

MEDICANES: database and environmental parameters

Maria Tous, Romu Romero and Climent Ramis (Universitat de les Illes Balears, Dept. Physics, Spain)

Contact: maria.tous@uib.es

Do they look alike?

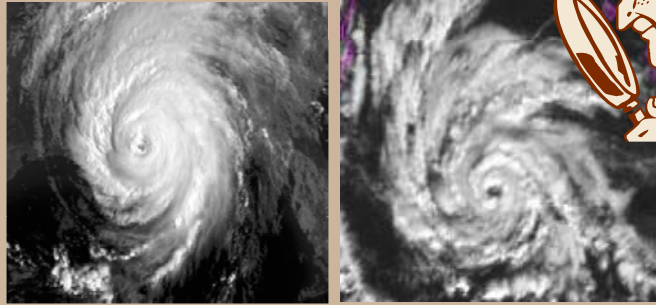


Fig. 1 Visible satellite image

Fig. 2 Visible satellite image

Both satellite images seem to reveal hurricanes, but only one of them is actually a **tropical cyclone**: Fig.1 is from Hurricane Katrina (August, 2005) near Florida and fig.2 is from an event over the Mediterranean Sea (January, 1995).

Tropical-like cyclones occasionally develop over the Mediterranean Sea, sometimes attaining hurricane intensity and threatening the islands and coastal regions. These storms, recently called **medicanes** (MEDiterranean hurriCANES), operate on the thermodynamic disequilibrium between the sea and the atmosphere and in this respect, as well as in their visual appearance in satellite images, are much like tropical cyclones.

Further work: This study is just in the beginning phase. It is necessary to complete the database of events and to examine in further detail other medicane-prone environmental parameters. In addition, we will extend the improved knowledge on medicane environments to future climate scenarios to study changes in medicane risk imposed by global warming.

This work has been framed within the MEDICANES/CGL2008-01271/CLI project, from Spanish Ministerio de Ciencia e Innovación.

1. Database

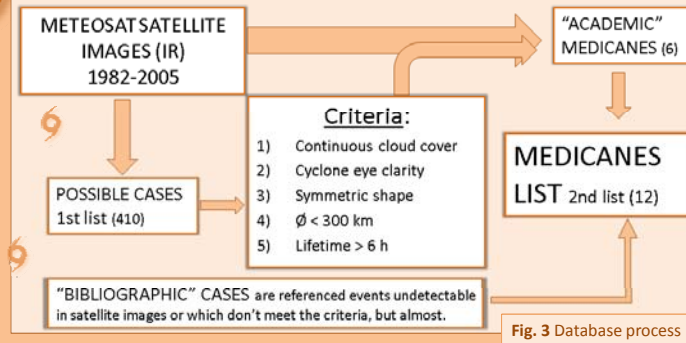


Fig. 3 Database process

In this work, **cases were selected** from historical IR image data (1982-2005) of Meteosat satellite. Two lists were created (fig.3) based on different criteria: a first list including any candidate storm, and a second one by narrowing the list down to most evident and studied events. This work presents specific analyses on the environments of this second list of cases (12 events).

2. Environmental parameters

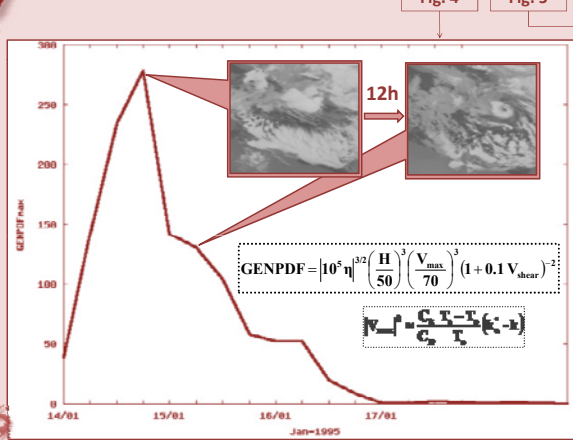


Fig. 4

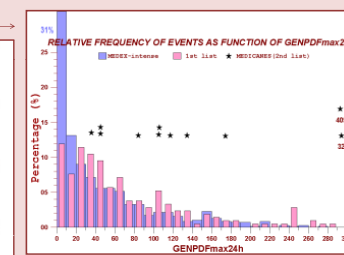


Fig. 5

Fig. 4 (left) Max. value of GENPDF found over a region of 600x600 km (GENPDFmax), centered on cyclone eye following its track. Fig.5 (up) Relative frequency of events (blue: intense baroclinic cyclones from MEDEX database; pink: first list of events; stars: medicanes) as function of max. value of GENPDFmax over 24 hours before the event.

Some **thermodynamical parameters** are associated with hurricanes/medicanes development (low-level positive vorticity, mid-high tropospheric relative humidity,...). An empirically-derived genesis index for the tropical regions (GENPDF), which involves the above ingredients, is revealed as an appropriate discriminative parameter. We apply this index to the Mediterranean region.

Following each medicane track, the maximum value of GENPDFmax (fig.4), higher than values typically found for intense baroclinic Mediterranean cyclones (fig.5), happens approximately twelve hours before the mature phase.

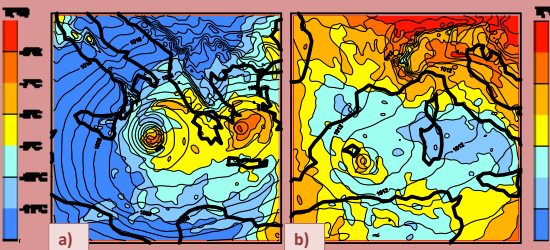


Fig.6 Sea Level Pressure (solid line, every 2hPa) and temperature at 700 hPa (colours, °C) in 2 cases of medicane: a) 16th Jan 95; b) 10th Dec 96.

Preliminary MM5 model simulations (grid length 7.5 km) show the capability of mesoscale models to simulate these extreme, small-scale storms (fig. 6). In these simulations, it is possible to identify intense lows with warm-cores, not fully isolated from the general cyclonic circulation, which are associated with events of medicanes. Simulations will be an useful tool to examine additional medicane-prone environmental parameters in future studies.