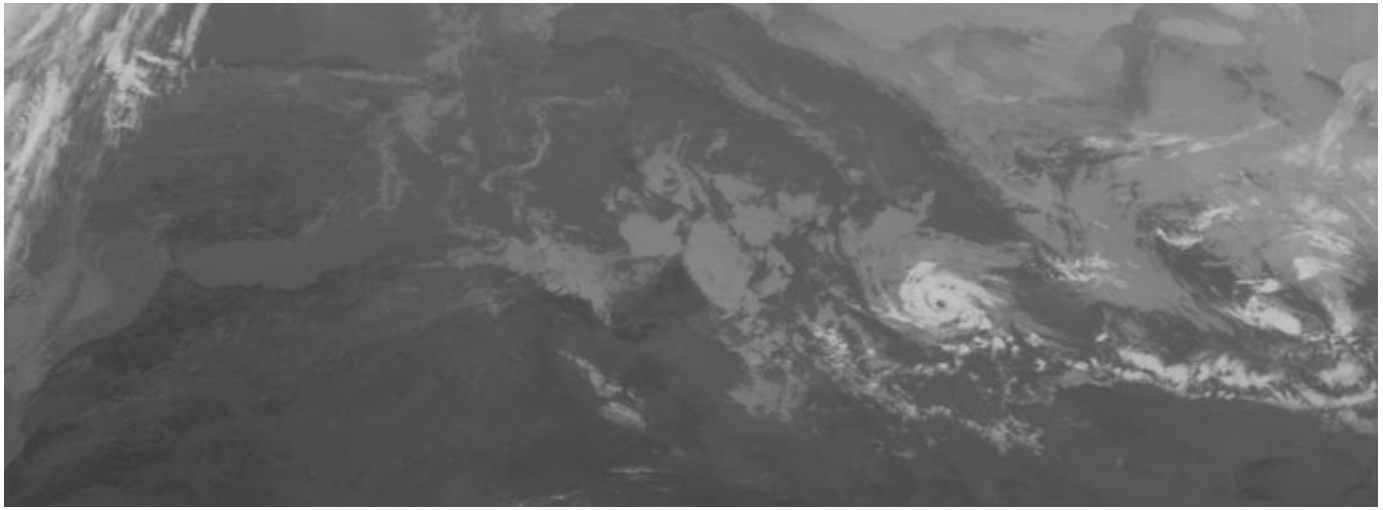
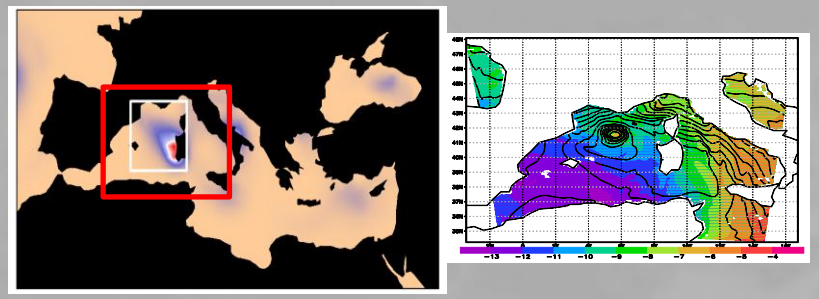
Medicanes in HadGEM3 N512 climate simulations



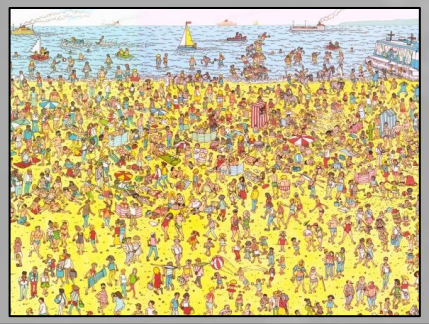
Maria Tous, Len Shaffrey, Giuseppe Zappa, Romualdo Romero

TO EVALUATE THE MEDICANE RISK IN THE PRESENT AND THE FUTURE SCENARIO



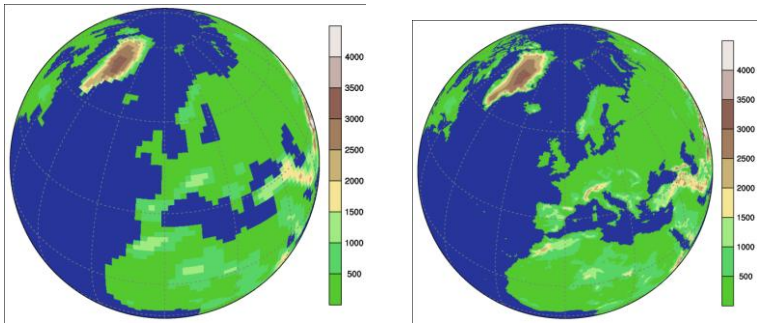
Nested climate simulations

Statistical-deterministic approach



Very high resolution climate model

MODEL



N96

N512

UPSCALE **simulations**

Based upon HadGEM3
Resolution (horizontal) ~25 km,
(vertical) 85 hybrid heigh lev. for the first 85 km
Present: forced with daily OSTIA SST
Future: following RCP8.5 scenario

1985-2011 → **1990-2010**
2085-2111 → **2090-2110**

at **00, 06, 12, 18 Z**

TRACKING

Hogdes 1994, 1995, 1999

Fixing vorticity centers
at 850 hPa
(filtered at T40-100)

Vorticity > $2 \cdot 10^{-5}$ s^{-1}
Lilfetime ≥ 2 time steps ≡ 12 h

MEDITERRANEAN CYCLONE CLIMATOLOGY

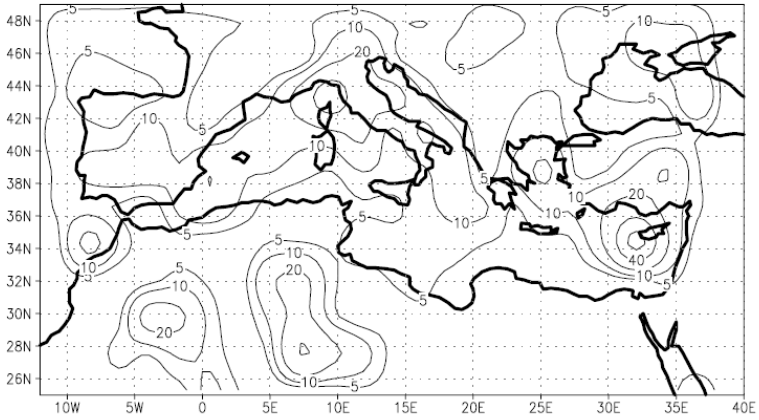


Figure 2. Mean number of cyclone centres in 2.25° × 2.25° latitude–longitude boxes. Contour intervals: 5, 10, 20, 40 and 60 centres/year.

(Campins et al, 2011)

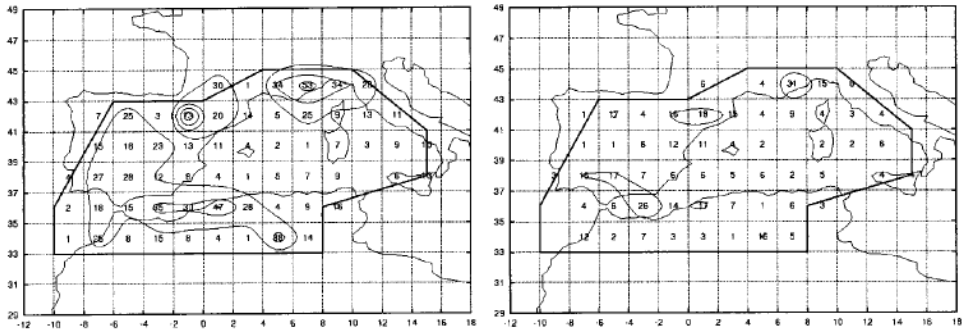


Figure 5. Seasonal frequency of appearance of cyclones obtained from the manual (top) and from the automated (bottom) method, for summer and autumn (from left to right) on 1995 at 00:00 UTC and 12:00 UTC, counted at intervals of 2° × 2° (the contour is every 15 units). The area of study is restricted to the area of the manual method

(Picornell et al, 2011)

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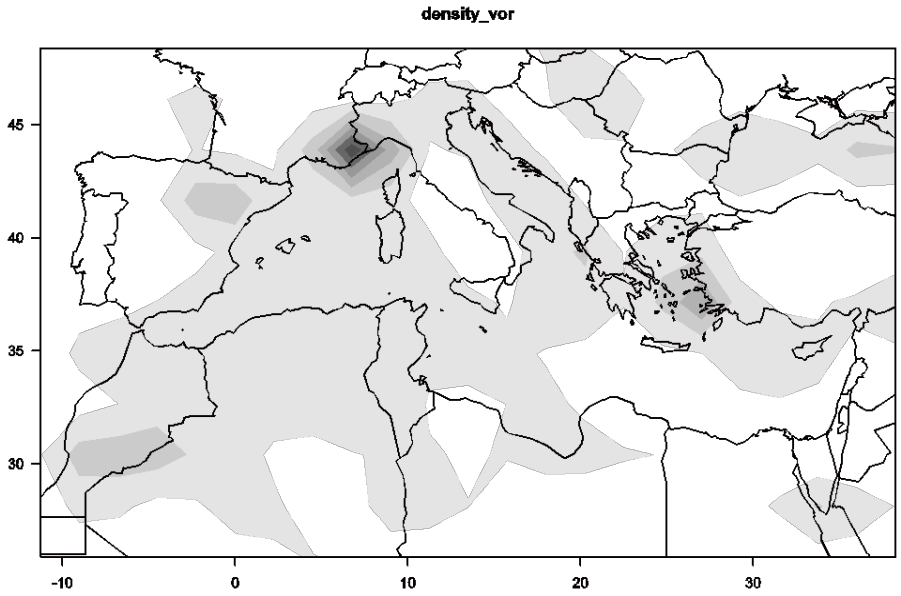

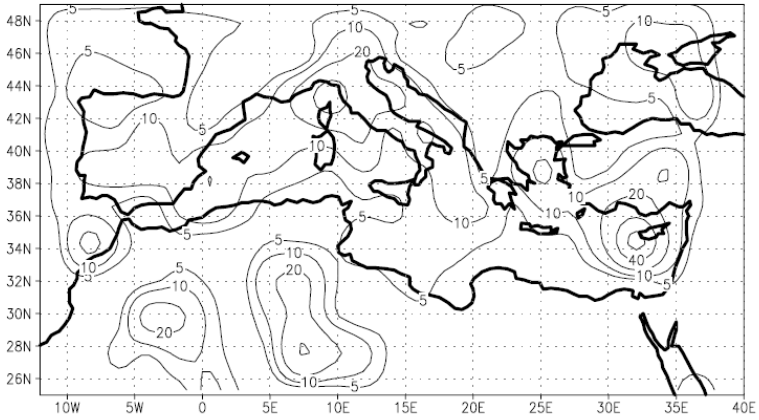

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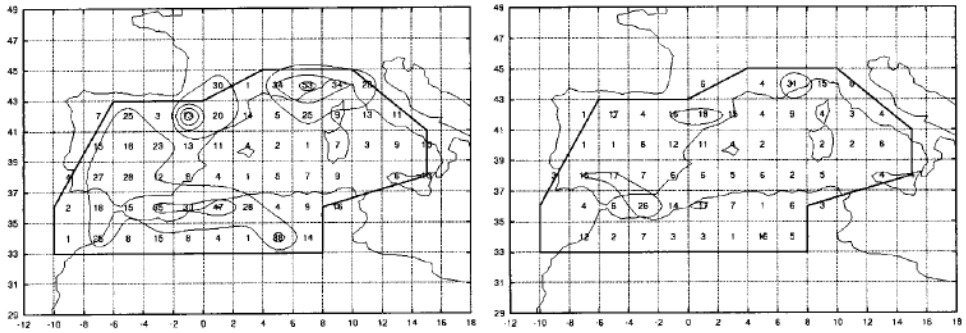

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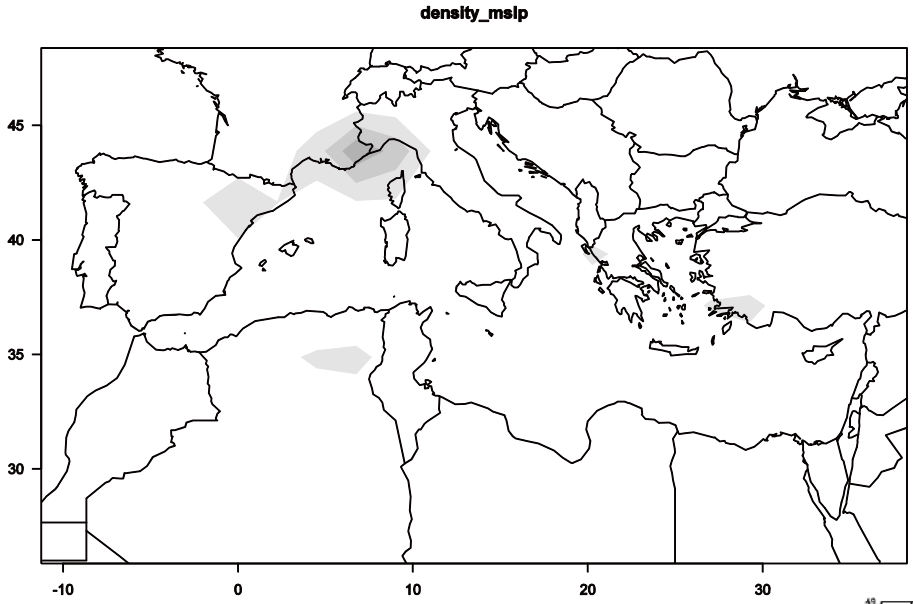

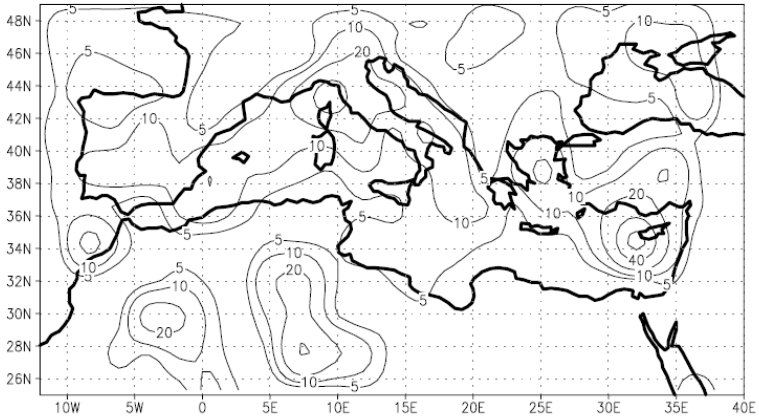

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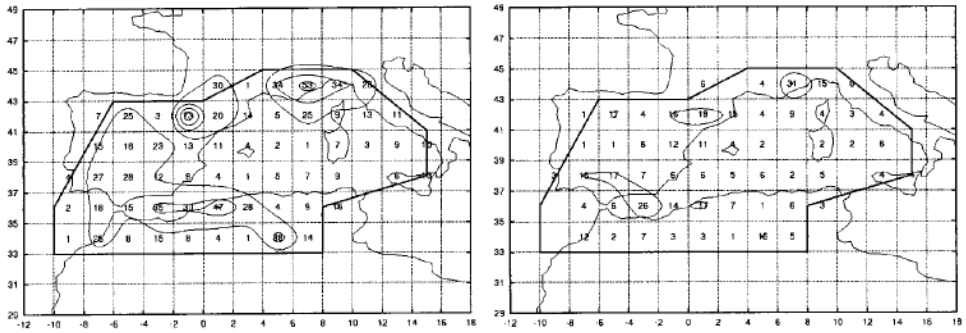

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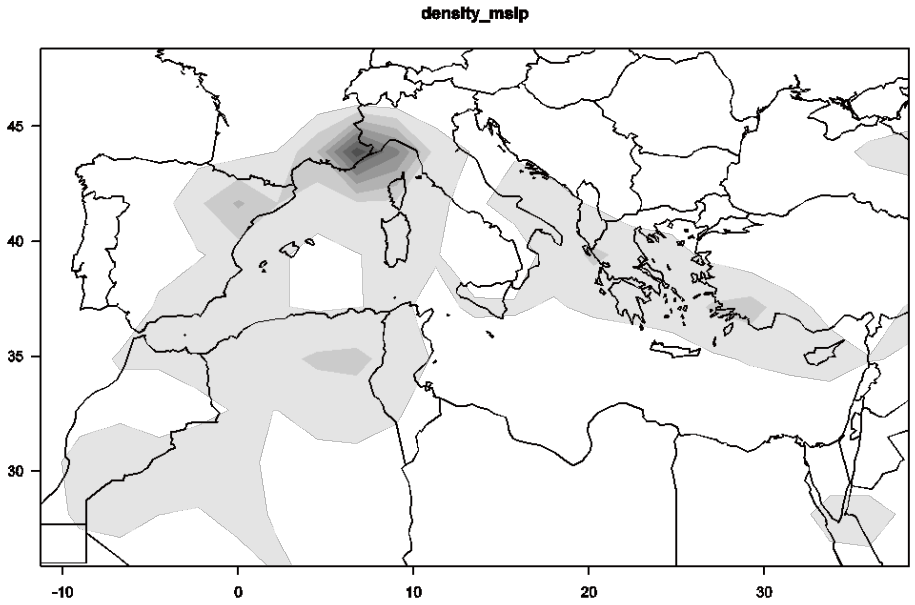

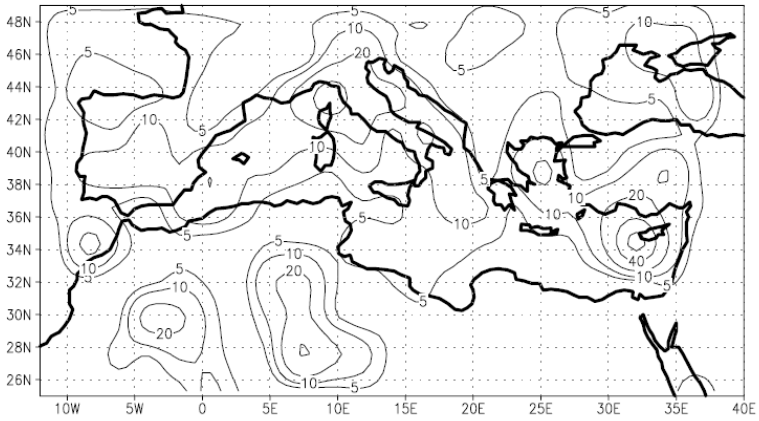

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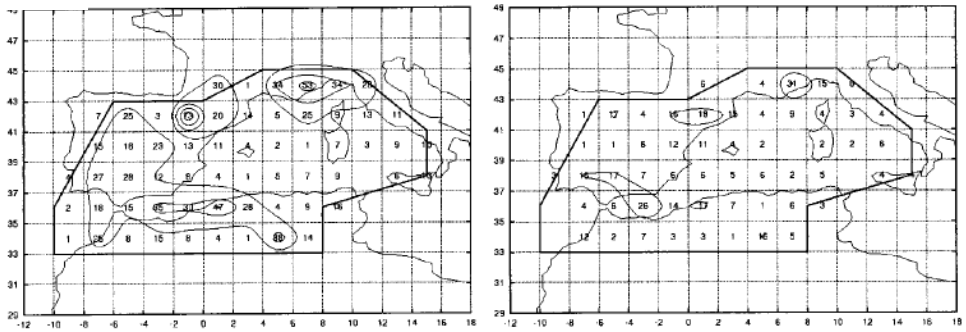

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IDENTIFICATION

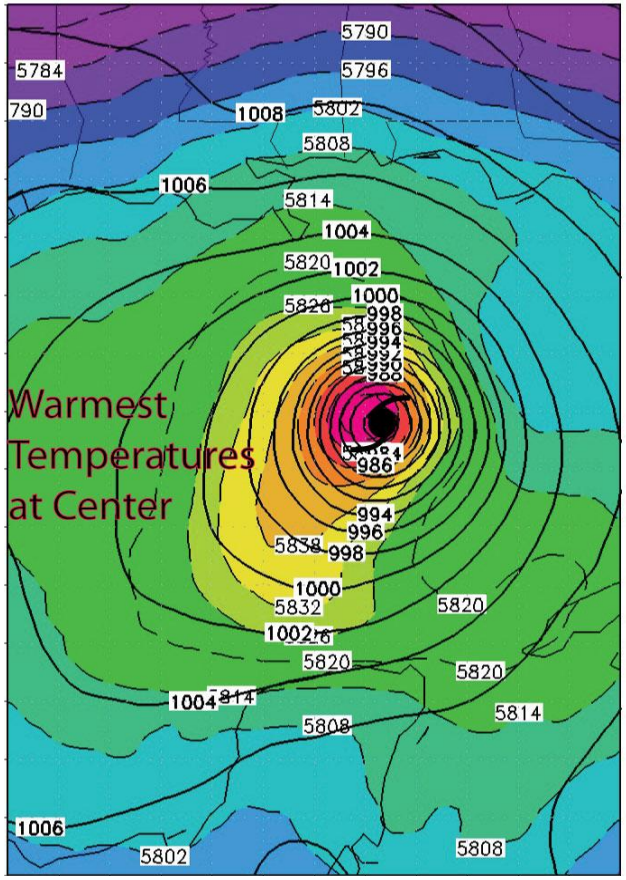
Quasi-symmetric
intense low-pressure centres
at surface with an isolated
warm-core structure aloft.

Intense low-pressure centre at surface

Warm core at 850 hPa

High humidity values at 850 and 600 hPa

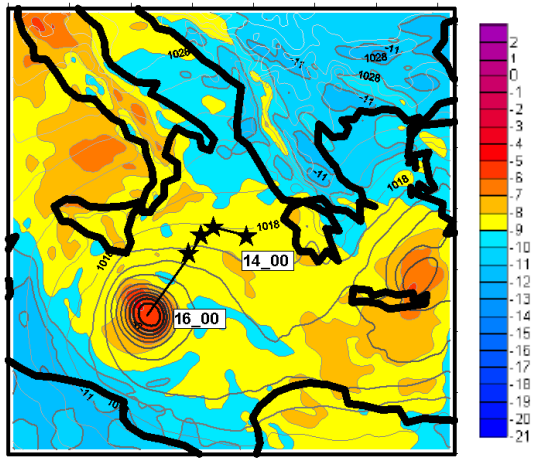
Katrina, Warm Core Low

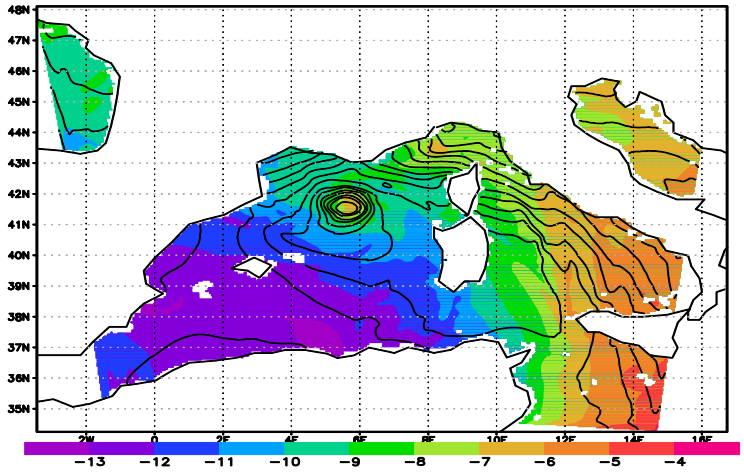


Sfc Isobars (solid, mb)
Sfc-500 mb Mean Temp (shaded)
12 UTC 28 Aug 2005

HOW DO THEY LOOK LIKE?

OTHER METHODOLOGIES





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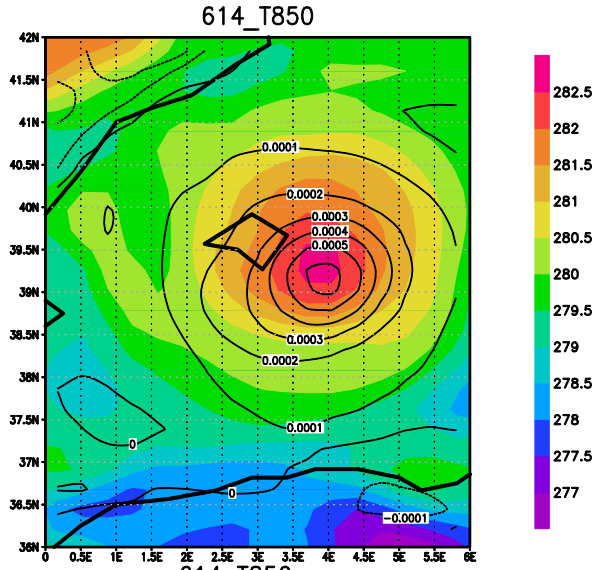

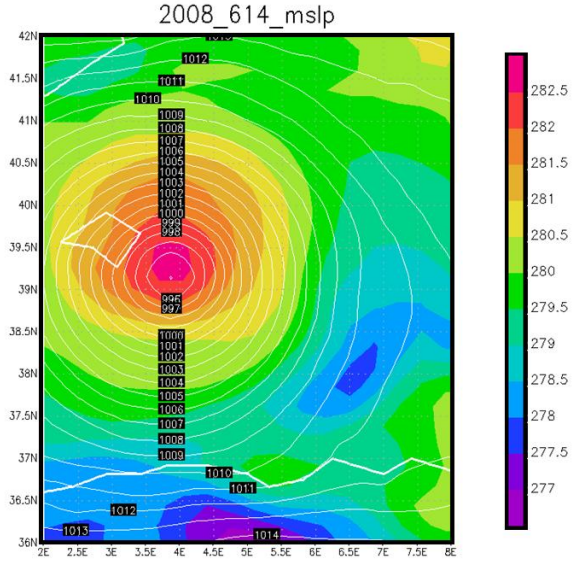

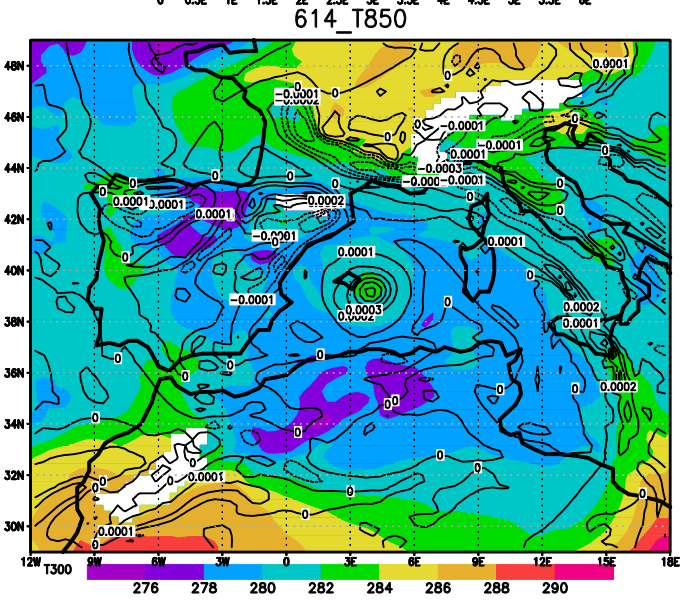

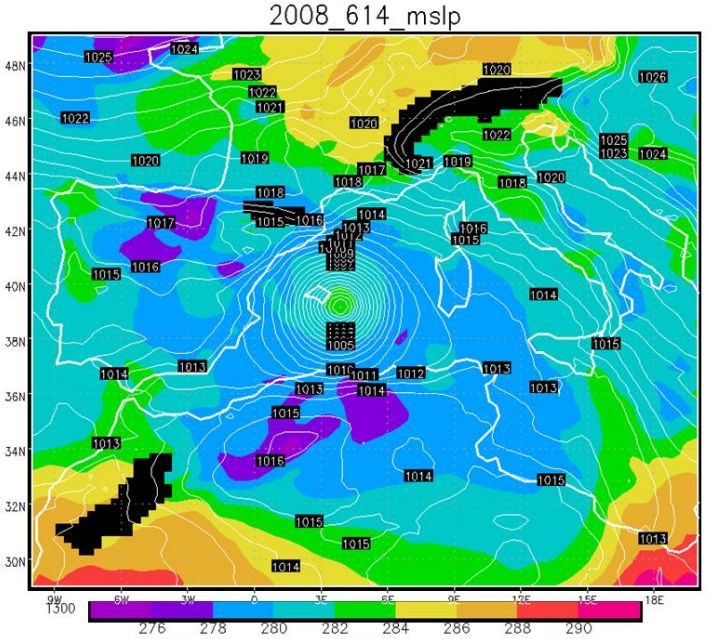

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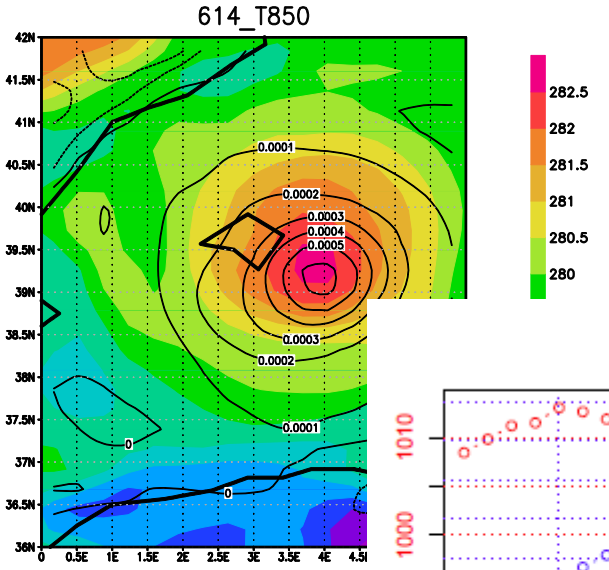
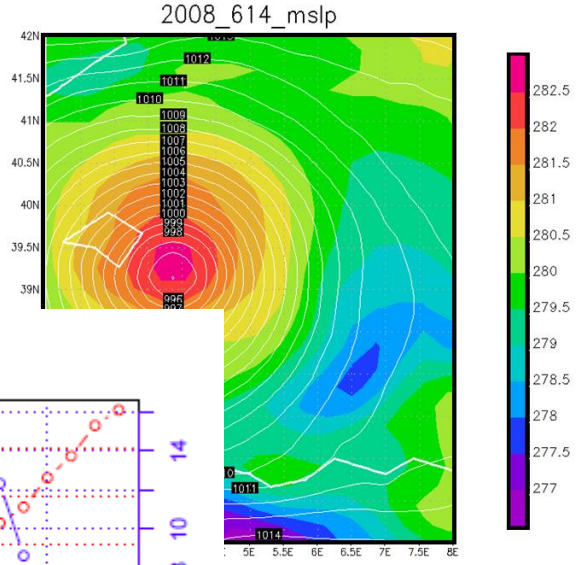
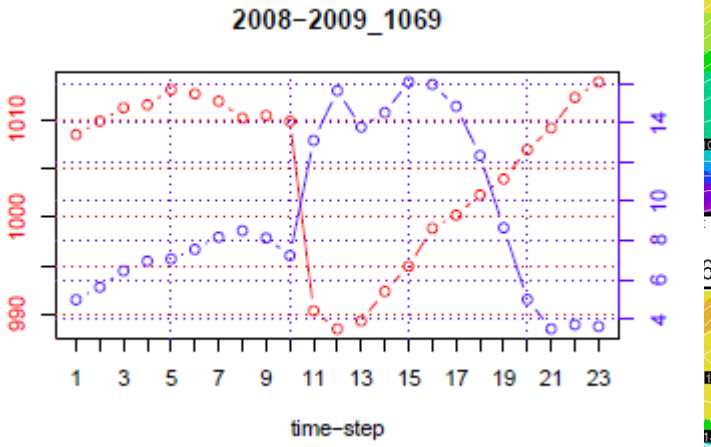
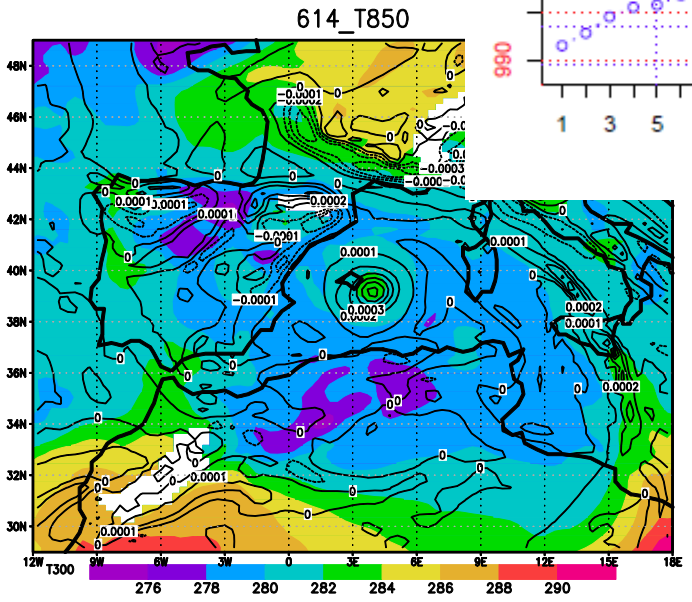
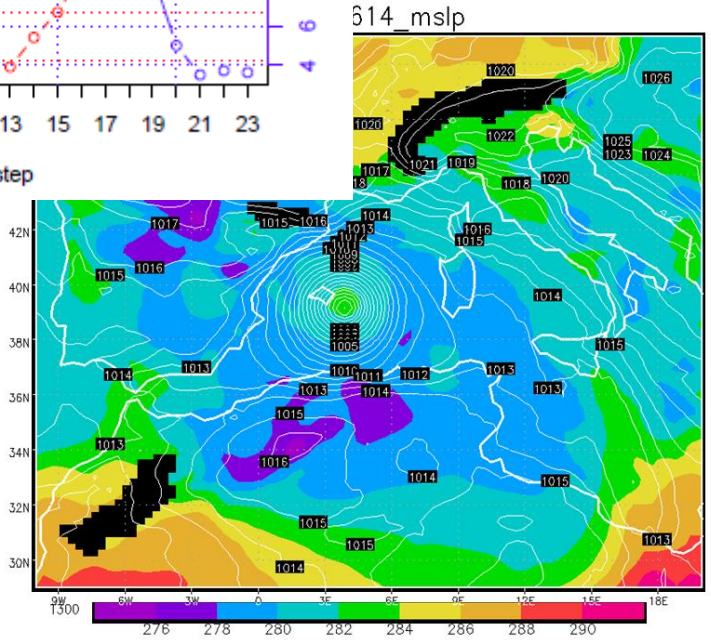


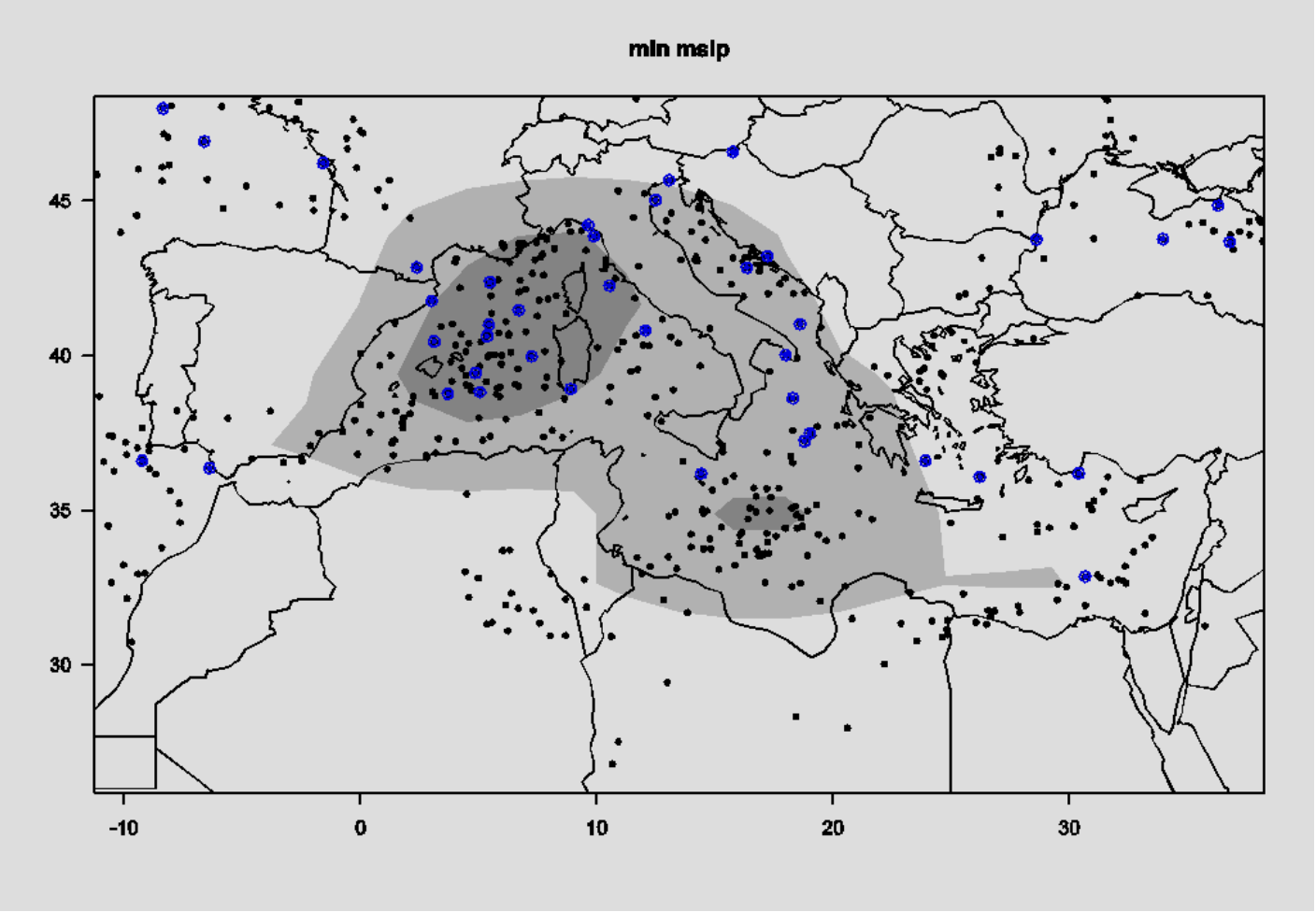








HOW ARE THEY DISTRIBUTED?



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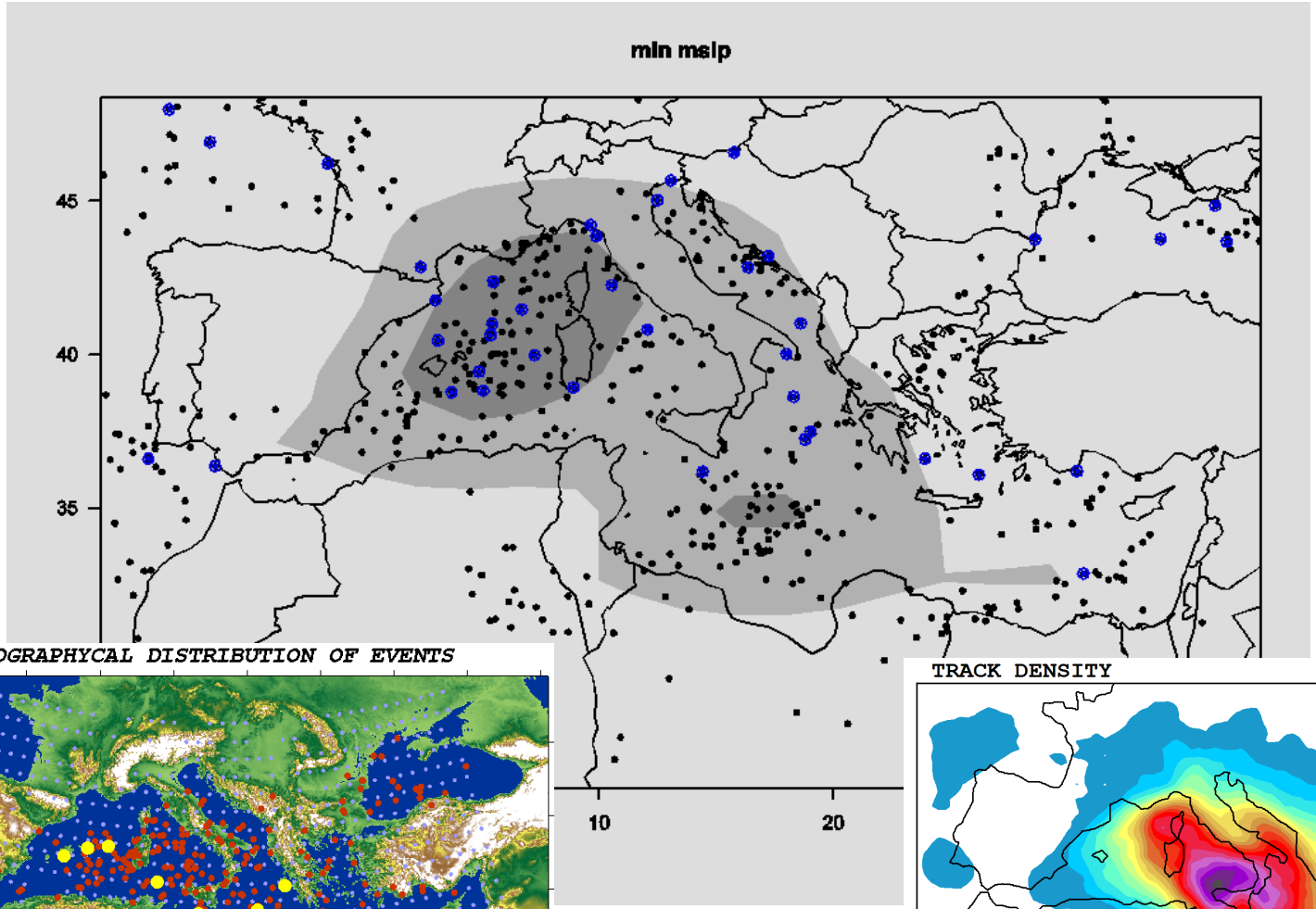

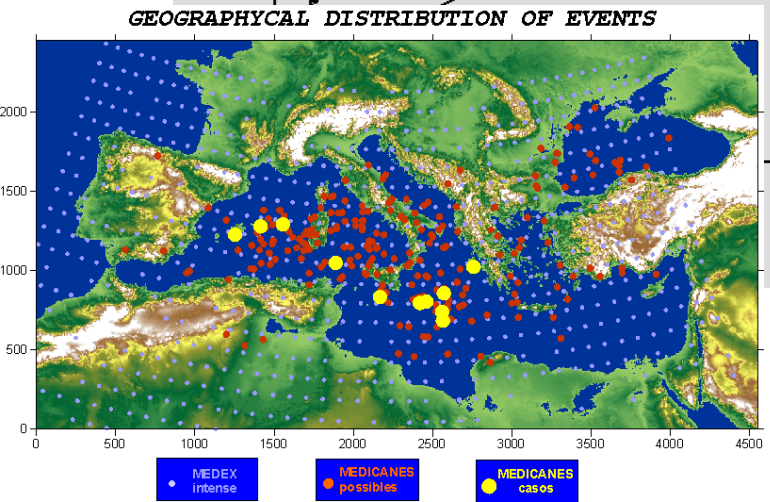

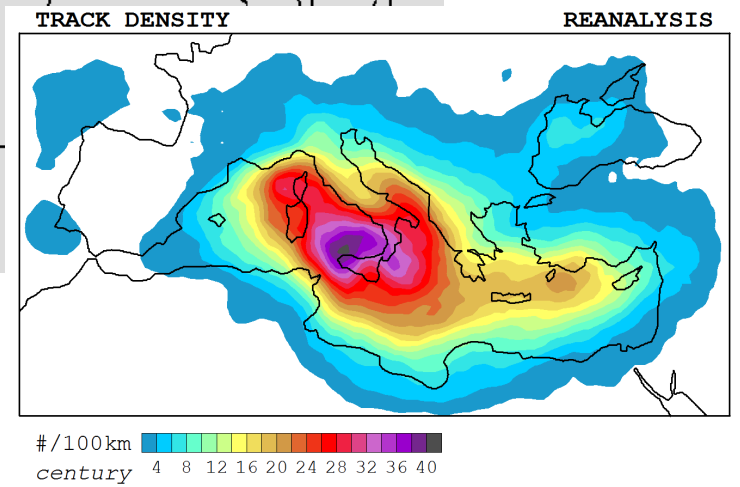

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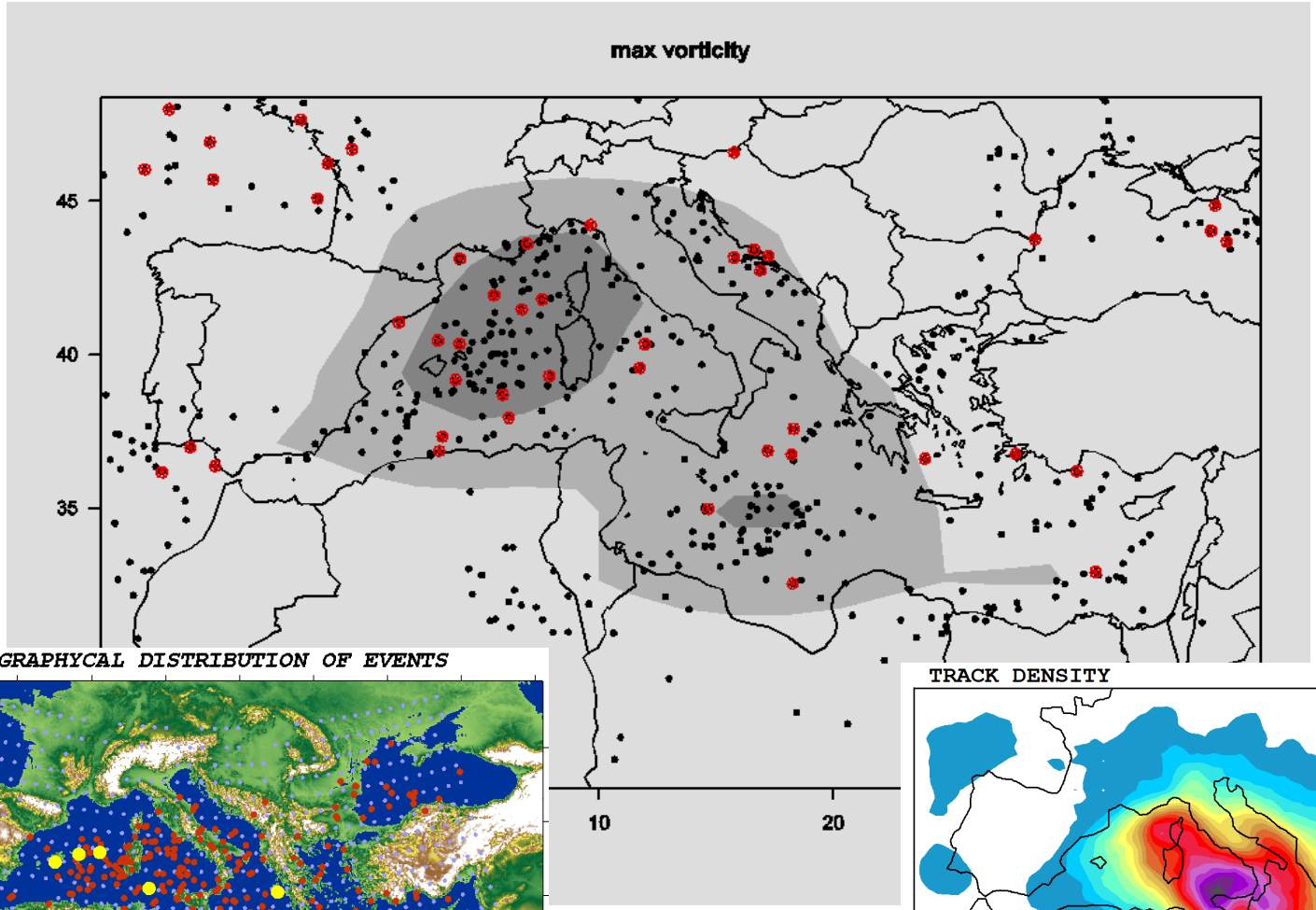

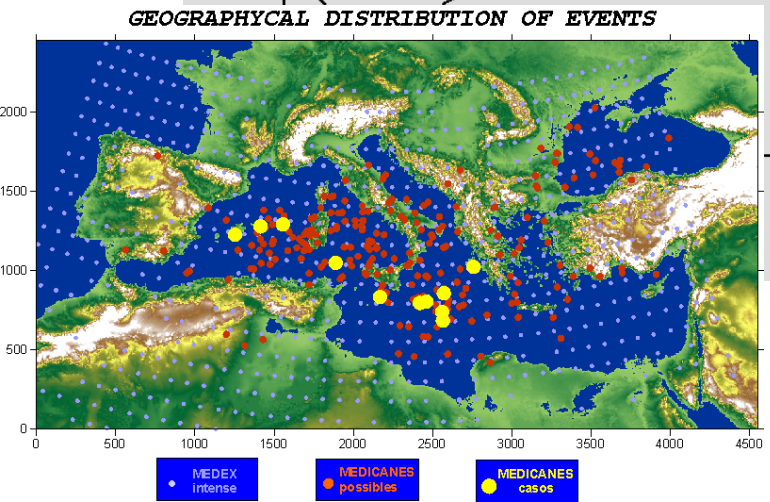

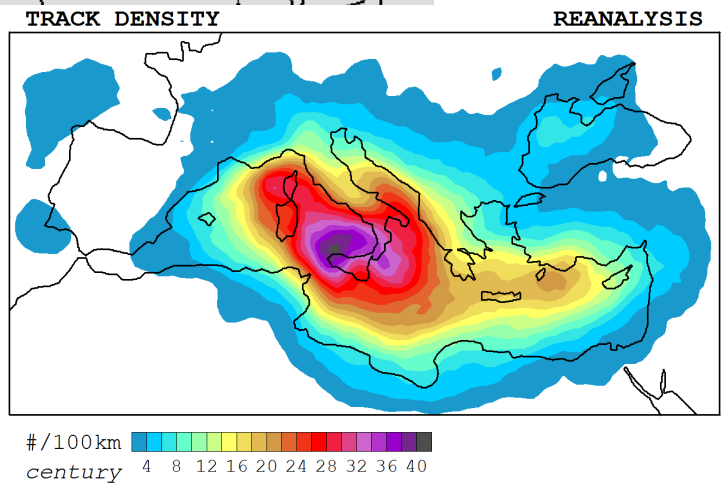

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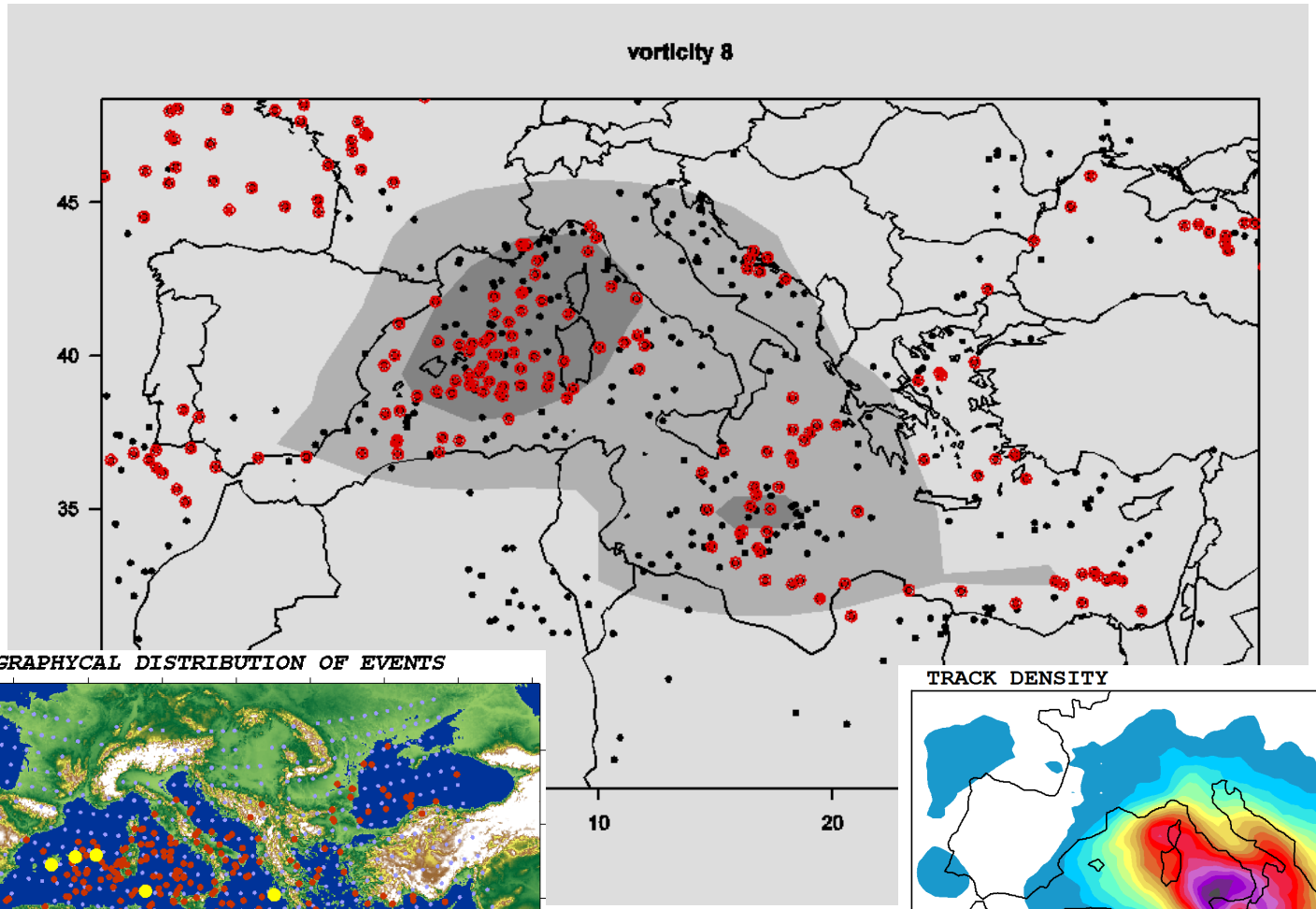

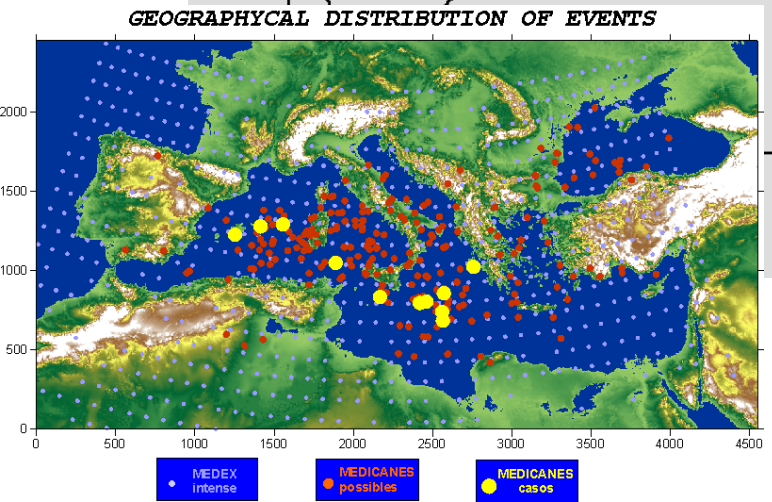

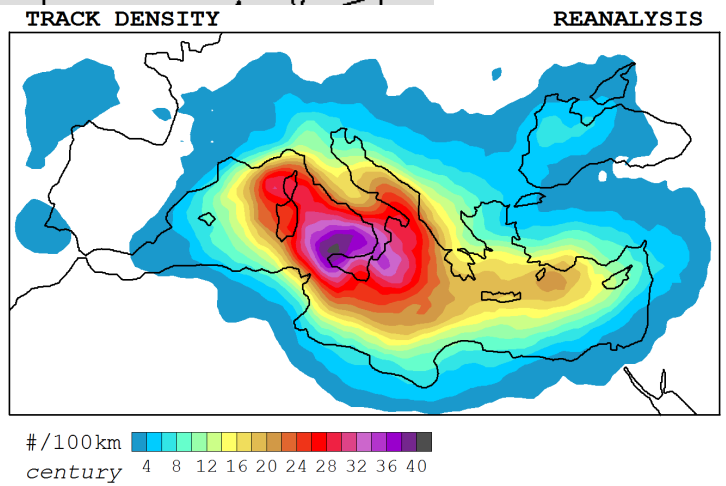

FUTURE

FUTURE

	Vort. centers	Lows	Cyclones	Medicanes
PRESENT	267 033	104 646	33 458	47
FUTURE	260 417	106 964	33 492	36

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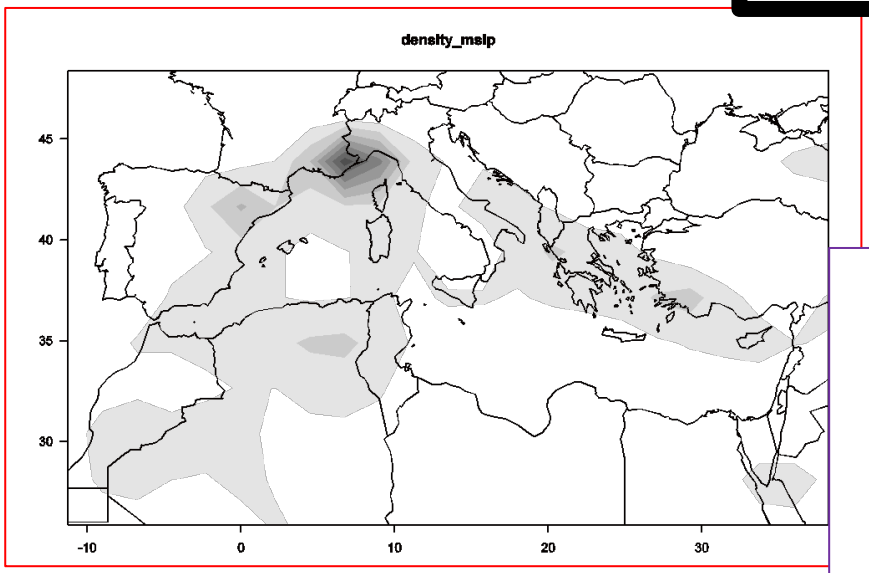

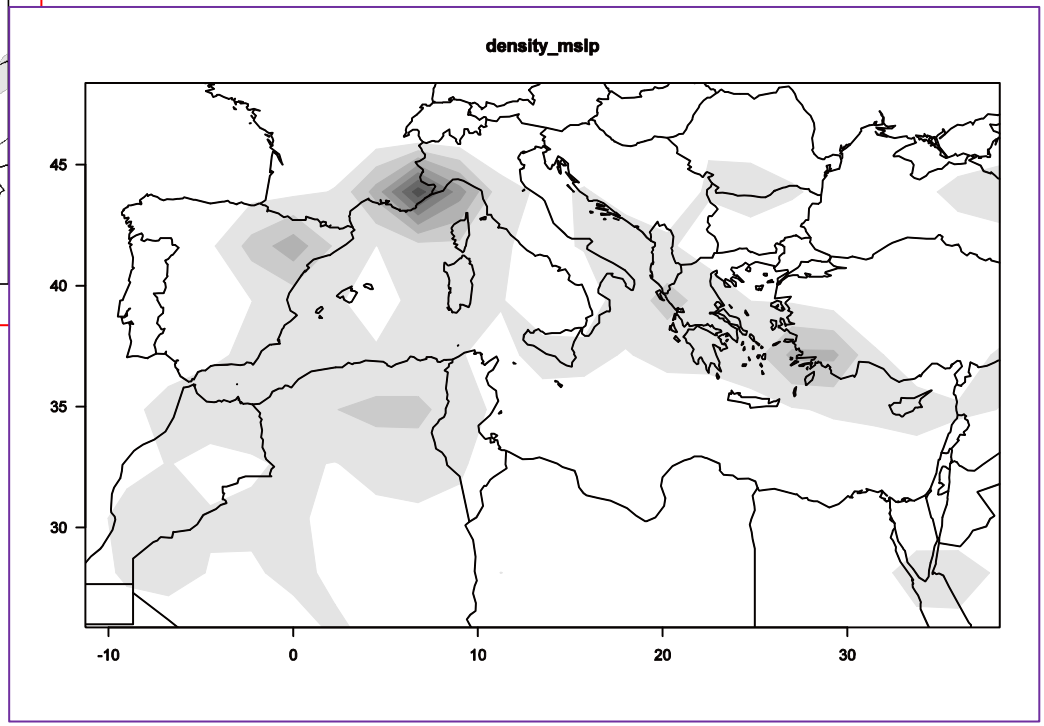

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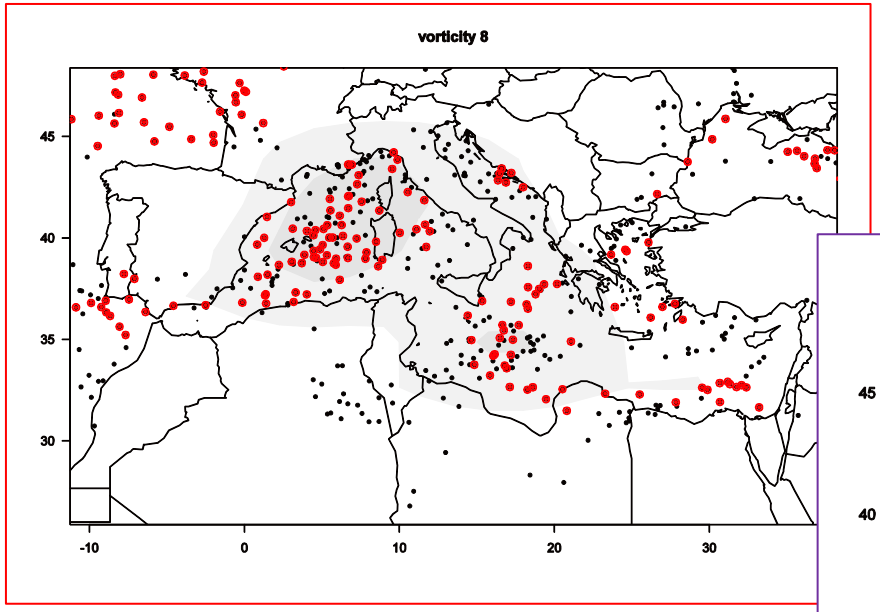

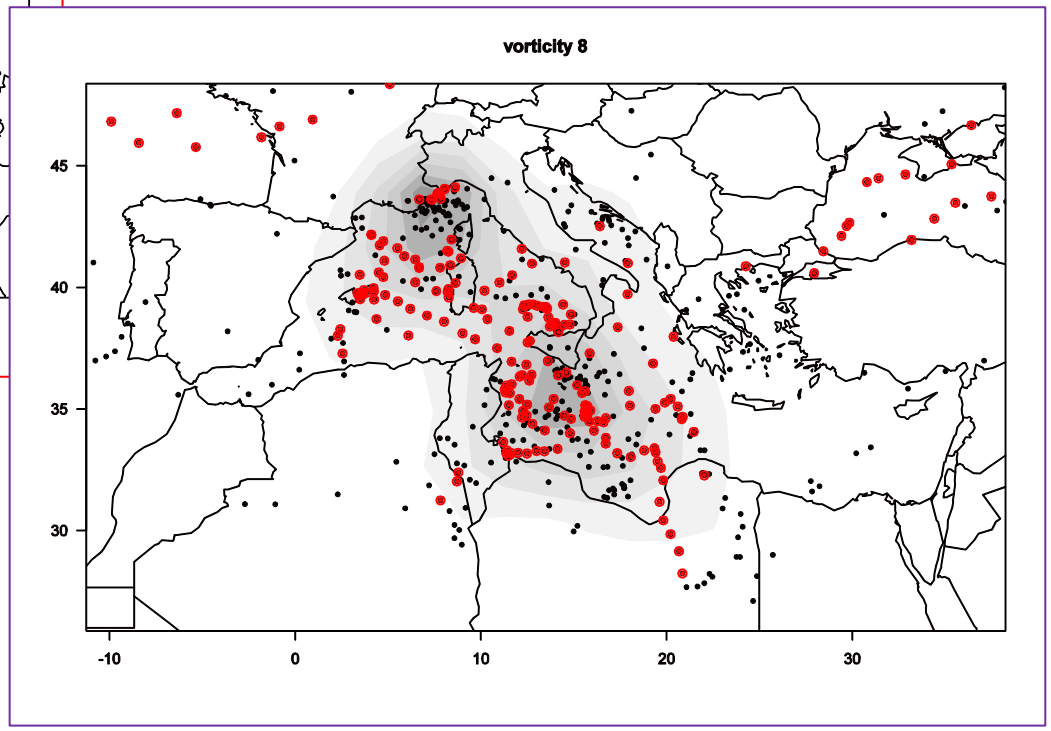

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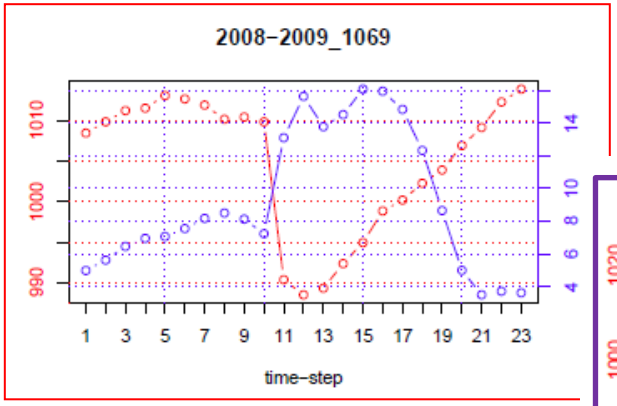

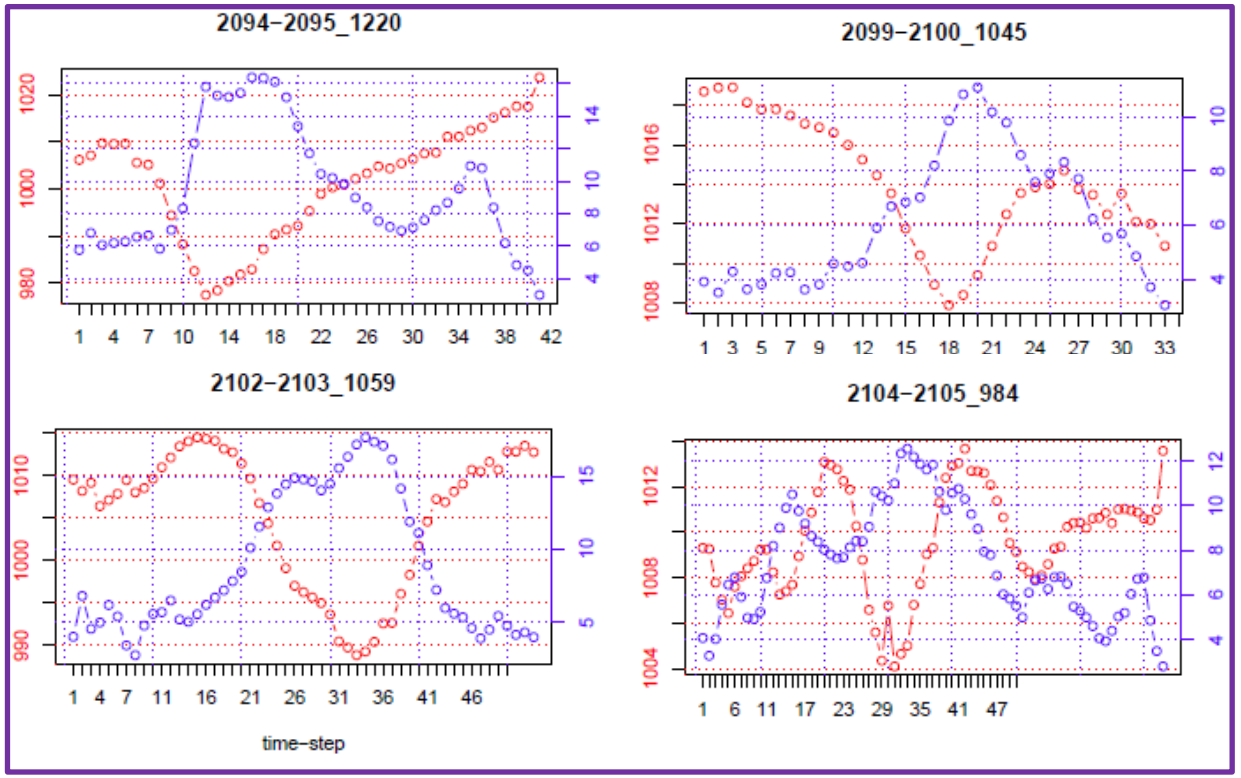

CONCLUSIONS

The HadGEM3 N512 has been validated for the Mediterranean cyclones.

The number and the distribution of the detected medicanes
is consistent with other climatologies in the present climate scenario.

Their appearance in the model have the main features of tropical-like cyclones.

FURTHER WORK

Add the max. wind speed (→ intensity).

Complete the statistics

Compare vertical sections of the medicanes.

Extend the studied period to 35 years.

Compare the results with the other methodologies.

Other ideas…

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