MEDICANE RISK
IN A CHANGING CLIMATE

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MEDliterranean

MEDICANE RISK IN A CHANGING CLIMATE. M.Tous (maria.tous@uib.es), R.Romero, C.Ramis and K.A.Emanuel

Only 1-2 events per year
Diameter max. ~300 km
MEDIterranean + HurriCANES MEDICANES

WHERE? HOW? WHEN

MEDICANE RISK IN A CHANGING CLIMATE. M.Tous (maria.tous@uib.es), R.Romero, C.Ramis and K.A.Emanuel
1. Nested climatic simulations
2. Statistical-deterministic approach
3. Very high resolution climate model
We would like Global Climate Models (GCMs) have enough resolution to distinguish well all the structures. But they have not. 

Medicanes are too small to be represented there.
Medicanes development is related with high values of GENPDF. We would like Global Climate Models (GCMs) have enough resolution to distinguish such structures. But they have not. Medicanes are too small to be represented there.

1.- Nested climate simulations
Most The Simpson characters are yellow
...but not all yellow characters are from The Simpsons

Medicanes development is related with high values of GENPDF

1.- Nested climate simulations
Downscaling simulations using ERA-40 data

IR Meteosat satellite image

1.- Nested climate simulations
1.- Nested climate simulations
2.- Statistical-deterministic approach

ONE order the magnitude increased:

<table>
<thead>
<tr>
<th># Events</th>
<th># Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>~20</td>
<td>15</td>
</tr>
<tr>
<td>~200</td>
<td>150</td>
</tr>
</tbody>
</table>

To grow the database

1.- Natural process:
Past: no measurements
Future: no patient

2.- Created by ourselves:
Machines or rain dancing
Other machines (computers) + brains
2.- Statistical-deterministic approach

Developed by K.Emanuel and his team in the context of the long-term wind risk associated with tropical cyclones.
2.- Statistical-deterministic approach

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2.- Statistical-deterministic approach

**GENESIS**: Random draws from observed PDF or Random seeding

**TRACK**: Randomly varying synthetic winds (respecting climatology)

**ENVIRONMENT**: Previous winds + monthly-mean thermodynamic fields

**INTENSITY and RADIAL DISTRIBUTION of WINDS**: **CHIPS model**

For each month, decomposition through **PCA** of 10-days synoptic evolutions of **z250, z850, T600, and P.I.** into the new space of independent PCs.
2.- Statistical-deterministic approach
Comparing methodologies

1. Nested

2. CHIPS
Comparing methodologies

1. Nested
   - ERA-40
   - ECHAM5-20C3M
   - ECHAM5-SRESA2

2. CHIPS
3.- Very high resolution climate model
<table>
<thead>
<tr>
<th>PROS</th>
<th>1. Nested simulations</th>
<th>2. Statistical-deterministic</th>
<th>3. Very high resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Callibration</td>
<td></td>
<td>• A lot of events (statistical robust)</td>
<td>• Direct technique</td>
</tr>
<tr>
<td>• Realistic</td>
<td></td>
<td>• Cheap computational cost</td>
<td></td>
</tr>
<tr>
<td>CONTRAS</td>
<td></td>
<td>• Synthetic</td>
<td>• Just one model</td>
</tr>
<tr>
<td>• Few events</td>
<td></td>
<td></td>
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<tr>
<td>• High computational cost</td>
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All for one... !!!