



A proposal to define seasons based on daily temperature annual cycle through their daily values and changes extremes

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The daily temperature annual cycle is the one of the most relevant climate variability mode that controls the phenological and climatic processes in extra-tropical regions. From a phenological point of view, the seasonality of temperature is considered to be one of the main variables that affects natural systems and their ecosystem services. On the other hand, the strong annual cycle of temperature in extra-tropical areas controls the main atmospheric circulation patterns that influence the definition of the continental climates and their seasonality at regional and local scales.

There are two main methods to study length and dates of seasons: one based on fixed thresholds, the other one through the analysis of annual cycle properties and shape. The first is common in phenological and climatic seasons definitions, the second one captures phase and amplitude changes.

In this work we propose a set of dynamical metrics that allow to describe the temporal annual characteristics of temperature in extra-tropical areas at local scale. These metrics are based in the annual occurrence of temperature extremes (maximum and minimum) and the transitions between them (day of maximum warming and cooling). This set of four indices gives then a full description of the annual cycle divided into four subperiods. We analyze them from an ensemble of three reanalysis databases, with a global cover of a roughly 0.5° spatial resolution and daily temporal resolution for the period 1980-2014.