PROGRESOS RECIENTES EN BASE AL MODELO MM5: ACTIVIDADES DEL GRUPO 01

4ª REUNIÓN RED IBÉRICA MM5
(AVEIRO, 26-27 ABRIL 2007)

Grupo de Meteorología, Dept. de Física UIB

Red Ibérica para la investigación y desarrollo de aplicaciones en base al modelo atmosférico MM5

Aplicaciones

Grupo 06

1. http://atmosfera.lma.fi.upm.es/mm5v3.6/
[Operational Weather Forecasts for Iberian Peninsula (MM5 Model) (operational since, September, 13, 2000)]

Grupo 30

2. http://meteo.ist.utl.pt
[Previsão Numérica do Tempo para Portugal]

Grupo 35

3. http://www.unex.es/fisica/meteoro/mm5/mm5unex.html
[Daily MM5 model outputs at the University of Extremadura]

Grupo 17

4. http://www.fis.ua.pt/torre/Yamazaki/modelos/index.html
[Integrações do modelo MM5 são apresentadas em três dominios aninhados (D1/D2/D3), com frequência horária, para um período de 48 HS]

Grupo 01

5. http://mm5forecasts.uib.es
[Real Time MM5 weather forecasts at UIB. Three domains with high resolution over the Balearic Islands]

Grupo 17

6. http://www.fis.ua.pt/torre/Yamazaki/modelos/index.html

http://mm5forecasts.uib.es/

Red Ibérica para la investigación y desarrollo de aplicaciones en base al modelo atmosférico MM5

Red MM5
Descripción
Grupos
Colaboraciones
Proyectos
Actividades

Aportaciones
Publicaciones
Documentación
Aplicaciones
Algoritmos
Bases de datos

Ensemble

Foro discusión

Buscador

Grupo 17

6. http://www.fis.ua.pt/torre/Yamazaki/modelos/index.html
[Predicciones del modelo WRF para Portugal con resolución espacial de 20 km]

Grupo 07

7. http://www.meteogalicia.es/galego/modelo/00z.htm
[Salidas gráficas de los modelos que se ejecutan operativamente para Galicia]

Grupo 01

8. http://ecss.uib.es
[European Climatology on Severe Storms: MM5 pre-processing programs are used to construct this climatology from ERA-40 reanalysis]

Grupo 06

9. http://verde.lma.fi.upm.es/cmaq_eu/
[European Operational Air Quality Forecasts System by using MM5-CMAQ-EMIMO air quality modelling system]

Grupo 37

10. http://meteo.iter.es
[Portal Meteorológico del Instituto Tecnologico y de Energias Renovables de Tenerife]

Grupo 01

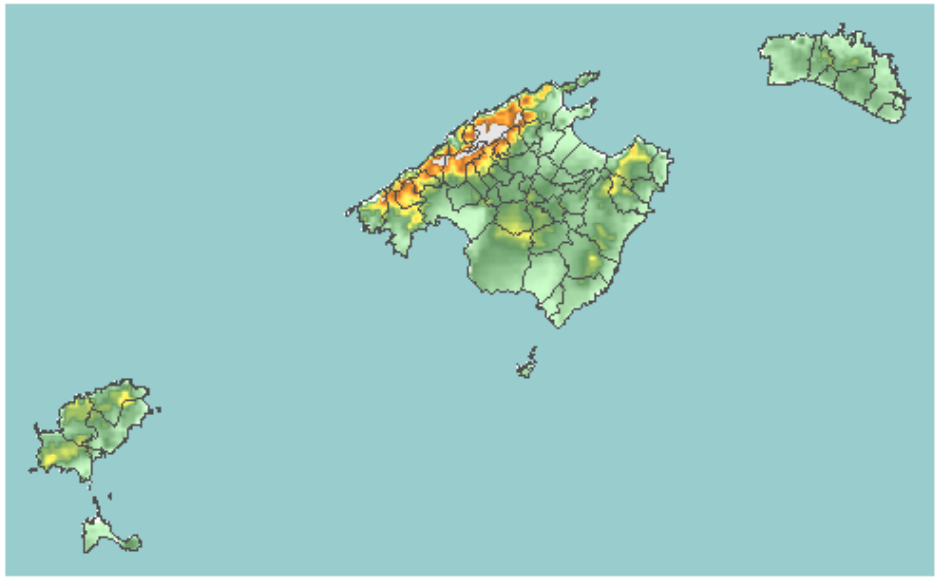
11. http://hmsforecasts.uib.es
[Real-time MM5 driven HEC-HMS runoff forecasts for the Llobregat basin (Catalunya) and Albufera basin (Mallorca)]

http://hmsforecasts.uib.es/

CONVENI DE COL·LABORACIÓ ENTRE LA CONSELLERIA DE MEDI AMBIENT I LA UNIVERSITAT DE LES ILLES BALEARS PER DESENVOLUPAR ACTIVITATS DE RECERCA I FORMACIÓ DINS DE L'ÀREA DEL CANVI CLIMÀTIC A LES ILLES BALEARS

OCLIB

Prediccions meteorològiques locals per a les Illes Balears



Mapa de les Illes Balears | Mapa de Mallorca | Mapa de Menorca | Mapa d'Eivissa i Formentera

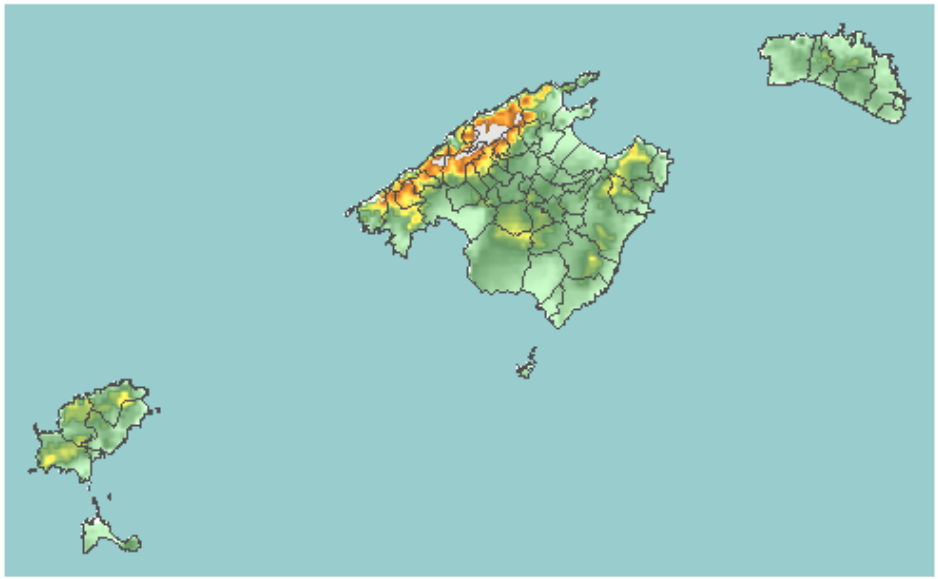
Govern de les Illes Balears
Conselleria de Medi Ambient
Direcció General de l'Oficina del Canvi Climàtic

Grup de Meteorologia
Departament de Física

Universitat de les Illes Balears

http://mm5forecasts.uib.es/OCLIBlocal

Regionalització climàtica de les Illes Balears com a suport al disseny de xarxes d'observació



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Direcció General de l'Oficina del Canvi Climàtic

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Departament de Física

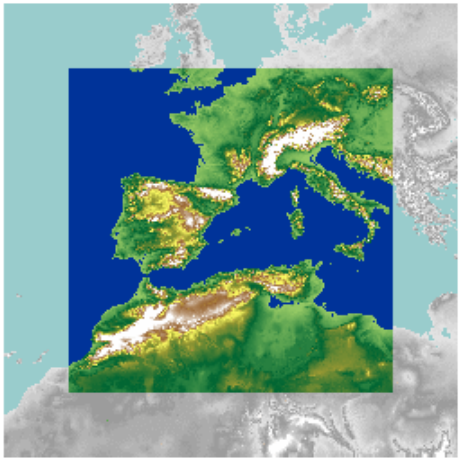
Universitat de les Illes Balears

Temperatura Precipitación Humedad Viento Todas

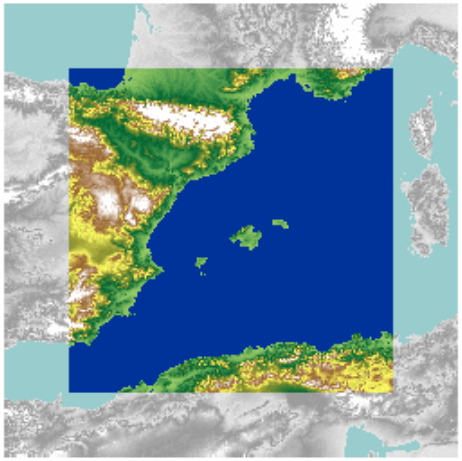
5 10 15 20 25 30 35 40 45 50 55 60 regiones

REAL-TIME MM5 WEATHER FORECASTS

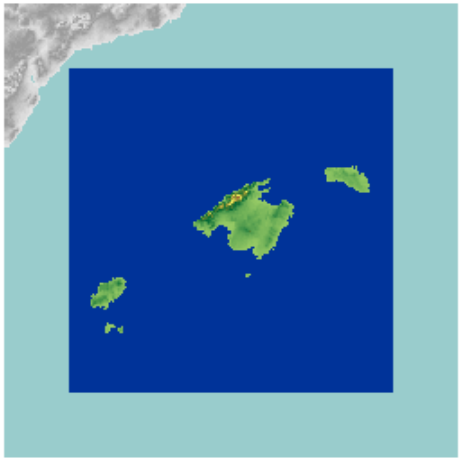
1 panel option (low resolution displays)



DOMAIN 1 (22.5 km resolution)



DOMAIN 2 (7.5 km resolution)



DOMAIN 3 (2.5 km resolution)

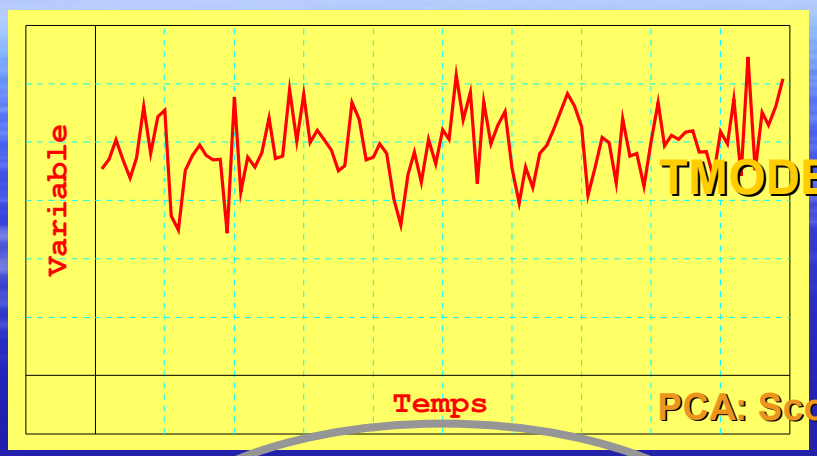
Grup de Meteorologia
Departament de Física

Universitat de les Illes Balears

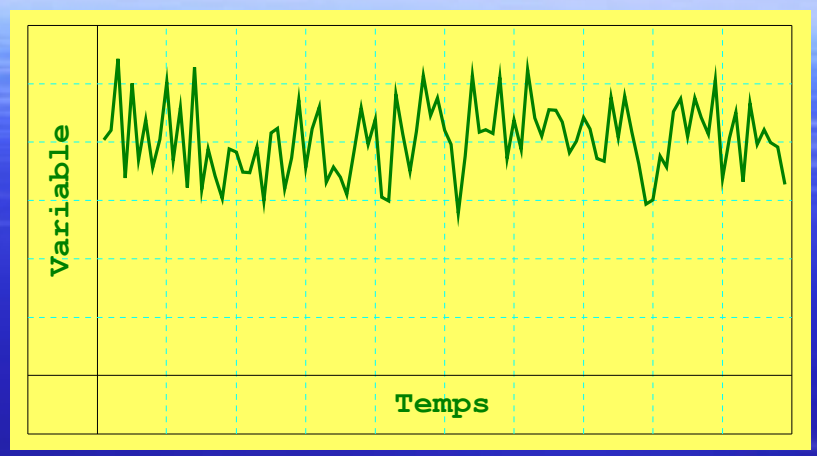
Archivo histórico de predicciones 3–horarias (con interrupciones !!!)

Septiembre 2004 – Noviembre 2005: Series temporales con 2680 datos para cada uno de los 729 puntos terrestres de las Baleares (dominio 3)

METODOLOGIA: PCA + CA



TMODE



PCA: Scores

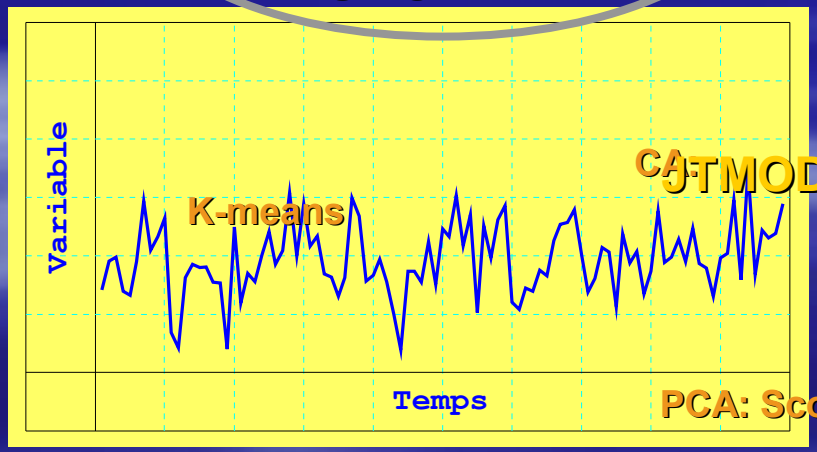
PCA: Loadings

CA: K-means

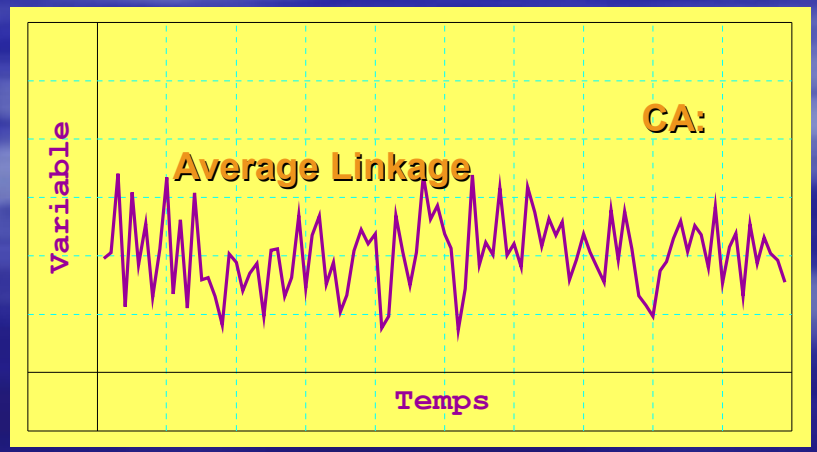
PCA: Loadings

SMODE

JSMODE



JTMODE



PCA: Scores

CA: Average

http://mm5forecasts.uib.es/OCLIBreg

Sensitivities of Mediterranean intense cyclones: A systematic climatology

Víctor Homar

Victor.Homar@uib.es

Intense cyclones database

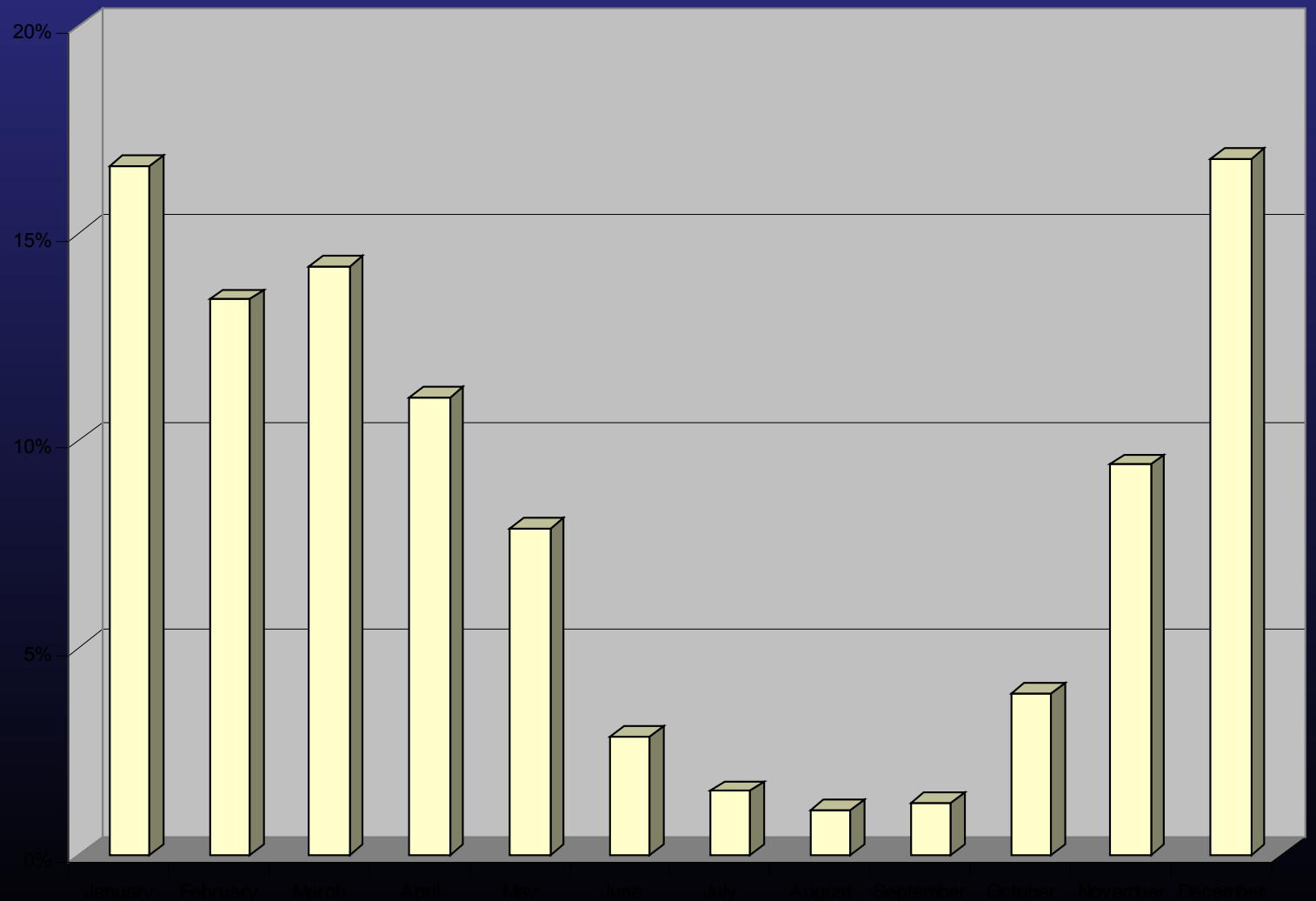
- From ERA40 (1957-2002):
  - Select intense cyclones with

$C_{max} \geq 7\ 10^7\ m^2 s^{-1}$ and $t_f - t_i \geq 24$ h

1359 Intense cyclones/45 years
30 Intense cyclones/year

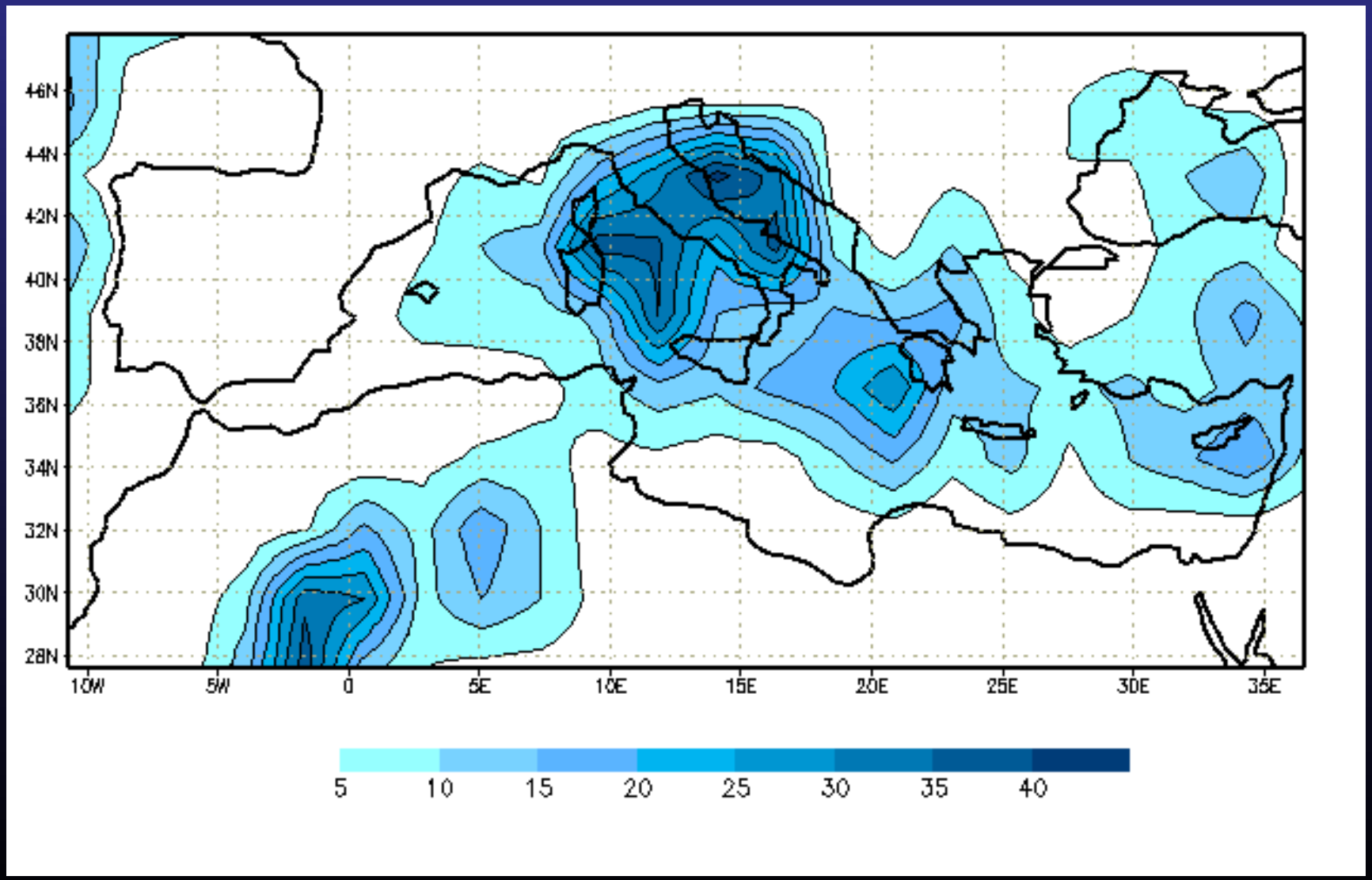
Intense cyclones database

Monthly frequency of intense cyclones (ERA40 1957-2002)



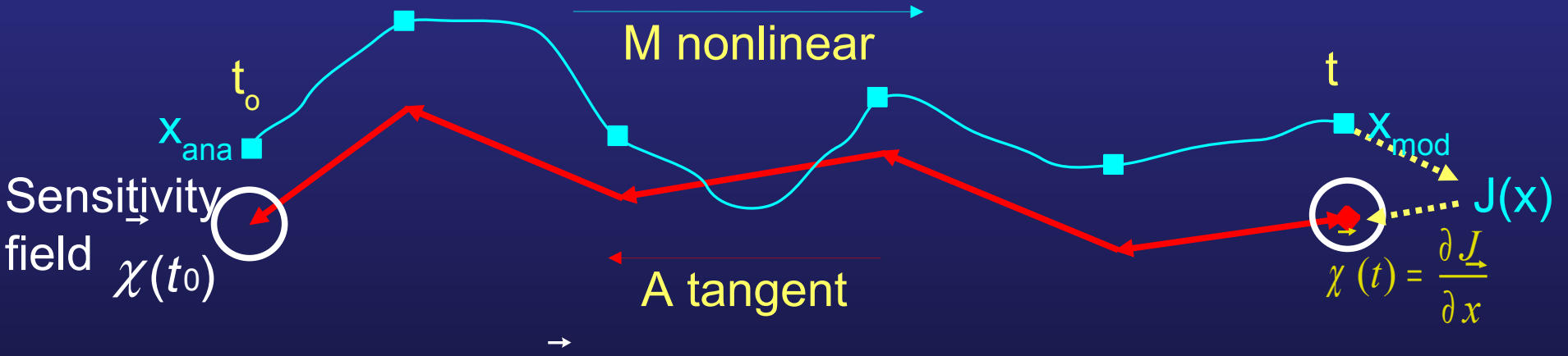
Intense cyclones database

Density of cyclones at the moment of their maximum intensity (ERA40 1957-2002)



Adjoint models

- Schematic view of integrations:



Sensitivity fields $\vec{\chi}(t_0)$

- Units of:

$$\frac{[J]}{[\text{Init. Cond.}]}$$

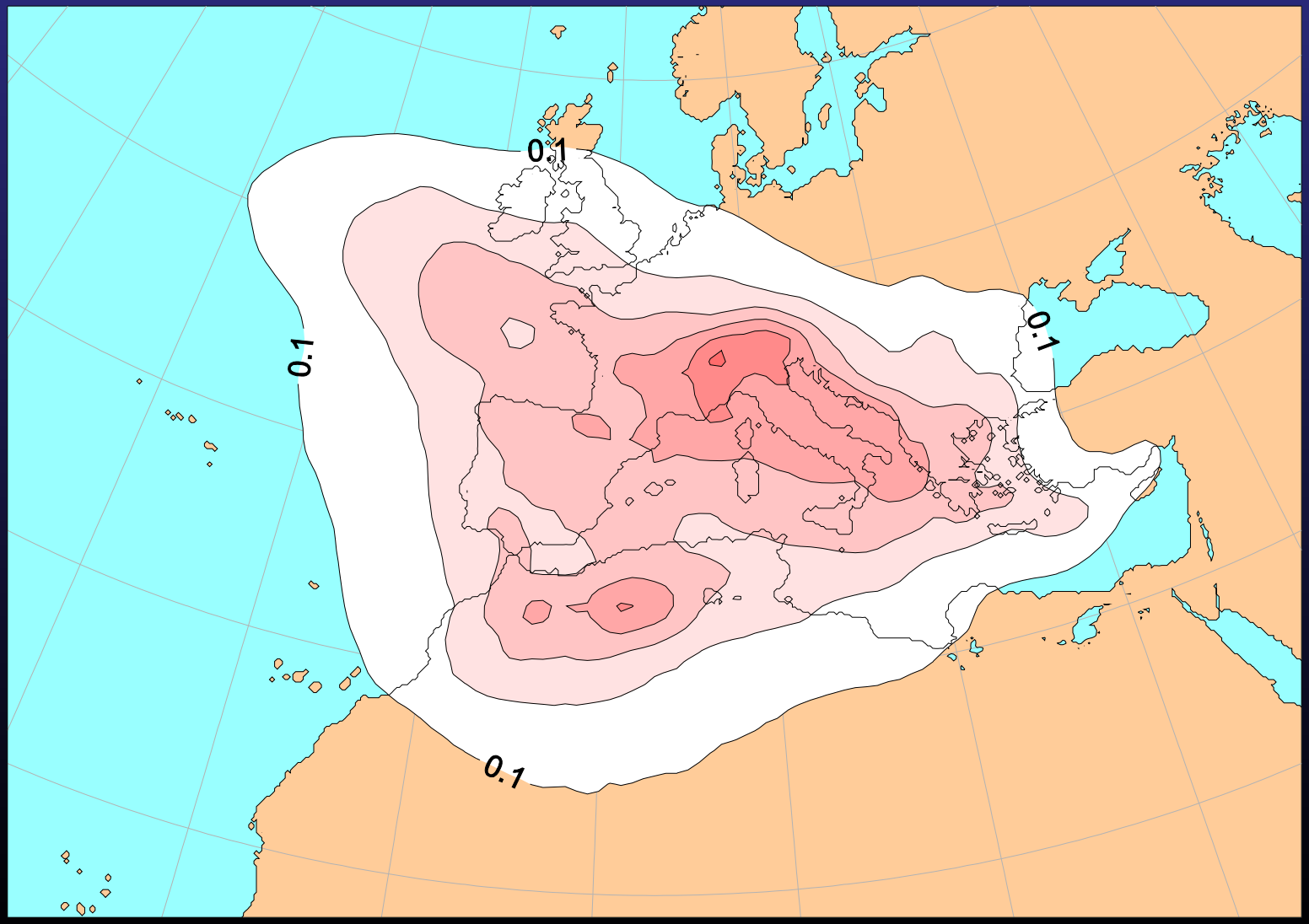
- It shows the sensitivity of J(x(t)) to the model initial fields

Response functions J(x(t))

- Model error: X_{obs} -X_{mod}
- Particular feature of interest
  - Cyclone's central pressure
  - Jet stream location and intensity
  - Temperature at a certain point
  - ...
- Any differentiable function of X_{mod}

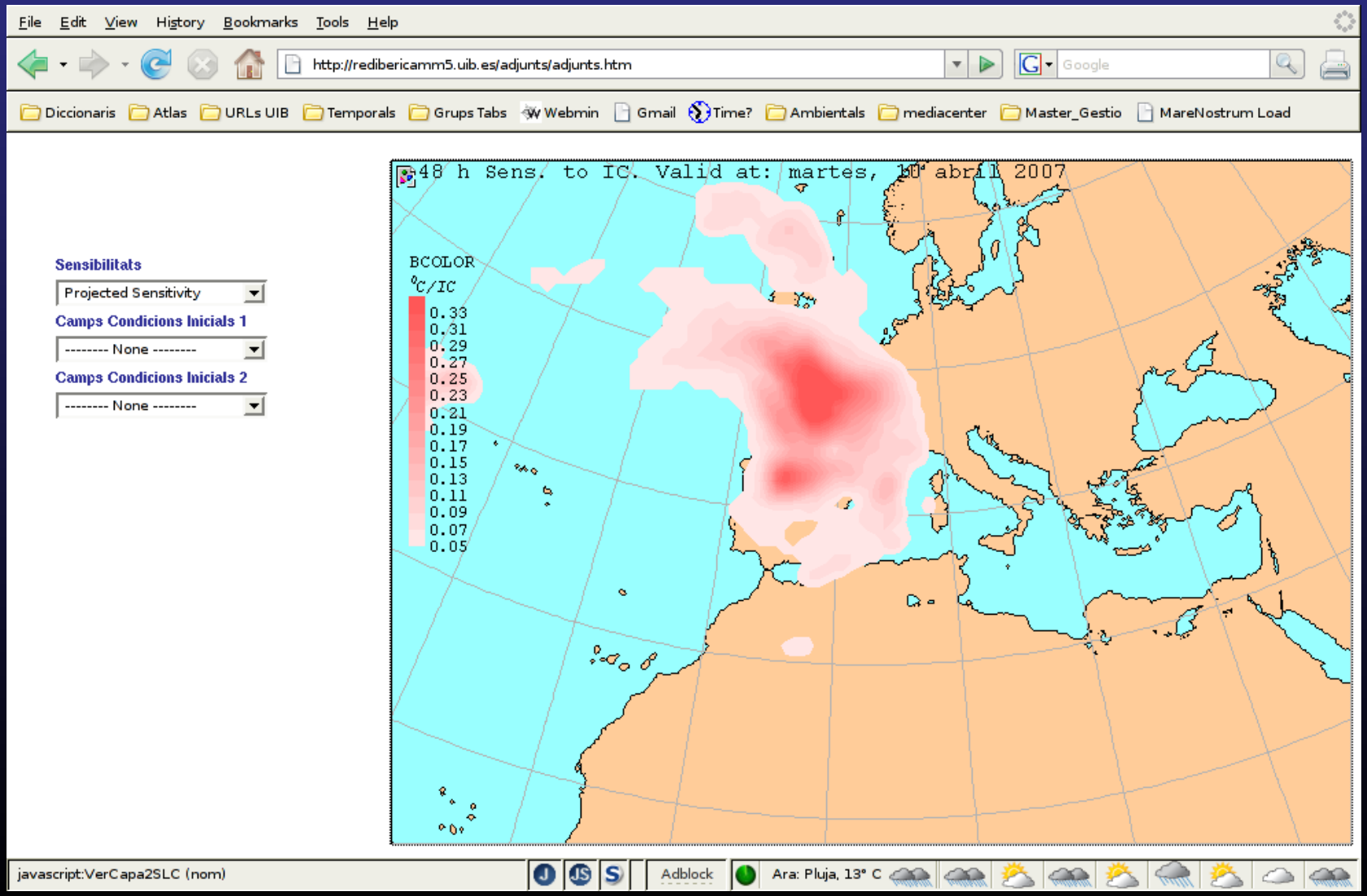
Results…

…the weighted mean of 48h sensitivities for intense Mediterranean cyclones:



“On demand” Sensitivity

http://redibericamm5.uib.es/adjunts/adjunts.htm



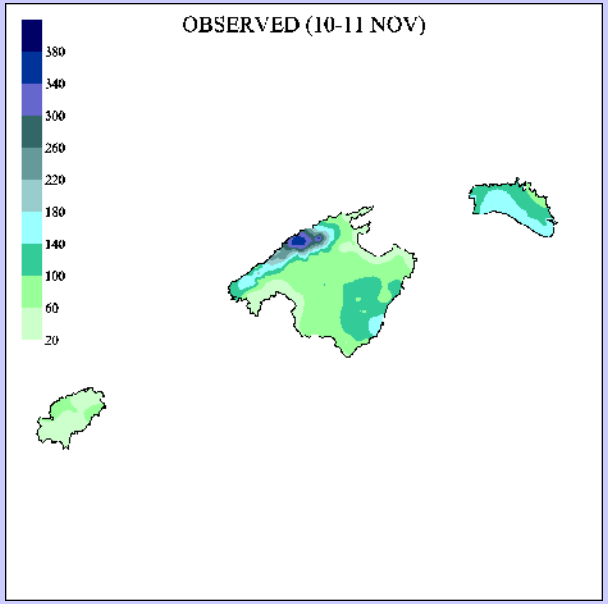
MM5 MULTI-PHYSICS ENSEMBLE

Explicit moisture scheme

IMPHYS=4	Simple Ice
IMPHYS=5	Mix phase
IMPHYS=6	Graupel (gsfc)
IMPHYS=7	Graupel (reisner2)
IMPHYS=8	Schultz

PBL parameterization

IBLTYP=2	Blackadar
IBLTYP=3	Burk-Thompson
IBLTYP=4	Eta M-Y
IBLTYP=5	MRF
IBLTYP=6	Gayno-Seaman
IBLTYP=7	Pleim-Siu


OBSERVED (10-11 NOV)
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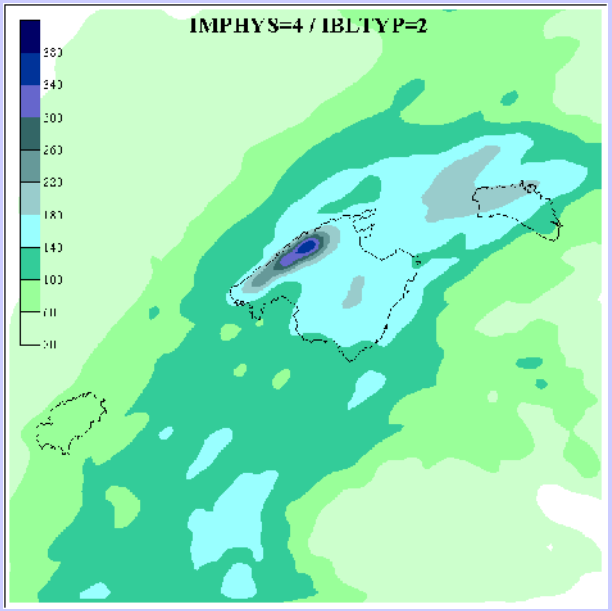
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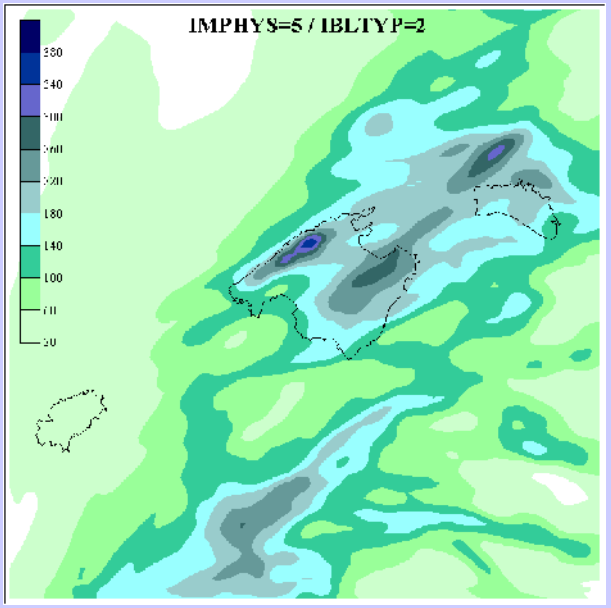
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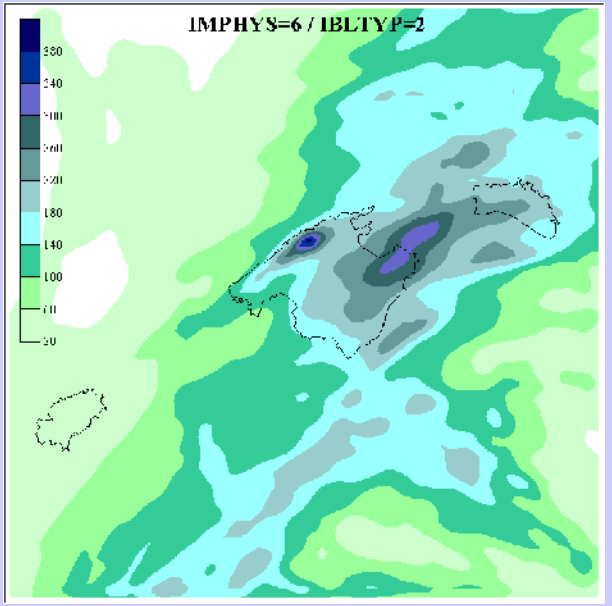
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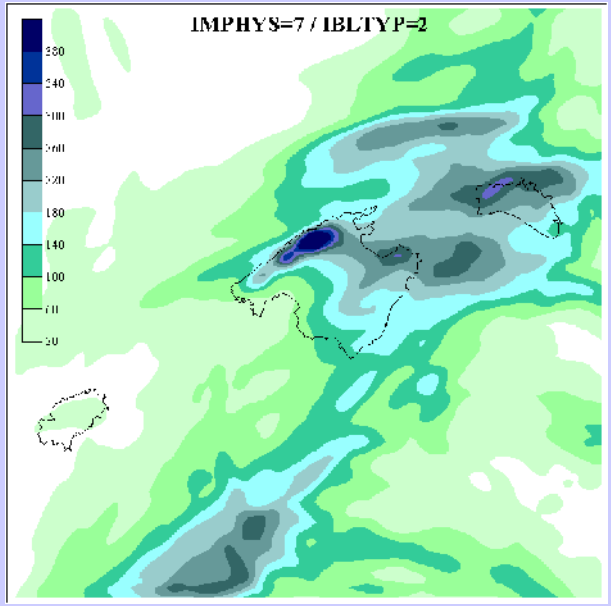
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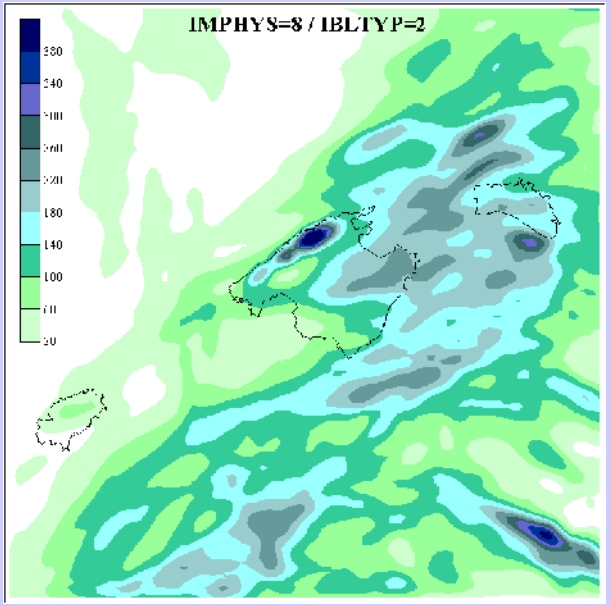
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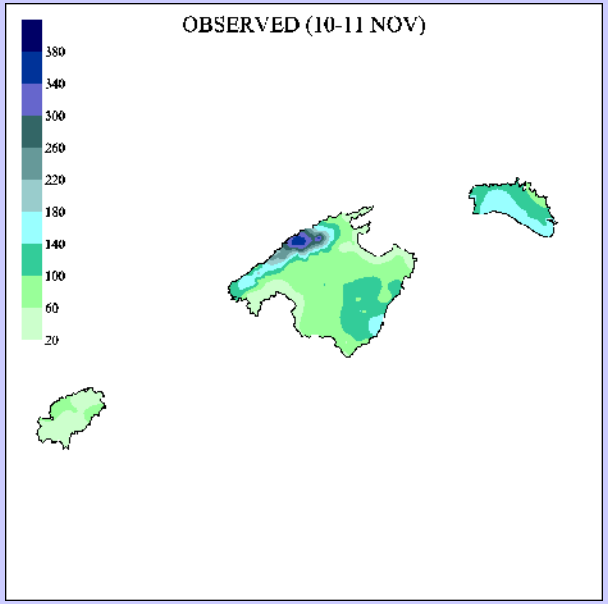
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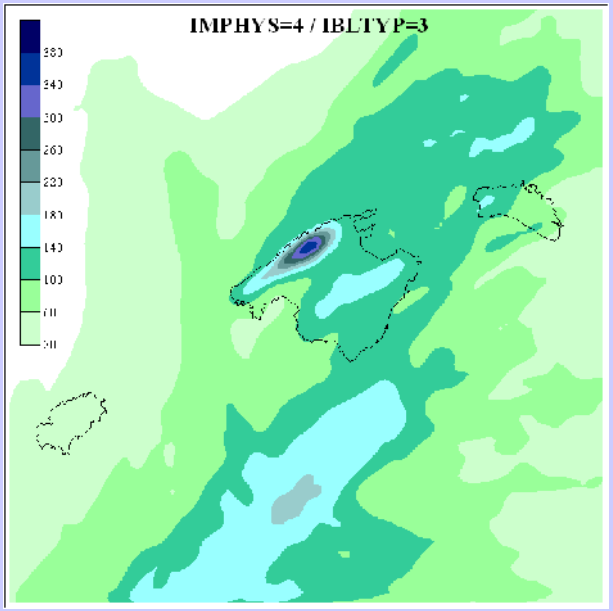
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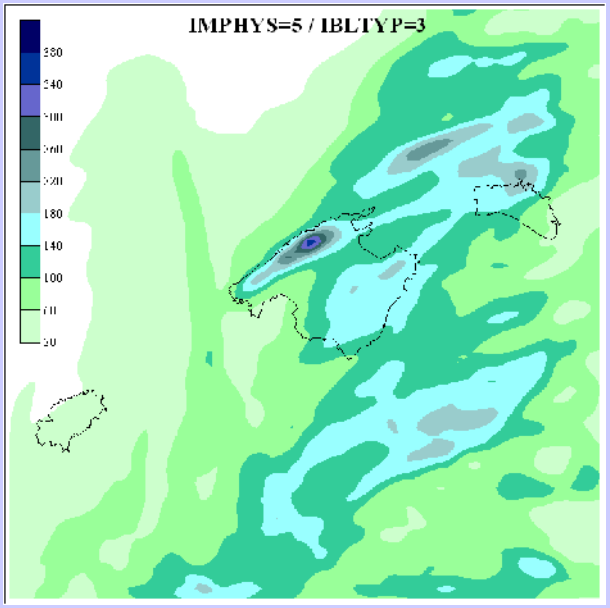
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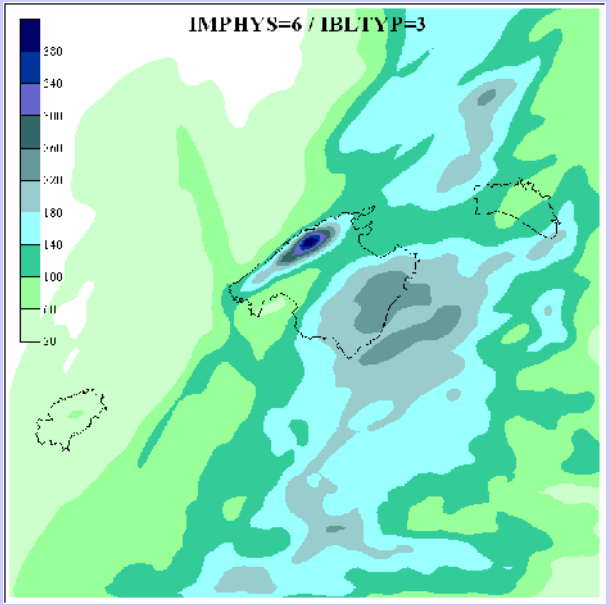
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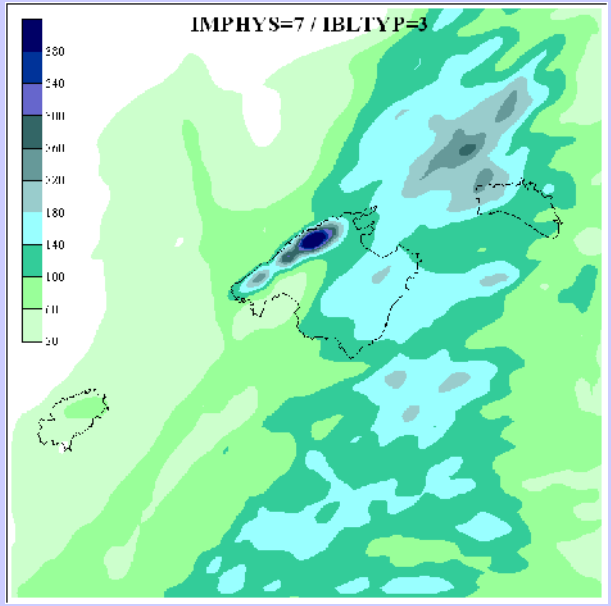
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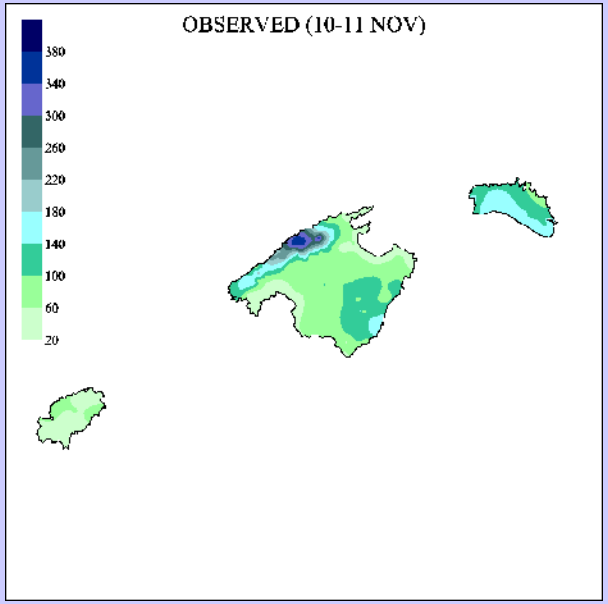
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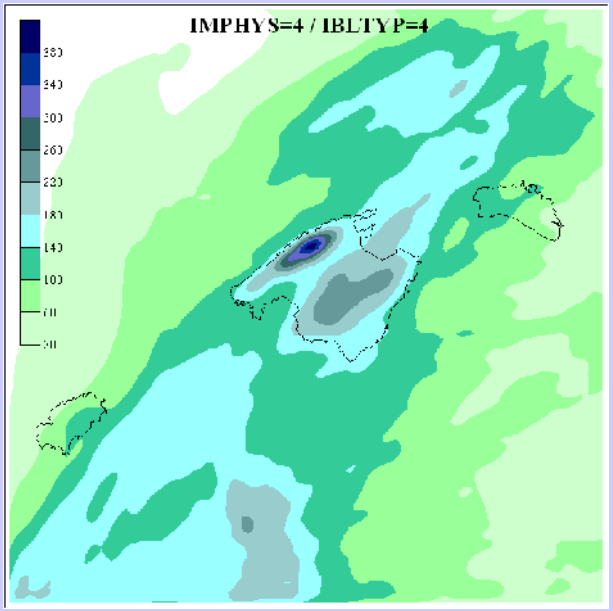
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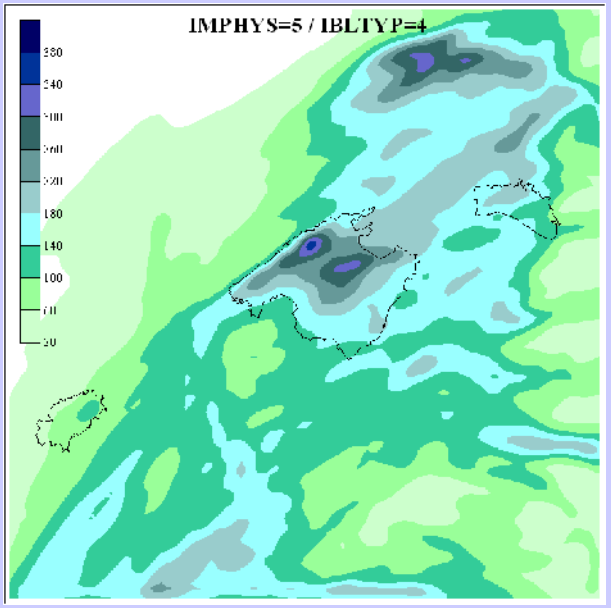
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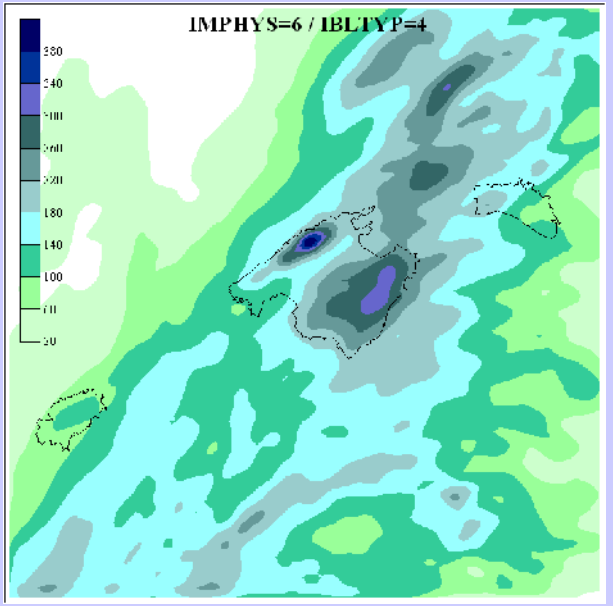
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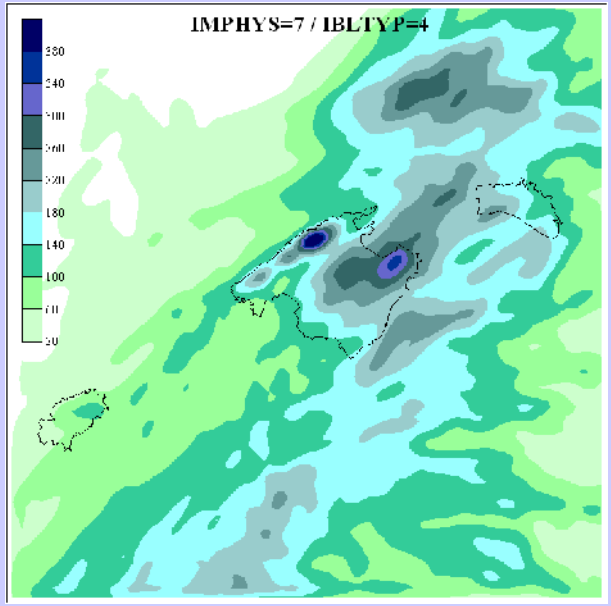
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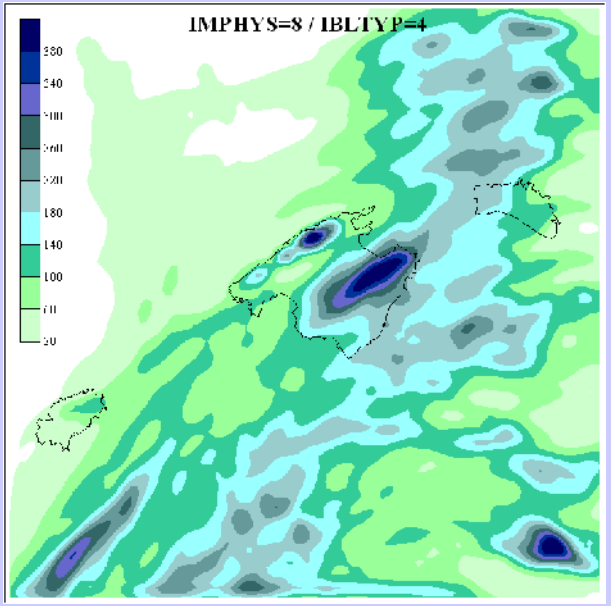
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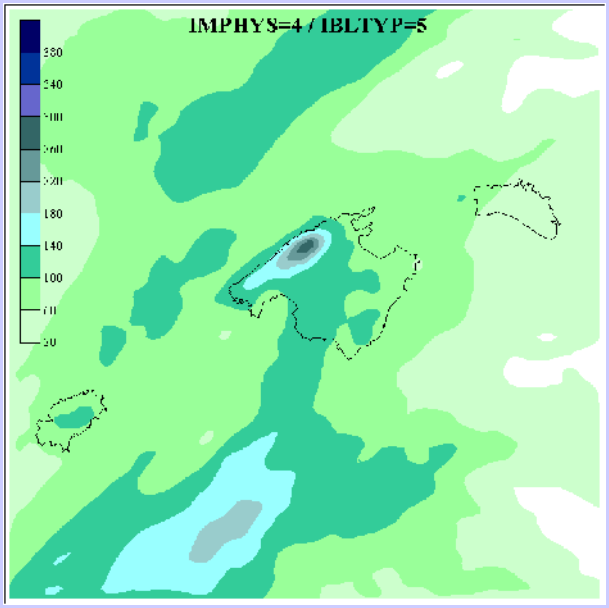
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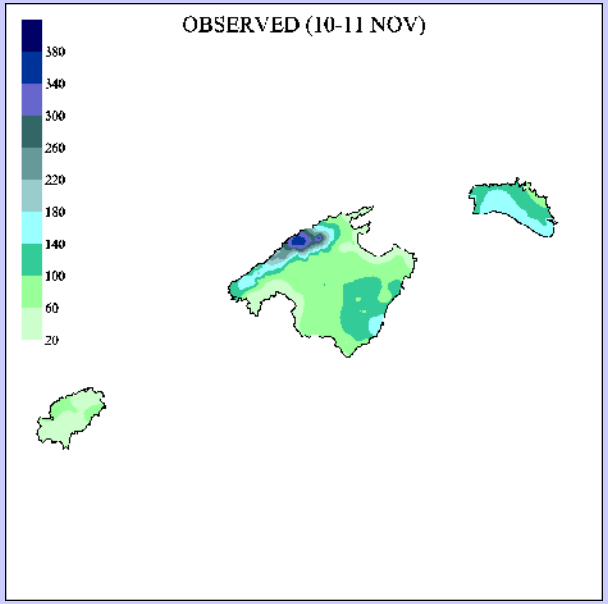
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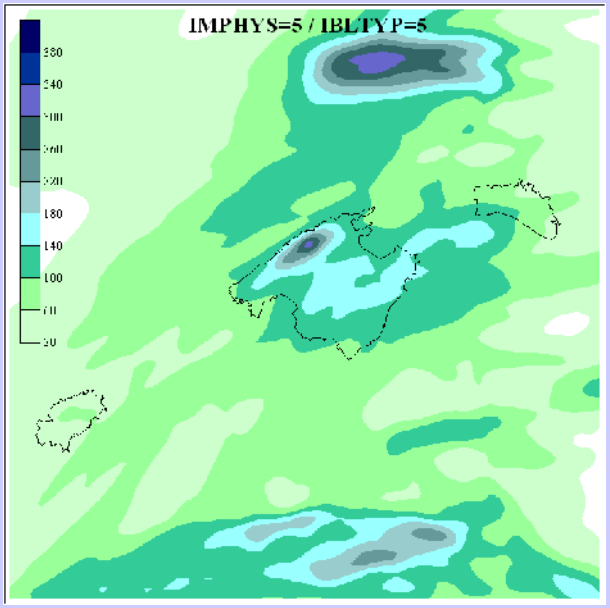
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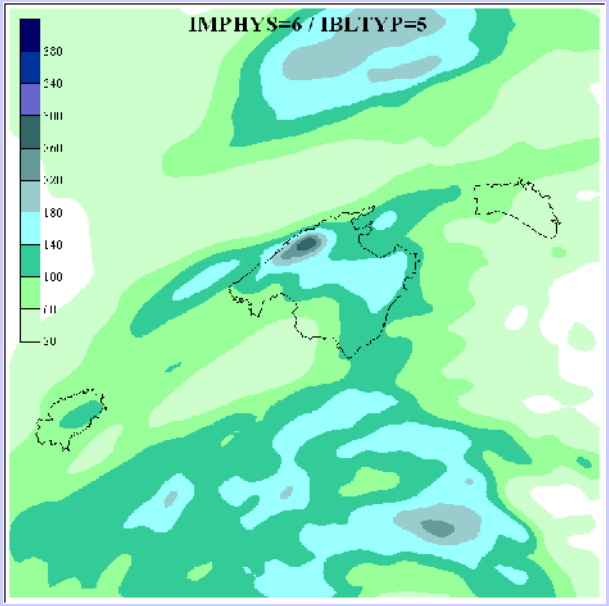
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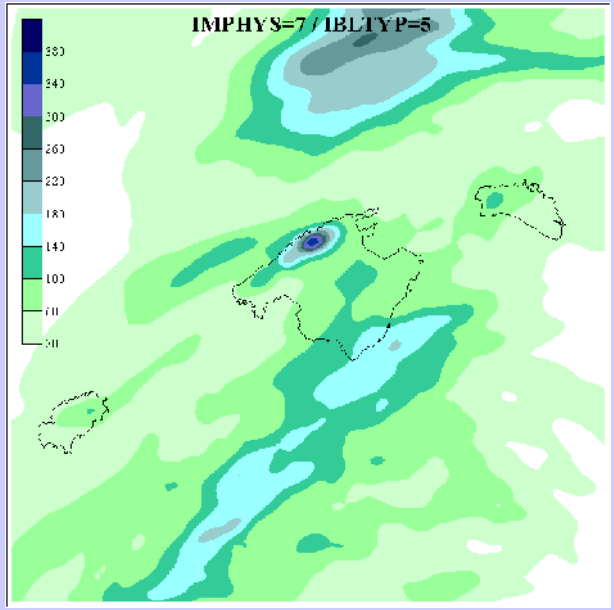
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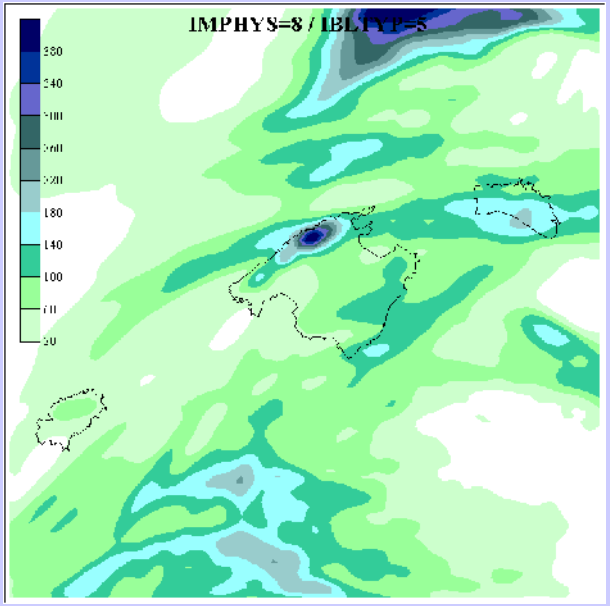
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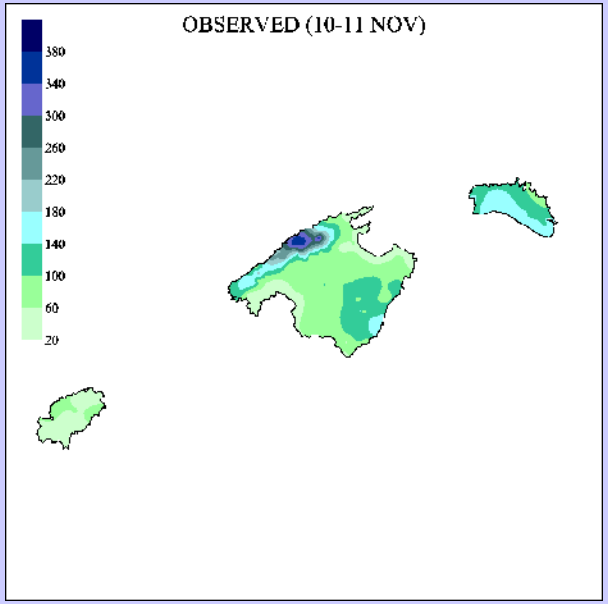
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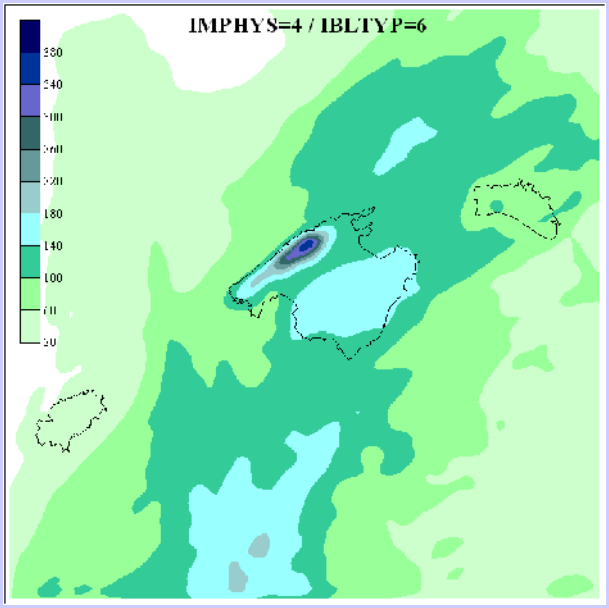
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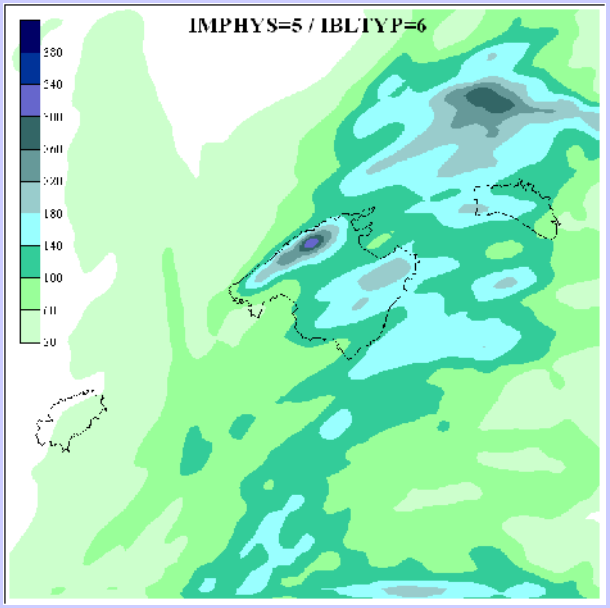
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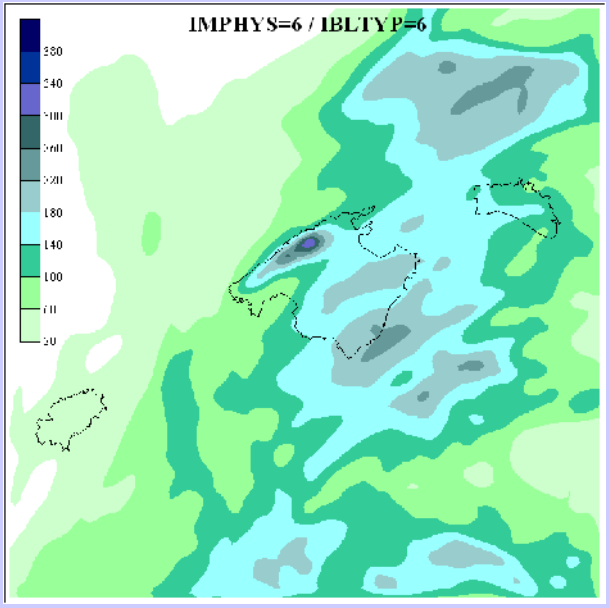
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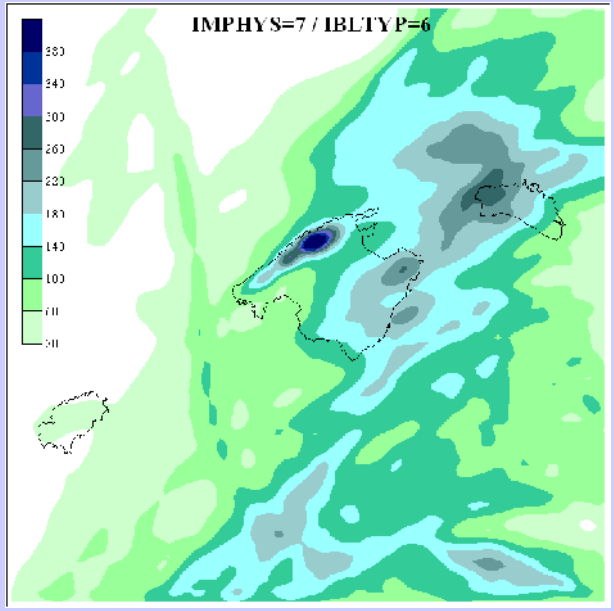
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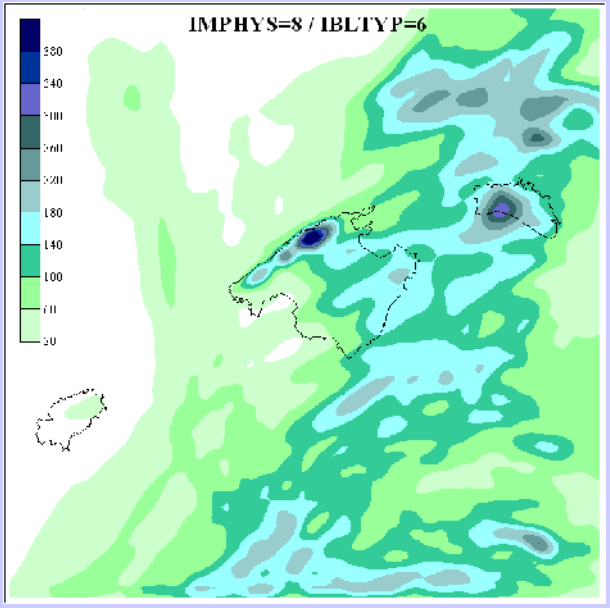
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MM5 MULTI-ANALYSIS ENSEMBLE

PV perturbations are introduced in I.C and B.C

PV inversion method + actual PV error climatology

Where?

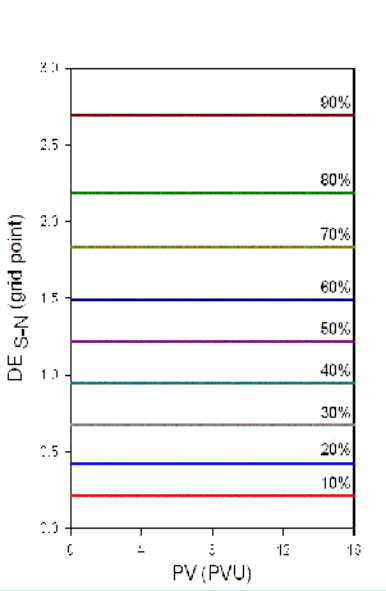
a) Zones with high PV anomalies or gradients
b) MM5-adjoint derived sensitivity zones

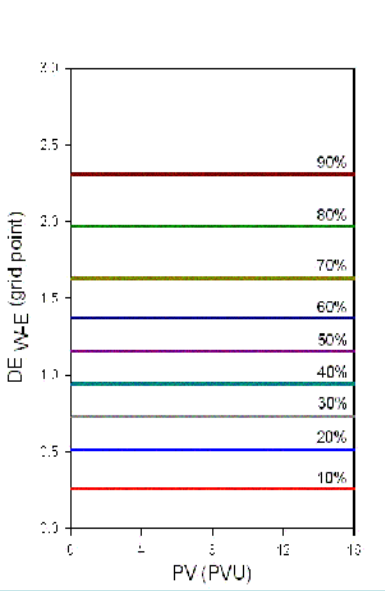
Methodology

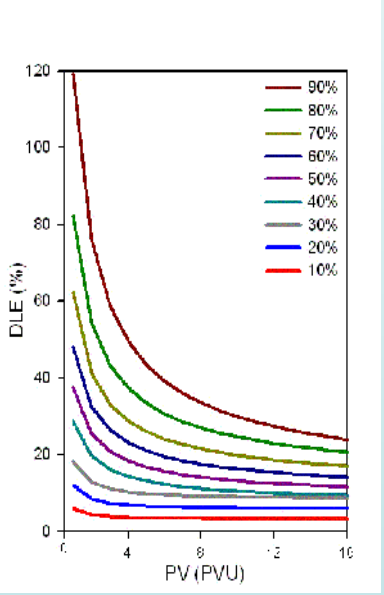
In an attempt to introduce realistic perturbations in the ensemble prediction system, a PV error climatology (PVEC) has to be done. This climatology allows to perturb the ECMWF forecast PV fields using the appropriated error range. The PVEC is calculated using a large collection of MEDEX cyclones, and provides the displacement and intensity error of the PV fields in the study region.

The displacement error (DE) corresponds to the displacement of the ECMWF 24 h forectast PV field showing local maximum correlation with the ECMWF analysis PV field. The DE presents a clear symmetry along South-North and West-East directions. The intensity error corresponds to the diference between the displaced ECMWF 24 h forecast PV field and ECMWF analysis PV field. This error presents a high symmetry, so the absolute value is used. The %DLE is defined as intensity_error/analysis_PV %.

Analytical functions have been fitted to model the error statistics (percentile levels of displacement and intensity errors) as function of pressure level and PV value. An example, at 300 hPa, is shown in the following fig





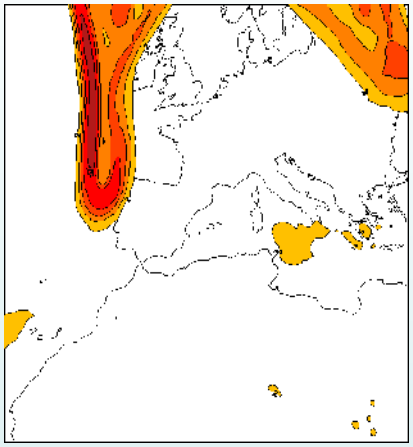


This PVEC is used to implement the above mentioned ensemble system by randomly perturbing the fields. These perturbations are aplied along the zones with the most intense PV values and gradients.

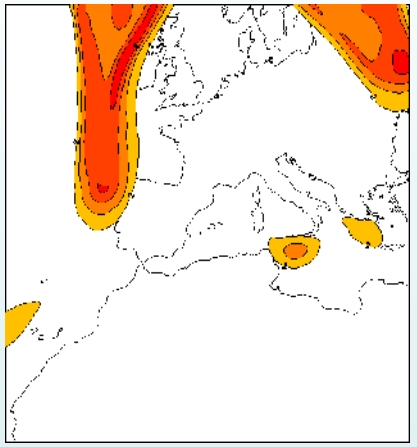
Application to a Mediterranean cyclogenesis event

Original and perturbed PV fields in the three dimensional domain through the forecasting period are defined, and with the PV Inversion Technique the balance fields (temperature, geopotential and horizontal wind) are calculated. Then, the difference between the original and perturbed balance fields provides the initial and boundary perturbations for each member of an ensemble of simulations.

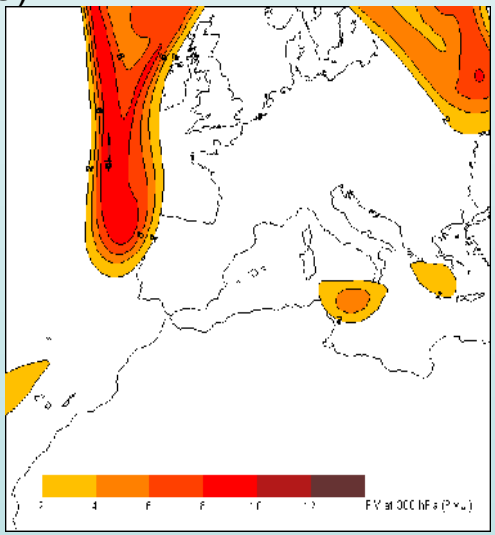
Preliminary results showing the potential of this methodology are presented for the flash-flood producing MEDEX cyclone of 9th June 2000. The following figures show the original initial state and four perturbed ensemble members. (9 th June 2000 at 00 UTC)



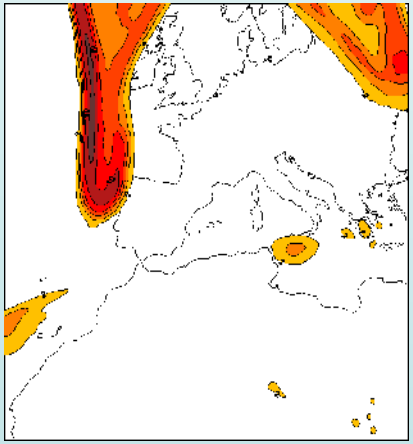
1st memeber



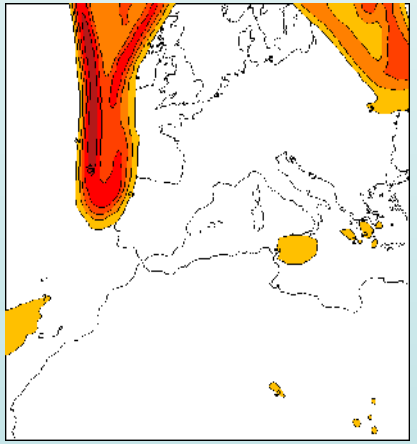
2nd memeber



Control member

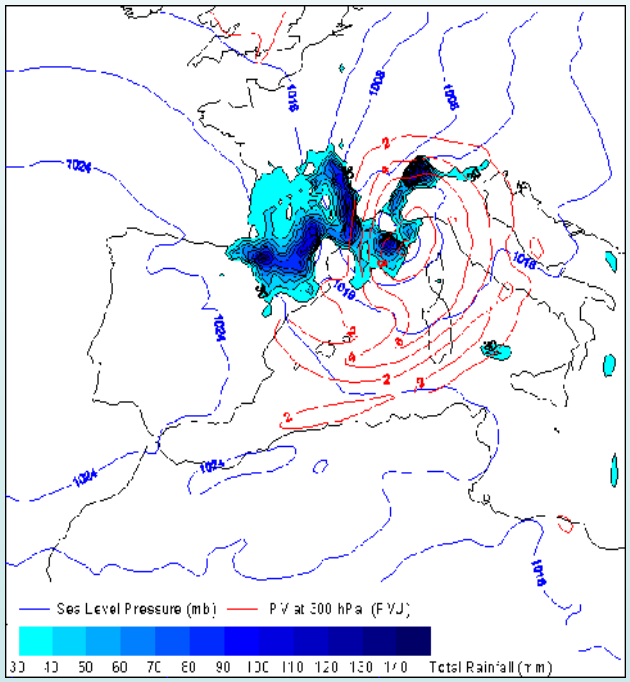


3th memeber

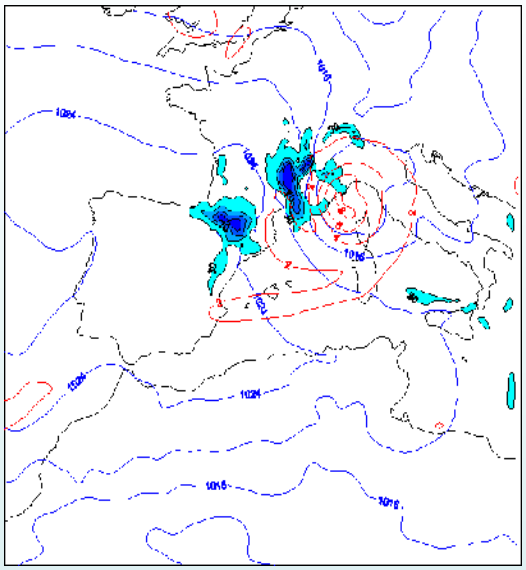


4th memeber

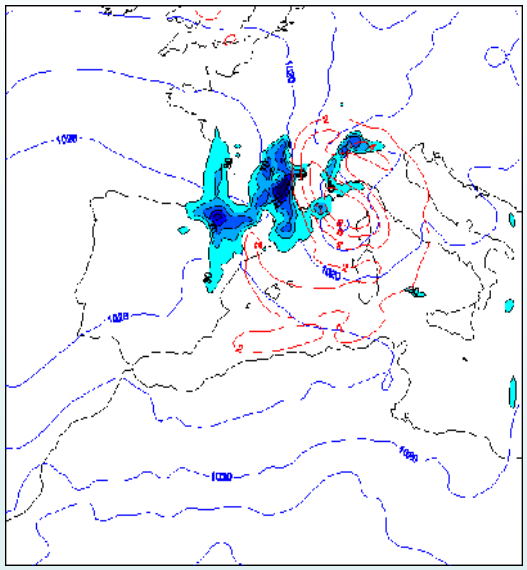
The following figures show the MM5 54 h forectasts from the above initial states. (11th June 2000 at 06 UTC)



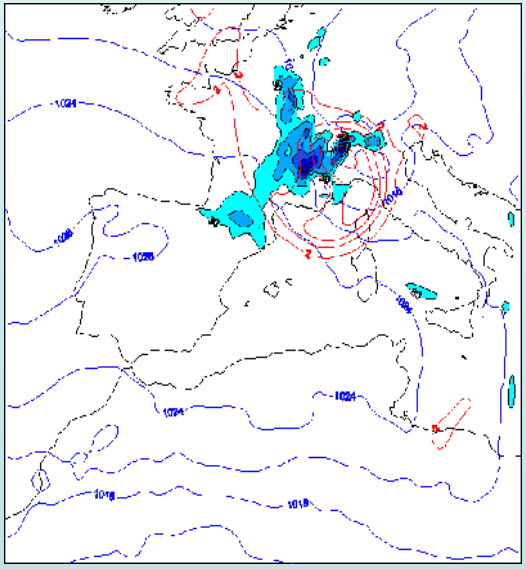
Control member



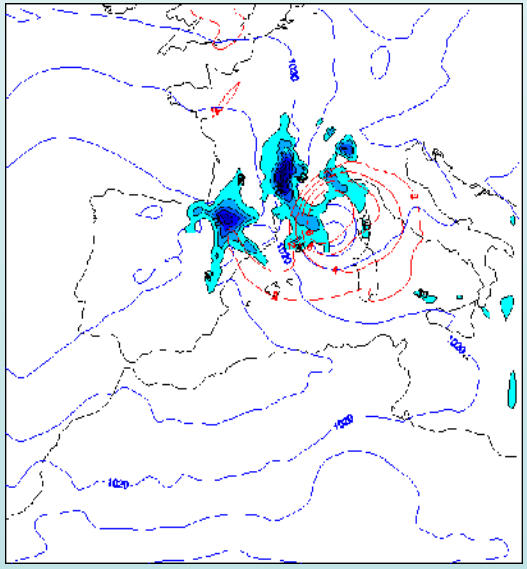
1st memeber



2nd memeber



3th memeber



4th memeber