Geophysical Research Abstracts
Vol. 19, EGU2017-19197, 2017
EGU General Assembly 2017

Linking Science to Practice: Exploring the Applicability of Standardized Precipitation Index in Weather Index Insurance in West Africa

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The Niger River basin is drought-prone and farmers are often exposed to the vagaries of severe weather and extreme climate events of the region. Spatio-temporal characteristics of drought are important for its mitigation. With 52 years of gauged-based monthly rainfall, the study investigates the potentials of Standardized Precipitation Index (SPI) as standard measure for meteorological drought, its characterization, early warning systems and use in weather-index-based insurance. Gamma probability distribution type 2, which best fits the rainfall frequency distribution of the region, was used for the transformation of the skewed rainfall data to derive the SPI. Results showed 9, 5, 5, and 6 drought events of severe to extreme intensities occurred in the headwaters of the basin, Inner Delta, middle Niger, and lower Niger sub-watersheds respectively. Their magnitudes were in the range 1 to 5, 2 to 6, 2 to 8, and 2 to 7 respectively. Spatially, results further showed that the 1970s and 1980s drought events were dominantly of moderate (SPI values -1 to -1.49) and severe (SPI values -1.5 to -1.99) intensities respectively; with sporadic cases of severe to extreme drought intensities occurring in 1970s and extreme to exceptional intensities in the 1980s. Further investigations show that 3-months SPI indicated 85% of variance in the standardized cereal crop yield, which suites well as weather index insurance variable. The study therefore proposes SPI weather index-based insurance (SWIBI) as a pathway forward to ameliorate the negative impacts on insured farmers in this region in terms indemnity payouts whenever drought disaster occurs.