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El Niño forecast information to support public health decision making

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El Niño Southern Oscillation (ENSO) is a high-impact climatic phenomenon causing substantial changes in the weather throughout the globe. The warm phase of the oscillation - El Niño (EN) - leads to extensive floods or droughts in certain regions of the globe, damaging agriculture and marine ecosystems, and also increasing the risk of certain infectious disease epidemics. Therefore, ENSO forecasts could help local authorities to plan in advance to mitigate the risk and to protect vulnerable communities worldwide.
A structural time series model applying a state space approach and using regression variables relevant to the evolution of the ENSO cycle has been developed and tested for the prediction of the Niño 3.4 index (area averaged sea surface temperature in the region [120-170W, 5S-5N]). The model configuration has been specifically tailored to forecast the EN phase at long lead times before the traditional peak of the temperature anomaly in boreal winter. The model has successfully predicted all EN events in the period 1996-2015 at least 24 months in advance, thus going well beyond the traditional “spring barrier” of ENSO prediction. The forecasting scheme provides valuable information about the amplitude/intensity of the events, their duration and the peak time of the respective sea surface temperature anomalies. This information then could significantly aid decision makers, especially in tropical and subtropical countries that are directly and severely affected by the anomalous temperature and precipitation rates during and after El Niño. Previous studies have found that the timing and magnitude of dengue outbreaks and in El Oro province in Ecuador were associated with El Niño events. Therefore, the availability about two years in advance of N3.4 index model data as a driver of a dengue epidemic forecasting model would further enhance the development of a dengue early warning system in the region.