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The Extreme Climate Index: a novel and multi-hazard index for extreme weather events.

Marco Cucchi (1), Marcello Petitta (1,2,3), and Sandro Calmanti (2)

(1) Amigo s.r.l., Roma, Italy (marco.cucchi@amigoclimate.com), (2) ENEA, SSPT-MET-CLIM, Roma, Italy, (3) EURAC, Institute for applied remote sensing, Bolzano, Italy

In this presentation we introduce the Extreme Climate Index (ECI): an objective, multi-hazard index capable of tracking changes in the frequency or magnitude of extreme weather events in African countries, thus indicating that a shift to a new climate regime is underway in a particular area. This index has been developed in the context of XCF (eXtreme Climate Facilities) project lead by ARC (African Risk Capacity, specialised agency of the African Union), and will be used in the payouts triggering mechanism of an insurance programme against risks related to the increase of frequency and magnitude of extreme weather events due to climate regimes' changes.
The main hazards covered by ECI will be extreme dry, wet and heat events, with the possibility of adding region-specific risk events such as tropical cyclones for the most vulnerable areas. It will be based on data coming from consistent, sufficiently long, high quality historical records and will be standardized across broad geographical regions, so that extreme events occurring under different climatic regimes in Africa can be comparable.
The first step to construct such an index is to define single hazard indicators. In this first study we focused on extreme dry/wet and heat events, using for their description respectively the well-known SPI (Standardized Precipitation Index) and an index developed by us, called SHI (Standardized Heat-waves Index). The second step consists in the development of a computational strategy to combine these, and possibly other indices, so that the ECI can describe, by means of a single indicator, different types of climatic extremes. According to the methodology proposed in this paper, the ECI is defined by two statistical components: the ECI intensity, which indicates whether an event is extreme or not; the angular component, which represent the contribution of each hazard to the overall intensity of the index. The ECI can thus be used to identify "extremes" after defining a suitable threshold above which the events can be held as extremes.
In this presentation, after describing the methodology we used for the construction of the ECI, we present results obtained on different African regions, using NCEP Reanalysis dataset for air temperature at sig995 level and CHIRP dataset for precipitations. Particular attention will be devoted to 2015/2016 Malawi drought, which received some media attention due to the failure of the risk assessment model used to trigger due payouts: it will be shown how, on the contrary, combination of hydrological and temperature data used in ECI succeed in evaluating the extremeness of this event.