A Cyclone tracking climatology for characterisation of wind events with the ERA-*Interim* reanalysis

B. Joly, P. Arbogast,
CNRM/GAME - Meteo France/CNRS, Toulouse France.

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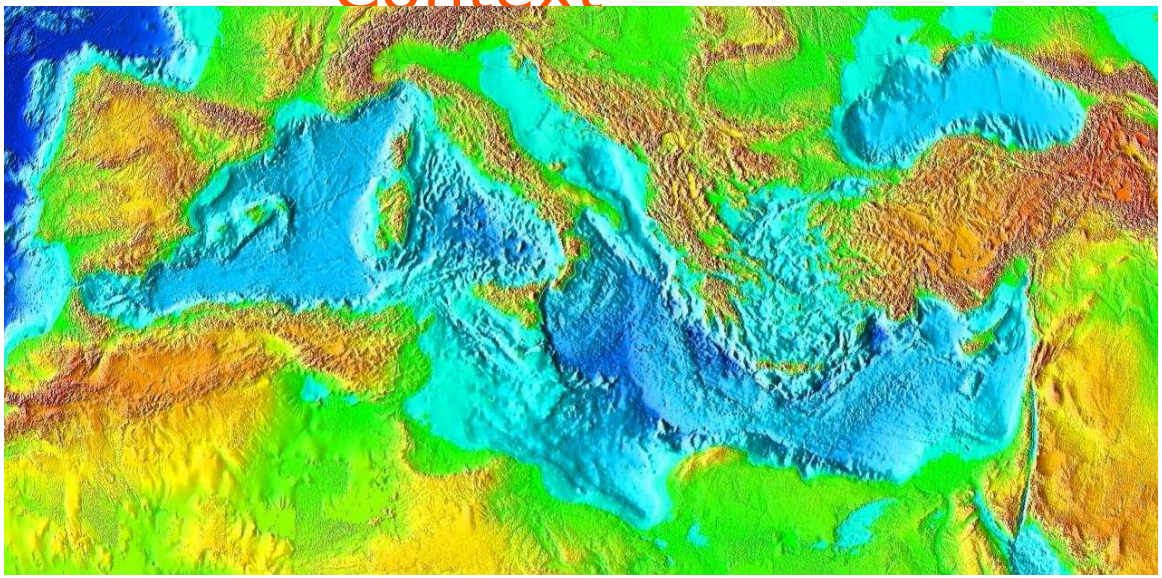
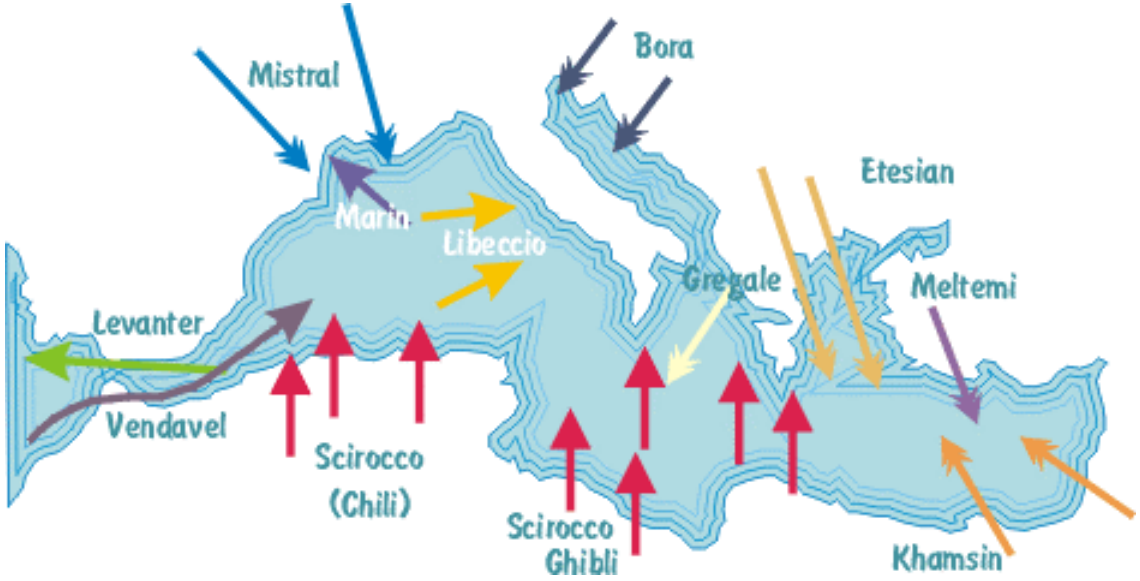
Context



Orography



Local winds

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Overview

1. Context
2. Cyclone tracking
3. ERA-I cyclone climatolgy
    - Comparison with ERA40
    - High intensity cyclones over the Mediterranean
4. Wind properties along cyclone tracks
5. Conclusion

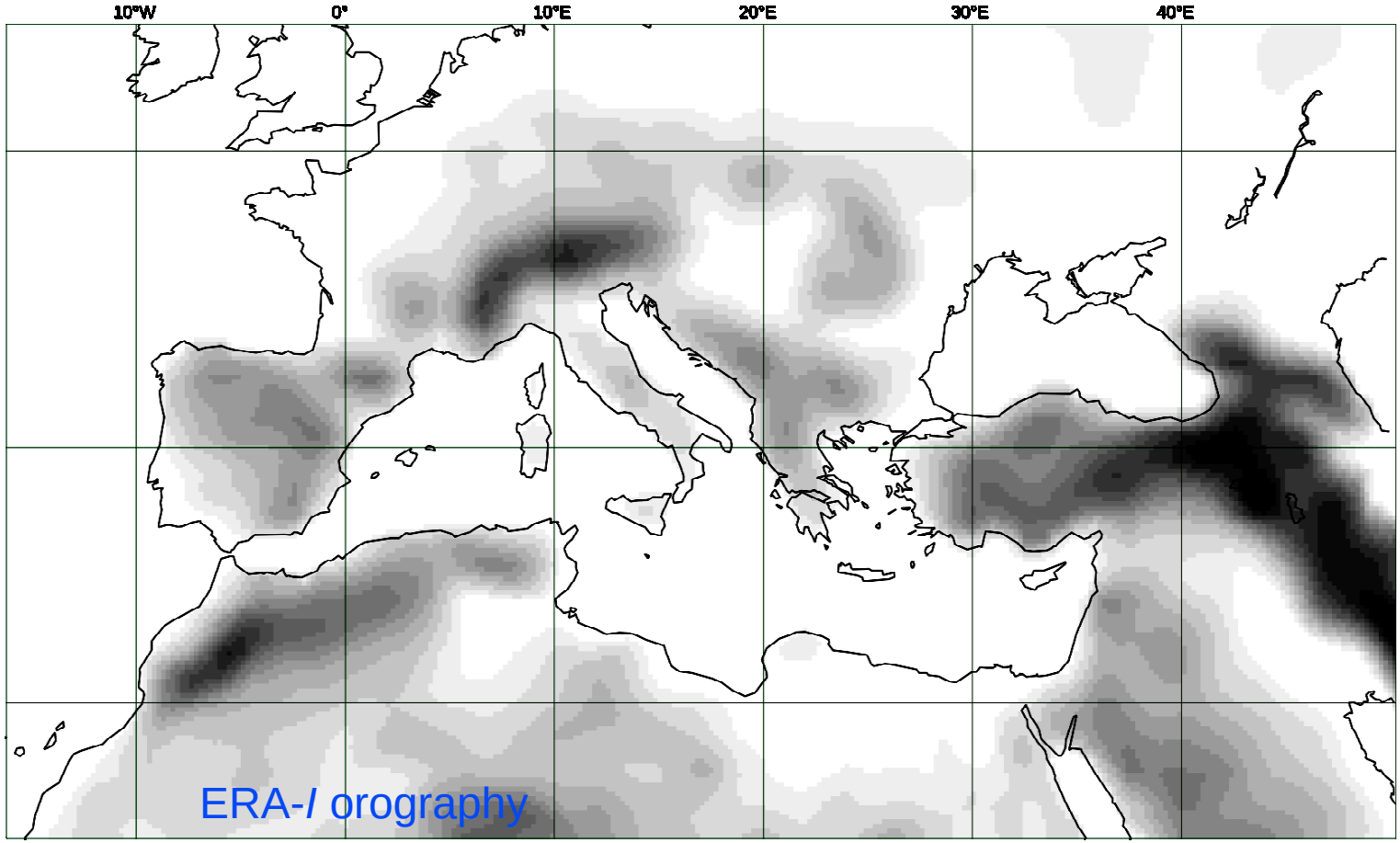
Cyclone tracking

- Cyclone climatology from reanalysis data. (Alpert (1990), Ayrault (2000), Trigo(1999,2000), Campins (2000,2006)). Different algorithms, different low definitions (MSLP, vorticity, Z1000).

➔ Mediterranean cyclones main characteristics (versus Atlantic):

  - Smaller spatial extension,
  - Shorter life cycle.

ERA-I reanalysis data



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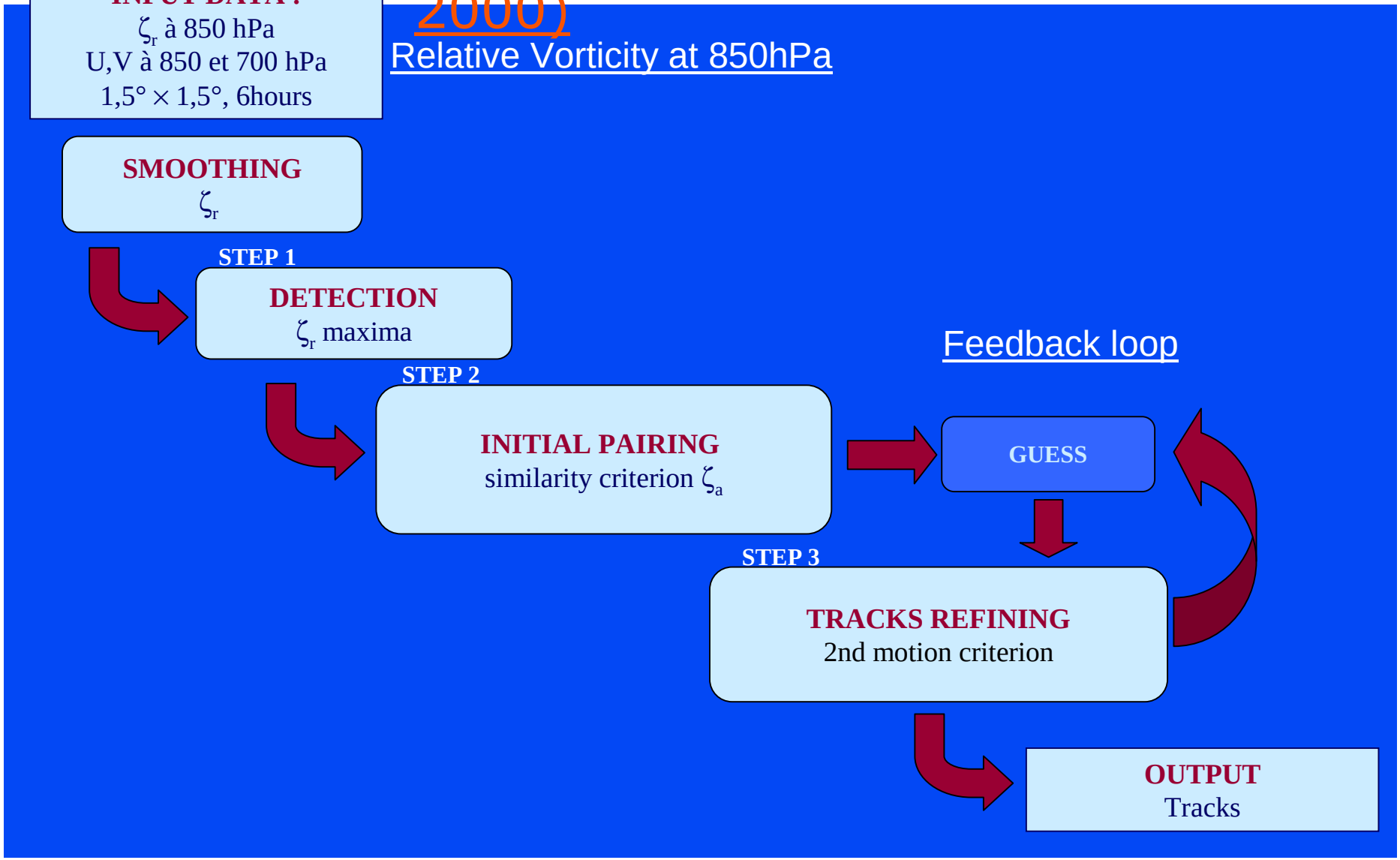
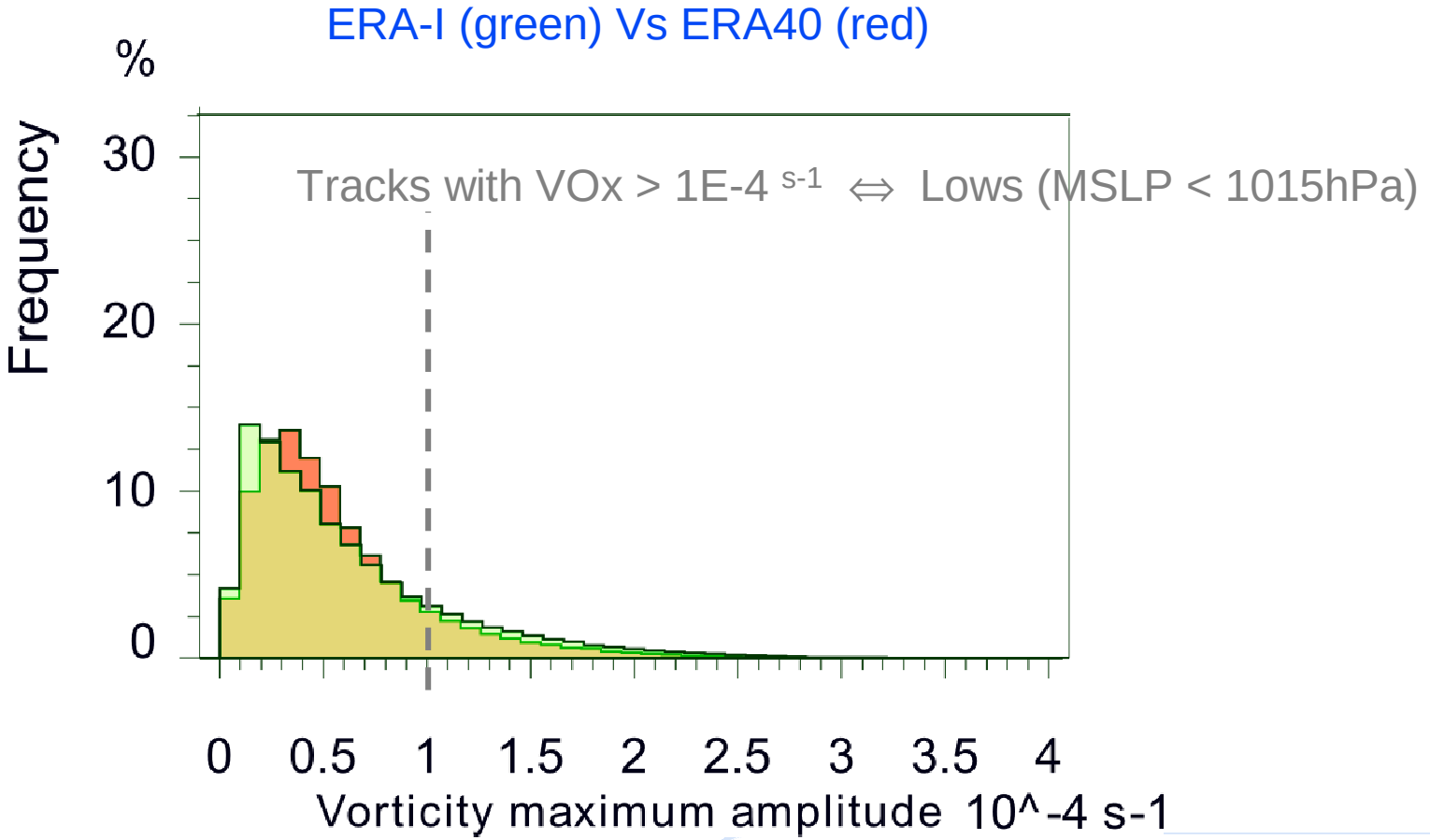
Tracking algorithm (F. Ayrault 2000)



Relative Vorticity at 850hPa

Comparison with ERA40 tracking

- Cyclones maximum vorticity distribution



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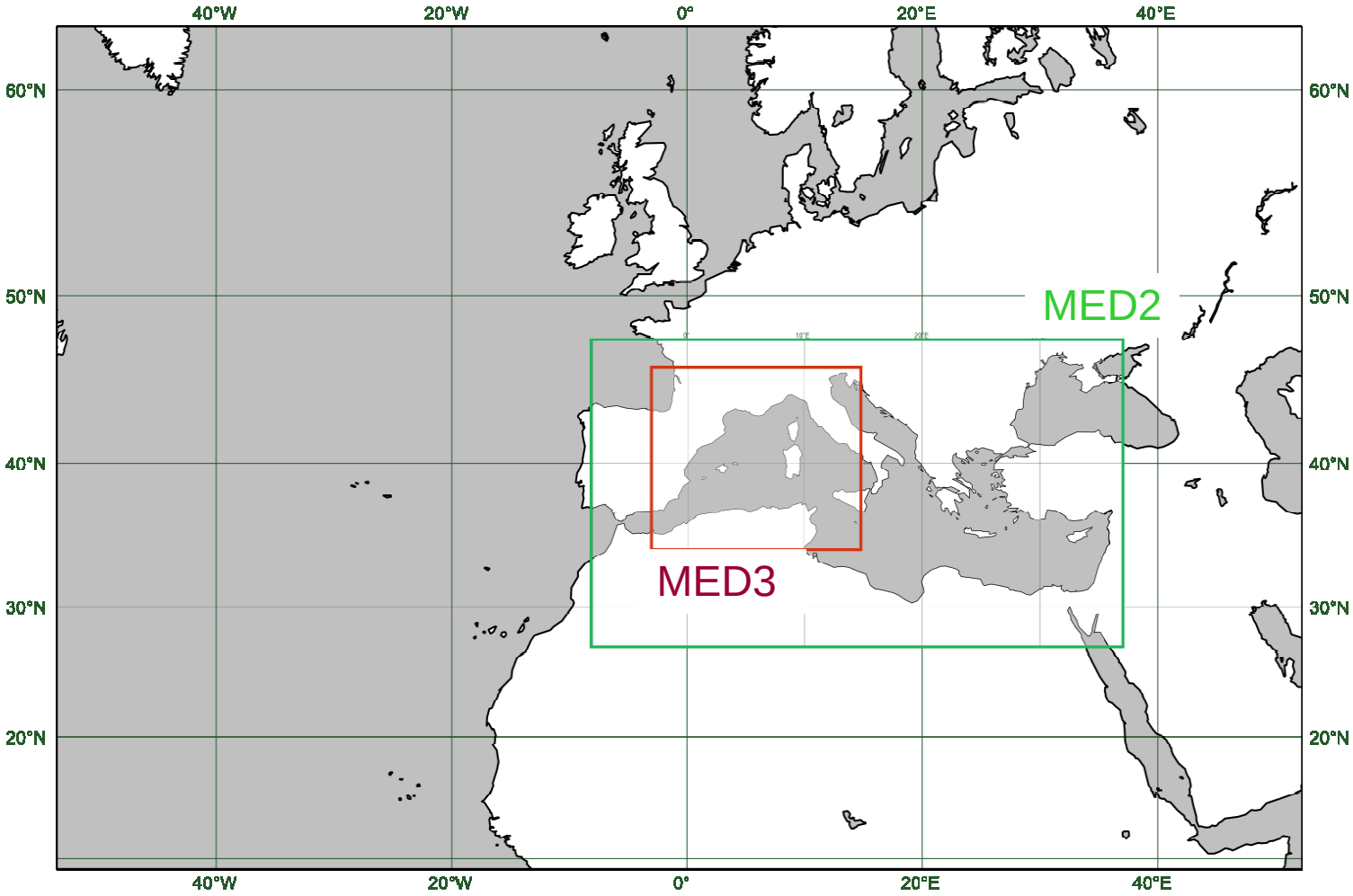
Cyclone activity in the Mediterranean



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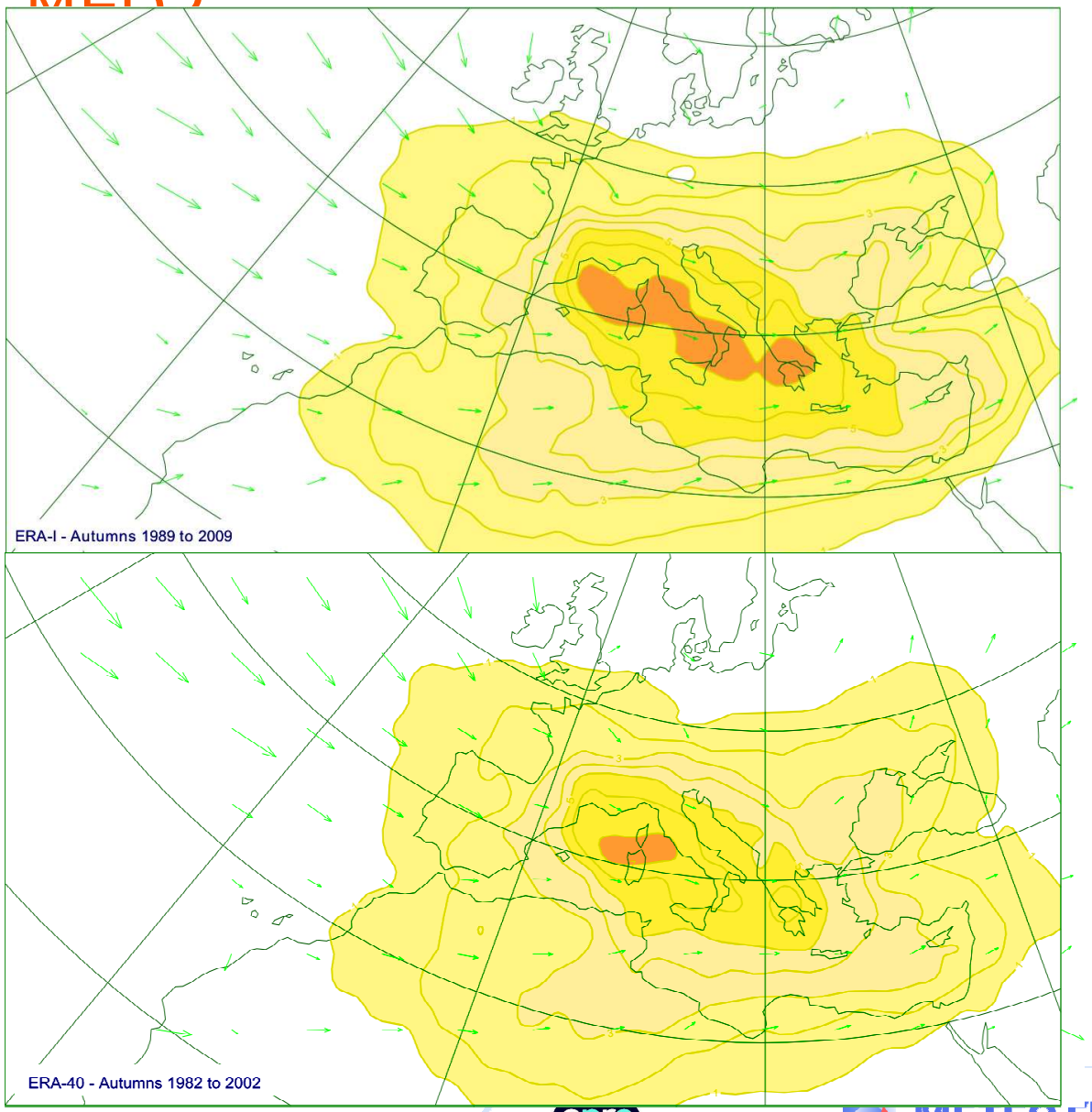
Most intense cyclones with max in MED2

Vox > 1.E-4 s^{-1}

ERA-I 1989-2009

ERA-40 1982-2002



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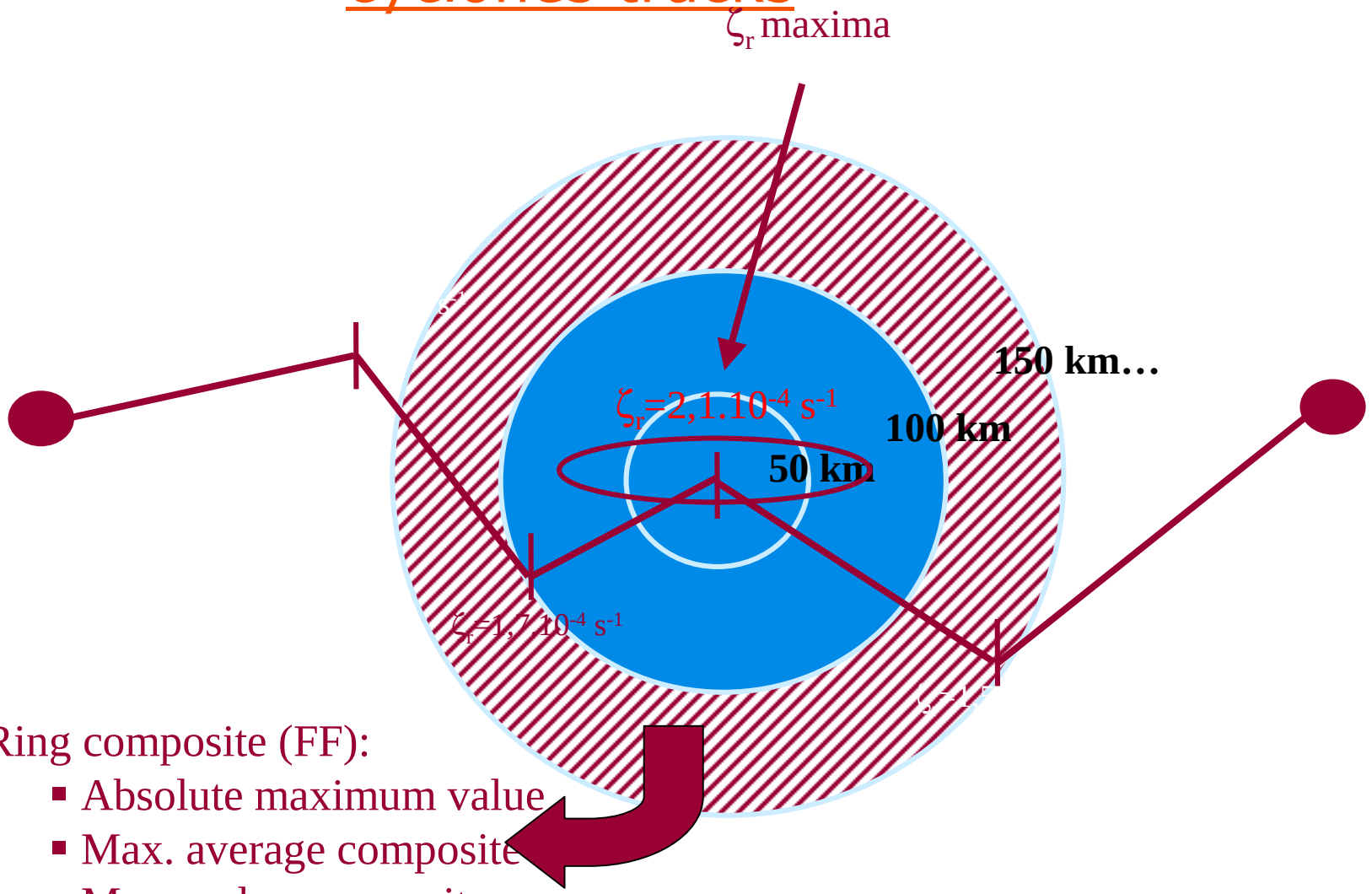
Cyclones wind environment

- ERA-I 10m average winds (Lat-lon 0.5° grid).
  - Some works using ERA-I winds are in progress, but no validation study at this time.

Wind compositing along the cyclones tracks



- Ring composite (FF):
  - Absolute maximum value
  - Max. average composite
  - Mean value composite

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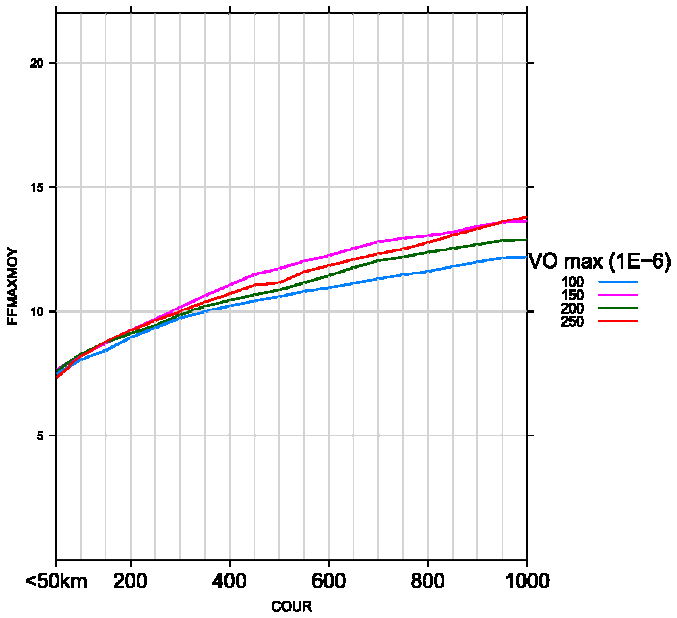
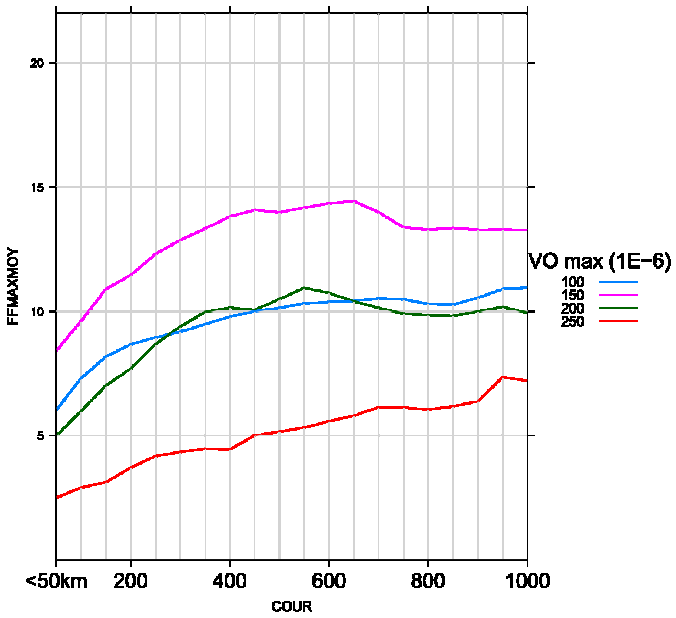
ERA-I 10M-Winds cyclones composites

ATL



MED2



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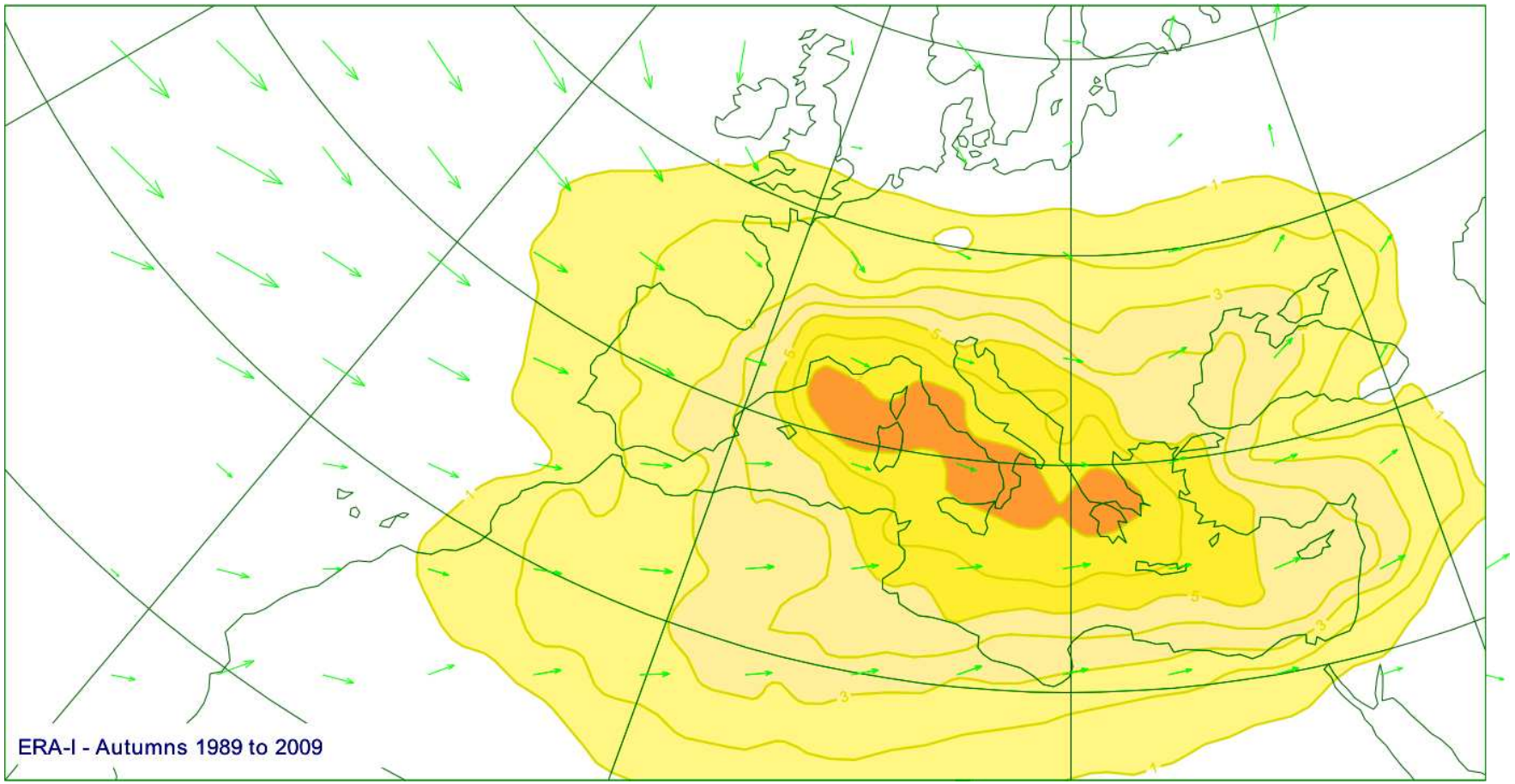
Wind spatial distribution for cyclones VOx in MED2



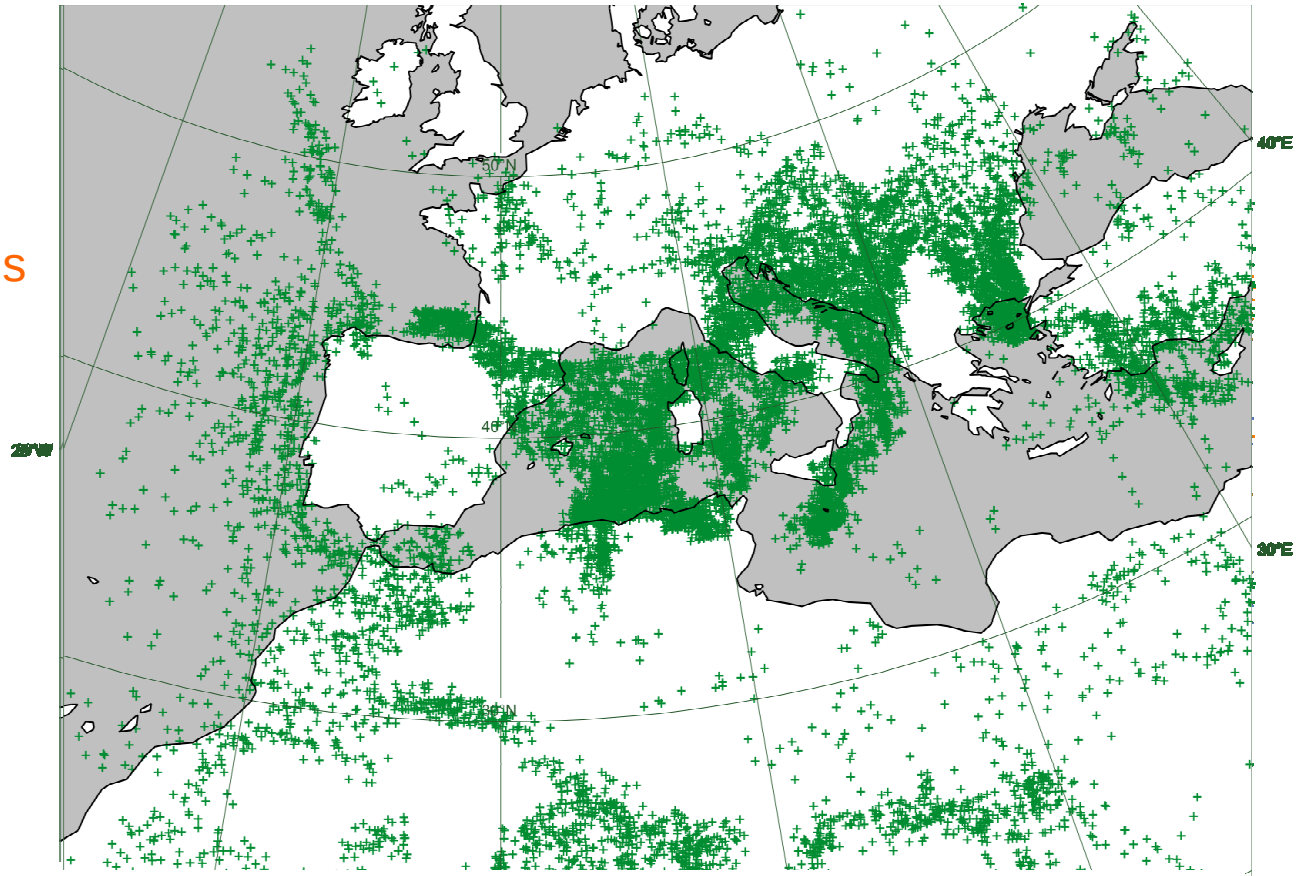
Wind spatial distribution for cyclones VOx in MED2

FFx distance ranges to the cyclone position :

R < 300 kms

300km < R < 600 kms

600 kms < R



Winds max within a > 600kms distance to cyclone VOx

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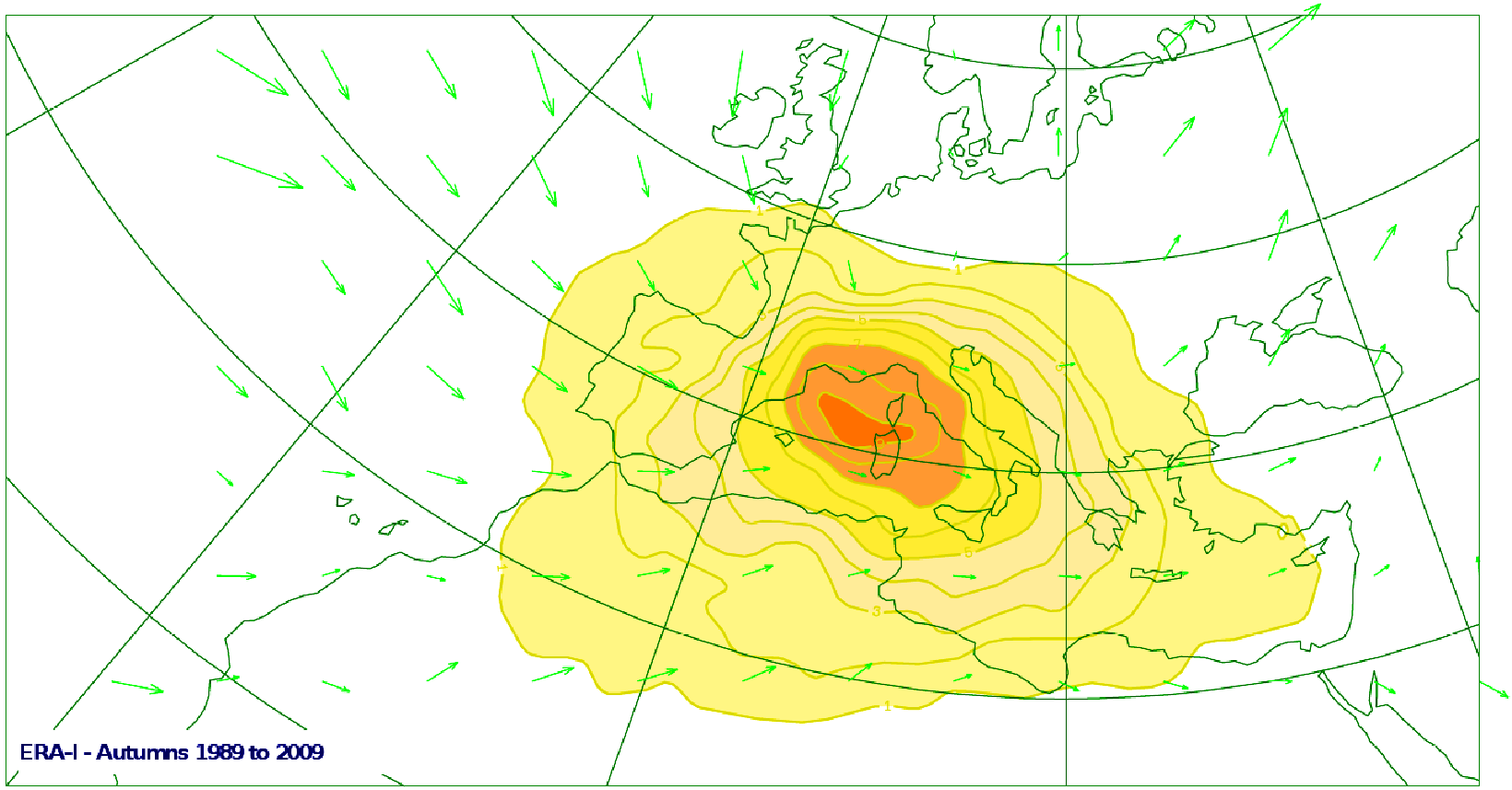
Intense Winds (> 15m.s$^{-1)}$ vectors composites for cyclones with VOx in MED3



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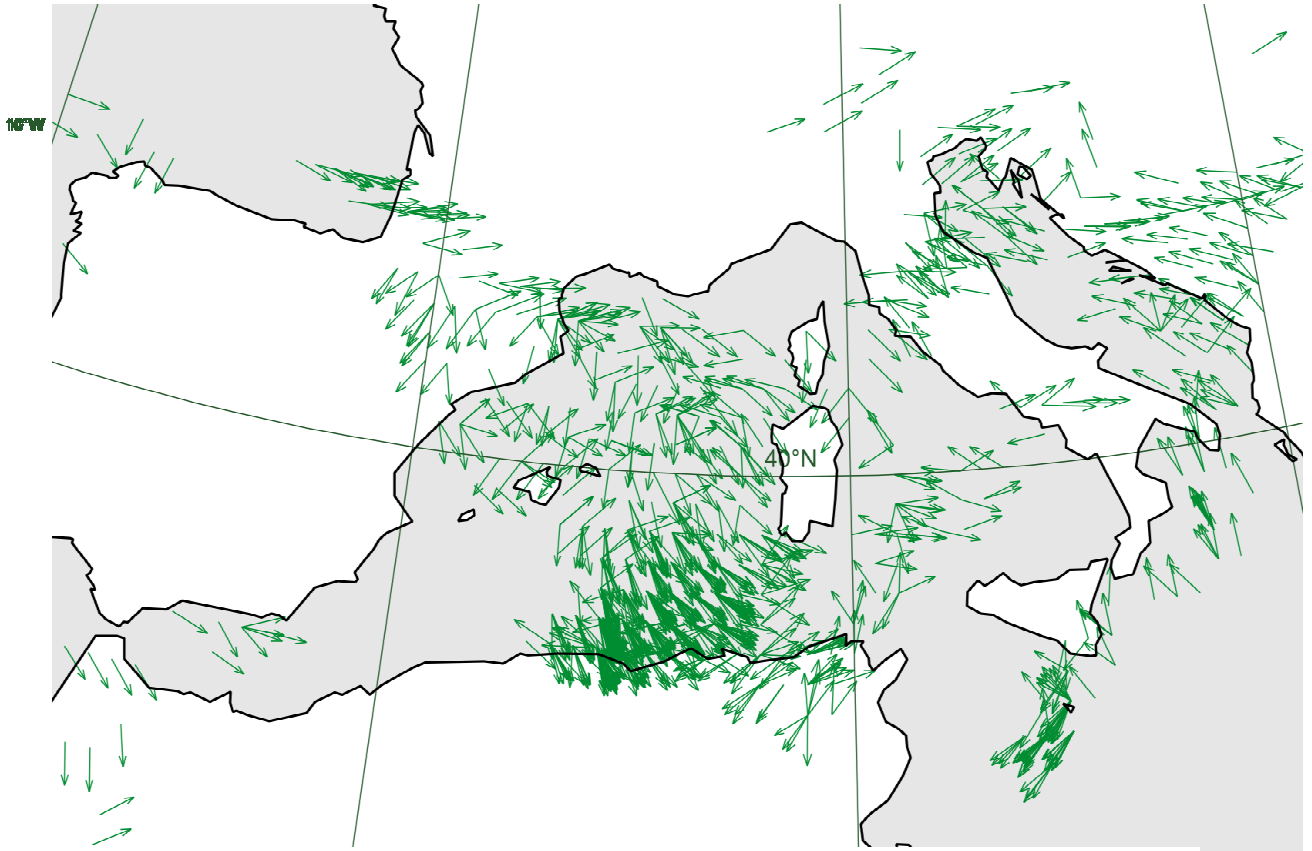
Intense Winds (> 15m.s^{-1}) vectors composites for cyclones with VOx in MED3

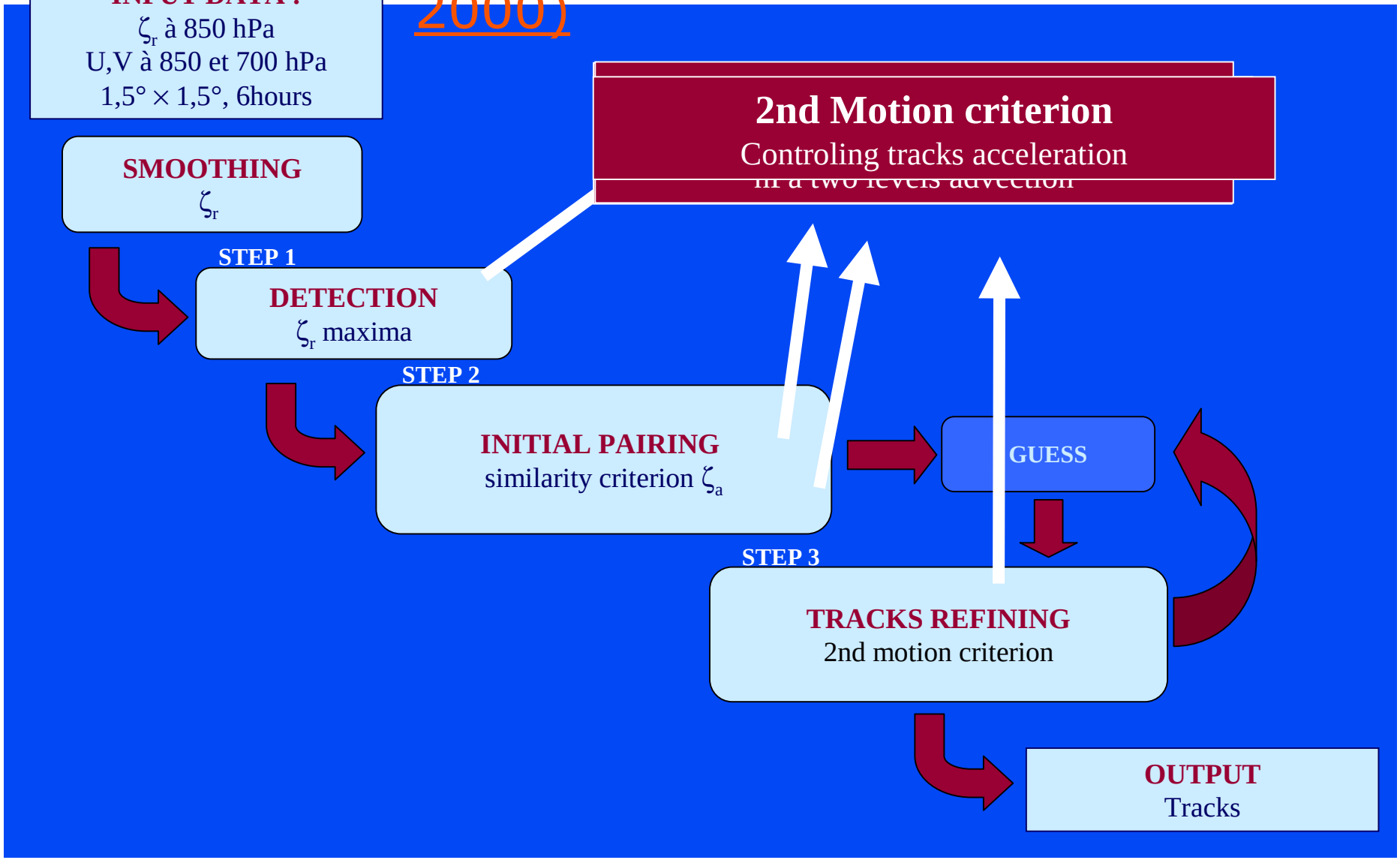


Winds max within a >600kms ring from cyclone VOx

CONCLUSIONS

- ERA-Interim provides a refined framework to study the structure of mediterranean stormtrack,
- It improves the capacity to regionalise the properties of cyclones.
- A validation study should be held to evaluate the potential of description of cyclogenesis processes diagnosis.
- Most intense winds are gathered far from the cyclone center (with strong interaction with the local environment)
- We could expect cross-checking of this latter assumption by selecting cyclones related to local intense wind events.

Tracking algorithm (F. Aryrault 2000)



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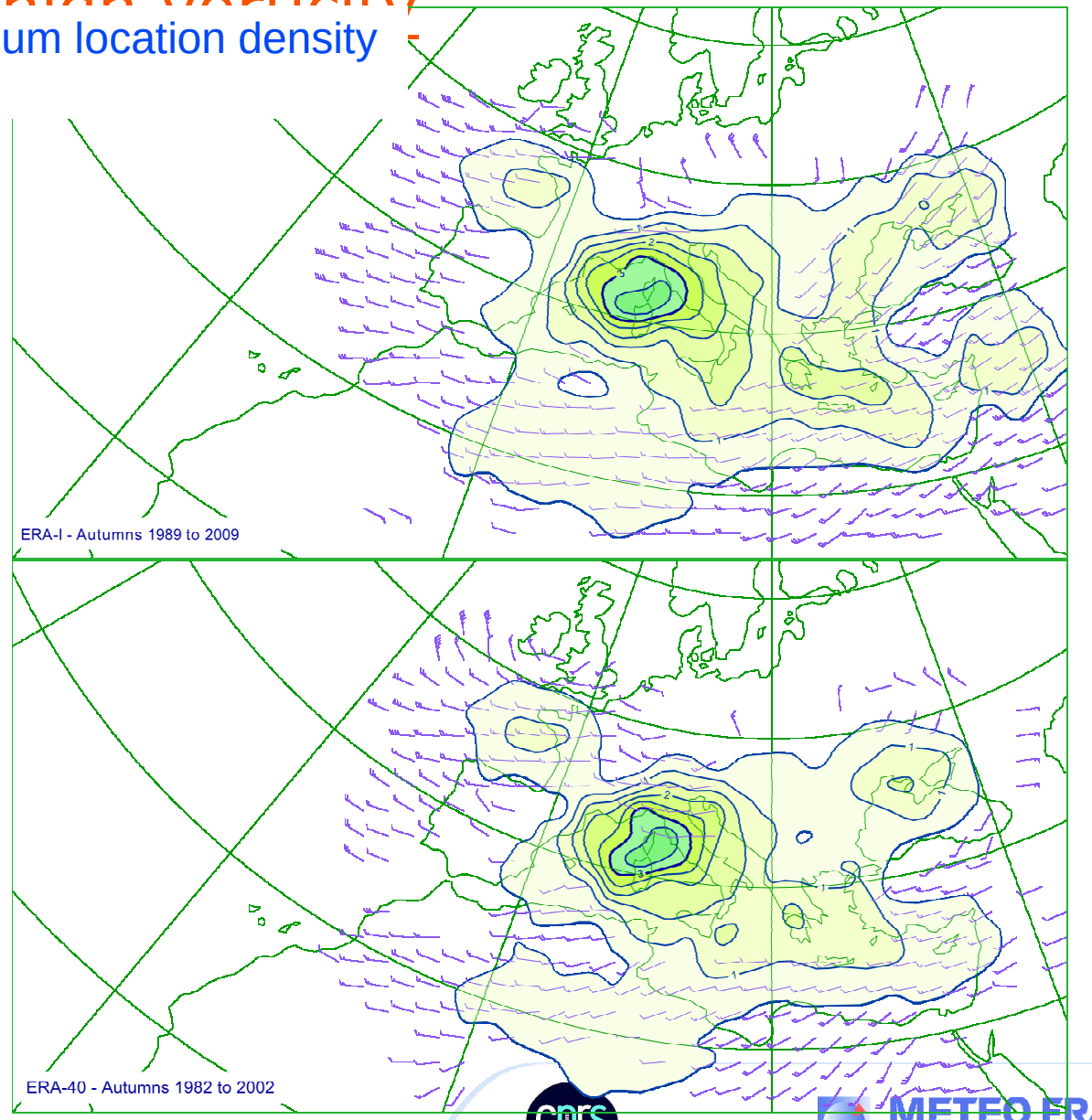
Cyclones with max in Medit and high vorticity

Tracks amplitude maximum location density for Vox > 1.E-4

ERA-I 1989-2009

ERA-40 1982-2002



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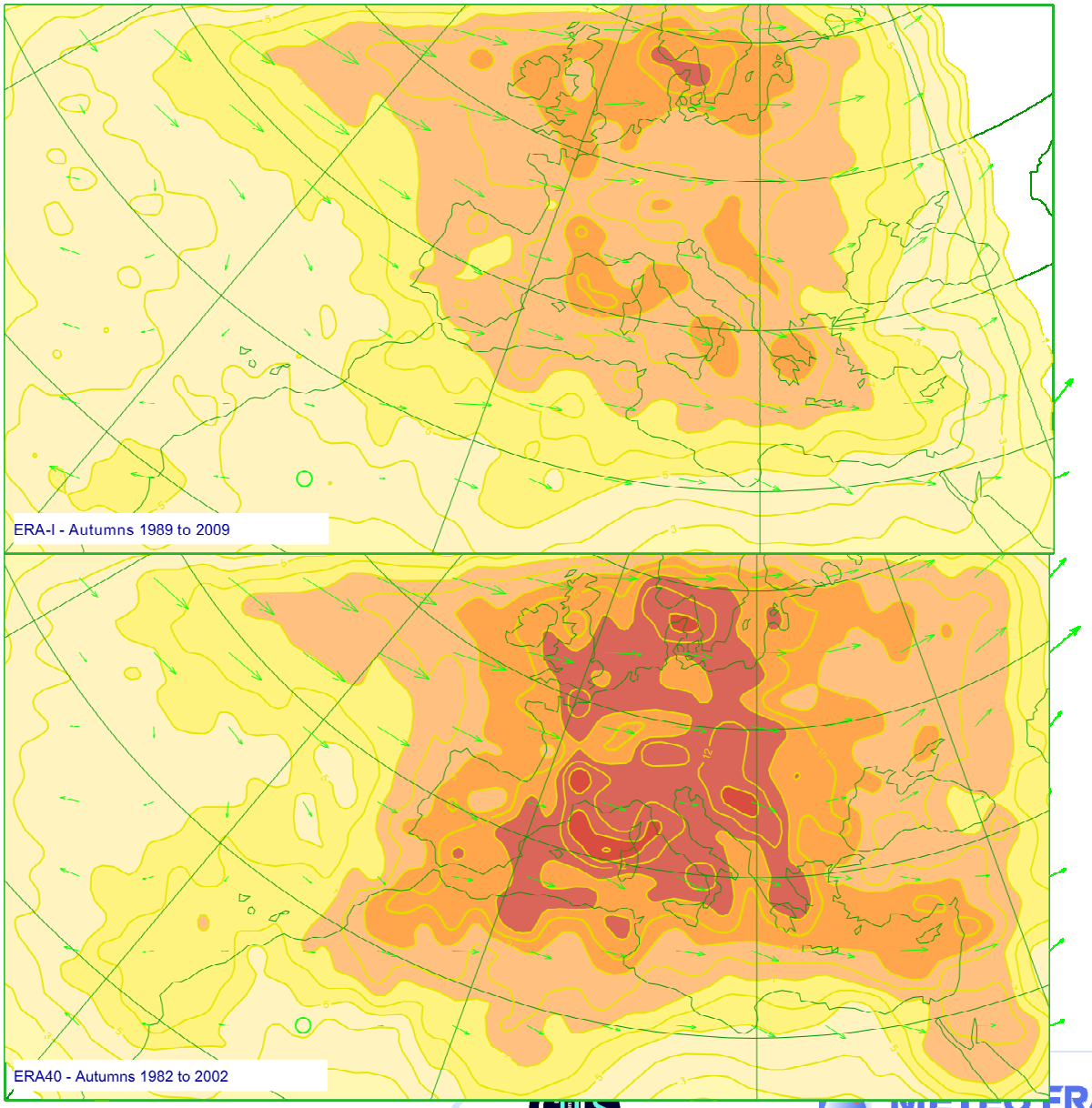
« Validation » with ERA40 tracking

Tracks density

ERA-I 1989-2009

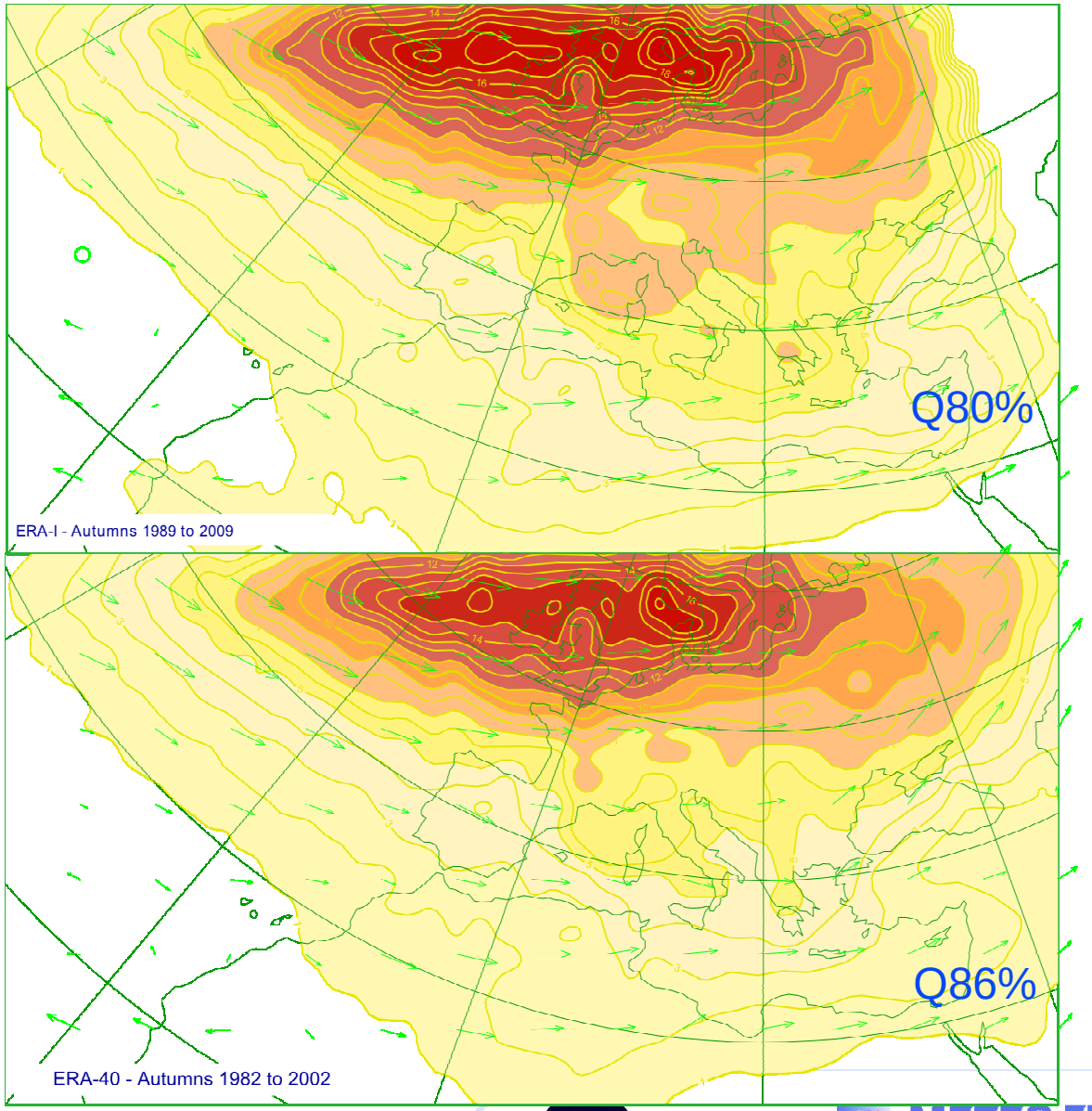
ERA-40 1982-2002



Cyclones with intense vorticity

ERA-I 1989-2009

ERA-40 1982-2002



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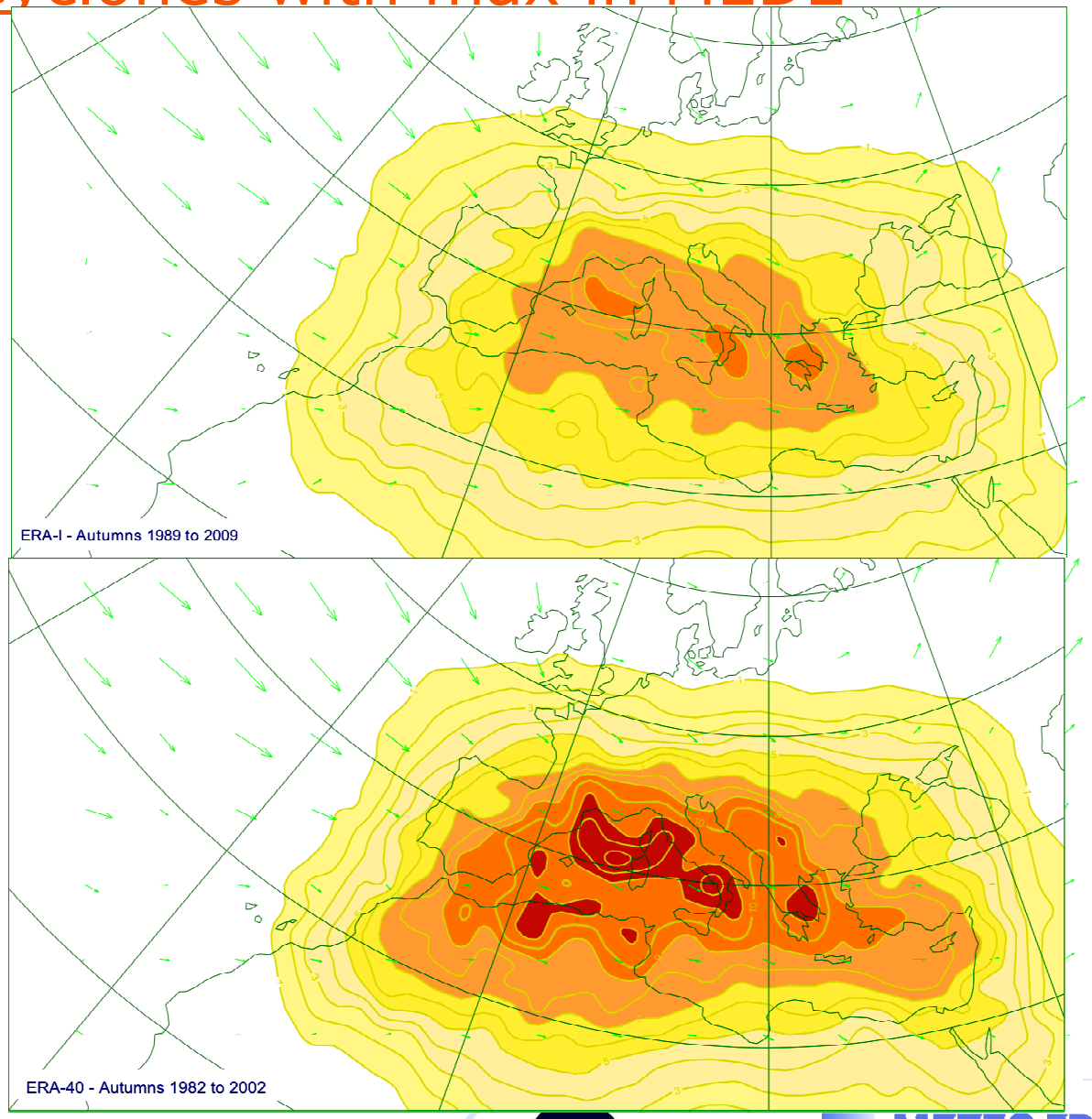
Cyclones with max in MED2

Tracks density

ERA-I 1989-2009

ERA-40 1982-2002



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