Estimación de las tendencias subregionales de precipitación para los próximos 100 años en la España mediterránea

100-year estimates of sub-regional precipitation trends in Mediterranean Spain

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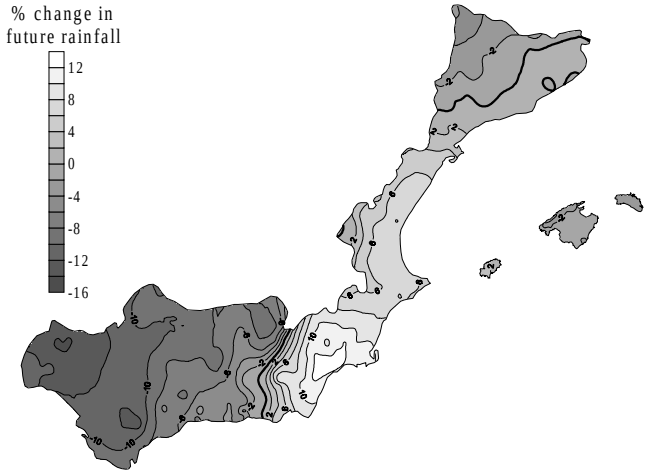
SUMMARY

There are several Global Climate Models (GCMs) available to attempt forecasts of regional changes of rainfall. Such regional changes, whilst they may be averaged to a single trend for a relatively large region, such as the Mediterranean, may not necessarily be consistent across that region. The current study is an attempt to down-scale the results from one well-known and used GCM so that future trends in sub-regional precipitation occurrence along the Spanish Mediterranean coastal regions are estimated. The background for this study are two earlier papers by some of the present authors: Romero et al. (1999a) produced a sequence of 11 typical rainfall patterns (RPs) for Mediterranean Spain in which the daily significant rainfall tends to organize spatially; Romero et al. (1999b) derived 19 characteristic regional atmospheric circulations (APs), based on the flow at the 925 and 500 hPa levels, under which the significant daily rainfall events occur. Many of the RPs from the first study were demonstrated to be closely associated with certain APs derived in the second, potentially of great importance to assess the impact of the long-term changes in the atmospheric circulation on the sub-regional precipitation.

The study uses results from the ECHAM model for the North Atlantic/European region for the the two decades 1971-80 and 1981-90, representing the 'present' climate, and for the decades 2080-89 and 2090-99, representing the 'future' climate. All decades are subjected to analysis aimed at categorising daily circulations for hypothetical sinificant rainfall days according to the 19 APs, and comparisons are made between present and future AP frequencies. The methodology thus enables comparison between model and reality as well as a means to model possible rainfall changes. Specifically, the previously derived relationships between APs and RPs are used to compute a map of estimated decadal rainfall distribution for the end of his century, which can be compared with the present rainfall distribution.

The results reveal clear contrasts between the present and future situation (see figure). These are consistent with expectations at the larger-scale expressed by many workers in the field of climate change in the European region, but allow for considerable finer-scale detail to be deduced. Specifically, though, whilst a drying tendency is frequently anticipated for the whole Mediterranean region as a consequence of global warming, it is clear that whilst some areas, notably Andalucía and the mountainous parts of Catalunya in this study, will in fact become markedly drier, others, such as the major coastal embayments along the Spanish Mediterranean coast proper, for example, Almería, Murcia, and Valencia, will experience an overall increase in annual precipitation.



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