

Present and Future Desertification in the Iberian Peninsula



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Short Communication

The Iberian Peninsula (IP) is experiencing desertification as a result of climate change caused by increasing human greenhouse gas emission [1]. This is particularly relevant in its southern regions where the average annual precipitation can be as low as 200mm.

Rainfall has decreased in the region and this trend is expected to persist [2-4]. Many studies identify a small, non-significant, increase in winter precipitation and significant precipitation reductions in the other seasons by 2100, under the RCP8.5 scenario [5-8].

Pereira et al. [9] detail the behaviour of precipitation and its changes in the IP and refer that, by 2100, for the RCP8.5, most of the region is expected to experience a statistically significant 20-30% reduction in precipitation which would contribute to desertification already occurring in some southern regions [10]. The exception is for winter where a small and not significant increase is projected. For summer, their study indicates a larger precipitation reduction of about 60% in a season where precipitation is already scarce and may pose problems for water resources. Intermediate seasons (MAM and SON) likewise experience precipitation reduction. Pereira et al. [9] further evaluate the full range (duration/intensity) of high frequency episodes and report a marked reduction in the average number of days of all-type precipitation episodes in the future. The combined effects of reduced precipitation and less precipitation days represent a generalized future tendency for precipitation to occur more concentrated in time in short-lived extreme precipitation episodes that, through extensive runoff, may generate landslides and flash-floods/floods, which can disrupt social and economic activities.

Viceto et al. [11] point to future increases in the number of atmospheric conditions favourable to severe storms associated to higher Convective Available Potential Energy in the region, particularly in the Mediterranean. These findings appear to agree with results of Pereira et al. [9] since the nature of precipitation in the IP seems to be become more of a convective nature in the future.

Changes in precipitation are accompanied with extensive future warming as reported by Viceto et al. [12]. The projected temperatures show an increase of over 6°C in some southern regions by 2100, concomitant with highest numbers of summer days and tropical nights. The number of heat wave days are expected to increase, with much of the average summer season being under heat wave conditions. Central/southern IP may experience an average of between 20 heat wave days per year with maximum temperatures surpassing 45°C in each wave day. For some locations in the southern/central non-costal region heat waves may last nearly the whole summer, with average maximum temperatures of about 40°C.

The combined changes of precipitation and temperature may have disastrous impacts in water resources, namely agriculture, and desertification than those associated to each variable independently. Figure 1 shows temperature and precipitation changes for Alentejo (Portugal) between 1971-2000 and 2071-2100, for the RCP8.5 scenario. Each dot represents one year of the ensemble average of a set of CORDEX regional climate model simulations performed on the European domain (EURO-CORDEX) at spatial resolution of 0.11 degree (~12km). The black dots represent the climate averages. Alentejo is one of the regions under a desertification process and is considered here to illustrate the dramatic changes many similar southern regions of the IP are expected to experience in the future.

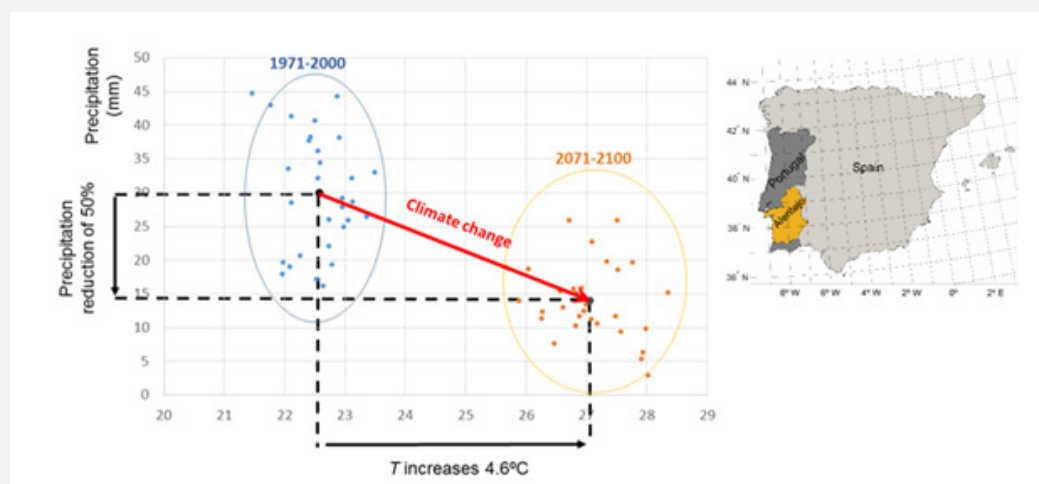


Figure 1: Temperature and precipitation changes for Alentejo (Portugal) between 1971-2000 and 2071-2100, for the RCP8.5 scenario. Each dot represents 1 year of the ensemble average of a set of CORDEX regional climate model simulations performed on the European domain (EURO-CORDEX) at spatial resolution of 0.11 degree (~12km). Data and detail of models and simulations can be found in <http://portaldoclima.pt/pt/>

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