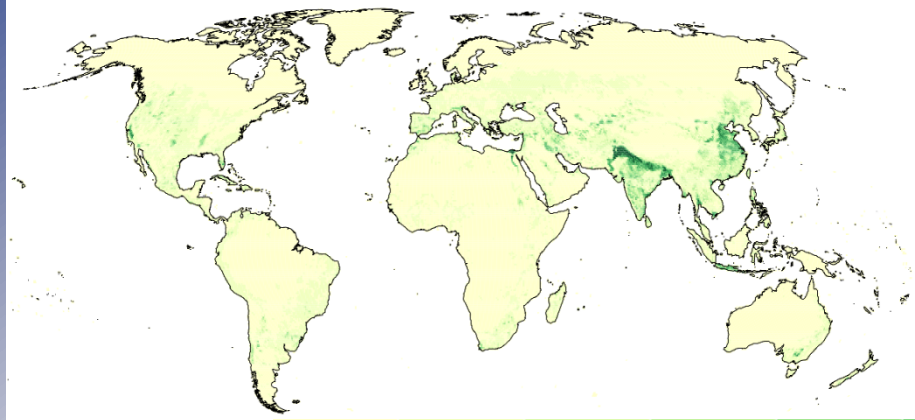
Drought Normal Wet

Drought risk assessment

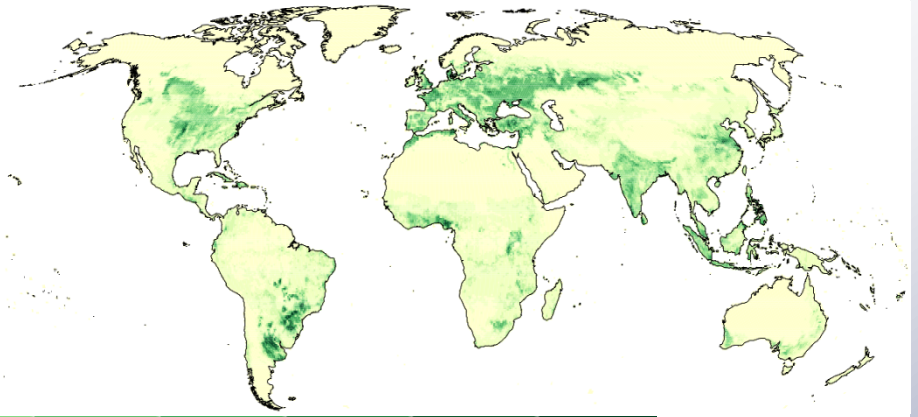
+ Exposure – April 2015

Crop growing area (average Nov-Apr, percentage of total surface area)

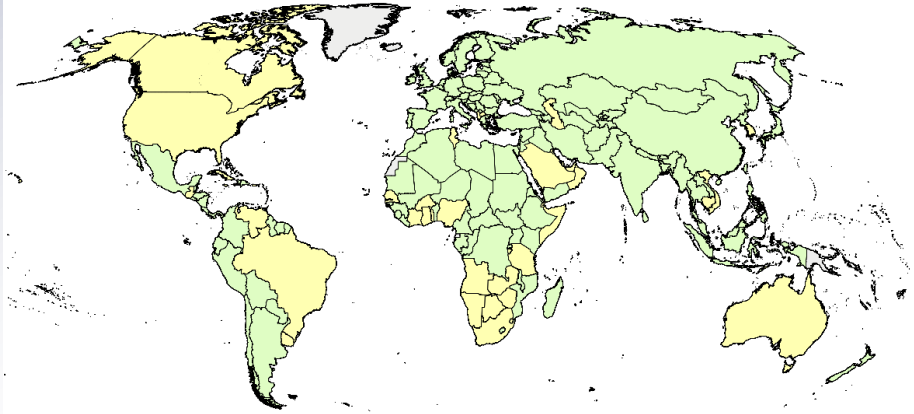
Irrigated crops



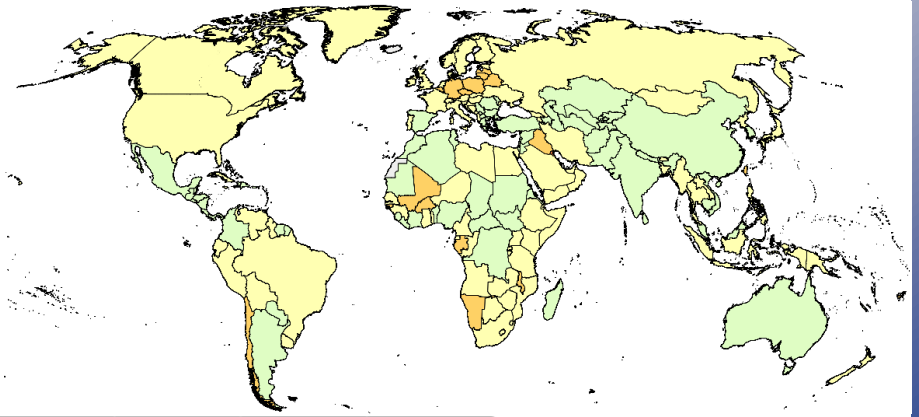
Rainfed crops



Exposure of irrigated agricultural systems



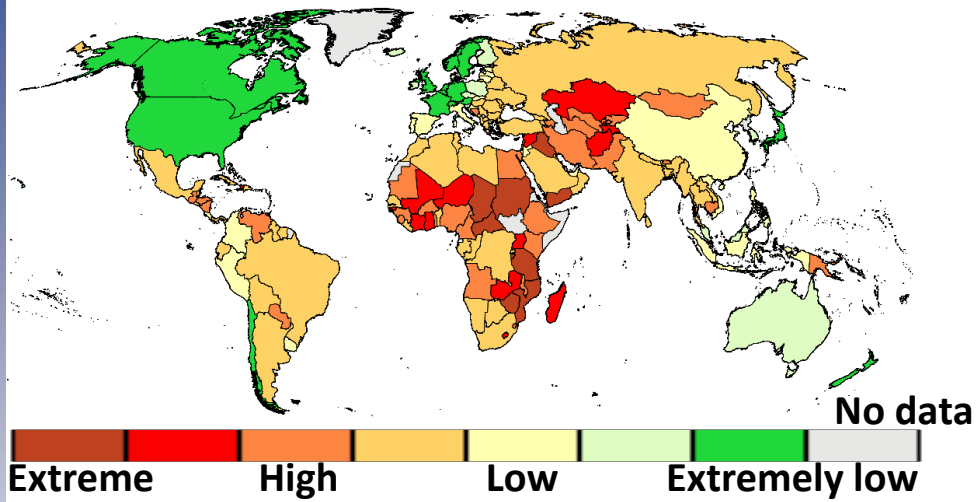
Exposure of rainfed agricultural systems

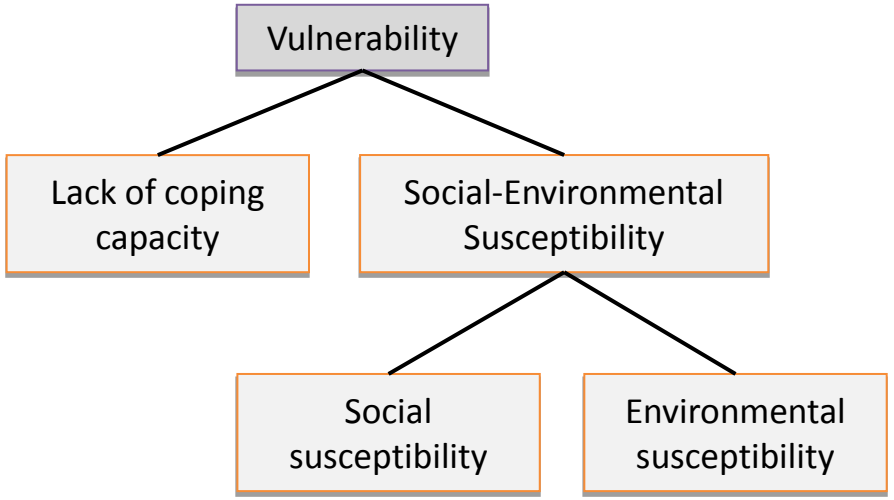


Drought risk assessment

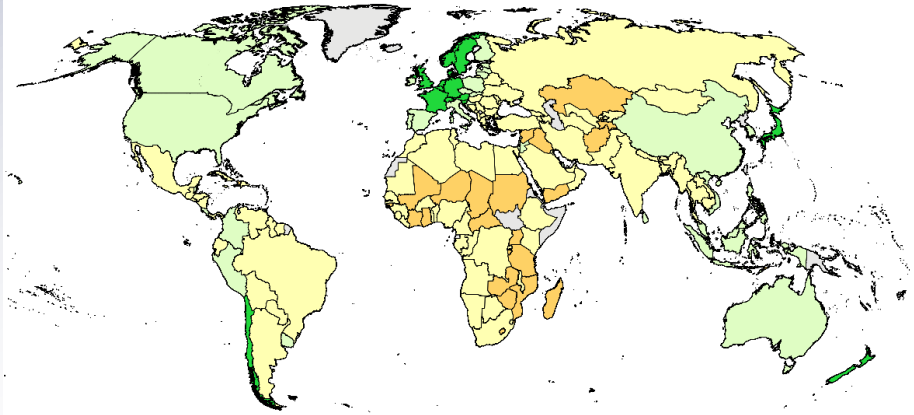
+ Vulnerability = Drought risk 2015

Vulnerability

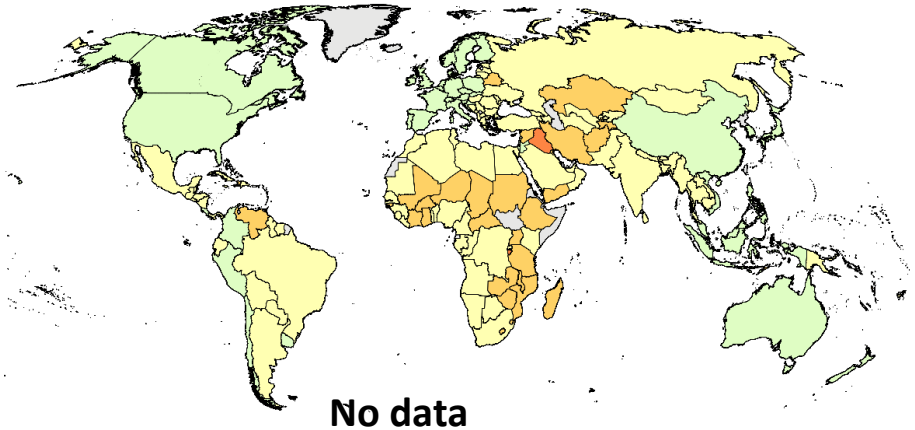




Drought risk irrigated crops



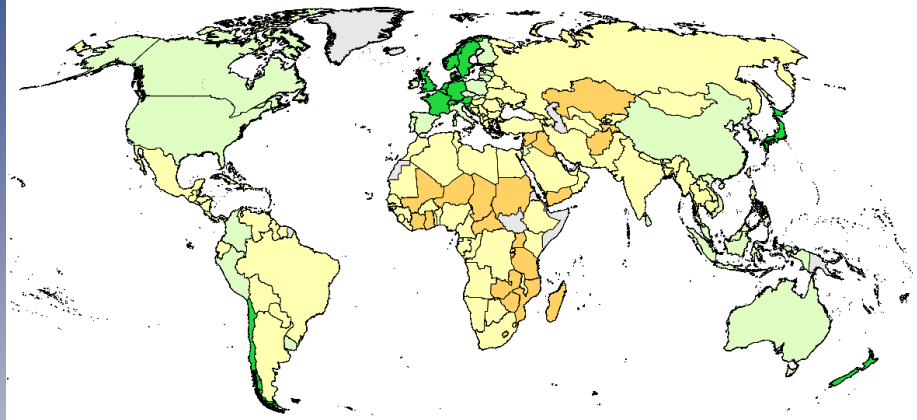
Drought risk rainfed crops



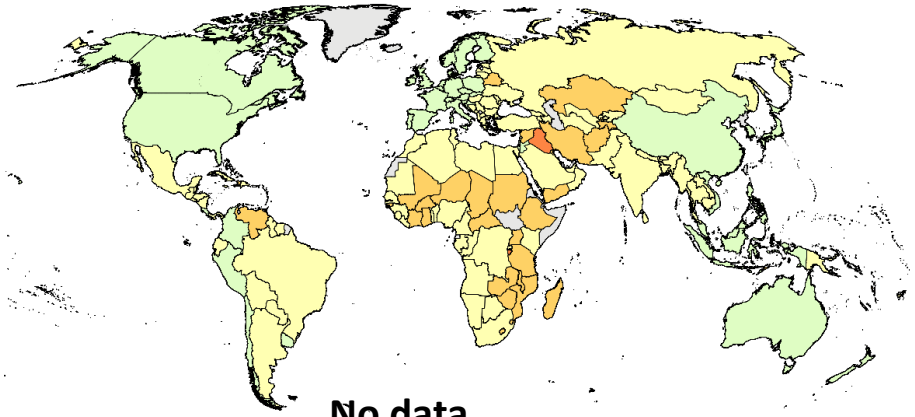
Drought risk assessment

Comparison with EMDAT

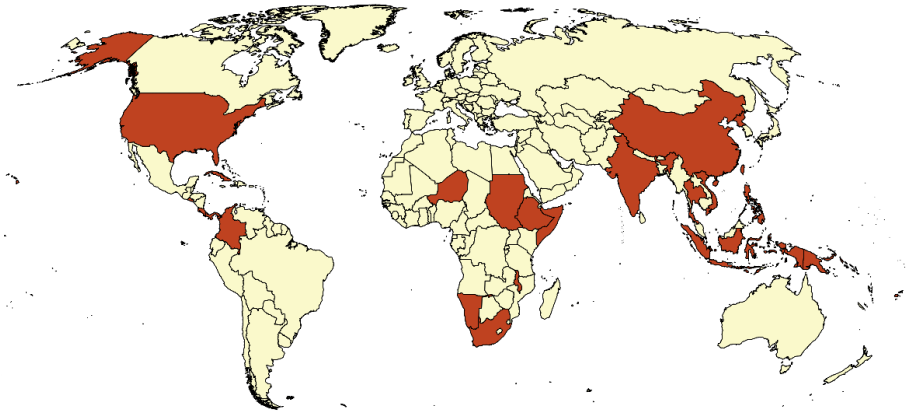
Drought risk irrigated crops, 04/2015



Drought risk rainfed crops, 04/2015



Drought occurrence in 2015 according to the international disaster database EM-DAT



=> Workflow to map drought risk established, implementation in information system ongoing

Drought risk assessment

Analysis of drought impacts

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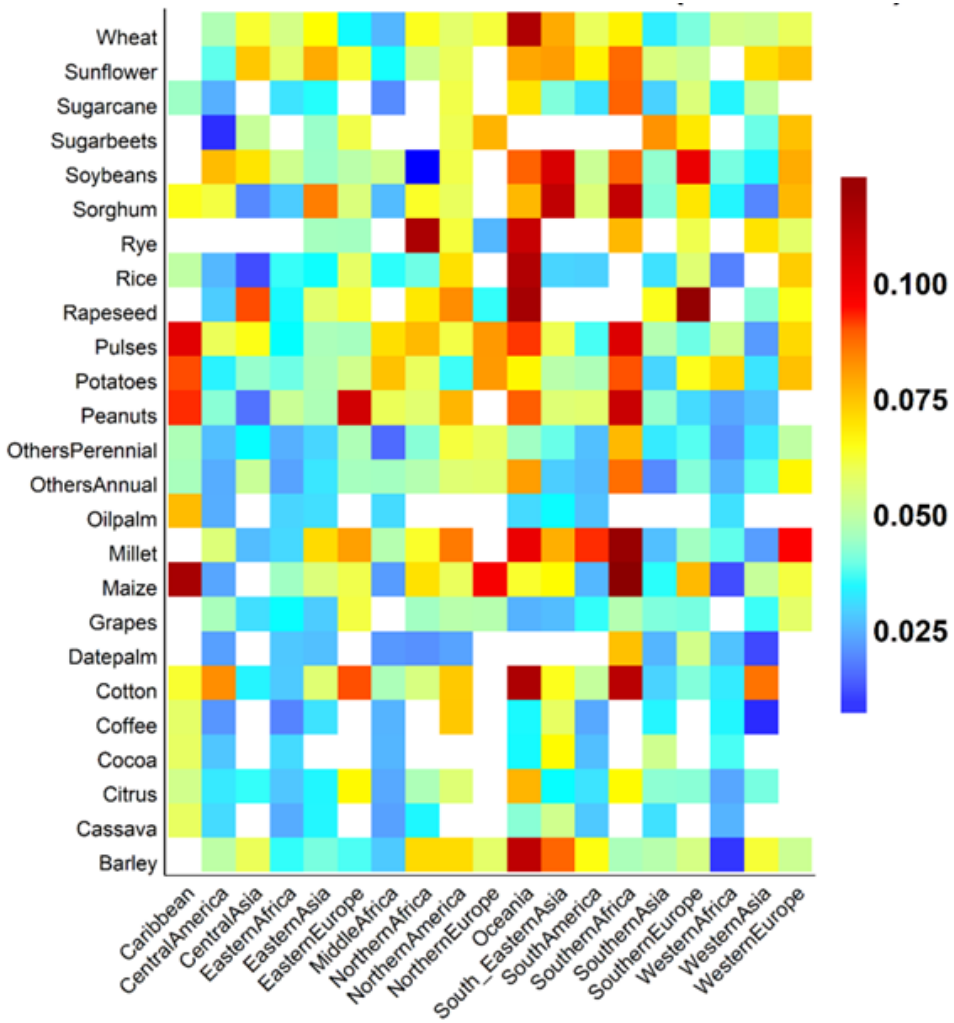
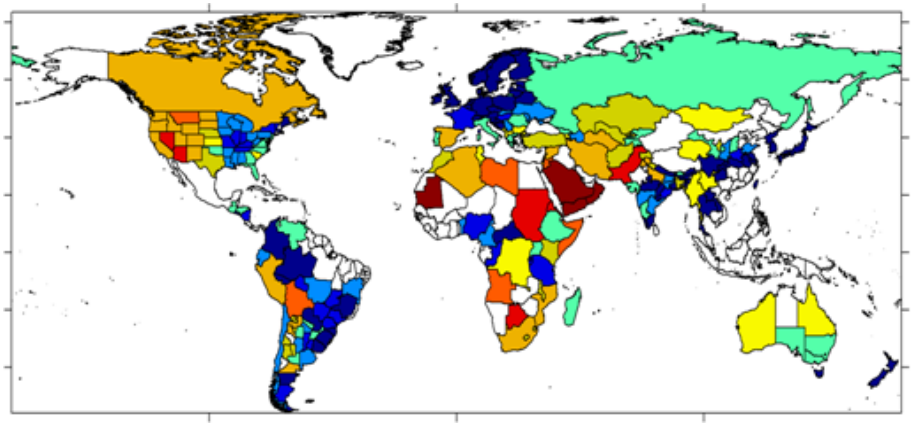
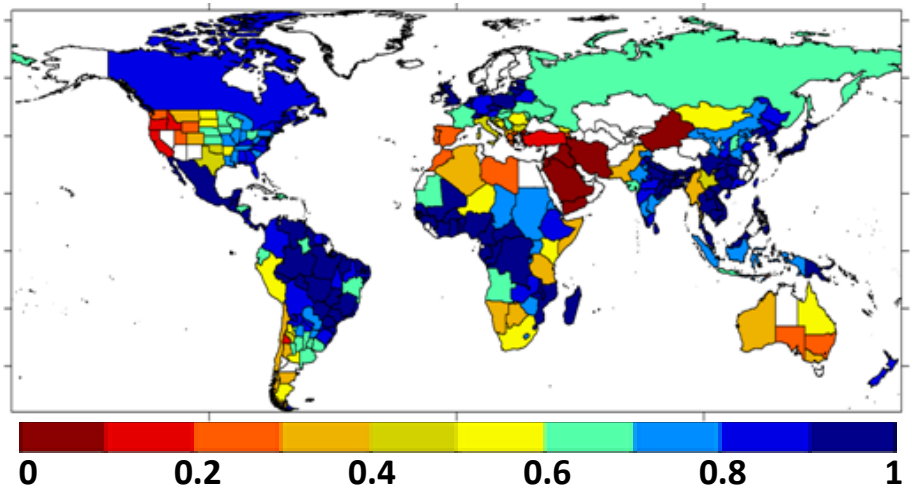
AET / PET, standard deviation, 1986-2015



AET / PET ratio – Rainfed wheat, 1985



AET / PET ratio – Rainfed maize, 1985



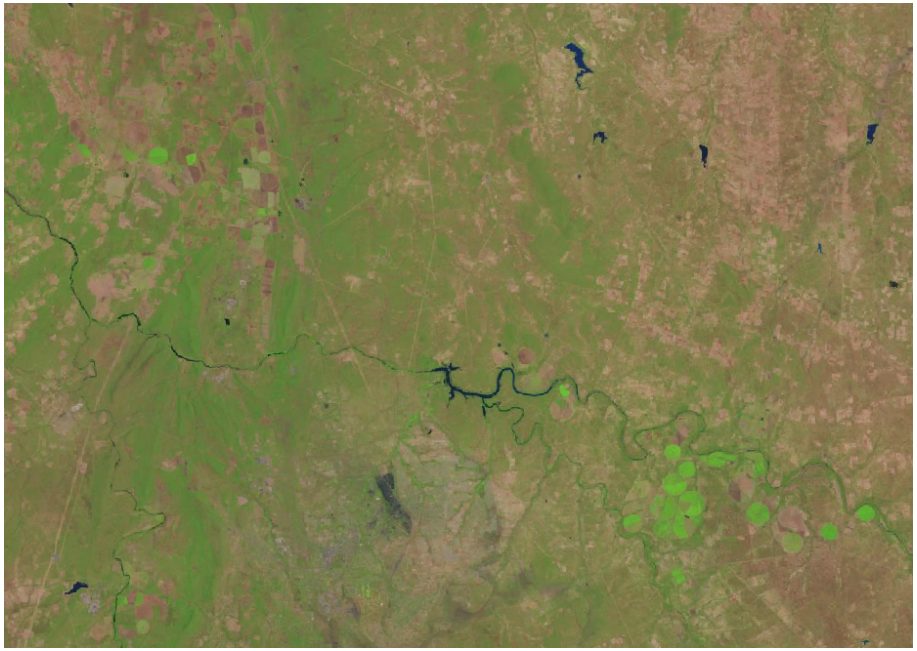
Rezaei et al., 2018; Nouri et al., under preparation

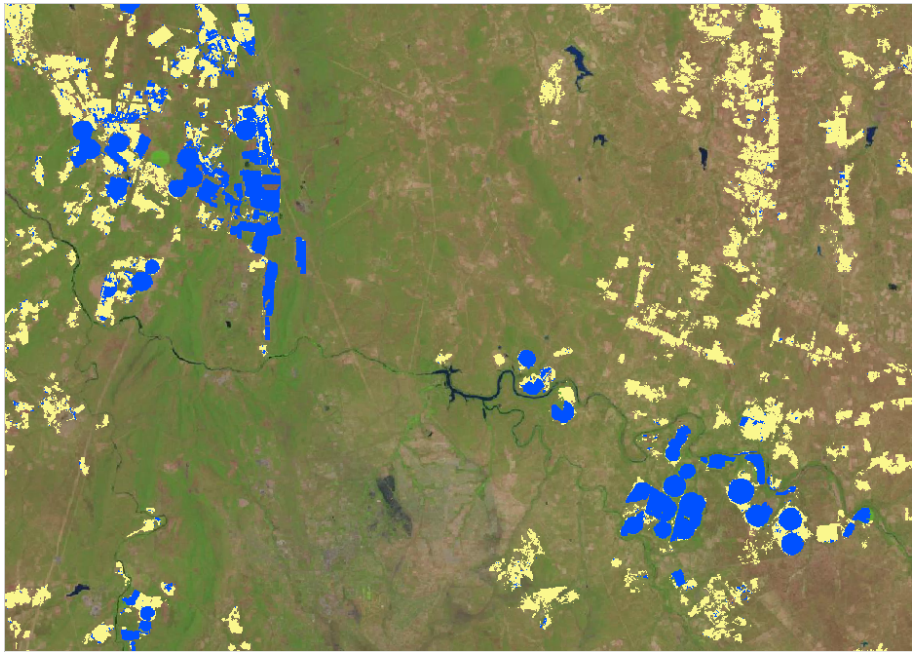
=> Crop specific drought impact assessments will be implemented into the Information System

Drought risk assessment

Regional studies – Southern Africa

Remote Sensing Solutions: Mapping of rainfed and irrigated cropland in Zimbabwe and RSA completed





Landmann et al., 2019; Landmann et al., under preparation

Rainfed crops **Irrigated crops**

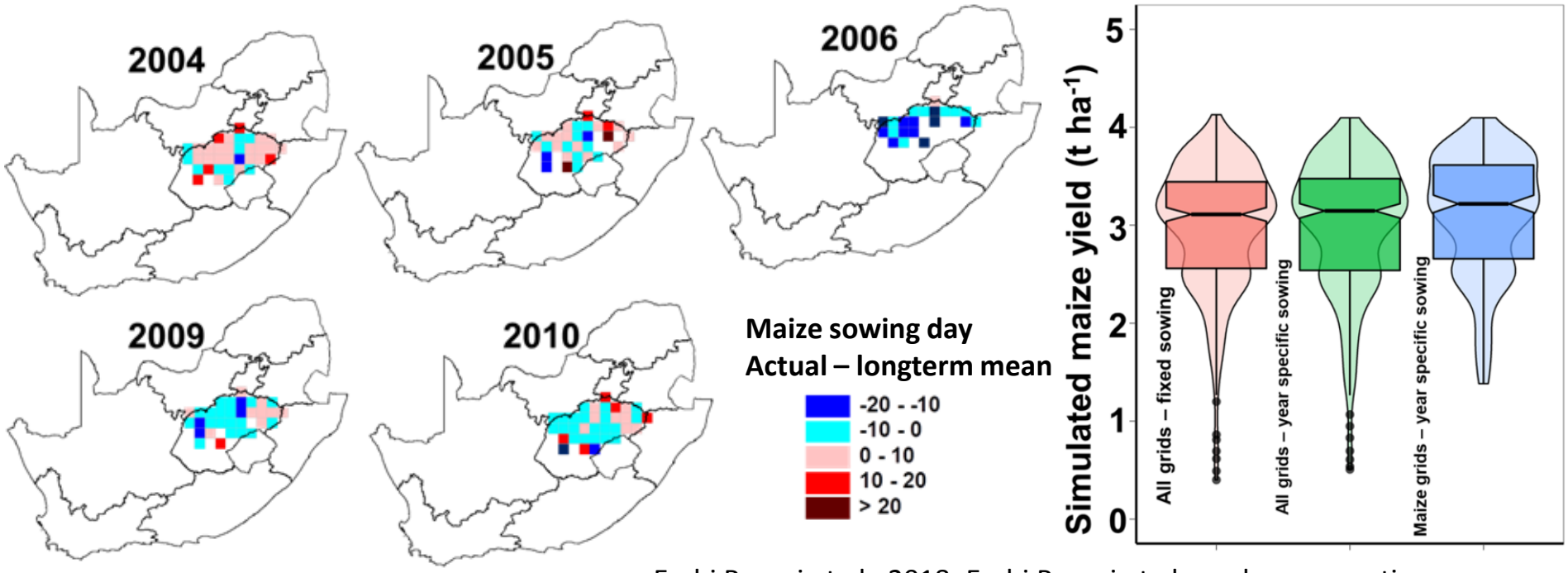
- Drought risk assessment for Southern Africa is constrained by the lack of basic information
- Global data sets are often not accurate enough for use in regional assessments
- New approach of mapping cropping systems by optimizing harmonic functions

=> Operational separation of irrigated and rainfed agricultural systems is possible

Drought risk assessment

Regional studies – Southern Africa

University of Bonn + University of Göttingen: Assimilation of remotely sensed sowing and harvest days into a regional crop growth model



Eyshi Rezaei et al., 2018; Eyshi Rezaei et al., under preparation

- Large interannual and spatial variability in crop sowing days
- Using correct sowing days is essential to simulate realistic crop yields
- Time series data not available, even not for developed regions such as Germany

=> Using time series of remotely sensed sowing days removes outliers in simulated yield

Drought risk assessment

Knowledge dissemination

GlobeDrought – characterizing and assessing drought risk and drought impacts at the global and regional level

The first introductory webinar & lecture provide a general overview of the objectives of the BMBF GroW initiative and its GlobeDrought project.
It will discuss the relevance of understanding and assessing drought risk and its sectoral impacts in order to create more resilience societies.
The leading questions are:
What is a drought, how can it be characterized, why does it matter globally (past events & impacts, future outlook), what is drought risk, what are key components, why do we need to understand and assess drought risk?

26 FEB 2019

SIGN IN

Droughts and the post-2015 agenda

While hazards are inevitable, and the elimination of all risk is impossible, there are many technical measures, traditional practices, and public experience that can reduce the extent or severity of economic and social disasters. In this webinar we will explore how International Organizations are dealing with Drought and how drought is managed and addressed according with the main frameworks: Sendai Framework for Disaster Risk Reduction 2015-2030; , SDGs and Paris Agreement .

18 MAY 2020

SIGN IN

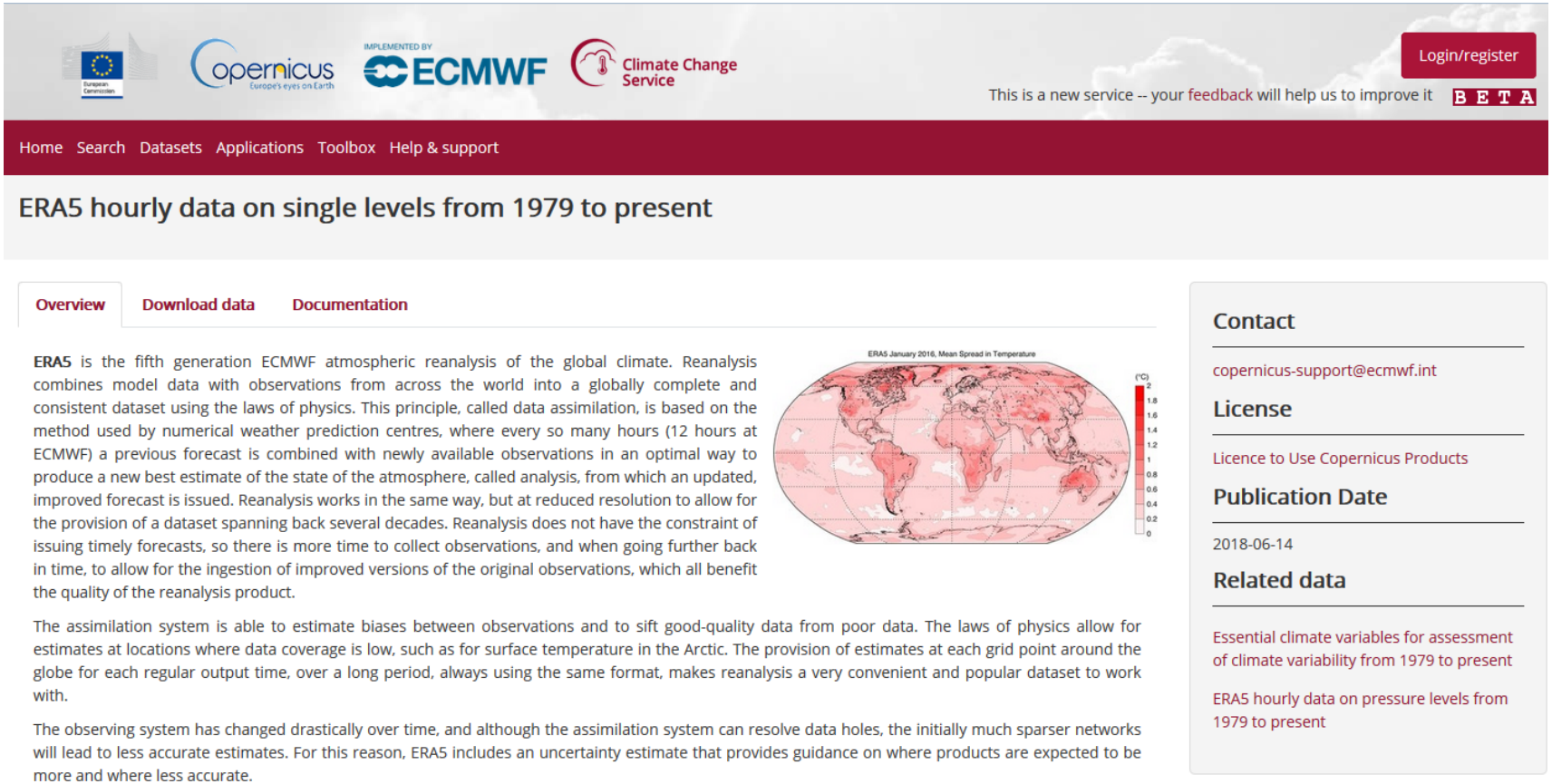
https://grow-globedrought.net/webinars/

=> 12 learning blocks comprising of an online lecture and a webinar scheduled for period February 2019 to May 2020

Way forward

Setup of the Early Warning System

Climate data processing to provide near real time drought information and forecasts



=> Selection of required variables, download, spatial + temporal aggregation of the data, formatting to fit to model requirements is ongoing, NRT information expected in 12/2019

Road map

Project start: 08/2017

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Co-design workshop

05/2018

- Selection of project regions, establishing collaboration with stakeholders
- Selection of appropriate drought risk indicators
- Design of the drought information system

Validation workshop

09/2019

- Validating the results of global and regional drought risk analyses
- Reviewing technical, institutional and functional requirements of the drought information system
- Development of the curriculum of training courses for users of the system

Capacity building workshop

04/2020

- End users, decision makers: hands on seminars how to use the information system
- Academic staff: how to integrate drought information into teaching
- NGOs, community: participative involvement of user communities, training of trainers, linking up with complementary information systems

Project end: 09/2020