

CoE-MaSS weekly seminar series

THE DST-NRF CENTRE OF EXCELLENCE IN
MATHEMATICAL AND STATISTICAL SCIENCES (CoE-MaSS)
PRESENTS A SEMINAR BY

Dr Dennis Ikpe

*(Mathematical Finance, African Institute for Mathematical
Sciences, South Africa)*

***“A Lévy Regime-Switching Temperature
Dynamics Model for Weather Derivatives”***

Friday, 17 May 2019
10h30-11h30

CoE-MaSS Seminar Room, 1st floor, MSB, Wits.

Weather is a key production factor in agricultural crop production but at the same time, the most significant and least controllable source of peril in agriculture. These effects of weather on agricultural crop production have triggered a widespread support for weather derivatives as a means of mitigating the risk associated with climate change on agriculture. However, these products are faced with basis risk as a result of poor design and modelling of the underlying weather variable (temperature). In order to circumvent this problem, a novel time-varying mean-reversion Lévy regime-switching model is used to model the dynamics of the deseasonalised temperature dynamics. Using plots and test statistics, it is observed that the residuals of the deseasonalised temperature data are not normally distributed. To model the non-normality in the residuals, we propose to use the hyperbolic distribution to capture the semi-heavy tails and skewness in the empirical distributions of the residuals for the shifted regime. The proposed regime-switching model has a mean reverting heteroskedastic process in the base regime and Lévy process in the shifted regime. By using the expectation-maximization algorithm, the parameters of the proposed model are estimated. The proposed model is flexible as it modelled the deseasonalised temperature data accurately. Email: dennis@aims.ac.za



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