EOMAJI SCIENTIFIC BACKGROUND

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Keywords DA

1 Abstract

2 Background and objectives

Project EOMAJI (Earth Observation system to Manage Africa's food systems by Joint-knowledge of crop production and Irrigation digitization) ET-Based algoritms for net irrigation estimation.

2.1 Identifying irrigation events through monitoring of changes in ET

The **ratio of actual to potential ET (ETa/p)** should be used in order to avoid changes in ET due to changes in weather (e.g. increased wind speed) or crop cover (e.g. quick development of leaves) being attributed to irrigation. This ratio is closely related to root-zone water availability and therefore is mainly influenced by irrigation or rainfall events.

This is achieved by first calculating the change in **ETa/p** between the time on which irrigation is to be detect and most recent previous time on which ET estimates are available. This change is **calculated both locally (i.e. at individual pixel level) and regionally** (i.e. as an average change in all agricultural pixels within 10 km window).

The local and regional changes are then **compared to a number of thresholds** to try to detect if:

- a) There is no input of water into the soil (e.g. local ETa/p does not increase above a threshold)
- b) There is input of water into the soil but due to rainfall (e.g. increase in regional ETa/p is over a threshold and larger or similar to increase in local Eta/p)
- c) There is input of water to the soil due to irrigation (e.g. increase in local ETa/p is over a threshold and significantly larger than increase in regional ETa/p)

Detected irrigation events are further split into **low, medium and high probability** based on another set of thresholds. Since irrigation is normally applied on a larger area, the raster map with per-pixel irrigation events is cleaned up by removing isolated pixels in which irrigation was detected.

2.2 Quantifying irrigation

Inet_EOMAJI

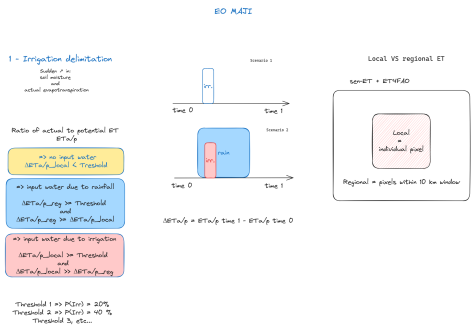

Figure 1: *
EO-MAJI-IrrDelineation

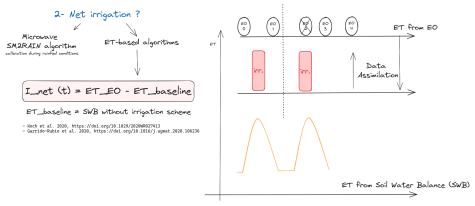

Figure 2: *
Issue with rain event

I_net (t) = ET_EO - ET_baseline

ET_baseline = SWB without irrigation scheme

- Koch et al. 2020, https://doi.org/10.1029/2020WR027413
- Garrido-Rubio et al. 2020, https://doi.org/10.1016/j.agwat.2020.106236

Figure 3: *
EO-MAJI-Inet