

Department of Physical Geography and Regional Geographical Analysis
Faculty of Geography and History
University of Barcelona

PhD Thesis

The Western Mediterranean Oscillation and Rainfall in the Catalan Countries

Memory presented by
Joan Albert López i Bustins
(Summary)

PhD Director

Prof. Dr Javier Martín Vide
University de Barcelona

Barcelona, June 2007

CONCLUSIONS

6.1. MAIN CONCLUSIONS

1) *The WeMO is the regional pattern of the western Mediterranean basin and feasibly explains the rainfall variability on the Catalan Countries.* **Confirmed hypothesis.**

The WeMO is one of the most important teleconnection patterns of the Catalan Countries, above all, for the Valencian Country. The rainfall influence area in its negative phase within north-western Mediterranean basin is very close to the Catalan Countries territory.

2) *The rainfall over the Catalan Countries in the near future depends on the cycles and recent trends of the WeMOi.* **Partially confirmed hypothesis.**

This affirmation is valid for those seasons when WeMO has the largest influence on Catalan Countries rainfall (autumn and winter), and for those areas where the influence is largest (Valencian Country). The evident conclusion is the precipitation increase and its irregularity, and those of torrential type, in the Gulf of València in winter due to the negative trend of the WeMOi in this season.

3) *Daily WeMOi is a very useful tool to predict torrential events in the Catalan Countries.* **Confirmed hypothesis.**

Most of the 100 mm/ 24 h episodes which take place in the Catalan Countries in the cold semester of the year happen when the WeMOi is negative. Moreover, the highest accumulation of torrential events always coincides with the period of the year when the WeMOi is usually very negative according to the 1951-2000 period (the 1st fortnight of October).

6.2. LAST COMMENTS

- In the current climate change (4th IPCC Report, 2007), the study of the role of the teleconnection patterns is essential because they allow us to analyse the future variation of climates and, particularly, of precipitation. Nobody denies that an anthropogenic climate change is detected with a rise of temperatures, but few affirmations can be done about precipitation variability. In this thesis, some rainfall changes in the Catalan Countries can be foreseen by means of the WeMO variability:
 - A rainfall increase in the Valencian Country and in the eastern Pyrenees in winter, above all, in January; with major torrentiality in the Gulf of València.
 - An extension of the period of torrential episodes, maximum in October, overall Catalan Countries until the 1st fortnight of November.
 - Apart from WeMO's role, there is an overall precipitation reduction in the Catalan Countries, very significant in the northern Balearic Islands. The most outstanding decreases over the continental Catalan Countries are in summer and in the Balearic Islands during the cold half of the year.
 - A strong precipitation decrease in the Pyrenees and Pre-Pyrenees in late winter (February-March), above all, in March and in the western Pyrenees, due to the AOi and NAOi trends.
- The results of this thesis coincide with those forecasts in the climate change reports for Spain and Catalonia: an overall warming and rainfall reduction, but an increase of the pluviometric irregularity. At the same time, the steady increase of human activities is conditioning the environment; this means a major hazard in the near future due to an increase in both directions: risk and vulnerability.
- The WeMO pattern is already consolidated and recognised among local climatologists (Rodríguez-Puebla and Brunet, 2007) and in the international framework (Martin-Vide and Lopez-Bustins, 2006).