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DROUGHT AND FOOD SECURITY MONITORING USING SPACE-DERIVED PHENOLOGY

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ABSTRACT:

Timely information on vegetation development at regional scale are needed in arid and semi-arid African regions where rainfall variability leads to high inter-annual fluctuations in crop and pasture productivity and to high risk of food crisis in the presence of severe drought events. Monitoring the state, evolution, and productivity of vegetation (crops and pastures in particular) is important to conduct food emergency responses and plan for a long-term, resilient, development strategy in this areas. Vegetation conditions are commonly assessed on the basis of anomalies of the current value of the remote sensing indicator (typically the normalized difference vegetation index, NDVI), with respect to a value extracted, for the same period of the year, from a reference temporal profile. The main disadvantage of this approach is that the comparison is made at predefined dates within the year regardless of the actual plant growth stage.
The timing of onset, the duration, and the intensity of vegetation growth can be retrieved from space observations and used as an additional information to monitor seasonal vegetation development and forecast the likely seasonal outcome when the season is ongoing. In this contribution we summarise a set of phenology-based remote sensing studies in support to food security analysis. Key phenological indicators are retrieved using a model-fit approach applied to SPOT-VEGETATION FAPAR time series. We first explore the link between phenology and biomass production in the Sahel in view of the possible direct use of the timing of start of season as early indicator of the quality of the growing season. Then we show two applications of the use of a phenology-tuned remote sensing indicator for productivity monitoring in the Horn of Africa and Tunisia. Finally, we describe a probabilistic approach using phenological information to forecast and map hot-spots of drought-related risk.

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