



## **Bio-Climate Change between 1951-1980 and 1981-2010 in Spanish mainland**

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The paper analyzes the spatial distribution of bioclimatic changes between the two climate normal periods (1951-1980 y 1981-2010) in Spanish mainland. The analyses is performed using high density monthly dataset of precipitation and mean temperatures: MOPREDAS (for precipitation) and MOTEDAS (for temperatures). Both dataset cover the period of 1951-2010 and have been analysed in their grid version (10x10 km). The characterization of the total amount of pixels (5234) followed the "Global Bioclimatics" from Rivas-Martinez to identify its Continentality, Macrobioclimate, Bioclimatic Variant, Bioclimate, Thermotype and Ombrotype. The results were quantified in spatial percentages of occupancy for each of bioclimatic units and for each normal period.

The most prominent changes observed between 1951-1980 and 1981-2010 are as follows:

- Clear increase in Continentality, ie increased annual thermal range;
- The Mediterranean Macrobioclimate increased in the same proportion as the Temperate Macrobioclimate decreased which means that the summer xericity increases;
- Slight decrease in the percentage of total land occupied by the Bioclimatic Variants Steppic and Submediterranean;
- Increase of all Mediterranean Bioclimates, especially Mediterranean Pluviseasonal Oceanic type and decrease of the Temperate Bioclimates (Temperate Hyperoceanic and Temperate Oceanic)
- Clear increase of the warm Thermotypes both Mediterranean and Temperate in áreas previously under fresh or cold Thermotypes; the highest percentage of change are in the Mediterranean Macrobioclimate than in the Temperate.
- General increase towards xericity.
- During the second period Continentality, summer xericity, extension of all Mediterranean Bioclimates, thermicity and dry ombrotypes increased.

Spatial comparison between the two periods suggest consistent gradual changes between bioclimatic levels, and spatial coherence.