A bottom-up weather type classification over France: methodology and applications

Joël Gailhard

EDF, DTG, Grenoble, France (joel.gailhard@edf.fr, (33) 4 76 20 20 45)

The relationship between large scale circulation patterns and precipitation over Western Europe has been emphasized for a long time. Several studies have highlighted that link for different countries : Goodess and Jones (2002) for the Iberian Peninsula, Plaut et al. (2001) and Boé and Terray (2007) for France, Xoplaki et al. (2004) for the Mediterranean basin, just to name a few.

In fact, a weather type classification (or circulation type classification) is a powerful tool to perform conditional climatology the same way it can be done with a seasonal sub-sampling. However, if there is no mystery in how to run seasonal sub-sampling, there are many different ways to achieve a classification based on atmospheric circulation (see the COST 733 action).

Our own experience based on previous work related to weather forecasting has led us to work preferentially on the shape of the geopotential fields, using the Teweless Wobus distance [Teweles and Wobus, 1954]. In addition, we used a "bottom-up" approach, firstly identifying the centroids of classes using our variable of interest (i.e. rainfall), and secondly projecting them into the space of geopotential heights. This led us to classify eight typical but contrasted synoptic situations for France and surrounding areas, classification that we used in various contexts during the last four years.

The aim of this presentation is to first introduce the methodology used for this classification, then to compare it with other classifications, and finally to show various concrete applications :

· Interpolation of daily precipitation fields over French mountainous regions [Gottardi – ICAM 2007]

· Extreme rainfalls distribution model based on weather pattern sub-sampling [Garavaglia - HESSD 2010]

· Analysis of trends for the last 60 years (1950-2009) and comparison with the trends modeled by Global Circulation Models for the same period [first results]