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NDVI statistical distribution of pasture areas at different times in the Community of Madrid (Spain)

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The severity of drought has many implications for society, including its impacts on the water supply, water pollution, reservoir management and ecosystem. However, its impacts on rain-fed agriculture are especially direct. Because of the importance of drought, there have been many attempts to characterize its severity, resulting in the numerous drought indices that have been developed (Niemeyer 2008). 'Biomass index' based on satellite image derived Normalized Difference Vegetation Index (NDVI) has been used in countries like United States of America, Canada and Spain for pasture and forage crops for some years (Rao, 2010). This type of agricultural insurance is named as "index-based insurance" (IBI).

IBI is perceived to be substantially less costly to operate and manage than multiple peril insurance. IBI contracts pay indemnities based not on the actual yield (or revenue) losses experienced by the insurance purchaser but rather based on realized NDVI values (historical data) that is correlated with farm-level losses (Xiaohui Deng et al., 2008). Definition of when drought event occurs is defined on NDVI threshold values mainly based in statistical parameters, average and standard deviation that characterize a normal distribution. In this work a pasture area at the north of Community of Madrid (Spain) has been delimited. Then, NDVI historical data was reconstructed based on remote sensing imaging MODIS, with 500x500m^2 resolution. A statistical analysis of the NDVI histograms at consecutives 46 intervals of that area was applied to search for the best statistical distribution based on the maximum likelihood criteria. The results show that the normal distribution is not the optimal representation when IBI is available; the implications in the context of crop insurance are discussed (Martín-Sotoca, 2014).

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