

Operational agro-climatic data products for the agriculture & food sector in Africa

Bringing 'Communities' and 'Sensors' together

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Hendrik Boogaard, Karianne de Bruin and others



Currently..

- Access to weather information and forecasting services challenge for family farmers
- Farmers rely on traditional knowledge to know when and where to plant crops
- Weather Information Services & forecasting may help to adapt to climate variability



Agricultural response options

Weather Hourly, days to weeks	Daily management Sowing, harvesting Irrigation and fertilizers Pest control	Farmers Individuals; Cooperative; (multi national), Industrial
Climate variability Months to years S2D – Seasonal to decadal forecasting	Systemic change Alternative crops Labour planning Store up irrigation reservoirs	Agricultural administration Tax/subsidy planning Insurance /Commodity traders
Climate change Decades (or longer) CC projections	Transformational changes Relocation farming Capital investments	Agricultural policy

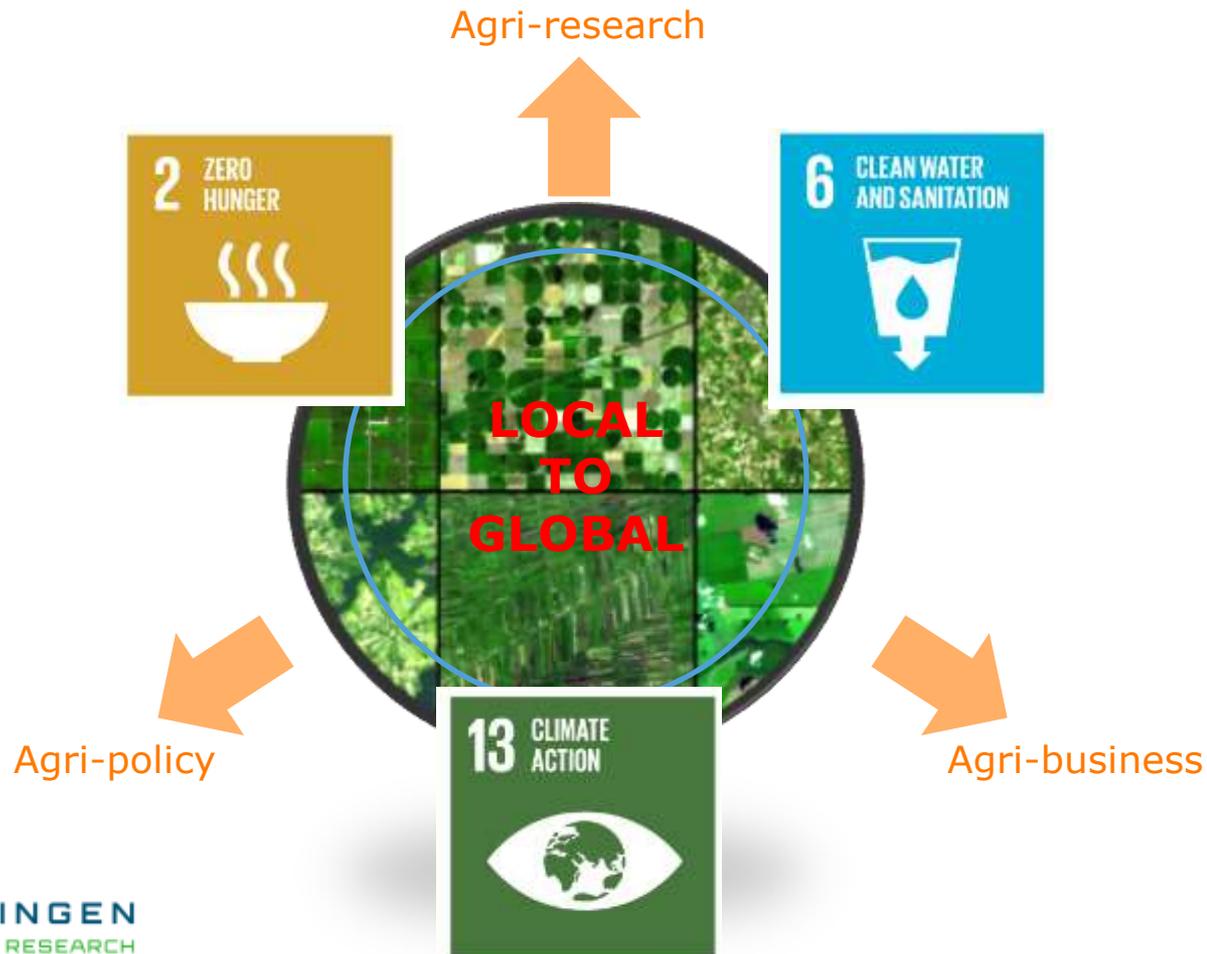
NWP

S2D

CC

Climate robust agriculture

Informed, anticipatory crop management to improve climate resilience of stakeholders across all scales



Copernicus Climate Change Service



Climate Indicators for Agriculture



Maps & graphs

Guidance

Showcases

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PROOF OF CONCEPT

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Maps & graphs

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Guidance

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Showcases

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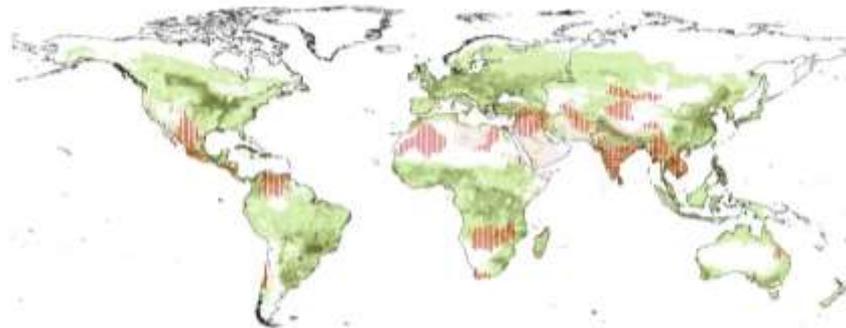
Towards operational agro-climatic data products

- **User engagement:** Requirements for decisions in an uncertain climate future through user champions
CIMMYT (CGIAR), JRC, GRO Intelligence (Kenya)
- **Co-design of service:** State of the art EO technologies combined with crop modelling
- **Potential downstream use:** Business plan for continuation of the service



Delivery of meaningful crop status indicators based on Copernicus assets

Climate derived indicators (bio-climatic)	Growing degree days, cold/heat stress days, ... All time scales, NRT and S2D
Climate enhanced EO based crop indicators	Dry matter productivity, Actual Evapotranspiration Historic and NRT
Water related indicators	Soil moisture, Groundwater recharge, Evapotranspiration Historic + seasonal forecasting



Climate Indicators for Agriculture

Indicator selector legend

1 Theme

- Climate derived indicators
- Climate augmented EO indicators
- Water related indicators

2 Indicator

<please select>

3 Time horizon

<please select>

4 Crop mask (current cropping areas)

<please select>

Themes group indicators

- 'weather and climate' include rainfall, temperature, etc., bioclimatic indicators (FD, HWD, CWD, CDD, etc.), crop indicators (GDD, VND, etc.)
- EO indicators, includes Dry Matter Productivity, actual EvapoTranspiration, 'Water' include soil moisture and water stress

Select indicator from the theme

- May concern historical, current (near real time) and future (forecasts)
- Different calculations, e.g. monthly mean, daily min, Long Term Average

Select time horizon for the indicator

- Historic (last year and further back in time)
- Real time (present and current growing season)
- Seasonal forecast (coming 7 months)
- Climate projection (up to coming 100 years). MIND: requires 'model' and 'scenario' selection

Optionally select a crop

- Crops include: wheat, maize, soy beans, rice and potato, etc. (major staple crops first)
- Can mask an indicator for aggregate statistics (based on global crop maps / cropping calendar)
- Can further specify the indicator, e.g. 'sum per (phase of) growing season'

View map

Download
(.netcdf)

Africa Bioclimatic indicators

Climate Indicators for Agriculture



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Guidance

Showcases

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- Climate derived indicators
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- Water related indicators

2 Crop Indicator

Temperature sum 1 (Anthesis)

3 Time horizon

Climate Projections

4 Crop mask (current cropping areas)

Maize

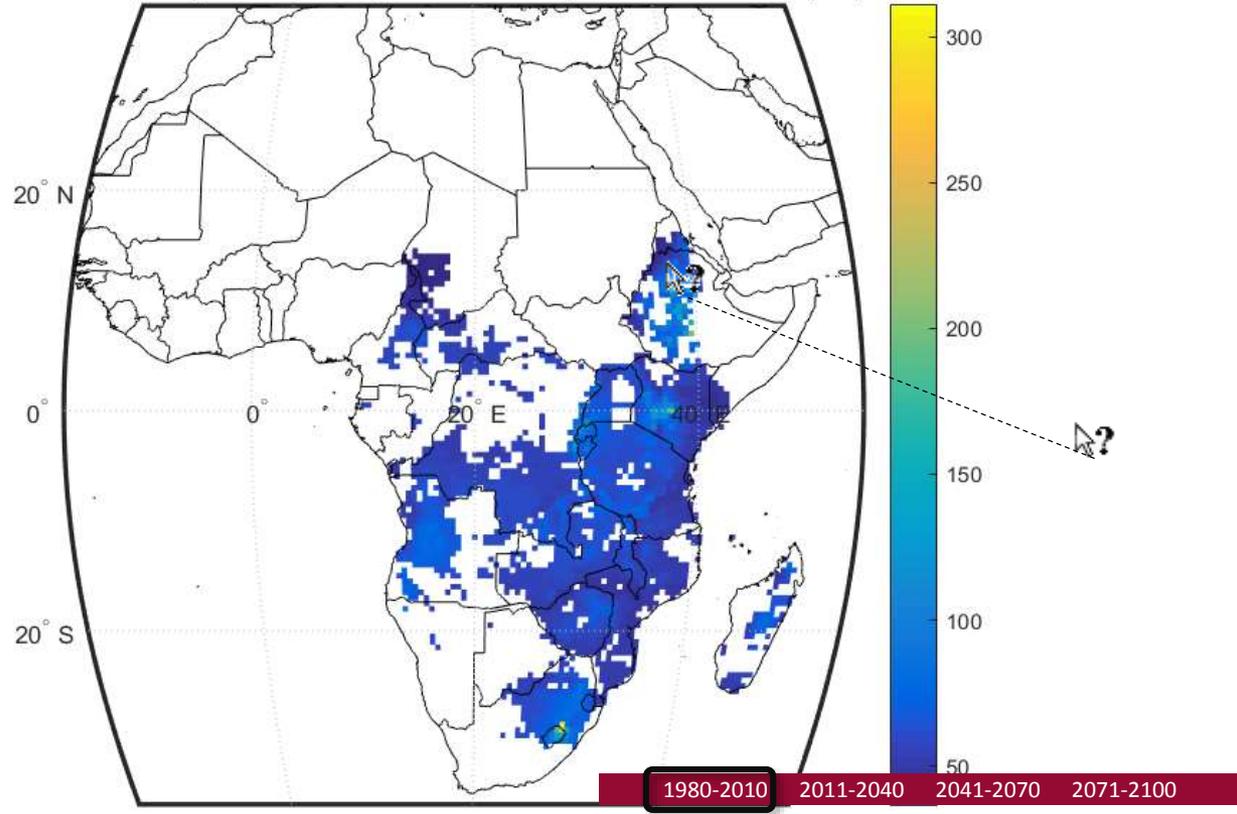
5 Meteo indicator for period

Temperature

6 Show statistics

Yes / No

Africa, long season Maize, historic mean period till Anthesis (920)



Africa Bioclimatic indicators

Climate Indicators for Agriculture



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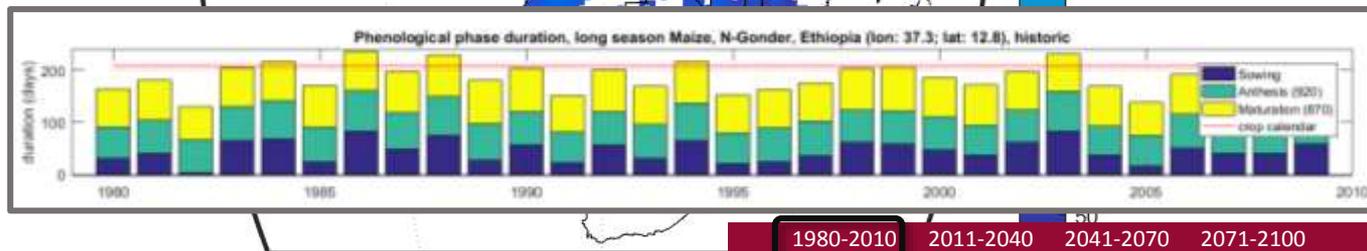
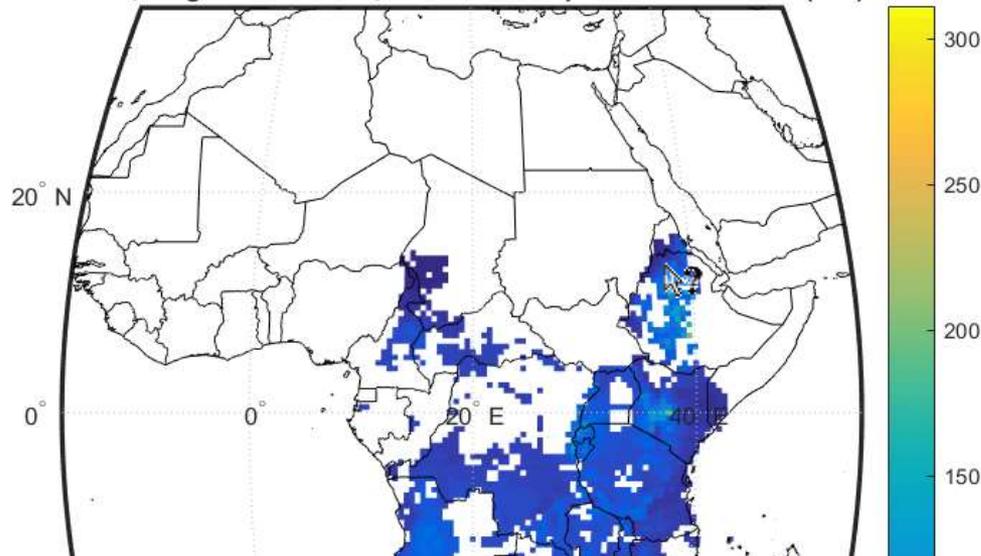
Temperature

Precipitation

6 Show statistics

Yes / No

Africa, long season Maize, historic mean period till Anthesis (920)



1980-2010

2011-2040

2041-2070

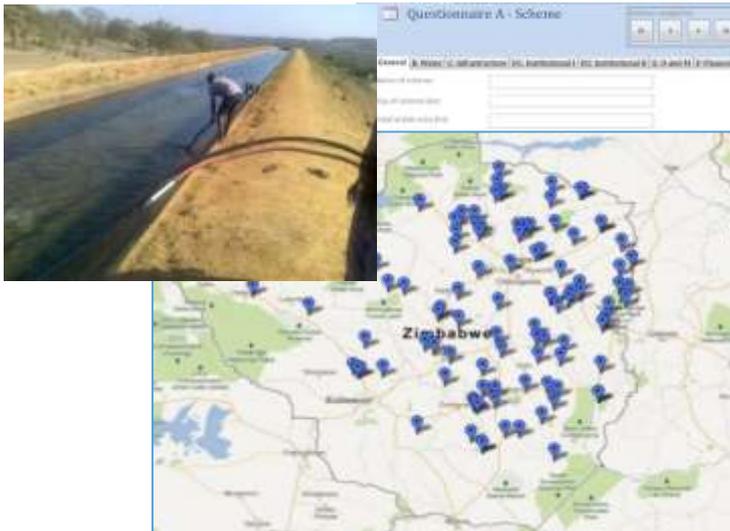
2071-2100

Weather/climate and local agriculture (Africa project experiences)

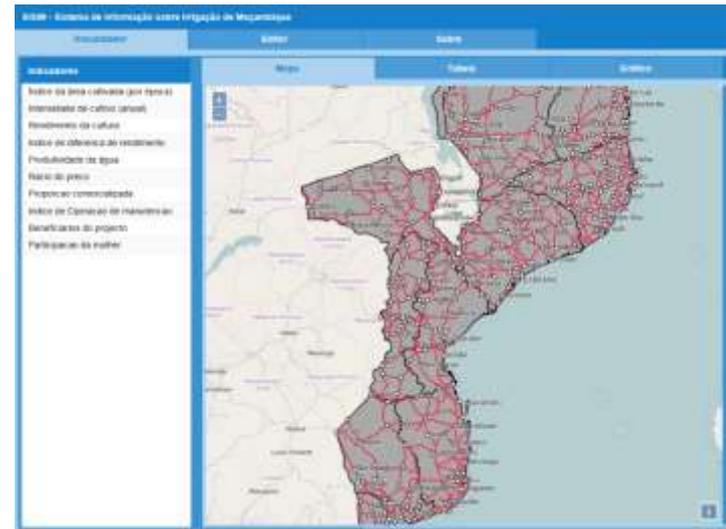
- Worldbank - Zimbabwe, Mozambique (irrigation monitoring)
- JPI Water South Africa
- Seasonal forecasting E-Africa (EUPORIAS)
- Capacity building E-Africa
- CCAFS climate smart agriculture
- Water Apps Ghana



Irrigation performance – World Bank projects Zimbabwe & Mozambique



Determinants productivity irrigation
Zimbabwe



Sustainable irrigation development
Mozambique

Improve irrigation performance:

- Difficulty in articulating needs
- Uncertainty how to use climate data in crop decisions
- Infrastructure and management should match information service

Climate change adaptation in wine production

Western Cape (JPI Water)

- Warming and drying Western Cape may threaten wineries with persistent drought
- Combining soil sensors, weather data and RS for irrigation scheduling

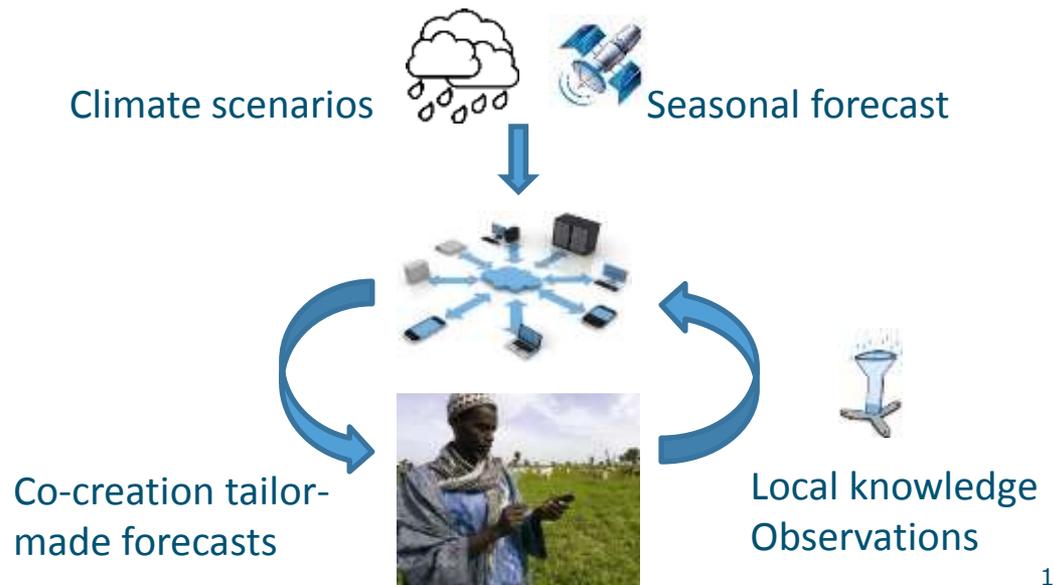


Water Apps Ghana

Long Hoang, Erik van Slobbe, Fulco Ludwig, Saskia Werners, ..



- Interactive app for farmers to manage crop production by forecasting water availability and extreme weather
- Co-creation of water information services
- Combine state-of-the-art modelling and local knowledge
- Revenue model



Conclusions / key messages



Key messages / way forward

- We cannot influence the weather ... but we can improve quality and access of information for farming
- Tailored services: bridging gap between scale and lead-time farmers need and information available
- Legitimacy: effective voice farming community in design and delivery of services
- Continuity: connecting services to existing communication lines so that revenue models exist that ensure continuity
- Opportunities: e.g. Copernicus



Thank you

More information:

<https://climate.copernicus.eu/>

<https://ccaafs.cgiar.org/climate-smart-agriculture>

