

TEMBO Africa: Seven sensors, five products, three services

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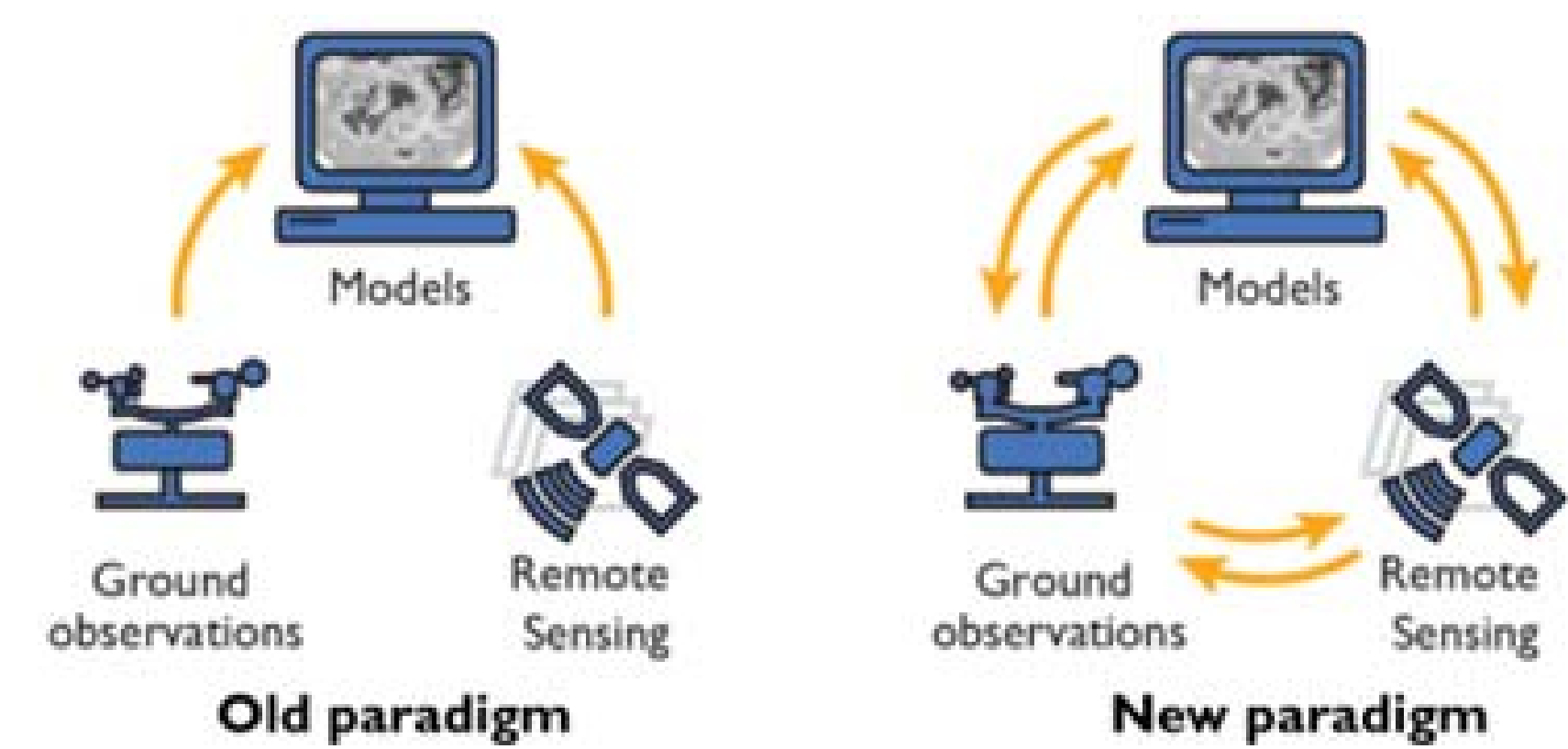
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TEMBO Africa

TEMBO Africa is a four-year project funded by the European Commission's Horizon Europe program. It brings together twelve partners from Africa and Europe to improve *in situ* sensing of water, weather, and climate. The central idea is that innovative cost-efficient sensors allow for the provision geo- and climate-services that produce economic value. By harvesting a small percentage of the economic value generated by these services, the observation network can be maintained.



TEMBO Africa paradigm shift

TEMBO Africa will not just be about *in situ* sensing. We seek to increase the value of ground observations by smartly combining them with remote sensing data and numerical models. In this way, the main advantages of each information source will be leveraged.

Seven sensors

The main reasons why this poster can be found in the MacGyver session, are the innovative sensors:

- Intervalometer (raindrop counter)
- BLOSM (neutron-based soil moisture)
- X-Band radar (rainfall)
- UAVs and fish finders (bathymetry)
- IP Cameras (river flow)
- Commercial Microwave Links (rainfall)
- GNSS (soil&atmos moisture, water levels)

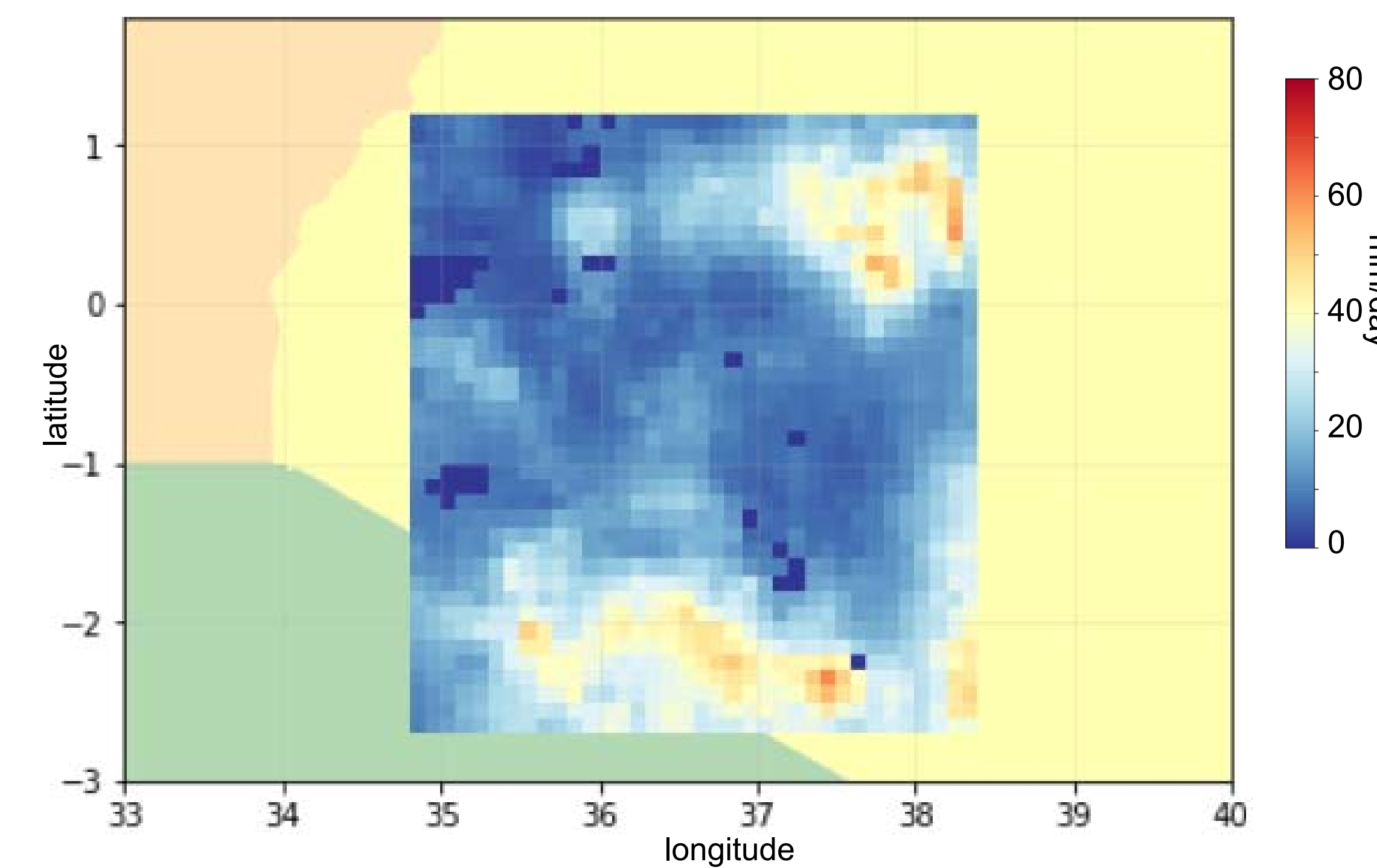
What is important to note is that a central principle of TEMBO Africa concerns cost effectiveness. With cost effectiveness we do not simply mean “cheap to buy” but the total cost of ownership. We aim that the new methods cost less than 10% of existing methods. Special attention is paid to the fact that the sensors can be used in the African context with the human resources that are locally available. For example, the BLOSM sensor does not need complicated export licenses and end-user agreements, such as needed for existing neutron detectors. Similarly, the microwave cavity of the X-Band radar can be replaced by removing seven screws and watching a YouTube movie.

Five products

In addition to the sensors and the services, there will be five products:

- Rainfall maps
- Soil moisture maps
- Bathymetric data
- Open water maps
- River flows

In a way, these products are intermediate steps in the development of the services.



Early result: Rainfall map over West Kenya, satellite products corrected with ground stations (quantile mapping), Vincent Hoogelander

The five products will be made available at no costs to scientists, and all other interested persons, through Copernicus.

Three services

The three services are:

- Flood Early Warning Systems (FEWS)
- Index-based germination insurance
- Reservoir management

The FEWS has a modular structure and is especially aimed at urban areas with less than 700,000 inhabitants (2/3 of Africa's urban population). It is meant to be run by national weather services, such as partner KMD in Kenya.

The main innovation for the index-based germination insurance is rapid pay-outs, such that farmers can reseed within the same rainy season.

Reservoir management concerns a relatively short value chain, which is very helpful. By being able to forecast inflows into reservoirs, unnecessary spilling can be avoided. As each cubic meter spilled has a well-defined value, reservoir managers tend to be willing to pay for this service.



Bui hydropower dam, Black Volta, Ghana



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