

Abstract Submitted
for the SES14 Meeting of
The American Physical Society

A Wave Equation Cyber Model for Tracking Ebola from Data Mining African Tweets ARMIN SMAILHODZIC, KEITH ANDREW, ERIC STEINFELDS, LANCE HAHN, PHIL WOMBLE, CATHLEEN WEBB, Western Kentucky University — We are tracking the spread of Ebola in Africa via data mining of active Twitter accounts. Using a meme based n-gram semantic usage model we search the Twitter database for indications of illness, flight and death from the spread of Ebola in Africa, principally from Guinea, Sierra Leone and Liberia. Memes of interest relate disease to location and severity and are coupled to the density of Tweets and re-Tweets. The meme spreads through the community of social users in a fashion similar to nonlinear wave propagation- like a shock wave, visualized as a spike in Tweet activity. We model the spreading as a system isomorphic to a modified SIR (Susceptible, Infected, Removed disease model) system of three coupled nonlinear differential equations using Twitter variables. The nonlinear terms in this model lead to feedback mechanisms that result in unusual behavior that does not always reduce the spread of the disease. The resulting geographic Tweet densities are coupled to geographic maps of the region. These maps have specific threat levels that are ported to an App and can be used by travelers to assess the relative safety of the region they will be in.

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Date submitted: 11 Sep 2014

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