



Characterization of thermal season and their projections in extratropical northern and southern hemisphere domains through the analysis of annual daily temperatures cycle as seen from regional climate model ensembles

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The study of the seasons characterization from a climatological point of view is widely discussed. Several definitions can be found based on different variables and criteria. Precipitation and temperature are the magnitudes commonly used, depending, respectively, if the study area is into tropical or extratropical regions. In the monsoon areas the annual cycle of precipitation defines two main seasons, dry and wet; whereas in the extratropical areas four seasons are apparent, related to temperature behaviour, and so these seasons can be named as “thermal seasons”. Different methods, from local fixed or percentile-based thresholds to physically-based phenomena have been proposed. This variety of methods is related to the heterogeneity of different climates on relatively nearby regions and hence makes it hard to find a universal definition of the season onsets and length.

Here we propose a simple method to differentiate among the four thermal seasons at any extratropical region based on the study of characteristics of the annual mean daily temperature cycle and the derivative of this variable. With the aim to demonstrate the global applicability of the proposed method, southern South America and Europe domains are chosen. Moreover, we take the advantage of the regional climate models (RCMs) to analyze at each grid point these different regions, both in present period and their projections under a intermediate greenhouse gas scenario. We use CLARIS-LPB (South America) and EUROCORDEX (Europe) RCM intercomparison projects, due to their entirety and current updated availability.