Determining optimal seasonal integration times of NDVI series for index-based livestock insurance in east Africa

Abstract:
Drought is a major cause of livestock mortality in the semi-arid areas of East Africa. Livestock losses during dry years can have detrimental effects on pastoralist households and result in persistent poverty [1]. Transferring this risk using an insurance scheme can help pastoralists to overcome the negative consequences of drought [2]. While high loss verification costs for traditional claim-based insurance would inhibit insurance provision to poor and remote pastoralists, an alternative approach is to determine premium and insurance payouts based on a transparent and objectively measured variable [3]. To be effective this variable should correlate strongly with what is insured, i.e. livestock losses and/or adverse forage conditions [4]. In 2010 the International Livestock Research Institute (ILRI) piloted an index-based livestock insurance (IBLI) project in Marsabit, northern Kenya [5], and gradually expanded to other areas of Kenya and southern Ethiopia. IBLI uses spatially and temporally aggregated MODIS NDVI time series as a proxy for forage conditions within an area (the insurance unit). Until recently the temporal aggregation was done for two periods of the year, i.e. the long rains-long dry (LRLD: March-September) and the short rains-short dry (SRSD: October-February) seasons. Including the dry season however meant that payouts were only made after animals suffered for long in case of adverse forage conditions; hence this scheme aimed for replacing livestock after incurred losses. It is preferable however to pay out earlier, allowing pastoralists to protect livestock by purchase of forage, water, or medicines. The objective of this paper is 1) to determine location-specific optimal NDVI integration periods for calculating a forage scarcity index, based on NDVI phenological analysis, and 2) to evaluate if the end date of this period can be anticipated further in time while retaining good predictability of end-of-season index variability.

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