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User-centred agricultural drought monitoring: Integrating multisource remote sensing data for effective decision making

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Abstract

Monitoring agricultural systems is essential for ensuring sustainability and achieving sustainable development goals. Achieving this requires understanding how climate extremes and field management practices impact crop yields in a spatio-temporal explicit and scalable way. To address this challenge, we propose an approach that leverages the increasing availability of freely accessible earth observation (EO) data to monitor changes in abiotic stressors in croplands accurately and frequently by tracking subtle changes in time series. Our approach focuses on developing cloud-based processing algorithms that enable the accurate and spatially explicit analysis of drought hazards and impacts using remotely sensed images. For this, several datasets including time series from 20-meter Sentinel-2 optical images, and 10-meter Sentinel-1 radar data are used for the national scale analysis in Kenya, where exceptional multi-season droughts were observed in recent years. In addition, drought-relevant agricultural information is derived, such as high-resolution crop management data, including irrigation at a national level and localised information on cropping practices in pilot areas. Our approach emphasises user engagement by actively engaging stakeholders to identify needs and incorporate their perspectives into the data development and validation process to ensure that the data is tailored to end users needs.

Our innovative approach to drought monitoring using EO data and agricultural information development enables more precise monitoring of drought conditions and crop status, facilitating better decision-making and targeted interventions in drought affected areas. By providing relevant and up-to-date information to stakeholders and policymakers, our approach can aid in developing effective drought management strategies and policies.

Keywords: Cloud computing, drought, earth observation, Kenya, Sentinel