Drought Monitoring and Analysis in Mainland Portugal

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Climate describes how the atmosphere behaves over a long period of time informing us on the "average of weather", as well as the description of other aspects of weather patterns and meteorological parameters' distribution, including anomalous, rare and extreme events. Some examples of extreme weather or climate events include heat waves, cold waves, floods, extreme precipitation, drought, tornadoes and tropical cyclones (WMO-CCL, 2018).

Drought is a prolonged dry period in natural climate cycle. It is a slow-onset phenomenon caused by precipitation deficit combined with other predisposing factors. Drought is a natural hazard that occurs in all climates and differs from other extreme events in that it has a slow onset, evolves over months or even years and can affects a large spatial region. Unlike other extreme events, such as floods, which are weather events that are immediately detectable, droughts develop slowly, making it difficult to determine the severity of the event and also the onset and end.

Drought is a recurrent climatic event occurring worldwide and intensively perceived by the Mediterranean countries (Pereira et al., 2009). Portugal is one of the countries strongly affected by drought, which creates the strong need for impact reduction strategies as an integral part of drought preparedness plans.

To better understand the risk of droughts in mainland Portugal, was used indices that rely on precipitation deficits and allows us to characterize and monitor meteorological drought in mainland Portugal, determining drought onset, duration and intensity. In this study was used the PDSI (Palmer Drought Severity Index), SPI (Standardized Precipitation Index) and SMI (Soil Moisture Index).

These indices were computed using daily and monthly data and based on the recommendations of CCL task team on the definition of extreme weather and climate events: Threshold (is determined based on historical values of the index); Temporal (Station-level information on starting date, ending date, and duration of the event); Spatial (calculates the area affected, by providing the distribution of stations where the threshold was surpassed and uses a geographical information system (GIS) to determine the area affected by the event, the magnitude, and severity).

In order to characterize an extreme weather and climate event was used the following properties: 1) Magnitude: measures the departure from the threshold and reflects unusualness or extremity of the event; 2) Duration: defined by the time at which the event begin and end; 3) Extent: defined as the geographical area affected by the extreme event; 4) Severity: severity should indicate the potential damages and impacts that can be associated to the event. It is a combination of magnitude and persistence of a drought.

It is also aimed the framing of this extreme event with climate changes based on trend analyses and simulation of scenarios with variables such as precipitation, temperature and evapotranspiration.