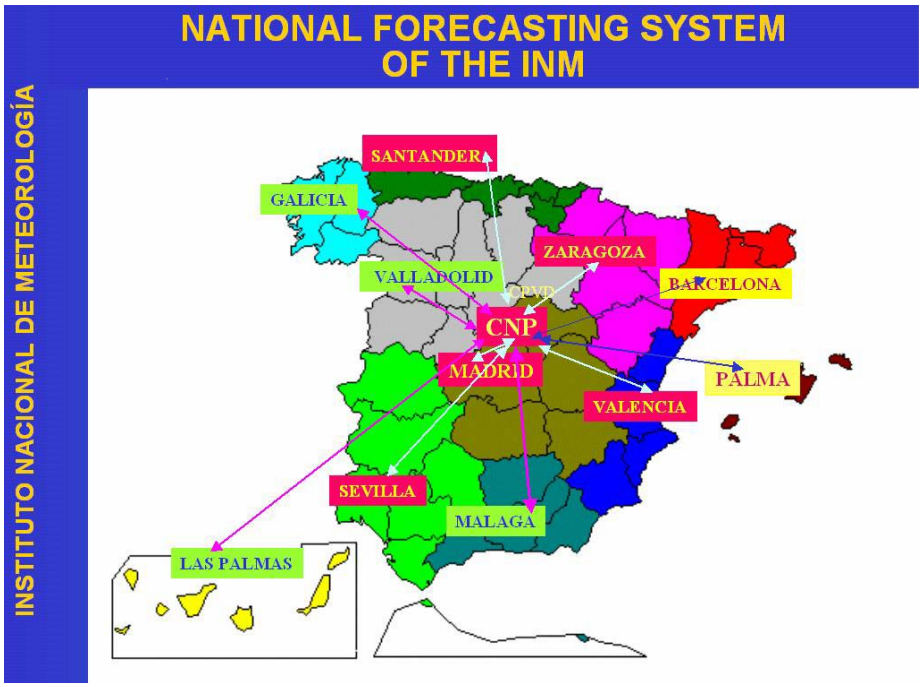
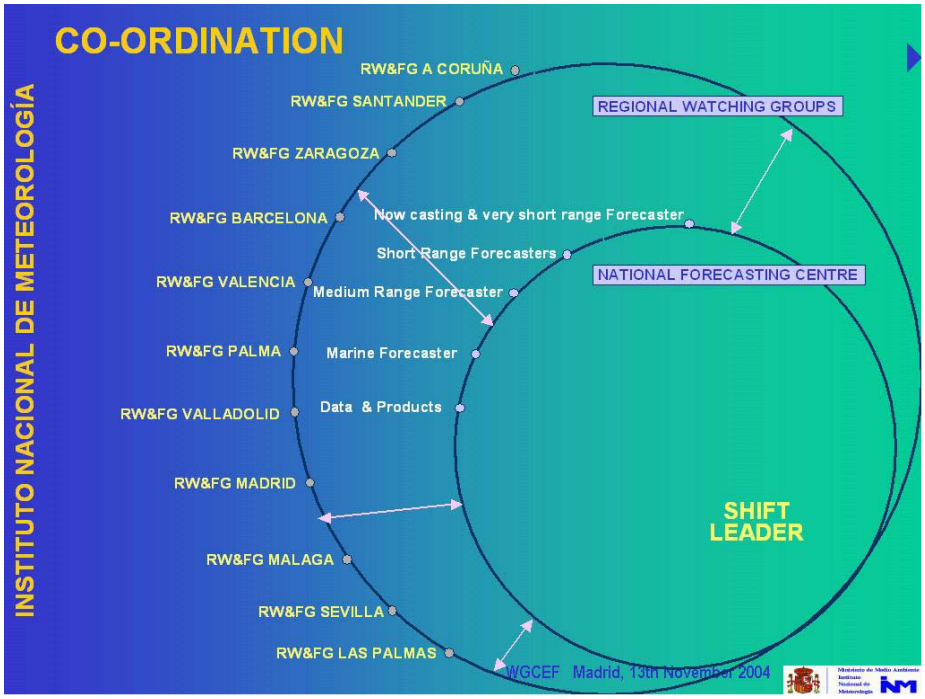
NATIONAL FORECASTING SYSTEM OF THE SPANISH METEOROLOGICAL SERVICE

In Spain the National Forecasting System is organized as a group of eleven Regional Centres, a National Forecasting Centre, and a Defence Centre. Each of the Regional Centres is responsible for a determined area, as shows the picture 1:



All the centres are coordinated, and this coordination is established between the Regional Watching and Forecasting Groups and the National Forecasting Centre, or among the different Regional Groups when the forecast affects more than one region.
Forecasting activities at any group are run 24 hours a day.
The different tasks have been divided by range of prediction criteria.

Picture 2 shows how the coordination routine is organized and also the different ranges and responsibilities of each group.



The National Forecasting Centre Shift Leader is responsible of the coordination and must be aware of what is going on in all the RWFG. The NFC forecasters are represented inside the external ring. Beyond this external ring the RWFG forecasters are also represented. Each forecaster coordinates his/her own range of prediction.

OPERATIONAL PROCESS

Before the issue of the different bulletins an operational process must be done. The processes for the short range (repeated 4 times a day) and the medium range (once a day) are summarised in fig. 3

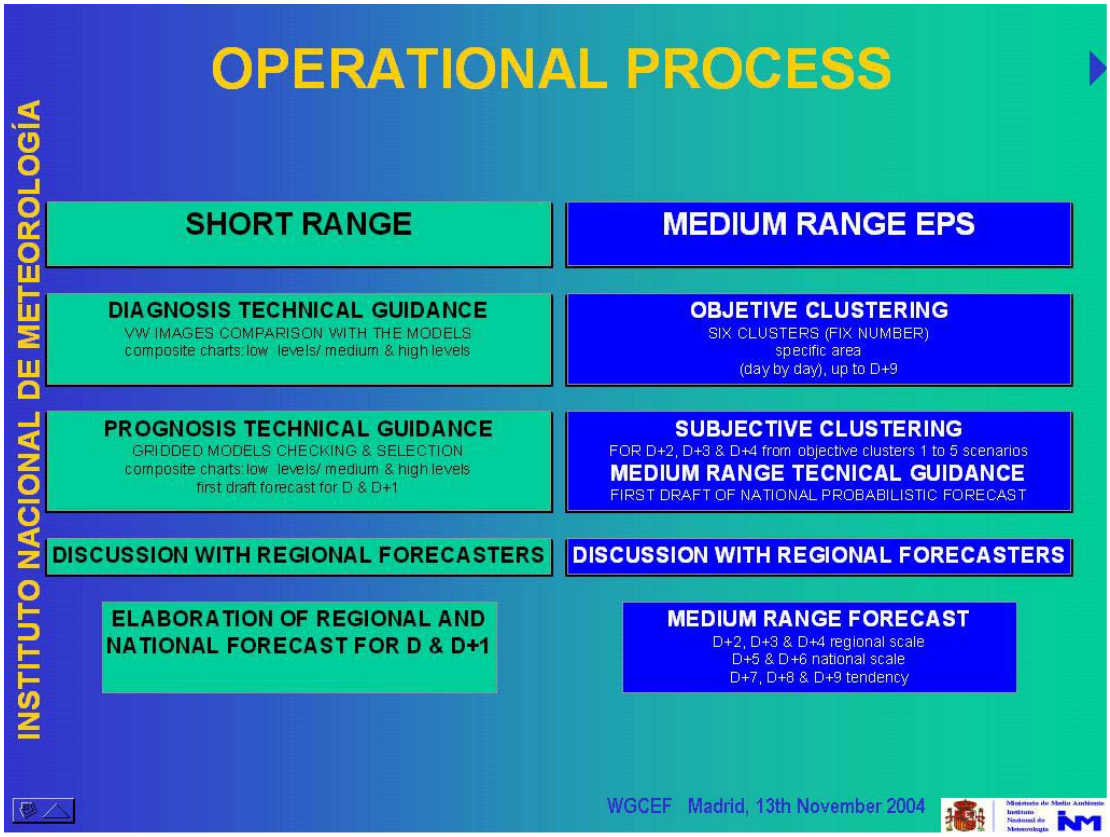
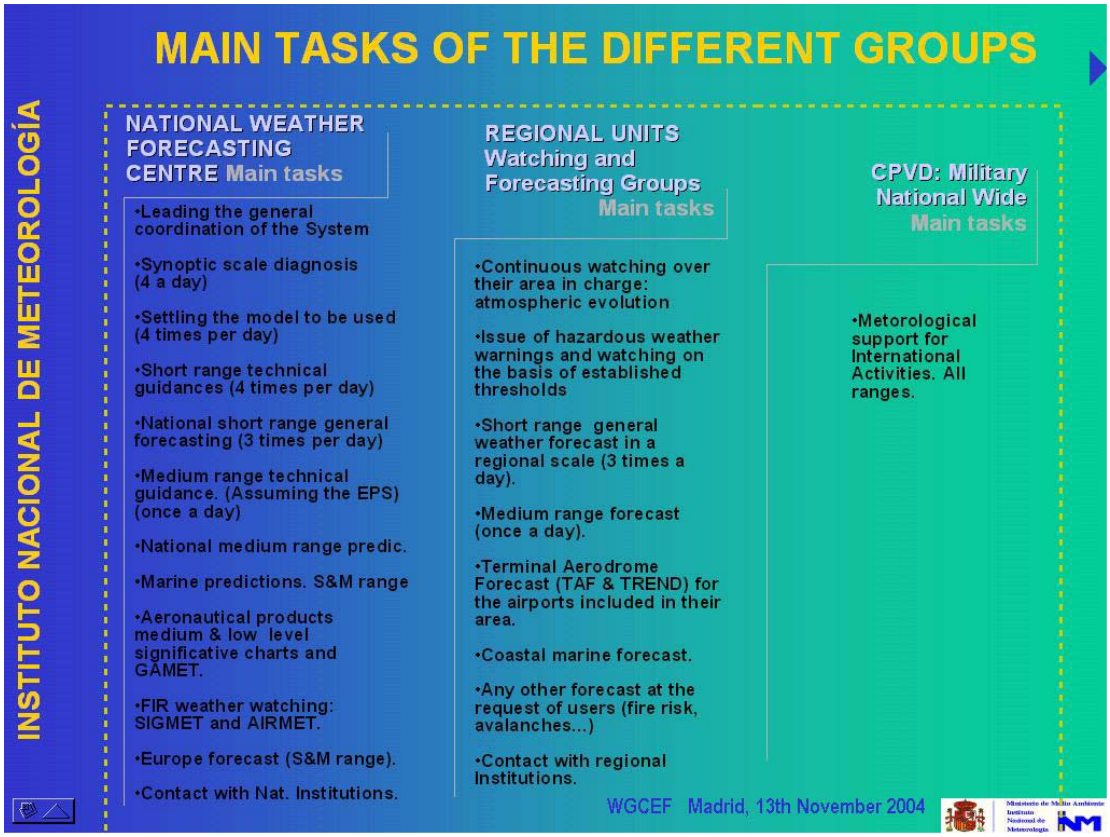
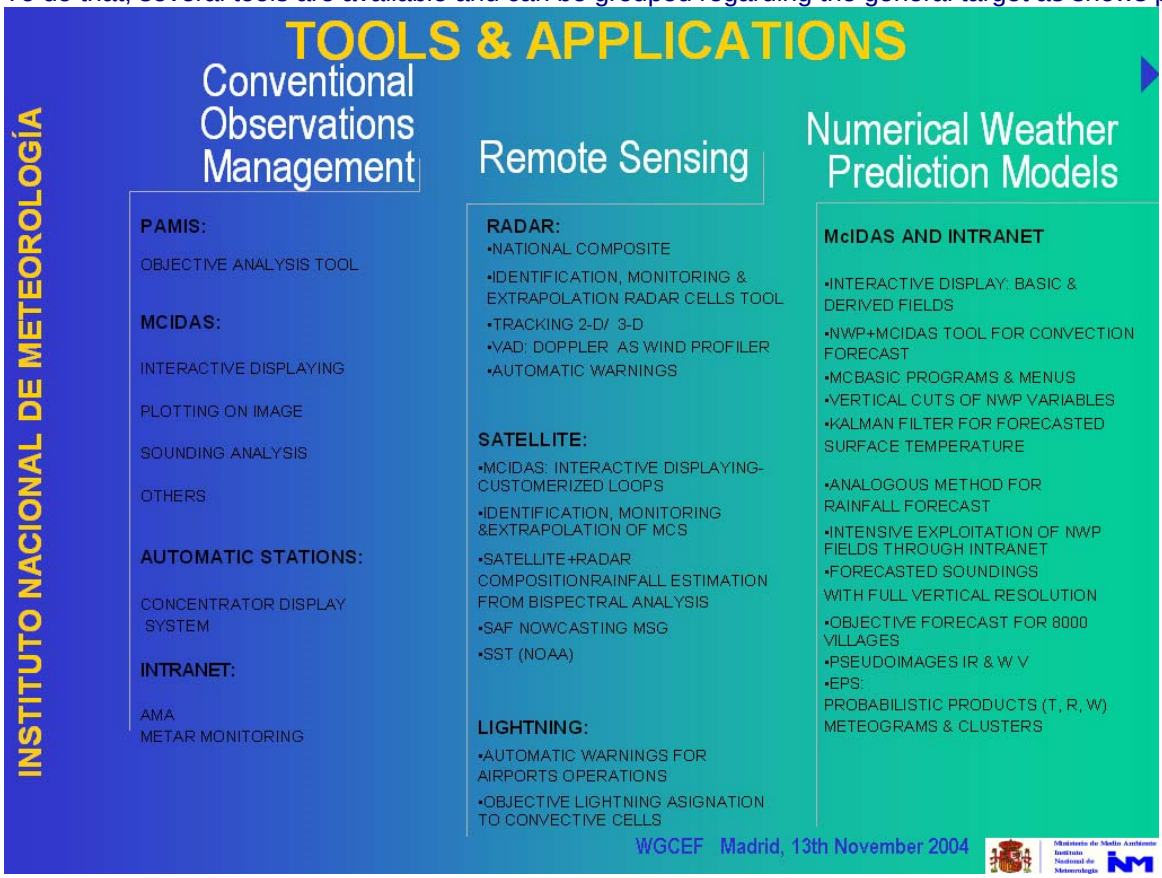


Figure 4 represents the main tasks performed nowadays by the different forecasting teams



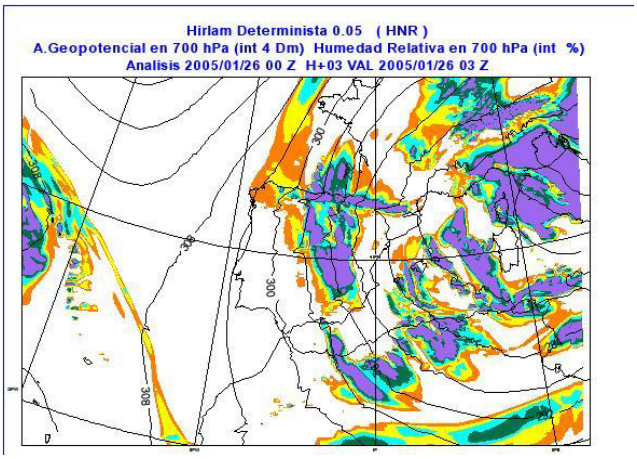
To do that, several tools are available and can be grouped regarding the general target as shows picture 5

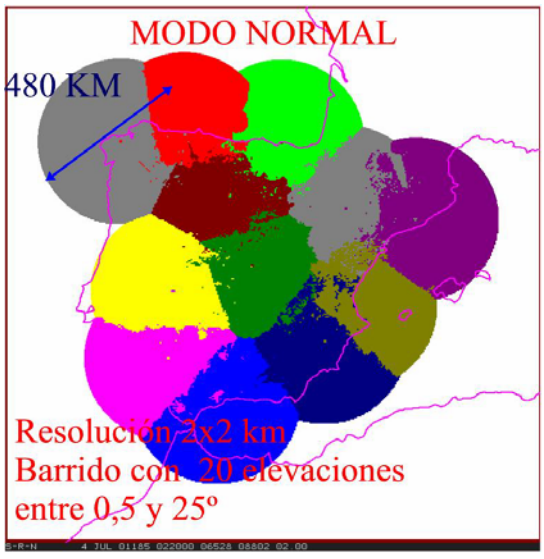


As first and more used tool, Numerical Weather Models Outputs provide a sort of gridded variables.

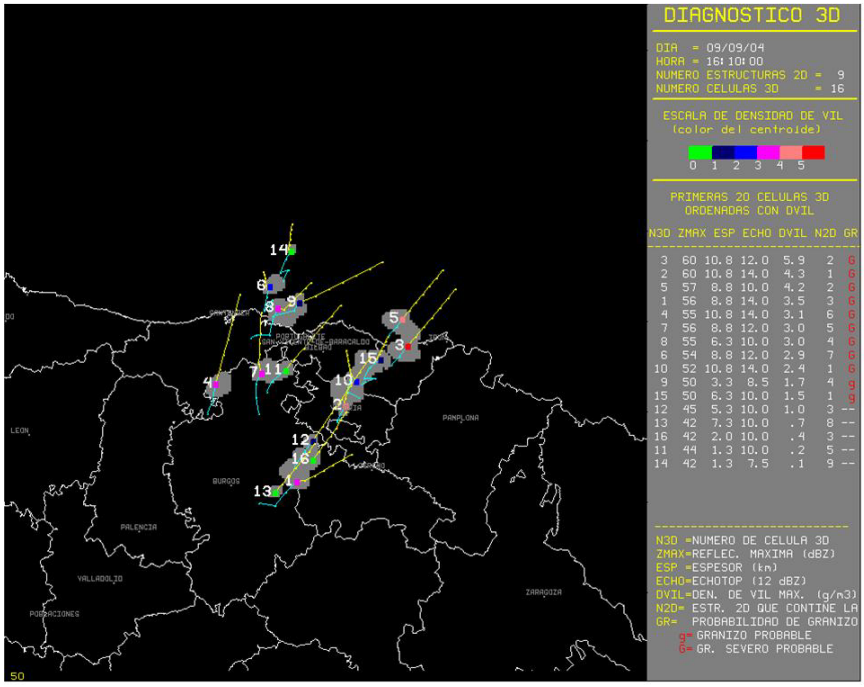
The models used at INM are:

HIRLAM 0.5º & 0.2º operational till March 2005
HIRLAM 0.16º & 0.05º operational from March 2005
SHORT RANGE EPS (DEVELOPING)
ECMWF DETERMINISTIC OPERATIONAL MODEL
ECMWF WAVE MODEL
ECMWF EPS
ECMWF WAVE
EPS





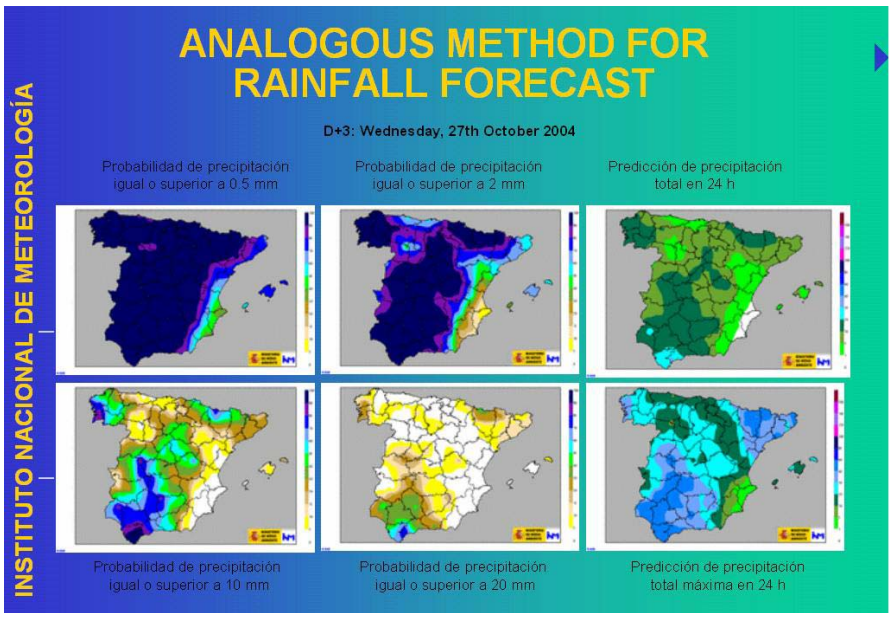
Concerning **nowcasting**, the radar network is a powerful tool. There are 14 radar working both Doppler (8 elevations) and normal way (20 elevations up to 25º). They generate a volume of data each 10 minutes.



mark the cells with probabilities of severe hail and hail, respectively.

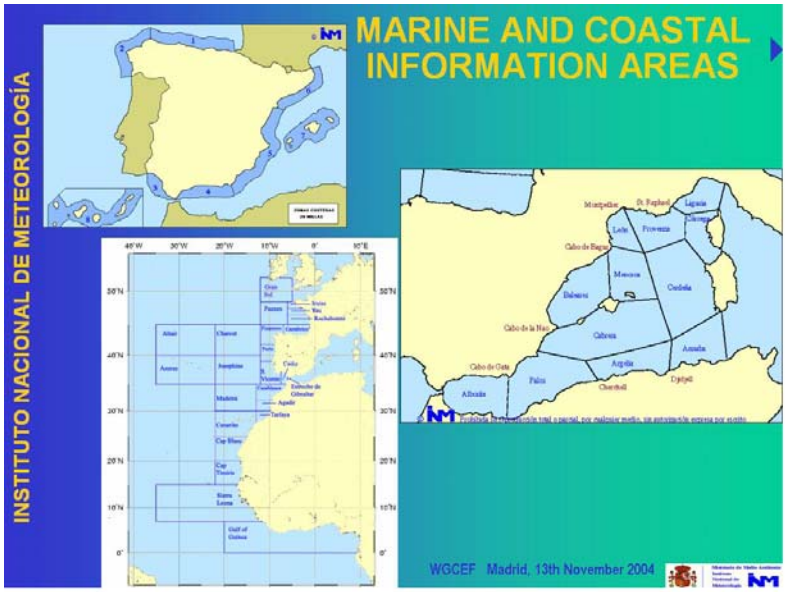
Based upon these data, the INM has developed several algorithms for monitoring and tracking severe convective cells. Next picture (number 8) is an example of an operational product based on the 3D analysis on 09th September 2004 at 16:10 UTC

Many characteristics of the convective cells are presented (maximum reflectivity, thickness, echo top, etc.), including the extrapolation at 10 minutes intervals up to 1 hour in yellow (the previous cell path is in blue). The colour for each cell depends on the VIL density. “G” and “g”, in red in the GR column,



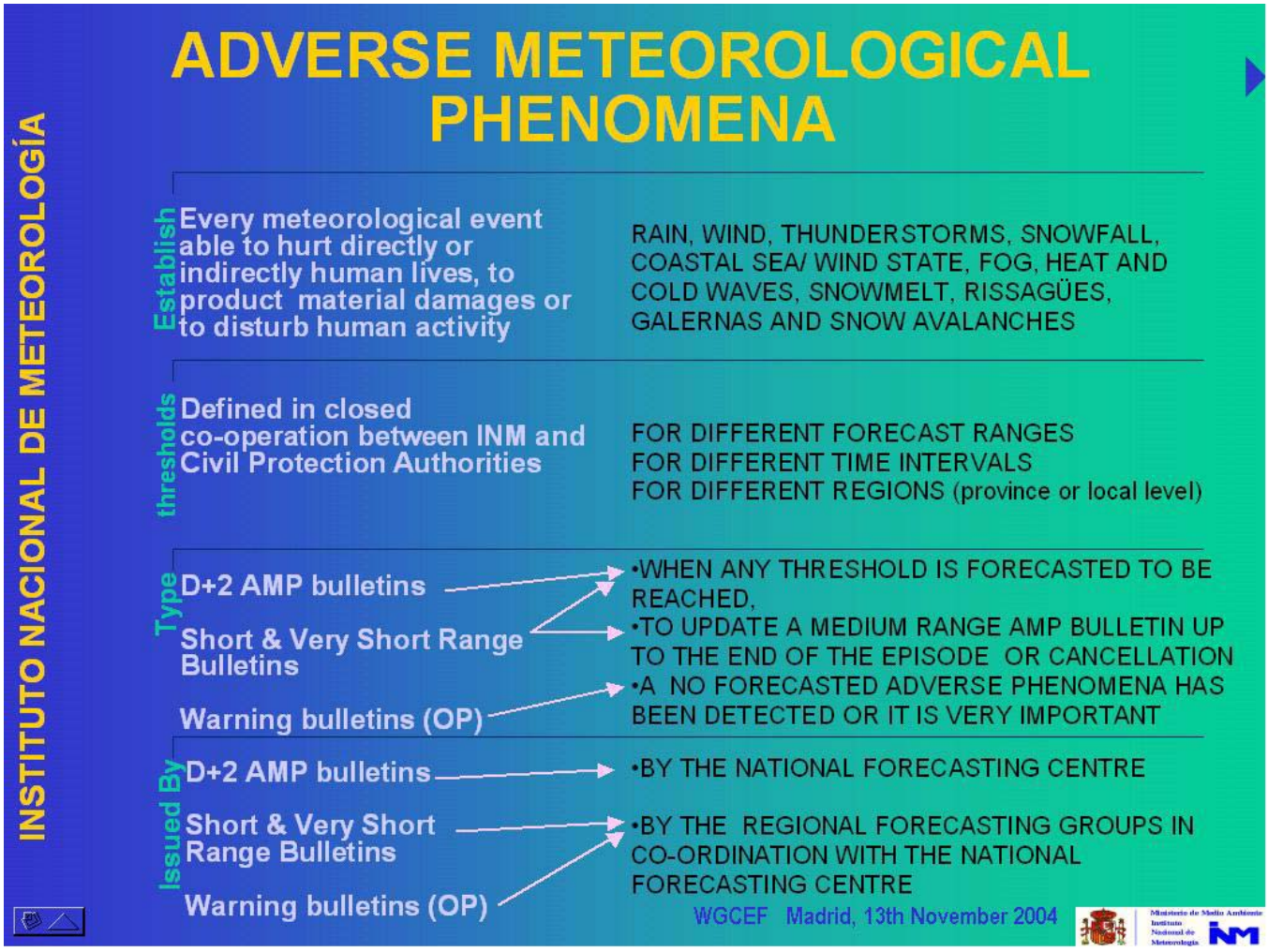
To mention a useful application, often used by medium range forecasters, I will give you some flavour about the analogous method: from the current model run and those with similar characteristics of model reanalysis historical dataset, it is obtained a rainfall probabilistic forecasting. It provides the probability of precipitation over 0,5 mm, 2mm, 10mm, 20mm, also gives the forecast of precipitation for a 24 hour period and the maximum precipitation for the same period, as shows figure 9.

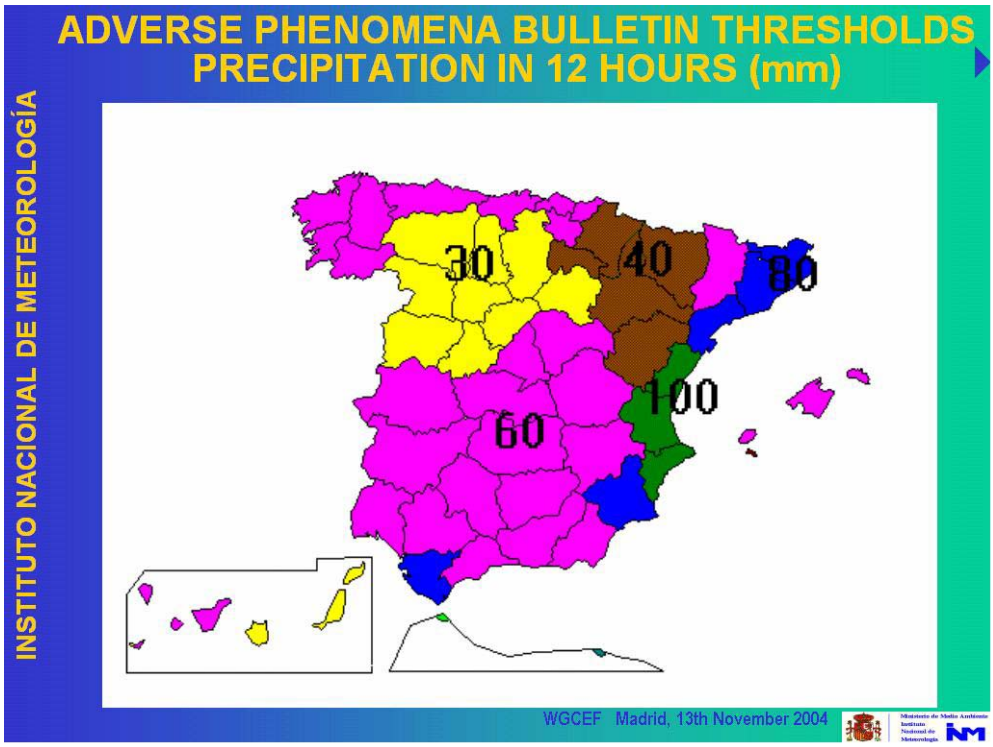
The National Forecasting Centre provides marine forecasts and gale warnings for the Mediterranean Sea and the Atlantic Ocean, while the Regional Groups are responsible of the coastal areas surrounding the Peninsula. Figure 10 contains the responsibility areas for the marine and coastal information



The National Forecasting Centre is also responsible for the Aeronautical information, divided in three FIR/UIRs (Madrid LEMM, Barcelona LEBN and Canary Islands GCGC), as shows figure 11. SIGMETs, GAMETs, AIRMETs and a Low level Significant Weather chart for Spain (4 times a day) are issued. The Regional Groups provide Terminal Aerodrome Forecasts (TAF & TREND) and warnings for the Airports included in their responsibility area.

Since 1982 the INM issues Adverse Meteorological Phenomena Warnings. Those bulletins have been changing from 1982 to the current warnings broadcasted by Internet.
Short range Warnings are available in the web site permanently. They aim to draw all situations, which can be dangerous till the 36 hours to come. Figure 12 summarises the phenomena for which a warning is issued, the different type of those bulletins and the responsibility of its emission, depending on the forecast range.



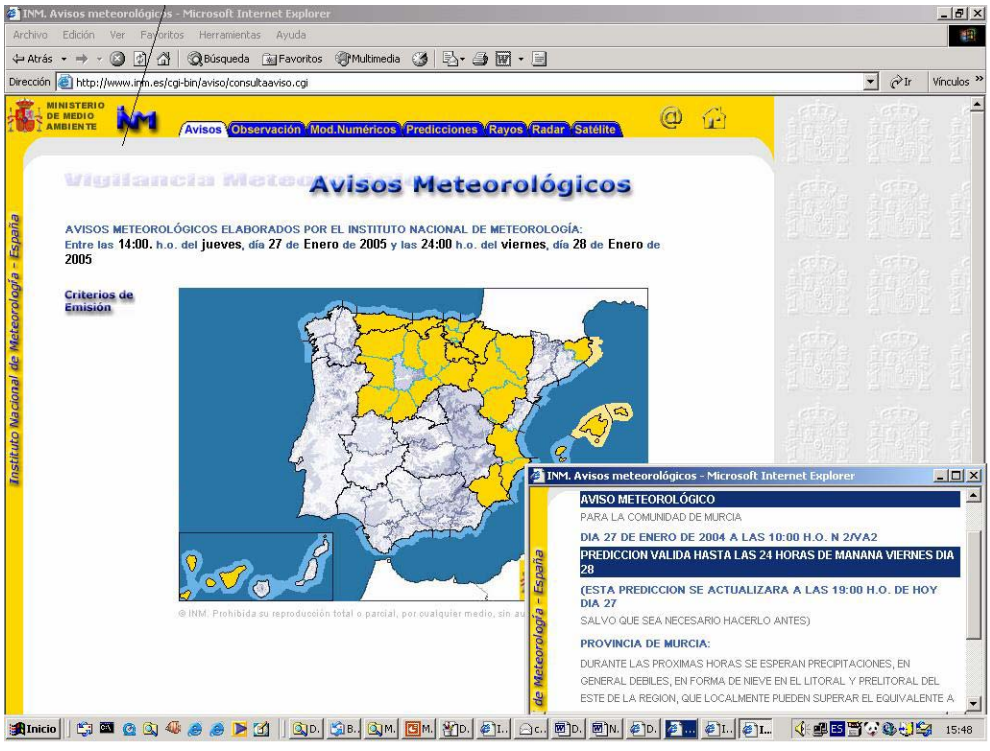


The climatic diversity of Spain forces to the election of very different thresholds for the different provinces, as can be seen in the figure 13, that shows the current thresholds (it would be similar to an orange level) for the amount of precipitation fallen in 12 hours.

The current short range warnings are made up on a map of Spain, which announces if a danger threatens one or more provinces. No colour indicates that no particular precaution is necessary. The province in danger is coloured in yellow and clicking on it, the warning bulletin is opened. This map is updated at least twice a day, at 10.30 and 19.30 or whenever it is need to.

Nowadays Spain joins the EMMA Group. All the thresholds have been changed, according to the four colours scale, but the new thresholds chosen for each area and each degree of danger, must be approved by the Civil Authorities.

The Warnings issued by the Regional Groups, are combined and displayed in a central website, elaborated in the National Forecasting Centre.



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