Assessing medicane risk using synthetic event sets

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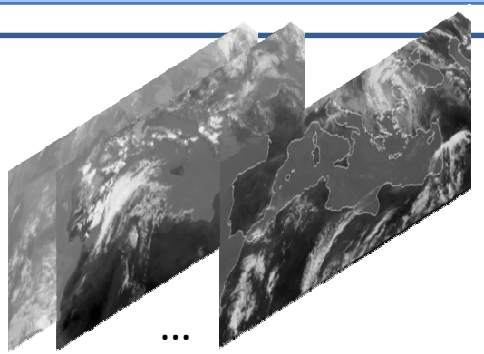
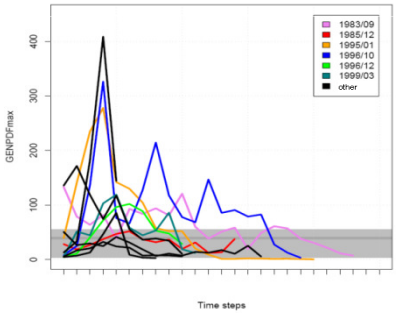
In last Plinius…

To create a database of events

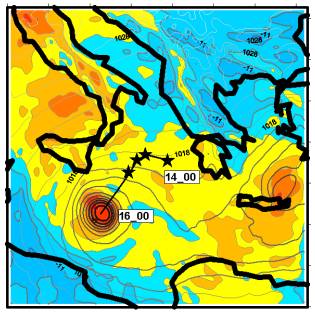
12 events (1982-2003)



To characterize large-scale meteorological environments for medicane development and maintenance



To examine numerical predictability



Growing the database

1.- Natural process:

Past: no measurements

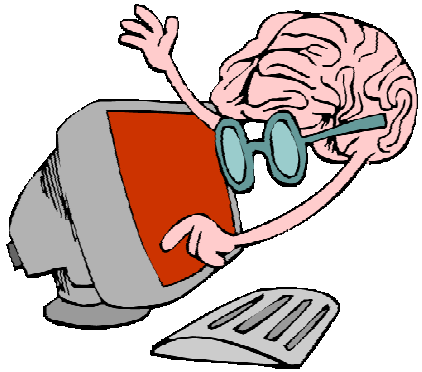
Future: no patient

ONE order the magnitude increased:

# Events	# Years
~10	20
~100	200

2.- Created by ourselves:

Machines or dancing



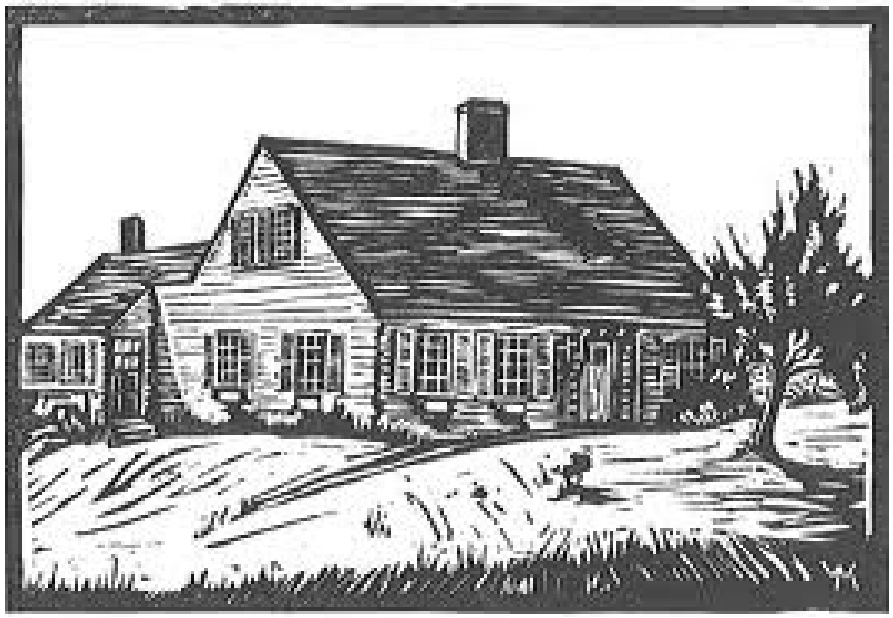
Other machines (computers) + brains

…using the CHIPS model

Coupled Hurricane Intensity Prediction System

1.- Traditional:

Tracks are initiated, based on historical cyclone data



2.- New:

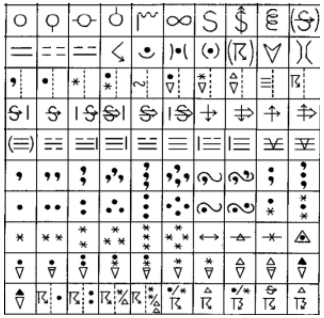
Genesis by random seeding

Genesis by random seeding

1.- Sowing the seeds

Initial track points are randomly distributed: These “seeds” are planted everywhere and at all times, SST, season or other factors.

2.- Looking the weather



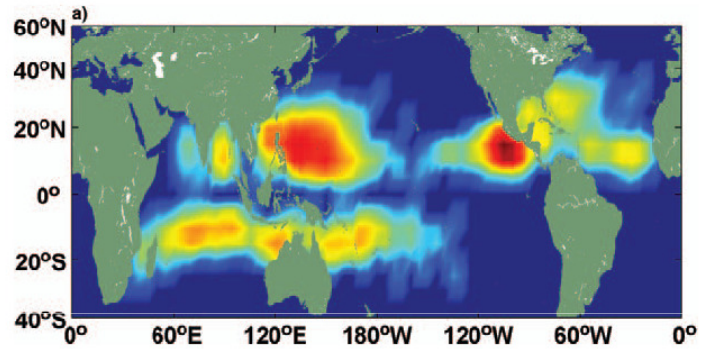
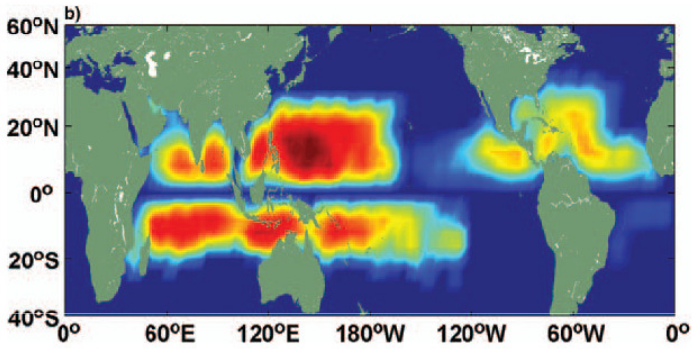
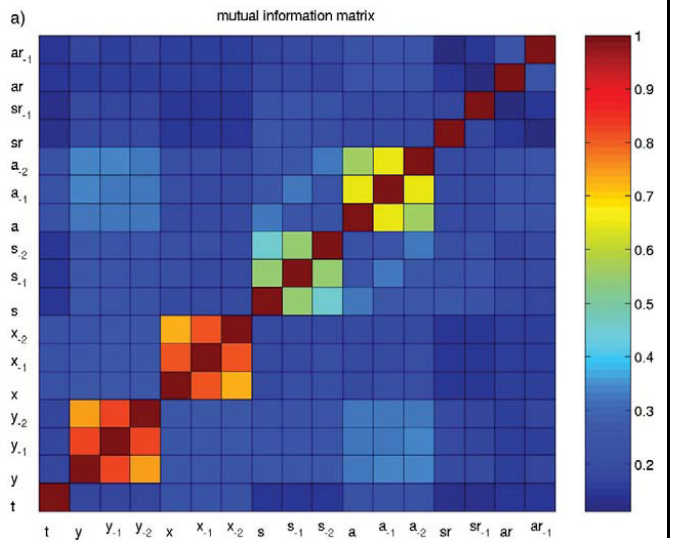
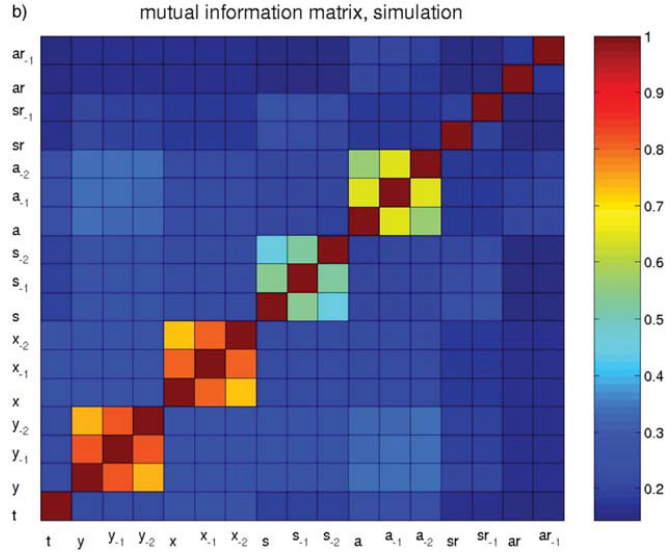
The ambient flow varies randomly in time, but it is constructed so that its mean, variance, and covariances conform to the climatology.

3.- Analyzing the benefits

Genesis is defined for the synthetic events as the first point at which the maximum winds exceeded 15 m/s .

Emanuel et al. 2008: Emanuel, K., R. Sundararajan and J. Williams; Hurricanes and Global Warming

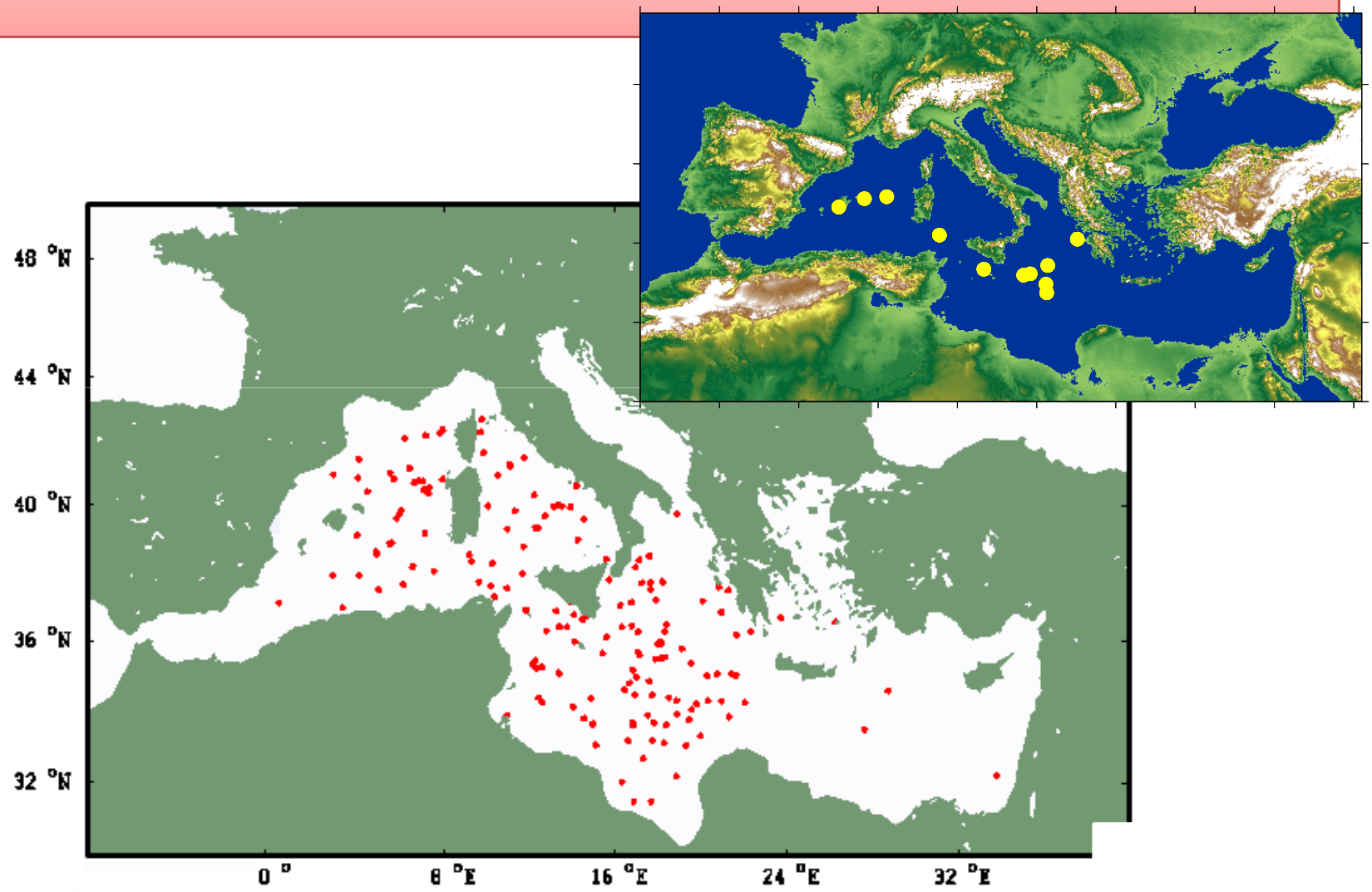
Some results for HURRICANES

	OBSERVED (1980-2005)	CHIPS MODEL
Genesis spatial distribution		
Normalized mutual information		

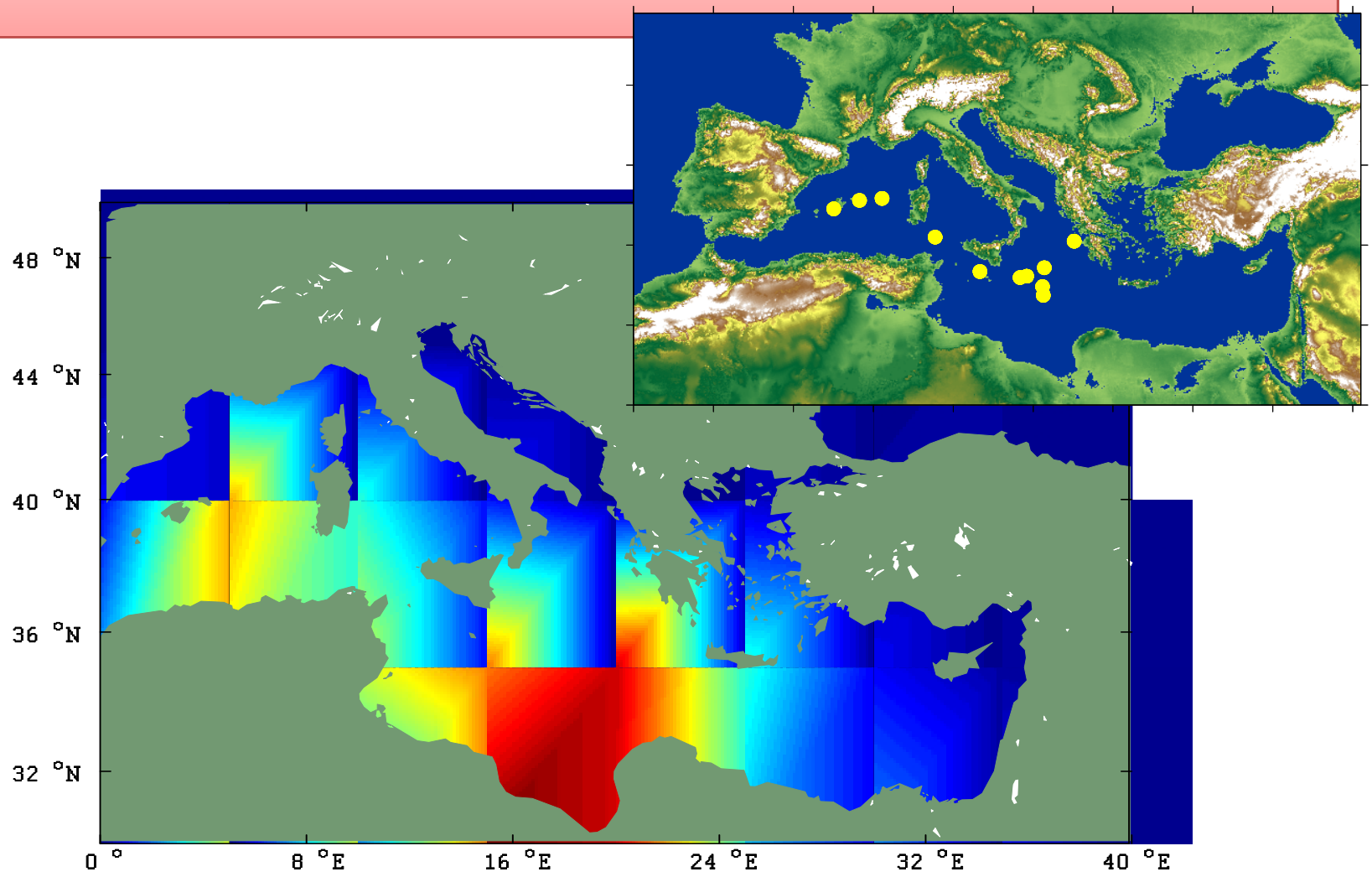
Emanuel et al. 2008: Emanuel, K., R. Sundararajan and J. Williams; Hurricanes and Global Warming

Emanuel et al. 2005: Emanuel, K, S. Ravela, E. Vivant and C. Risi; A statistical deterministic approach to hurricane risk assessment

Some results for MEDICANES

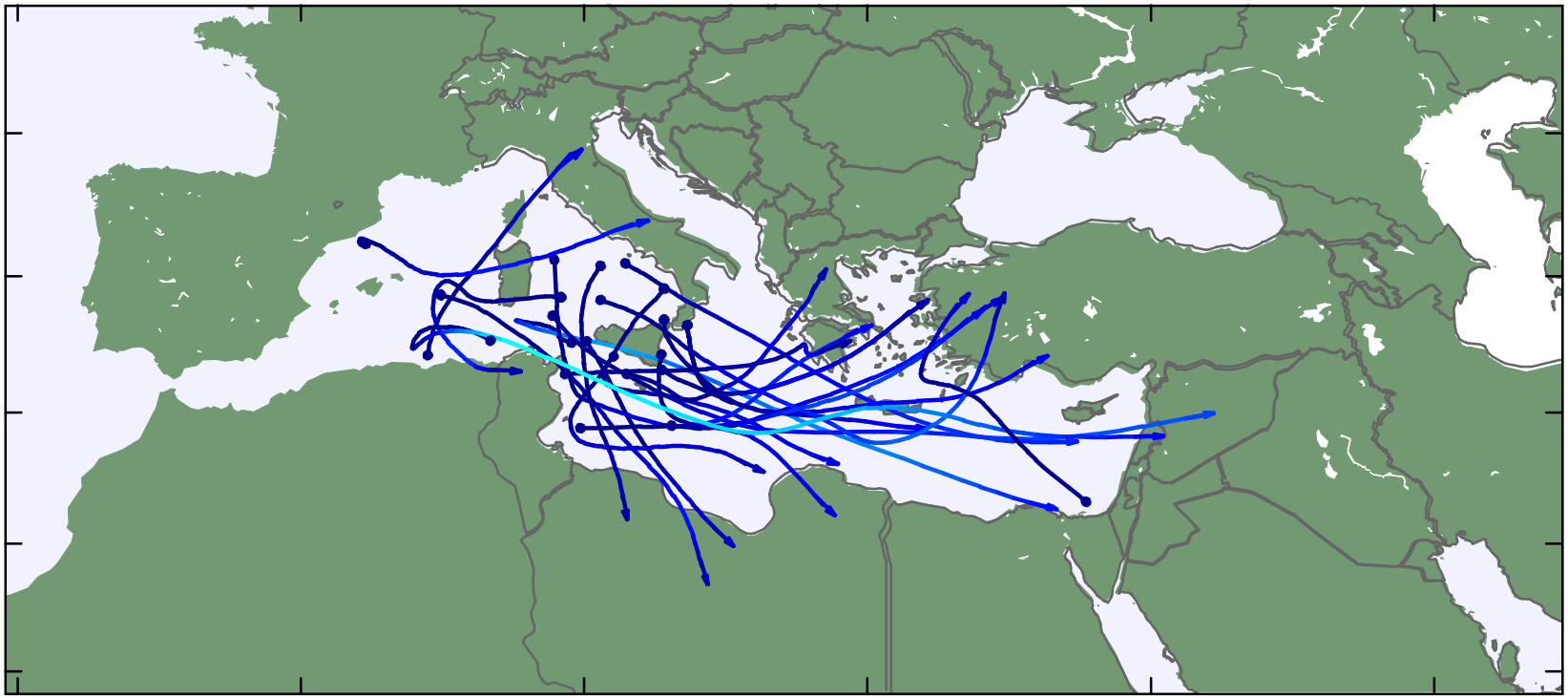


Some results for MEDICANES



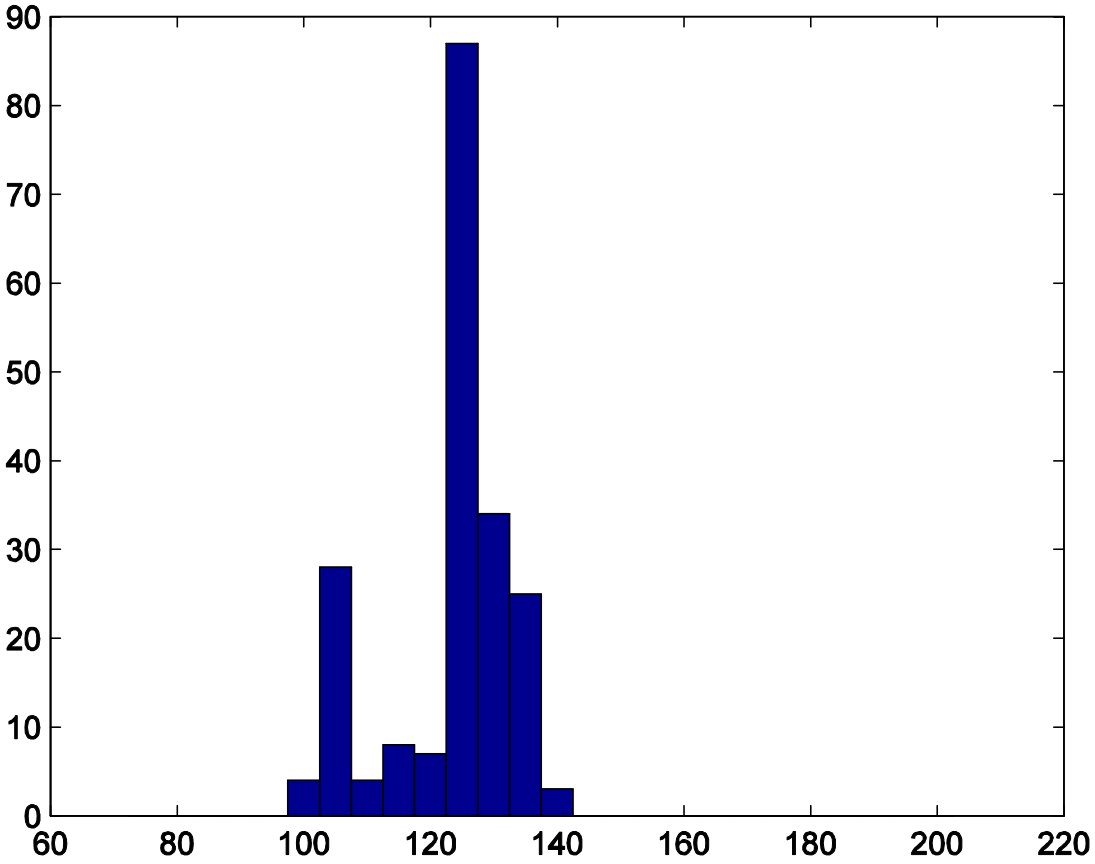
Some results for MEDICANES

Track of 25 random synthetic medicane tracks



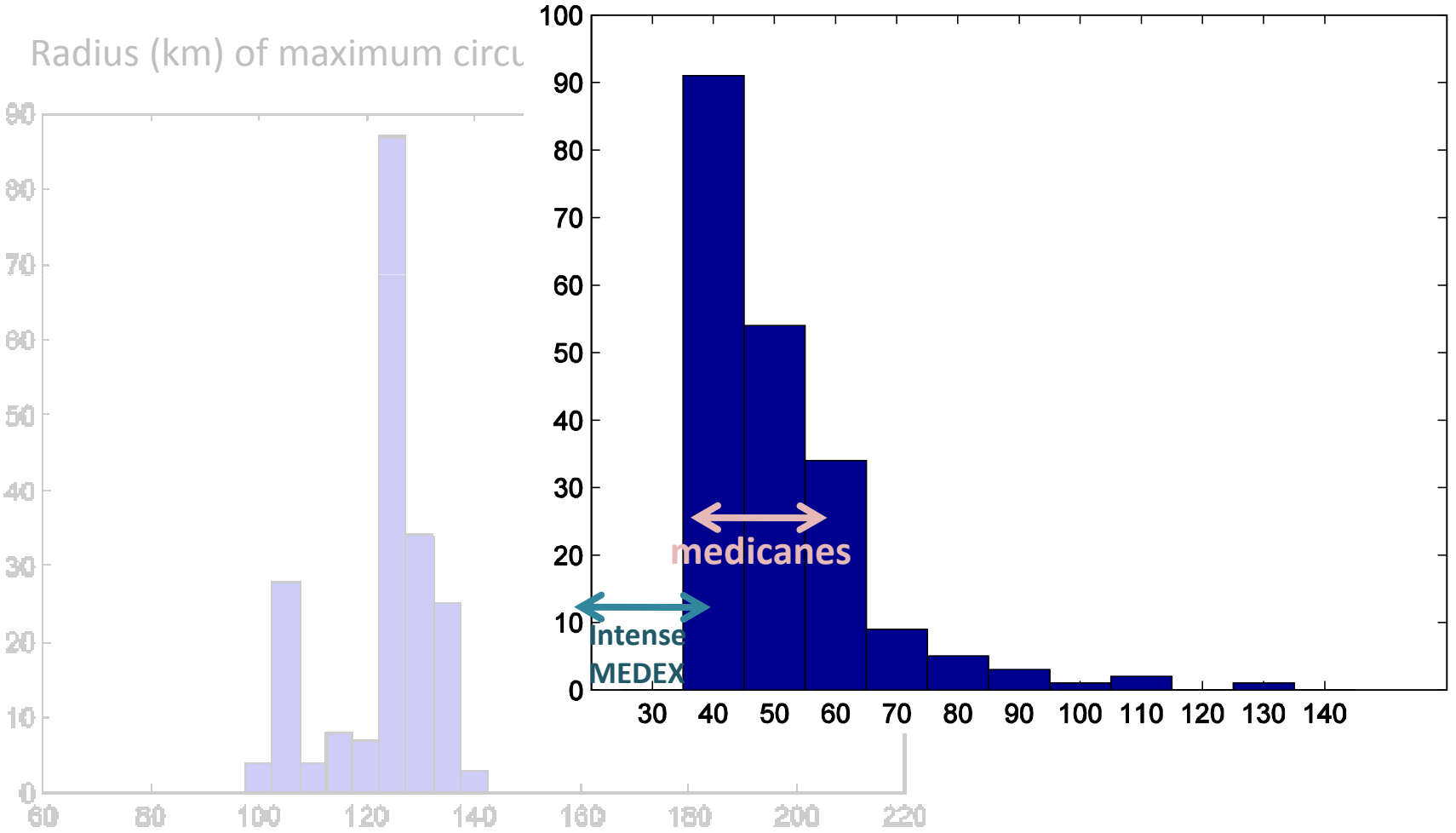
Some results for MEDICANES

Radius (km) of maximum circular wind in each event



Some results for MEDICANES

The maximum surface wind spead (m/s) in each event



Conclusions & Further work

Conclusions:

- Using this model, we are able to create a lot of synthetic medicanes to improve the statistical study of these events.
- Statistical results are approaching to observations.

Further work:

- To improve the fit of the parameter values in the CHIPS model.
- To use the climatologies from future scenario data.