Managing drought risk in Africa

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Summary

- The vulnerability of farmers to climate related risk is reduced if they can access insurance
- Weather index insurance (WII) compensates farmers if a weather index is breached rather than for a proven loss. WII is cheap to administer and could potentially cover millions of farmers in Africa against the effects of drought.
- Insured weather metrics are only proxies for agricultural losses, meaning that there is the potential for unfair payouts and uncompensated losses if the index is inaccurate or does not reflect the land surface conditions
- The TAMSAT group has worked closely with insurers in Africa to design robust WII schemes.

Key findings

- The accuracy of rainfall estimates can be assessed even in the absence of rain gauges, using a new algorithm developed by the TAMSAT group
- Weather indices based on rainfall cumulated over five days or more are accurately represented by the TAMSAT rainfall dataset, for Zambia.
- The association between rainfall and soil moisture in Zambia varies in space and time, and this must be accounted for when designing WII products
- **In 2015 WII was provided to 58,000 cotton farmers in Zambia, based on TAMSAT data. Feedback from farmers and insurers has been excellent.**

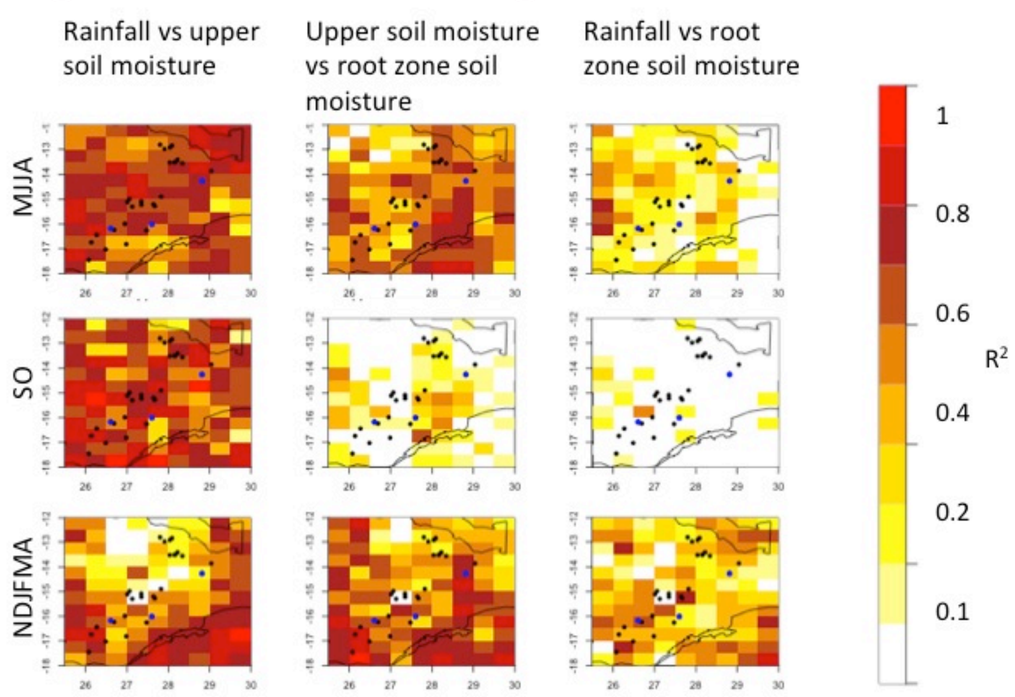
Why is this research important?

The majority of people living in Africa are dependent on rainfall, particularly for agriculture as this not only provides food but is also the main driving factor of most African economies.

In the absence of gauge data, Africans rely on satellite-based rainfall estimates for climate services, such as WII. Reliably monitoring meteorological drought (rainfall deficit) and the progression to agricultural drought (soil moisture deficit) is key to reliable and useful WII.

We illustrate these issues through a case study of the application of satellite-based rainfall estimates to WII in Zambia.

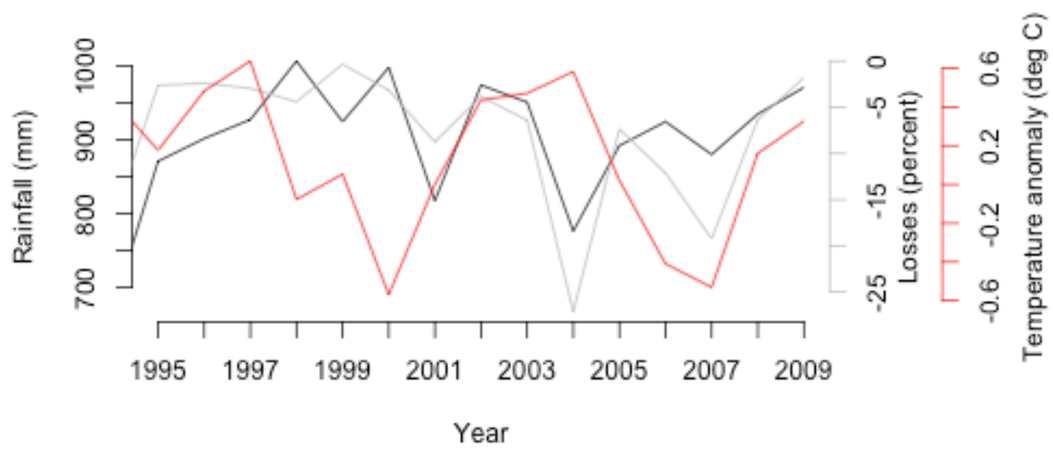
The progression from meteorological to agricultural drought



We used the JULES land surface model to assess the progression from meteorological to agricultural drought in Zambia.

Figure 1 shows the correlation between rainfall and upper level soil moisture; upper soil moisture and root zone soil moisture, and the ensuing correlation between rainfall and root zone soil moisture. Insured locations are shown as dots. The results are presented for three periods: the main rainy season (NDJFMA), the dry season (MJJA) and the onset of the rainy season (SO).

Cotton losses, rainfall and temperature



We combined satellite rainfall estimates with locally provided data on losses to investigate the link between rainfall variability and cotton production.

Figure 2 compares time series of cotton production losses (grey line) with rainfall (black line) and temperature (red line). The strong relationship between losses and rainfall demonstrates the potential for WII.

Find out more....

Black, E.; Tarnavsky, E.; Maidment, R.; Greatrex, H.; Mookerjee, A.; Quaife, T.; Brown, M. The Use of Remotely Sensed Rainfall for Managing Drought Risk: A Case Study of Weather Index Insurance in Zambia. Remote Sens. 2016, 8, 342.

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