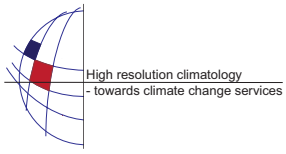
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-67, 2010
10th EMS / 8th ECAC



Modelisation of northerly snow episodes over Andorra (Pyrenees) using WRF

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North episodes over the Pyrenees represent a challenge in terms of forecasting associated effects, especially during the winter season. Andorra, a small country located in the Pyrenees, between France and Spain, is highly sensitive to these episodes. Usually these episodes generate heavy snowfalls and intense windstorms which can substantially increase hazards and accident occurrence in this mountainous region. Slight variations of the forecasted snowfall distribution and accumulation can cause a severe impact to the population: avalanche hazard, incidents on the communication systems and transports and other derivates social impacts. With north episodes, precipitation mainly affects the North Slope of the Pyrenees and nearby areas. However, in some cases, certain factors allow the precipitation to cross over to the leeward mountain slope and intense snowfalls can affect an extended area and low elevations. The challenge comes down to the difficulty that the models have in forecasting the regional effects of these events and how far over the southern side of the Pyrenees range will precipitation extend. The episode that took place on the 10-11th February 2009 is a recent example.

Previous research done by Esteban et al. (2005) over this area, examined the relationship between circulation types and heavy snowfall days in Andorra. Additionally, this study has provided a first climatology of N-NW episodes with at least 30 cm of snow in a 24h period during the winter seasons from 1986 to 2001 and has pointed out differences between similar atmospheric fluxes in the snow precipitation amount and distribution.

The specific objective of this study is to determine common features of these events and evaluate the ability of the high-resolution Weather Research and Forecast model (WRF) over complex terrain to predict them, especially the spatial precipitation distribution. Preliminary experiments for 10-11 February 2009 case have tested the performance of two different land surface parameterizations concluding that the Noah land surface model performs better results over Andorra. This study has examined the sensitivity of NW episodes over Andorra to model microphysics schemes at high resolutions (3, 1 km). The presence of a NW jet stream in all levels and a low level moist layer has been also analysed. The role of this synoptic flow and its interaction with the Pyrenees chain is preliminary examined in this work in order to identify the key factors that intensify these events.

Esteban, P., Jones, P.D., Martín-Vide, J., Mases, M., 2005. Atmospheric circulation patterns related to heavy snowfall days in Andorra, Pyrenees. Int. J. Climatol. 25:319-329.