



Food and Agriculture Organization
of the United Nations

WaPOR

FAO's portal to monitor Water
Productivity through Open-access
of Remotely sensed derived data

Improving water productivity in agriculture, from satellites to fields

Living Planet Symposium | Bonn | 24 May 2022
Livia Peiser, FAO

with Mohamed Gareeb Alla AbdAlla, Ahmed Helmi, Naglaa El Bendary, Sajid Pareeth,
Abebe Chukalla, Virginie Gillet, Ashraf Ghanem, Mohamed El-Gamal (Cairo University,
HRC Sudan, IHE Delft, MetaMeta, FAO)



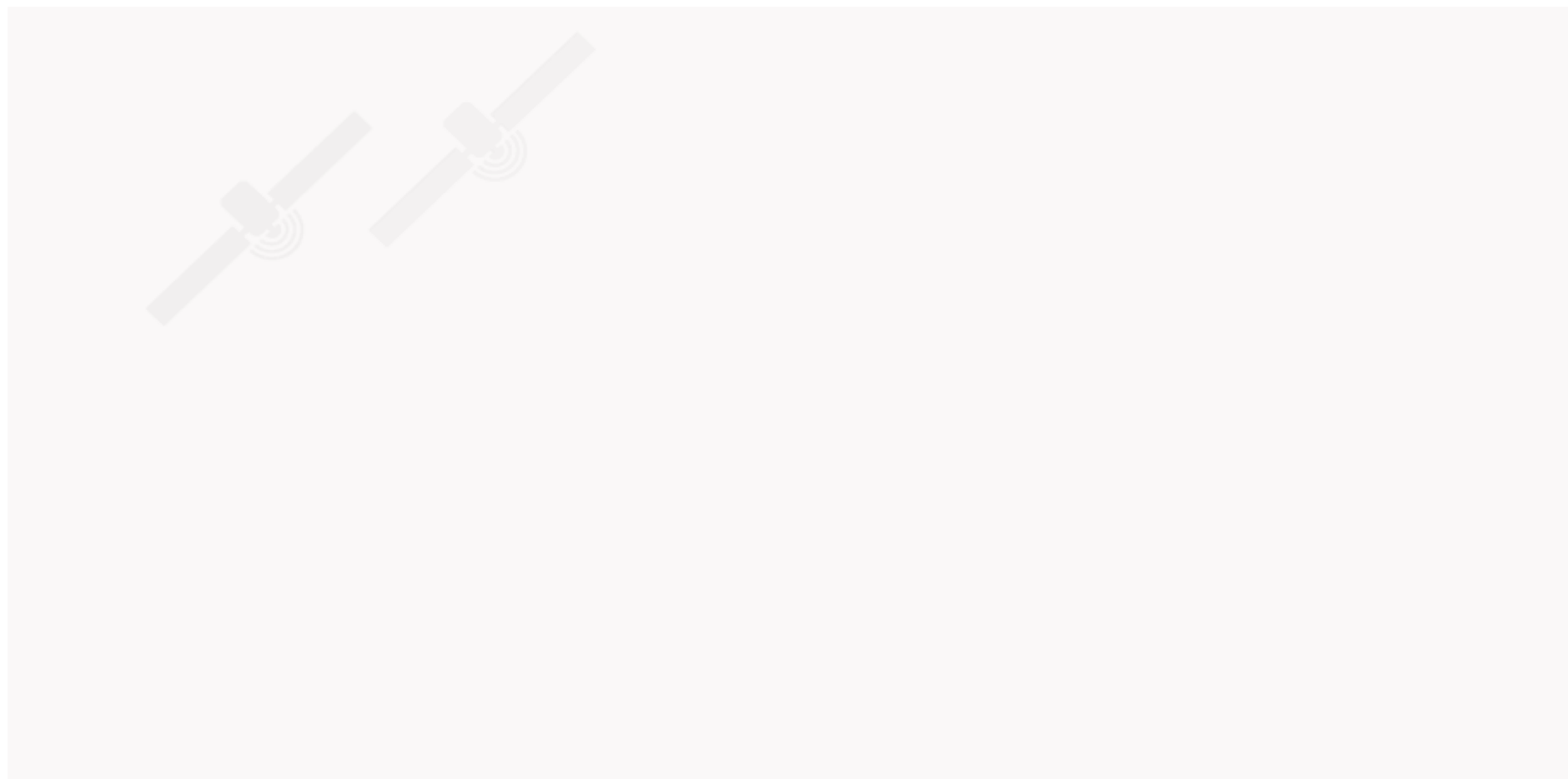
Ministry of Foreign Affairs of the
Netherlands



IHE
DELFT



Improving water productivity from satellite to field

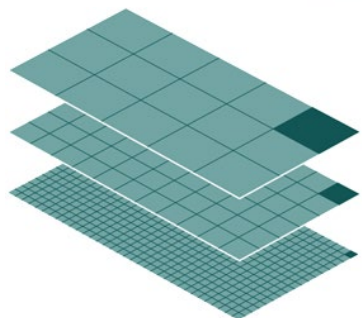


Ramadan Breakfast in Wad Medani, Sudan



Ramadan Breakfast in Wad Medani, Sudan

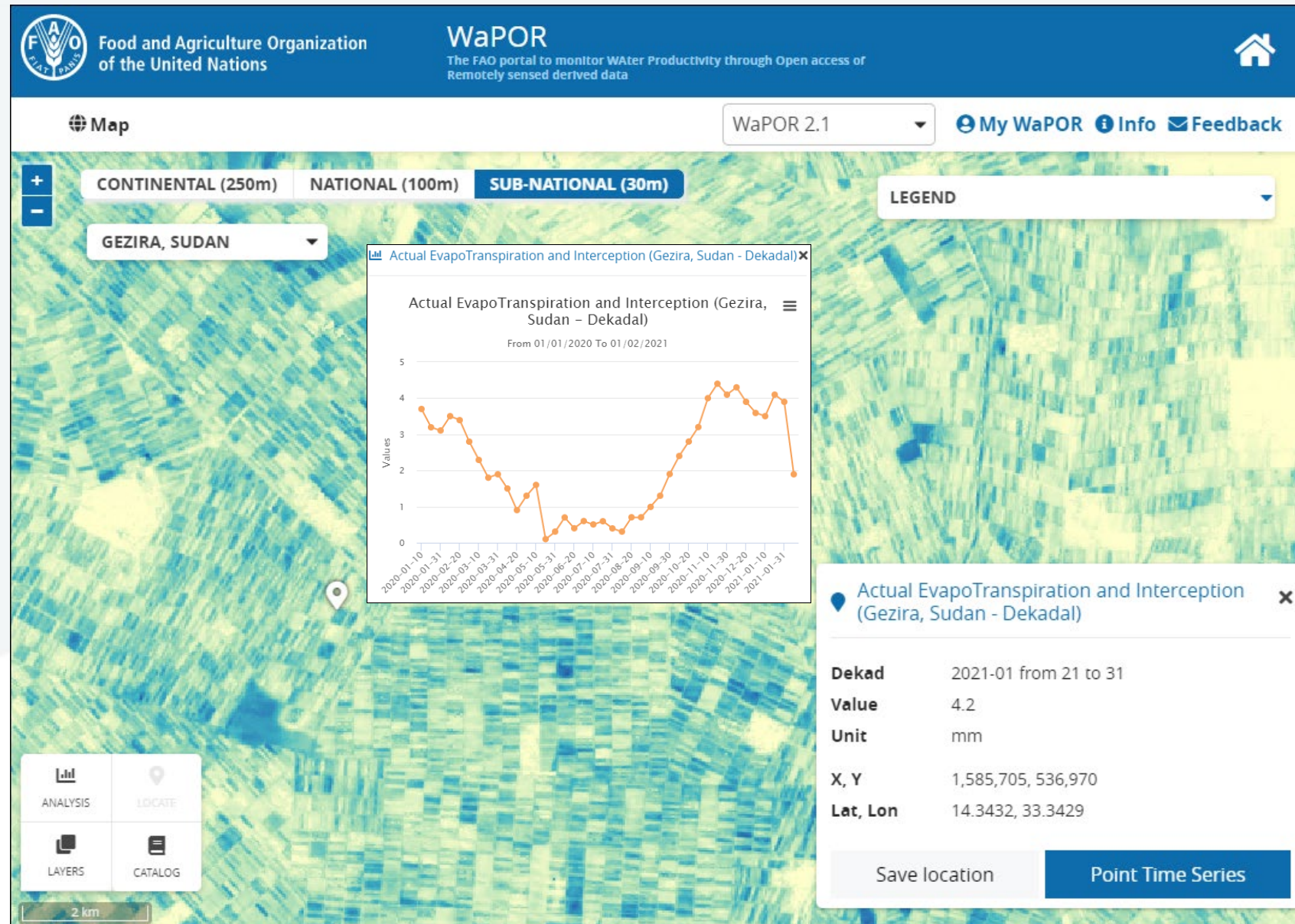
- In collaboration with HRC: analysis of performance of irrigation system highlights practices that are more conducive to higher water productivity;
- Data resolution (30 m) allows for monitoring of crop water consumption at field level and by crop type;

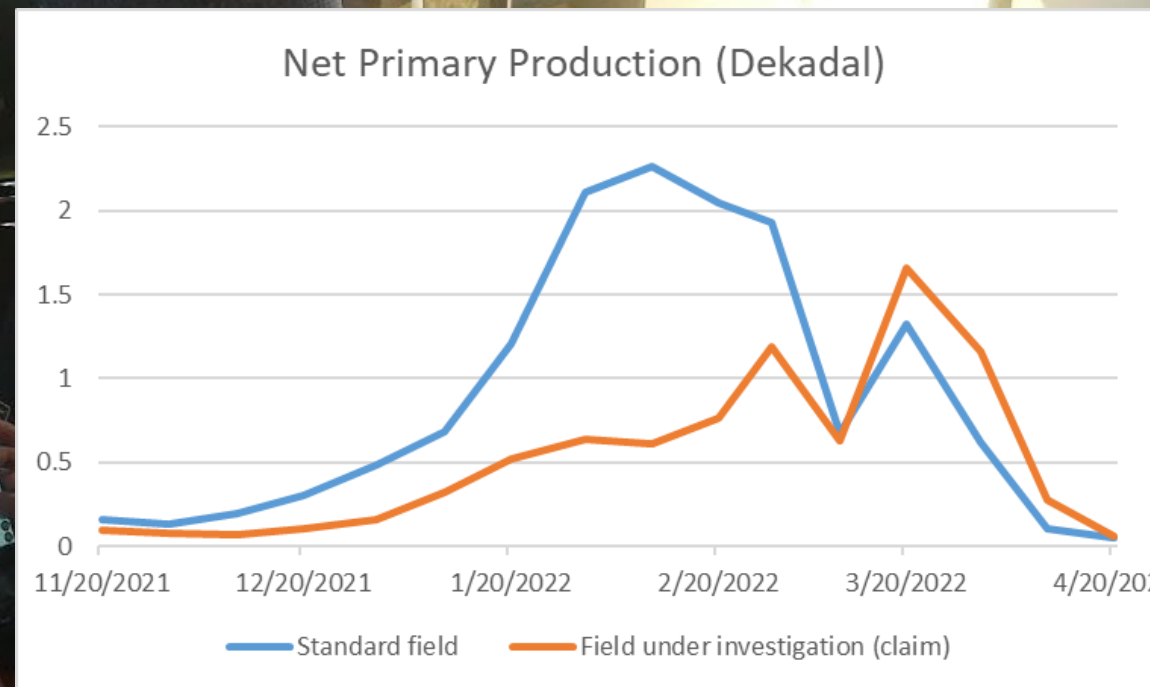
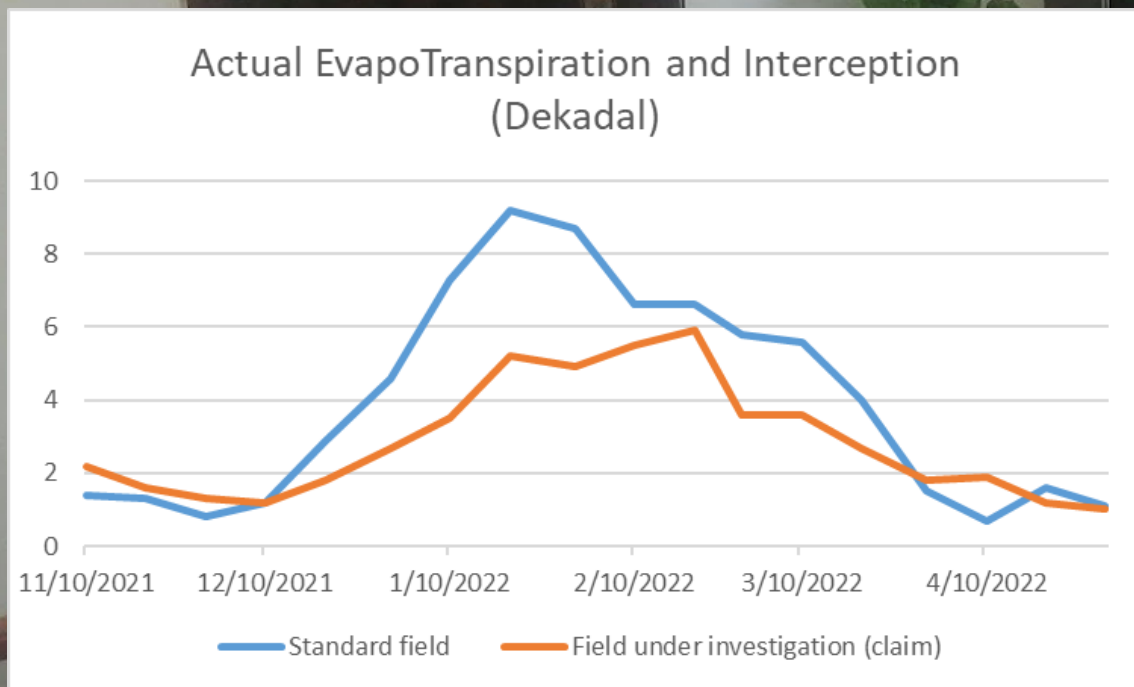


250m

100m

30m





National policies: sugar production in Egypt

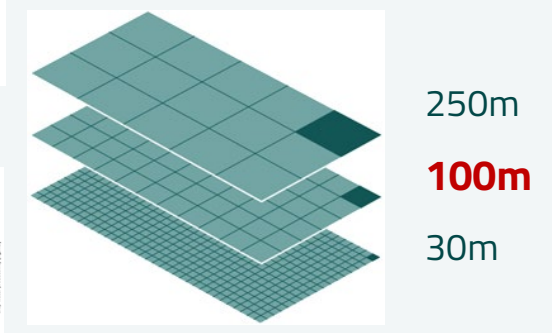
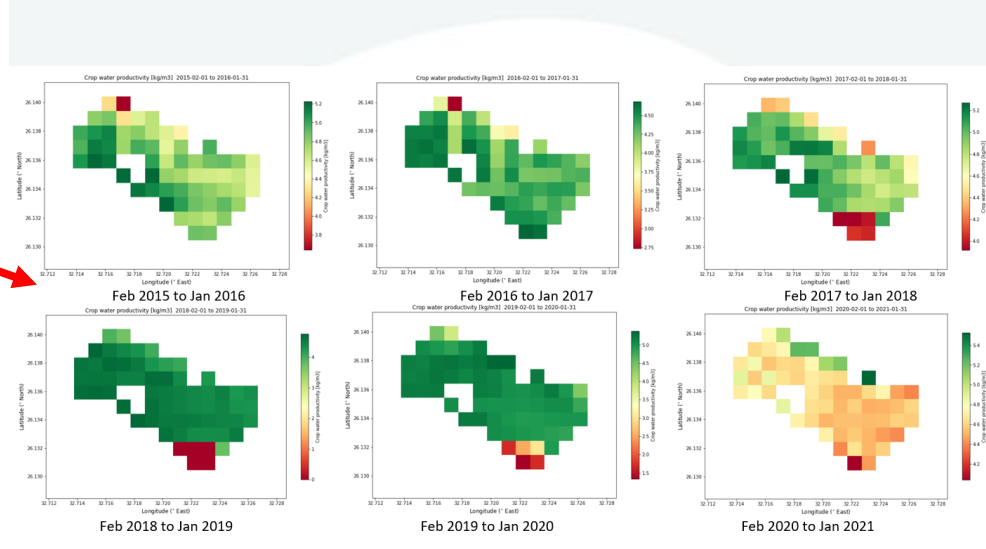
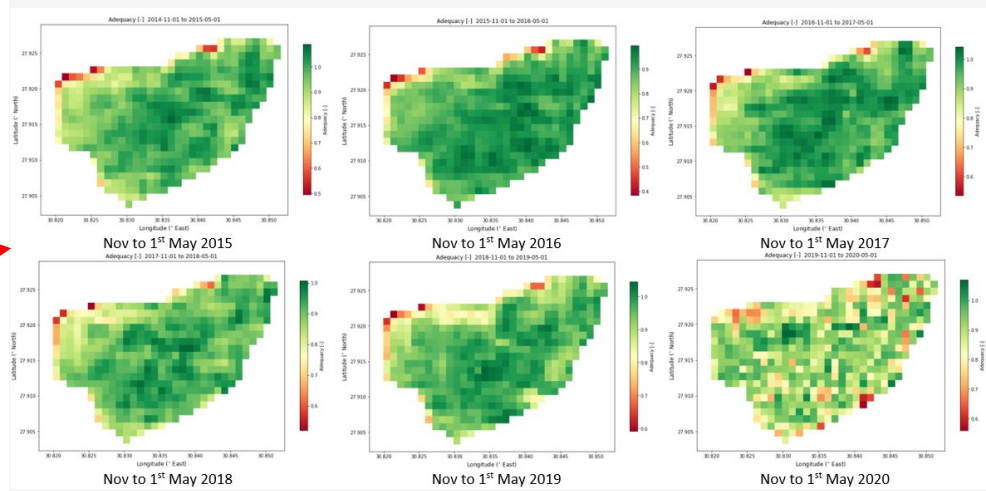
SUGARCANE



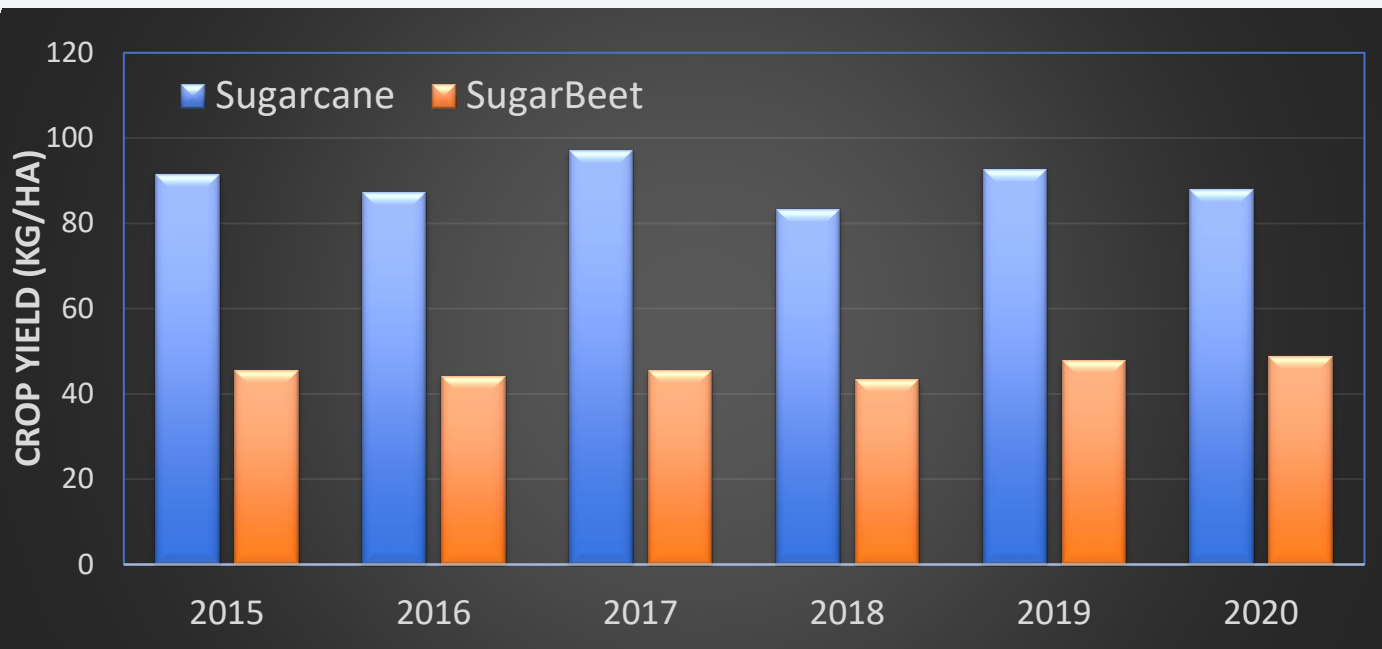
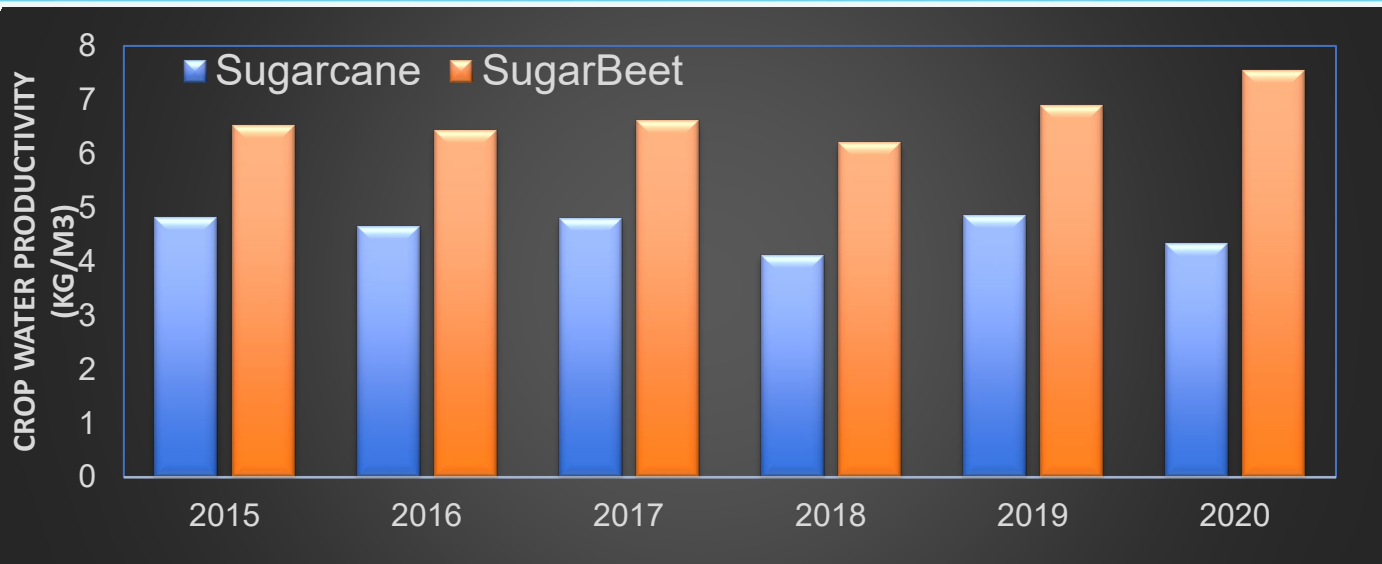
SUGARBEET



National policies: sugar production in Egypt



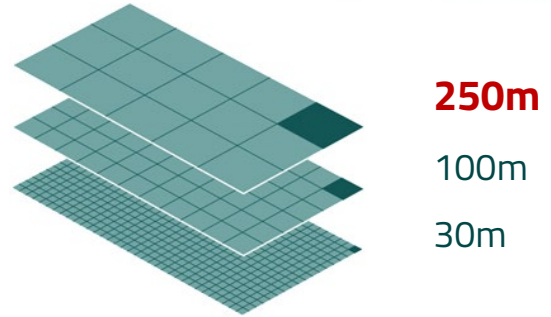
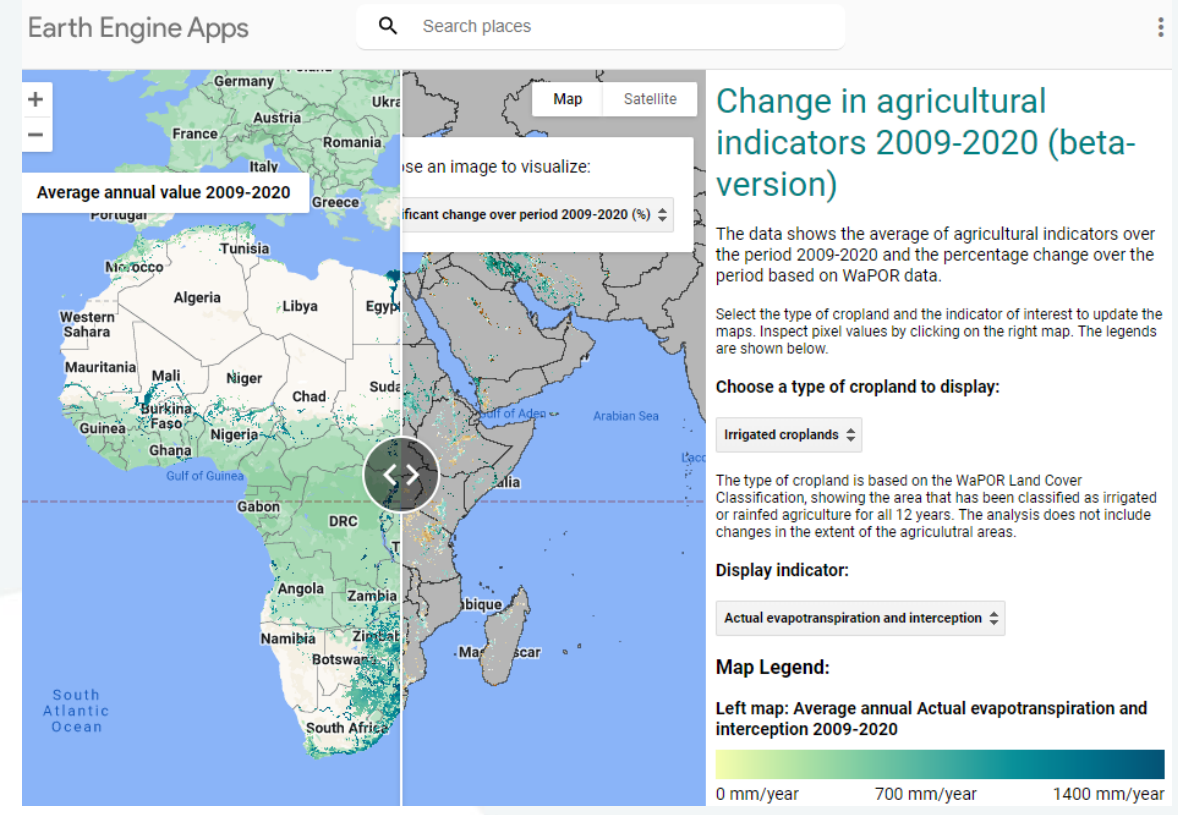
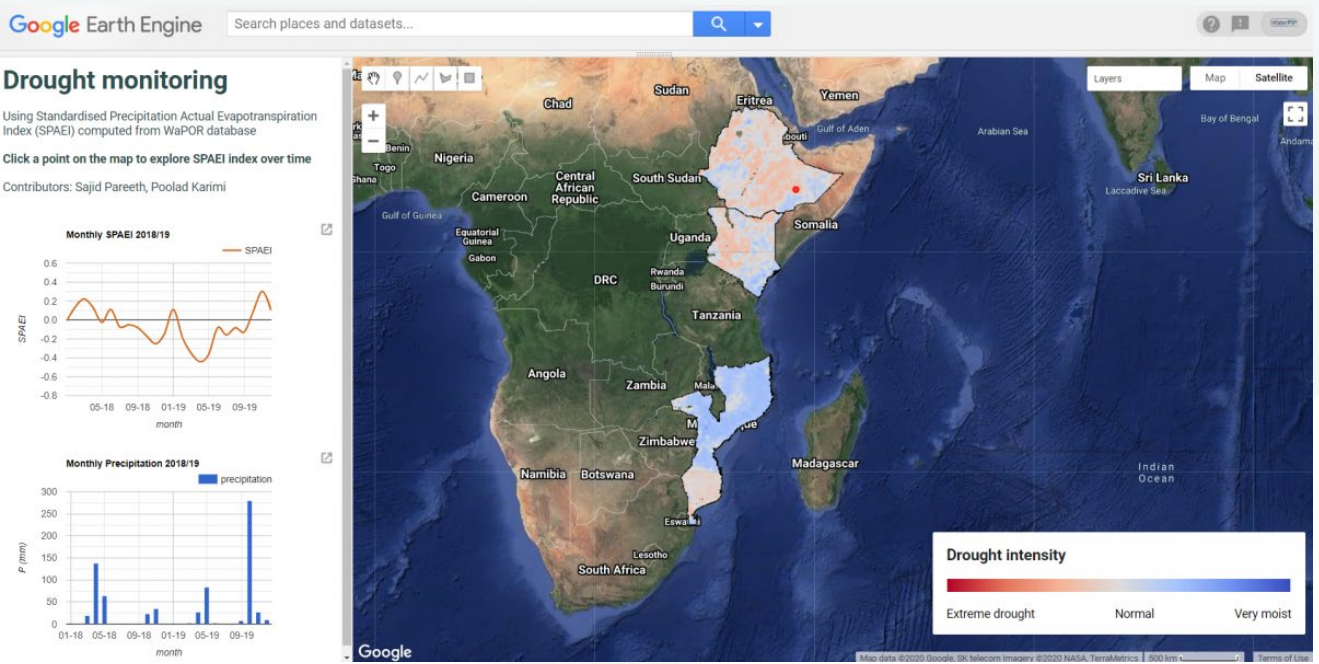
National policies: sugar production in Egypt



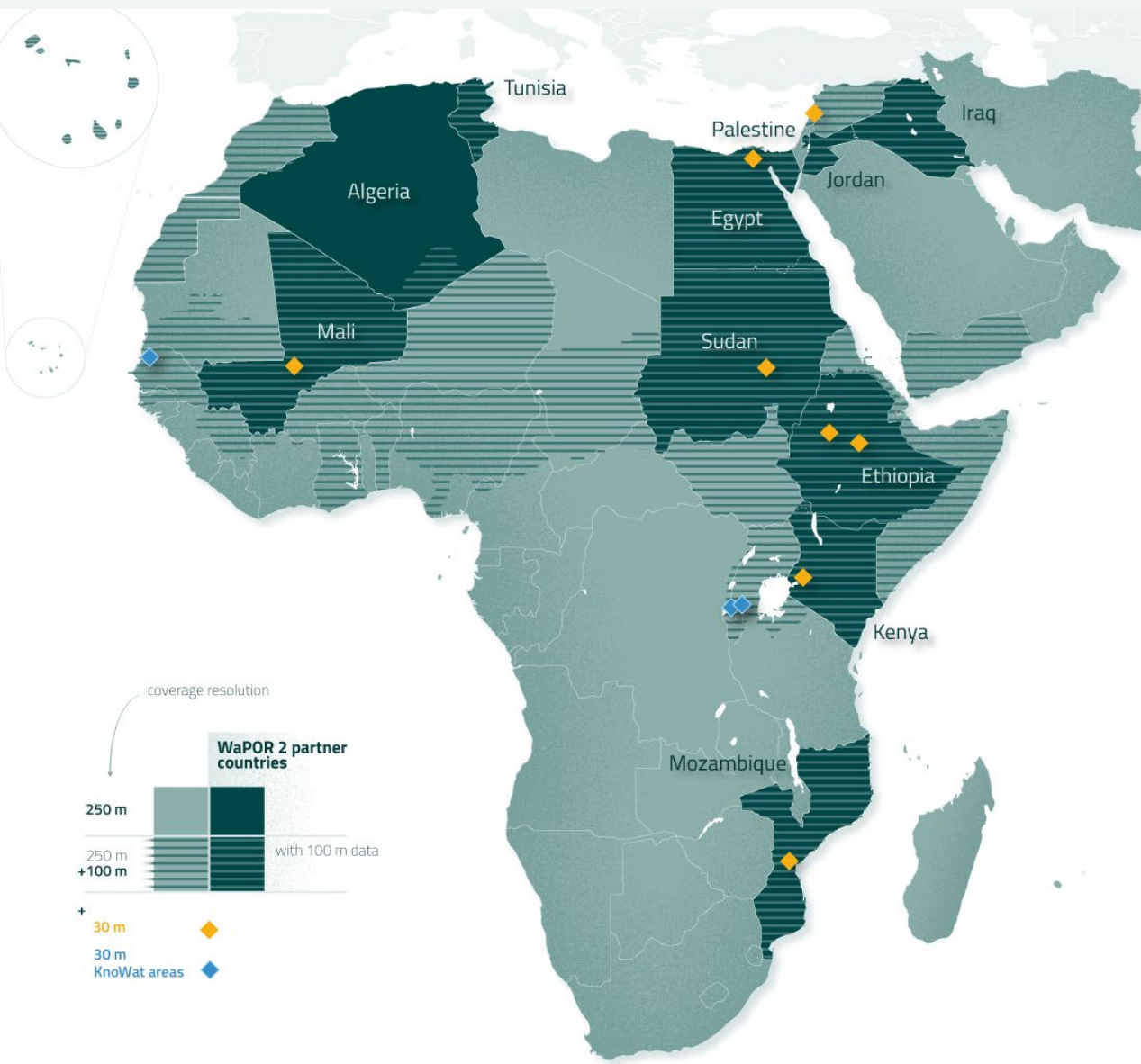
- Water productivity of sugar beet is on average higher, with lower yields than sugarcane
- but sugar content in SB is also higher
- SB cultivated for shorter period and in winter, lower crop water requirements
- Other considerations: labour and other inputs, market, etc

WaterPIP

Water Productivity Improvement in Practice



- Continental applications include: drought impact, water and agriculture indicators
- SDG 6.4 disaggregation and others, promising but need for global data for SDG methodology uptake



Data components	Level ¹ 1 (~250m)	Level 2 (~100m)	Level 3 (~30m)	Remarks
Water productivity (WP)	Annual ²	Dekadal ³ / Seasonal ⁴	Dekadal/ Seasonal	Level specific calculations
Evaporation (E)	Dekadal/ Annual	Dekadal/ Annual	Dekadal/ Annual	
Transpiration (T)	Dekadal/ Annual	Dekadal/ Annual	Dekadal/ Annual	
Interception (I)	Dekadal/ Annual	Dekadal/ Annual	Dekadal/ Annual	
Actual evapotranspiration and interception (ETIa)	Dekadal/ Annual	Dekadal/ Annual	Dekadal/ Annual	
Net primary production (NPP)	Dekadal	Dekadal	Dekadal	
Total biomass production (TBP)	Annual	Seasonal	Seasonal	
Phenology		Seasonal	Seasonal	
Reference Evapotranspiration (RET)	Daily/ Dekadal/ Annual			Different resolution: 20km
Precipitation	Daily/ Dekadal/ Annual			Different resolution: 5km
Land cover classification	Annual	Annual	Dekadal	Level specific classes

WaPOR open data access

- Methodology documents, manuals, quality assessments:

<http://www.fao.org/in-action/remote-sensing-for-water-productivity>



WaPOR, remote sensing for water productivity

	Overview	Water and land productivity assessment	Water accounting	Capacity development	Resources	News & Events
--	----------	--	------------------	----------------------	-----------	---------------

Publications

WaPOR publications

Other FAO publications

Key documents

Webinars & tutorials

Video animations

WaPOR publications

WaPOR V2 quality assessment - Technical report on the data quality of the WaPOR FAO database version 2



WaPOR Version 2 was launched in June 2019 based on extensive internal and external validation and quality assessment. This report, developed in collaboration with ITC-Twente and the other partner of the FRAME Consortium, provides a quality evaluation of the WaPOR V2 evapotranspiration, biomass and water productivity data across Africa and the Near East, currently distributed through the FAO's WaPOR portal.

WaPOR applications catalogue

Find out examples of WaPOR applications in the field

See also on Flickr

- WaPOR at World Day to Combat Desertification and Drought
- WaPOR at #COAG26
- WaPOR at the launch event

With the support of



Ministry of Foreign Affairs of the Netherlands

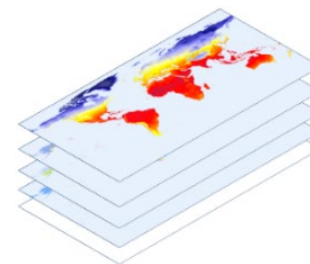
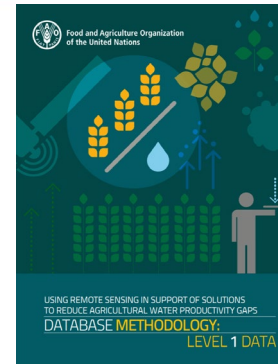


"Water accounting in the Niger River Basin"

The Niger River Basin is one of the largest transboundary river basins globally, covering a wide range of latitudes and longitudes. The climate over its area is diverse and the water availability is affected by high rainfall variability, with long periods of drought and damaging floods. There are many opportunities

WaPOR open data access

- Methodology documents, manuals, quality assessments;
- Codes and algorithms:
 - <https://www.fao.org/aquastat/py-wapor/index.html>
 - <https://bitbucket.org/cioapps/wapor-et-look>
- Data and metadata available through:
 - WaPOR portal wapor.apps.fao.org and FAO geospatial platform
 - ReST API for easier integration in ICT applications
 - Open geospatial standards (wms, wcs, CO GeoTiff)



CONTINENTAL (250m) NATIONAL (100m) SUB-NATIONAL (30m)

Water Productivity Water Land Climate Ancillary

<p>Gross Biomass Water Productivity</p> <p>WATER PRODUCTIVITY</p> <p>The annual Gross Biomass Water Productivity expresses the quantity of output (above ground biomass production) in relation to the total volume of water consumed in the year (actual evapotranspiration).</p>	<p>Net Biomass Water Productivity</p> <p>WATER PRODUCTIVITY</p> <p>The annual Net Biomass Water Productivity expresses the quantity of output (above ground biomass production) in relation to the volume of water beneficially consumed (by canopy transpiration) in the year, and thus net of soil evaporation.</p>	<p>Actual EvapoTranspiration and Interception (Annual)</p> <p>WATER</p> <p>The actual EvapoTranspiration and Interception (ETIa) is the sum of the soil evaporation (E), canopy transpiration (T), and evaporation from rainfall intercepted by leaves (I).</p>
<p>Actual EvapoTranspiration and Interception (Dekadal)</p> <p>WATER</p> <p>The actual EvapoTranspiration and Interception (ETIa) (dekadal, in mm/day) is the sum of the soil evaporation (E), canopy transpiration (T), and evaporation from rainfall intercepted by leaves (I).</p>	<p>Transpiration (Annual)</p> <p>WATER</p> <p>The Transpiration (T) data component is the actual transpiration of the vegetation canopy.</p>	<p>Evaporation (Annual)</p> <p>WATER</p> <p>The Evaporation (E) data component is the actual evaporation of the soil surface.</p>
<p>Interception (Dekadal)</p> <p>WATER</p> <p>The Interception (I) data component (dekadal, in mm/day) represents the evaporation of intercepted rainfall from the vegetation canopy.</p>	<p>Net Primary Production</p> <p>LAND</p> <p>Net Primary Production (NPP) is a fundamental characteristic of an ecosystem, expressing the conversion of carbon dioxide into biomass driven by photosynthesis.</p>	<p>Above Ground Biomass Production</p> <p>LAND</p> <p>The annual Above Ground Biomass Production expresses the total amount of dry matter produced over the year.</p>
<p>Land Cover Classification</p> <p>LAND</p> <p>This experimental land cover dataset at continental scale (Level 1) shows a broad classification aiming at identifying cultivated land and, more specifically, distinguishing between irrigated and rainfed areas.</p>	<p>Reference EvapoTranspiration</p> <p>CLIMATE</p> <p>Reference EvapoTranspiration (RET) is defined as the evapotranspiration from a hypothetical reference crop and it simulates the behaviour of a well-watered grass surface.</p>	<p>Precipitation</p> <p>CLIMATE</p> <p>Precipitation data is delivered on a daily basis. The source of this dataset is CHIRPS (Climate Hazards Group Infrared Precipitation with Station) quasi-global rainfall dataset, starting from 1981 up to near present.</p>
<p>Quality Normalized Difference Vegetation Index</p> <p>ANCILLARY</p> <p>The layer gives an indication of the quality of the NDVI input data.</p>	<p>Quality Land Surface Temperature</p> <p>ANCILLARY</p> <p>The quality layer gives an indication on the quality of the Land Surface Temperature (LST) input data.</p>	

EO requirements and next steps

- WaPOR works in highly fragmented landscapes often with image quality issues. Sentinel helps, but for ETa we need LST data that is fit for agricultural purposes;
- Operational crop map over large areas: crop type mapping is still very resource intensive, difficult to automate, unreliable quality;
- Version 3 of the data: updated input data (AgERA5, VIIRS), methodology improvements based on QA findings;
- Better documented open scripts for easier testing, comparison, calibration.



**Join us to build a water and food secure
future where no one is left behind**



wapor.apps.fao.org

wapor@fao.org

www.fao.org/in-action/remote-sensing-for-water-productivity