T10/T12.- TIPOLOGÍA DE LOS FENÓMENOS METEOROLÓGICOS Y CLIMÁTICOS EXTREMOS Y RIESGOS ASOCIADOS (ASPECTOS MEDITERRÁNEOS)

Módulo 1.01.- Motores del clima, escenarios futuros y fenómenos extremos

Máster UIMP/CSIC en Cambio Global – Octubre 2013

Universitat de les Illes Balears

Romu Romero (Grupo de Meteorología – Dept. de Física)

¿ QUÉ ES TIEMPO VIOLENTO O “SEVERO” ?

A) Definición clásica (USA)

- **Granizo con diámetro > 2 cm**
- **Vientos superiores a 95 km/h**
- **Tornados**
- **Producido por tormentas**

B) Definición ampliada

- **Lluvia intensa (> inundaciones relámpago)**
- **No necesariamente producido por tormentas**

RIESGOS CLIMÁTICOS >> TIEMPO SEVERO

C) Otros riesgos de origen ciclónico

- **Nevadas**
- **Olas de frío**

D) Incluso de origen anticiclónico

- **Olas de frío y fuertes heladas**
- **Olas de calor**
- **Nieblas persistentes**

ESTRUCTURA

1) Ideas previas

2) Ciclones extratropicales o de latitudes medias

3) Ciclones cuasitropicales o "medicanes"

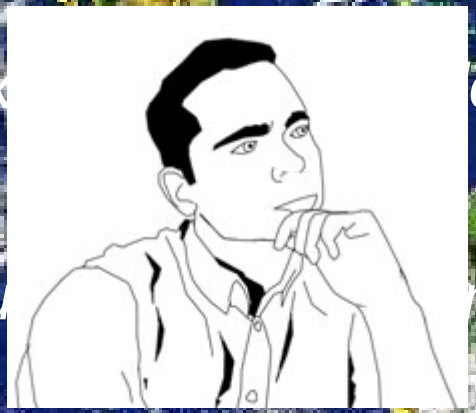
4) Relación estadística ciclones – lluvias intensas

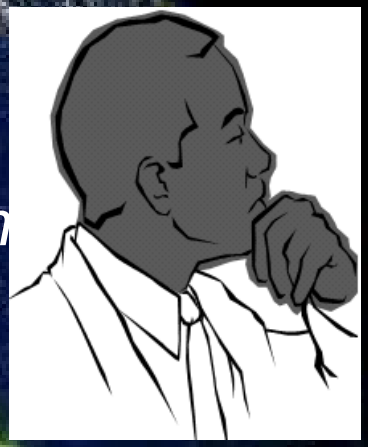
5) Tormentas y fenómenos severos

6) Otros riesgos climáticos

ESTRUCTURA

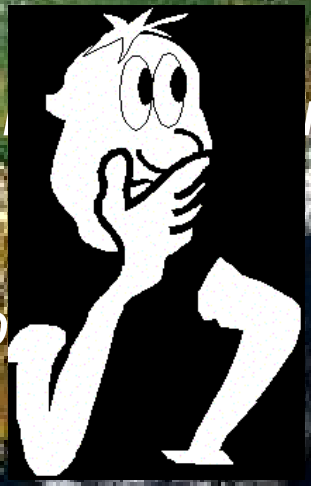
1) Ideas previas





2) Ciclones ex *e latitudes m*

3) Ciclones cu *medicanes”*

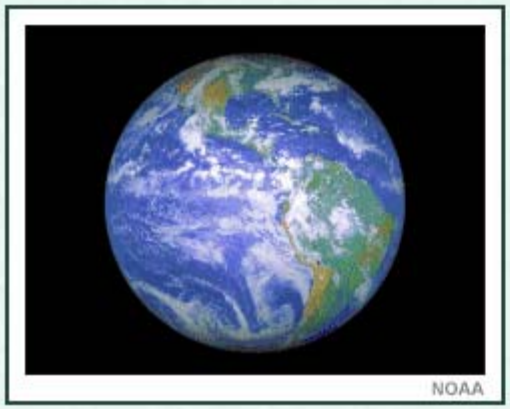


*4) Relación estadística ciclones – * *nsas*

5) Tormentas y fenómenos severo

6) Otros riesgos climáticos

Global Scale



Weather on Planet Earth is the result of basically **four main features: the sun, the planet's atmosphere, moisture, and the structure of the planet**. These ingredients create dust devils and hurricanes, floods and droughts, heat waves and blizzards, and everything in between. We'll take a closer look on the following pages.

The Sun

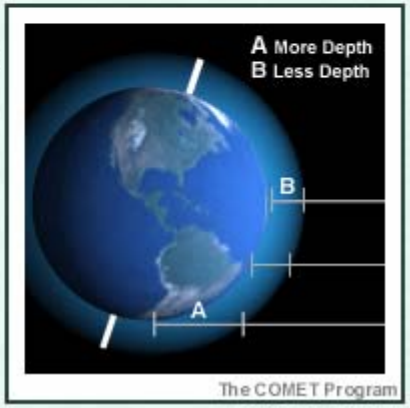
The weather on our planet is largely due to the sun heating areas of the planet unequally. This unequal distribution occurs because

1. The sun's radiation reaches only half the planet at any one time.
2. The amount of radiation reaching the surface varies at different places.
3. The planet tilts as it revolves around the sun.

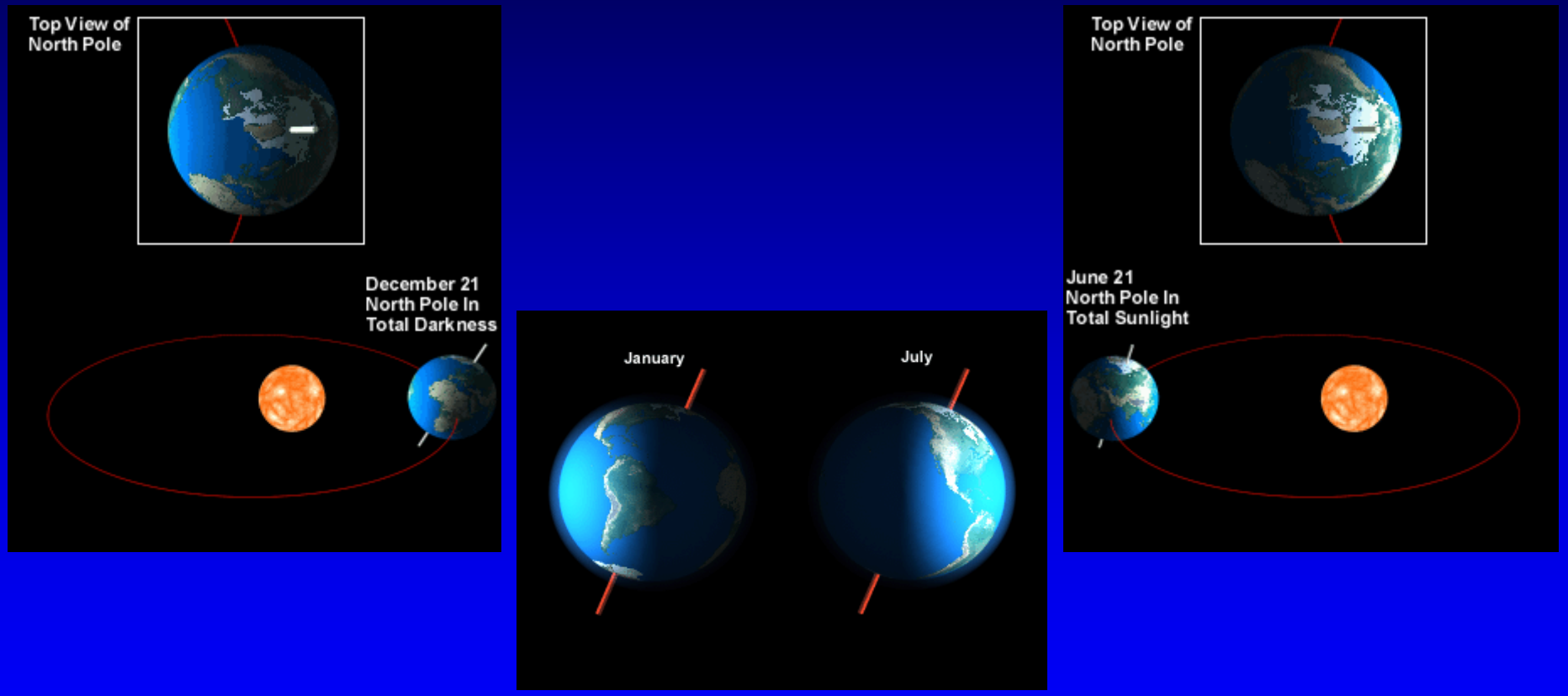
The first cause listed above refers to the temperature difference between night and day. The part of the planet that faces the sun heats up during the day as the **earth rotates every 24 hours**. Meanwhile, the other half loses heat during the night.

Second, **the spherical shape of the planet causes an unequal distribution of radiation**. The sun's rays must penetrate a larger volume of the atmosphere at the poles (Point A) than at the equator (Point B). Consequently, more radiation is diffused by the atmosphere before it reaches the ground in higher latitudes.

In addition, the rays are more concentrated at the equator than at the poles where they strike at a more oblique angle. The net result is higher temperatures at the equator—another imbalance in the distribution of heat.



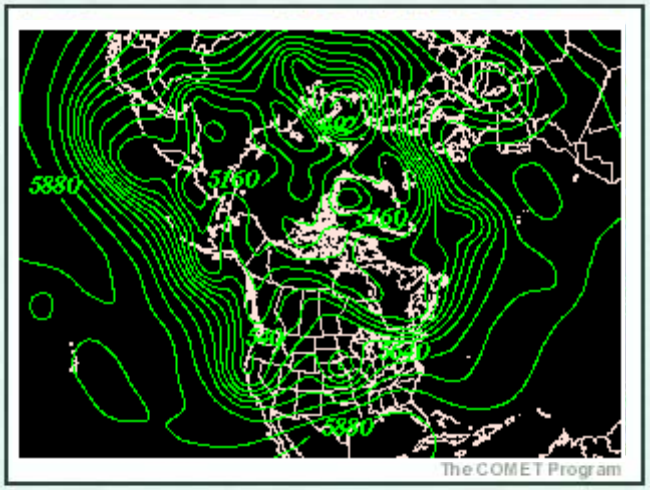
Third, **the earth revolves around the sun** every 365 days (see figure below), and as it does, different parts of the planet tilt toward the sun and receive more radiation. For example, on June 21 (the summer solstice), the North Pole is tilted toward the sun and has continuous daylight. Notice that on December 21, the North Pole is tilted away from the sun. In April, the planet has relatively little tilt, meaning that day and night are about equal length in most places. This **tilt causes the seasons**.



The variations in temperature, both on a daily and seasonal basis, cause the circulation of the atmosphere

Temperature, Pressure, and Winds

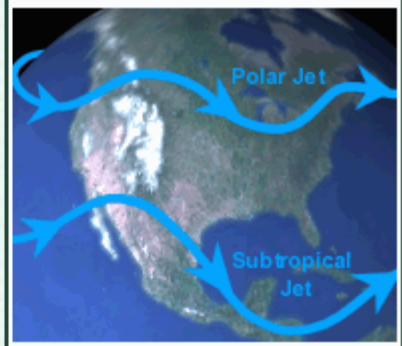
The temperature differences discussed earlier also cause pressure differences in the atmosphere. So, for example, we have cold, dense air at the poles and warm, lighter air near the equator. The same processes that try to equalize temperature differences over the globe also try to balance the pressure differences between denser and lighter air. **This creates winds that blow from areas with higher pressure to those with lower pressure.**



When pressure changes rapidly between two areas, we say that there is a "tight pressure gradient." In general, the tighter the pressure gradient, the stronger the winds tend to be. In other words, the greater the pressure differences for a given distance across the ground, the stronger the wind.)

These movements, plus the planet's rotation, create the large-scale wind patterns that transport weather systems. For example, trade winds propel tropical storms from the coast of Africa westward to the coast of the U.S., while the prevailing westerlies on the North American continent can carry Pacific Northwest rainstorms all the way to the East Coast.

Winds tend to increase with height, reaching their maximum about 8 miles (11 km) above the Earth's surface at the tropopause, which is the top of the troposphere. These maximum winds concentrate in narrow bands called **jet streams**, where wind speeds may reach more than 200 mph. Jet streams exist because of temperature contrasts, and they are stronger in the winter when that contrast is greatest. They are an important factor in heat transfer in the atmosphere and in the development and movement of low- and high-pressure systems.

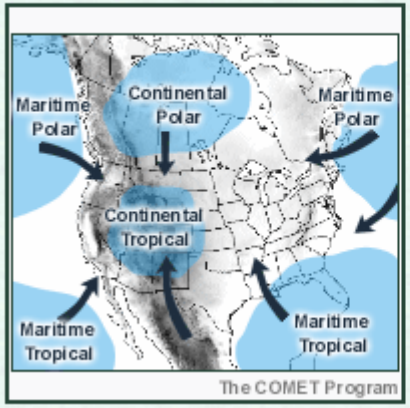


The Planet's Structure

Moisture

While water vapor is not the most abundant gas in the atmosphere, it is very important in terms of weather. In addition to forming liquid and solid particles in clouds that fall as rain or snow, the process of changing from the gaseous state into liquid water or ice releases large amounts of heat that is an energy source for weather systems, particularly thunderstorms and hurricanes. In addition, the vapor absorbs some of the earth's outgoing radiation, which affects the heat balance of the planet.

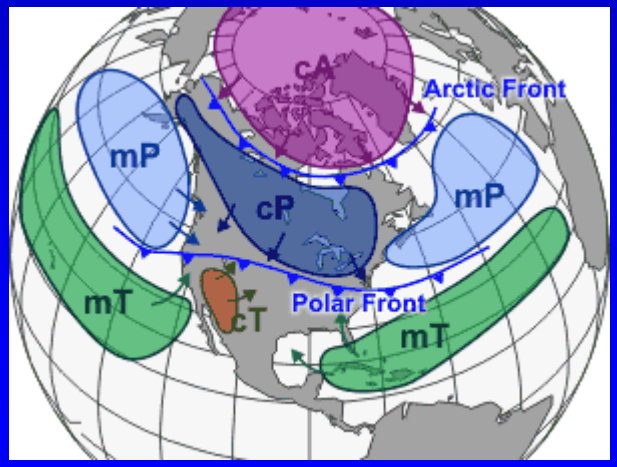
Temperature: Air Masses



If a body of air moves slowly or stays over an extensive area that has fairly uniform temperature and moisture characteristics, the air takes on those characteristics and is called an **air mass**. Four main types of air masses affect U.S. weather:

- Continental polar (cold, dry)
- Maritime polar (cool, moist)
- Continental tropical (hot, dry)
- Maritime tropical (hot, moist)

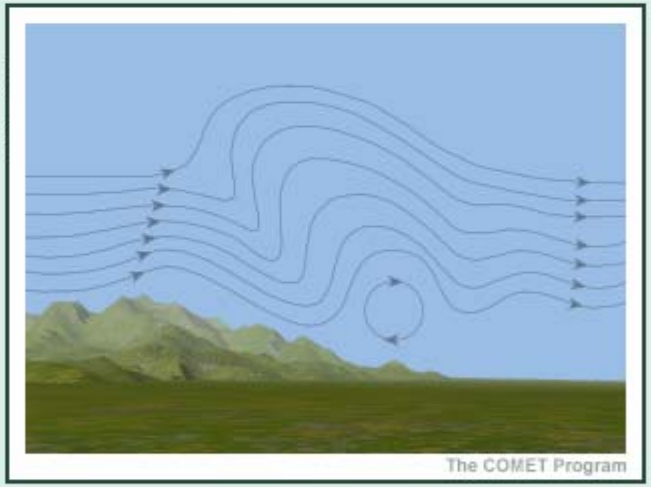
Masa de aire	Origen	Nombre	Características	Temperatura media	Humedad absoluta
Ártica	Indistinto	A	muy fría y seca	-46 °C	0,1 g/m³
Polar	Continental	PC	fría y seca	-11 °C	1,4 g/m³
Polar	Marítimo	PM	fría y húmeda	4 °C	4 g/m³
Tropical	Continental	TC	cálida y seca	24 °C	11 g/m³
Tropical	Marítimo	TM	cálida y húmeda	24 °C	1 7 g/m³
Ecuatorial	Indistinto	E	cálida y húmeda	28 °C	19 g/m³



Topography

The **basic structure** of the planet—landforms, oceans and other bodies of water, mountains, deserts, vegetation, and even urban areas—is also important in determining weather. The oceans are particularly important in weather because they provide much of the water that evaporates into the atmosphere. This **moisture**, transported by the "rivers of air," **condenses to form clouds**. In addition, the oceans collect heat and release it more slowly than the land. This also affects the distribution of temperature.

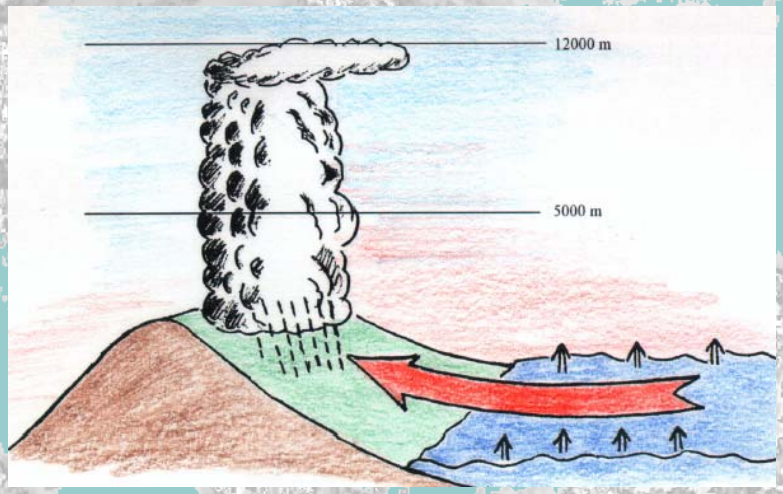
Topographical variations affect weather in many important ways. For example, the presence of mountain ranges affects the distribution of moisture. If the prevailing winds blow from the ocean toward high terrain (as is the case in the Pacific Northwest, for example), a "rain shadow" effect is often produced where the slopes facing the prevailing winds (the windward side) receive much more rain or snow than on the leeward side. We'll talk more about topographical effects when we discuss the mesoscale.

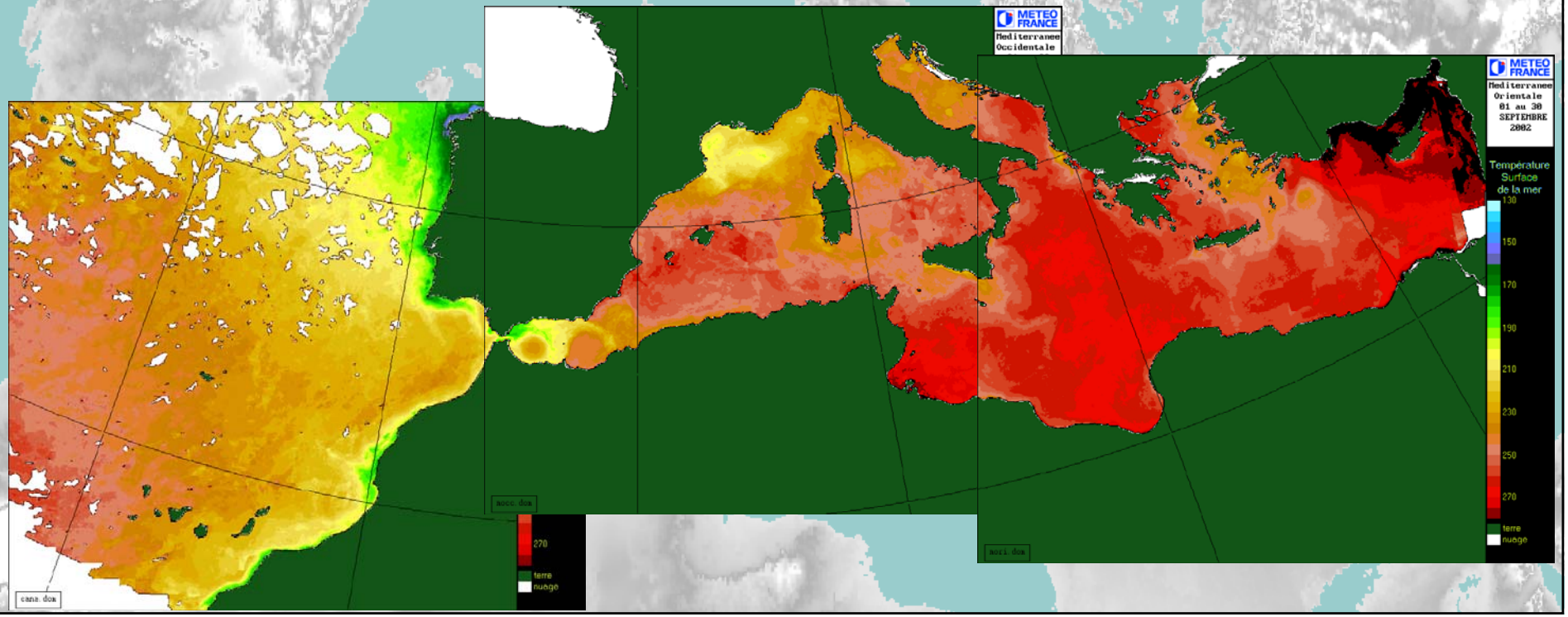


Climate

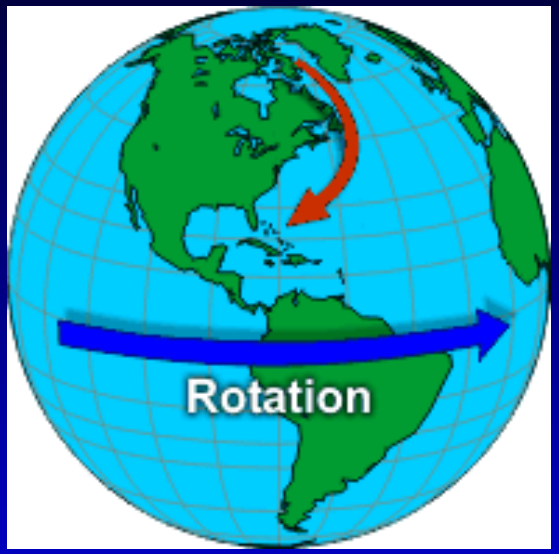
The **climate** in your area is a function of your location on the planet, topography, proximity to water bodies, etc. It is essentially the **average** weather conditions over 30 years or more. This average will contain some extreme conditions along with a larger number of more normal conditions. So knowing your average precipitation, for example, does not tell you anything about the likelihood of an extreme event—the kind that results in problems for your community. Historical and statistical analyses can give you a better idea of extremes for your locale, and we'll talk more about these in the Hazards Section.

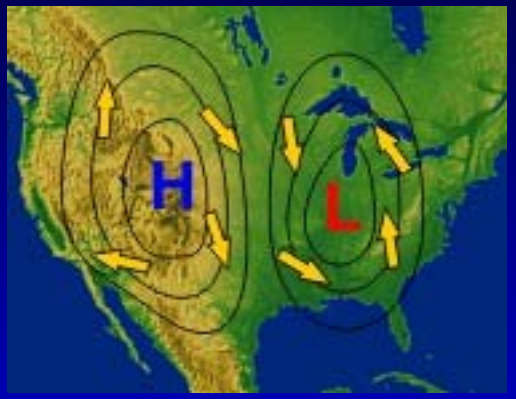
PARTICULARIDADES GEOGRÁFICAS

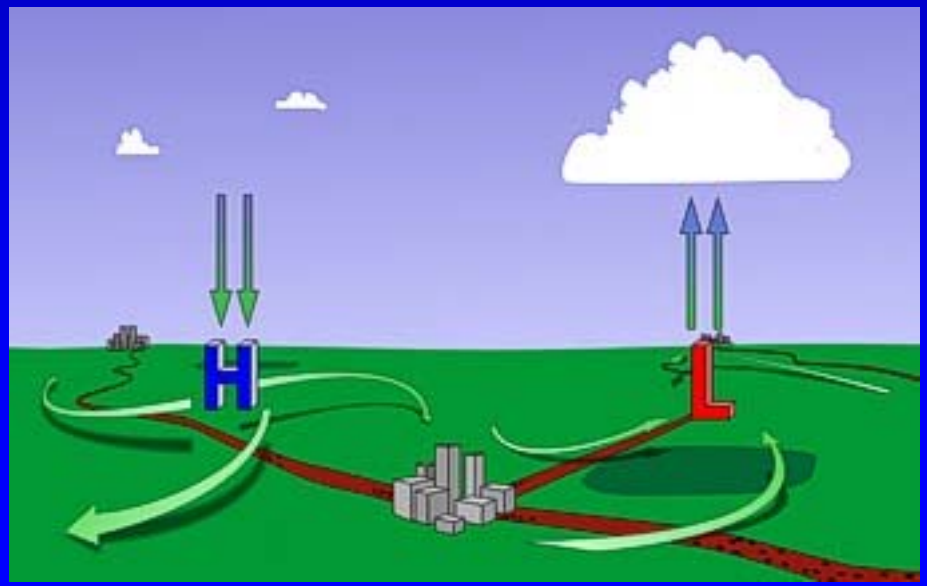




EL PAPEL DEL CICLÓN







ESTRUCTURA

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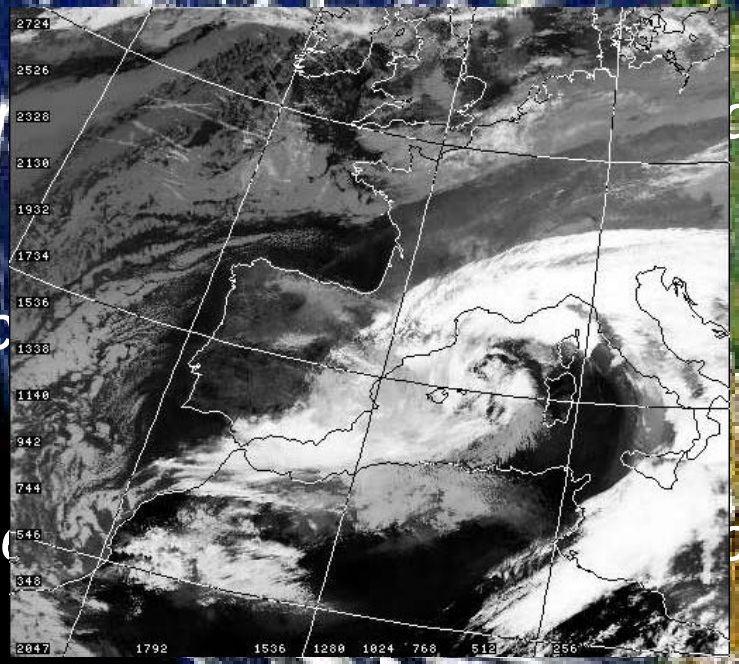


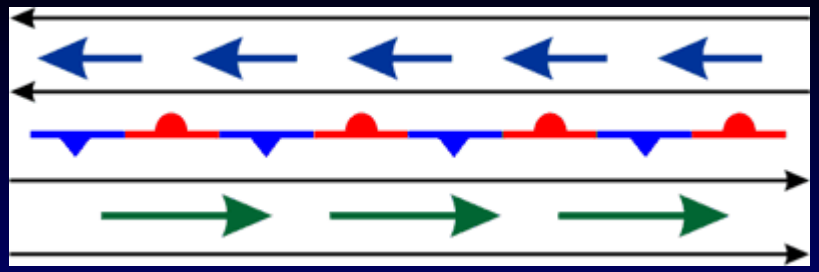
3) Ciclo dicanes”

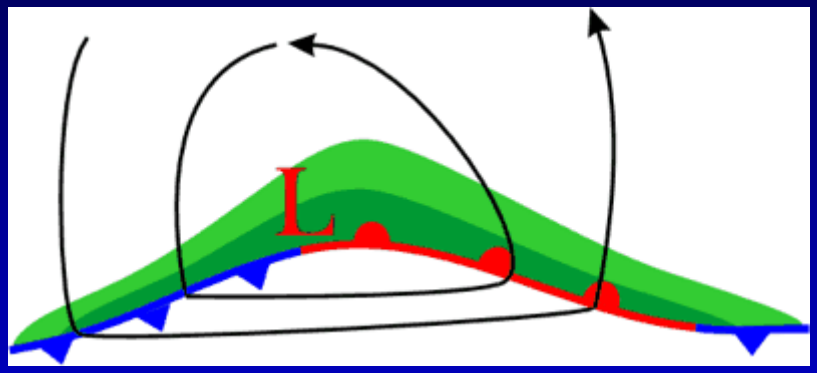
4) Relac lluvias intensas

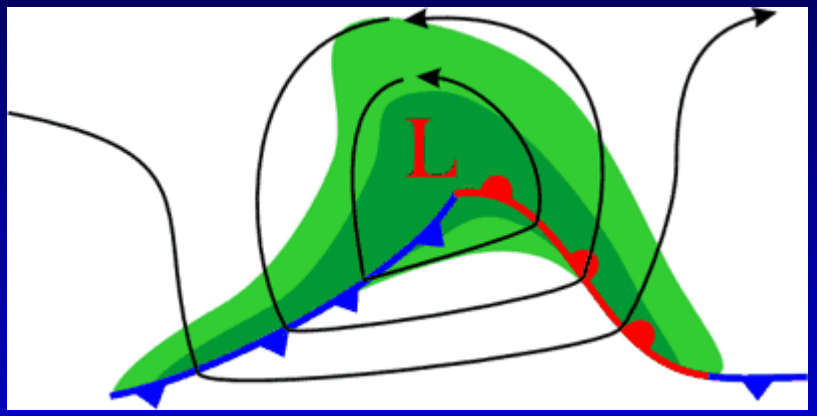
5) Torm os

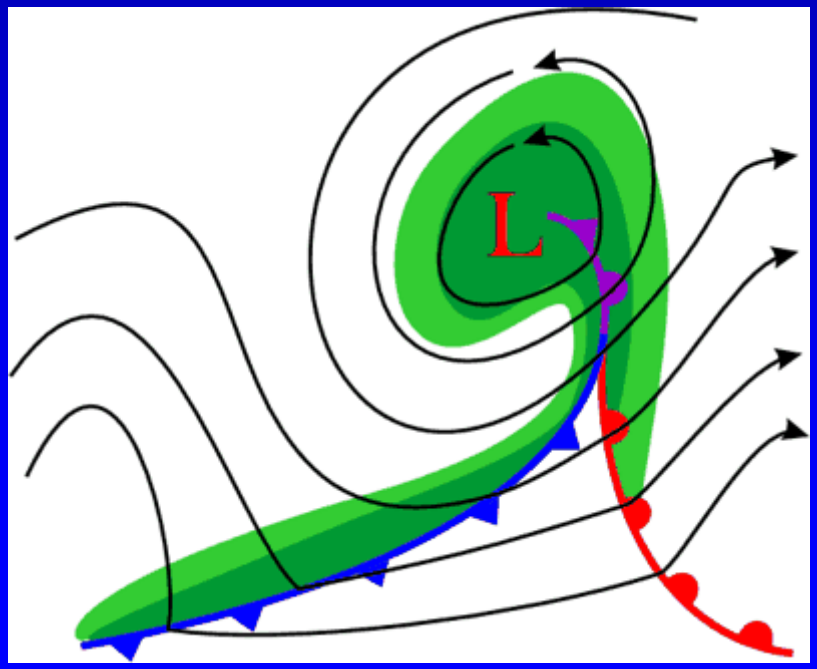
6) Otros riesgos climáticos

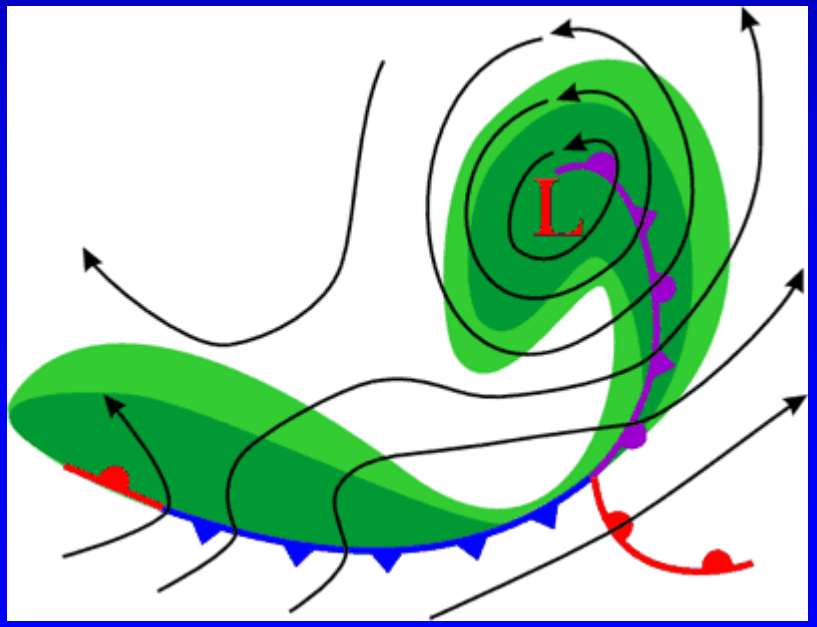
Inestabilidad Baroclina











Characteristics

Under ideal wind and temperature conditions, a coastal low-pressure system deepens rapidly. Because these storms form over water, which has a smoother surface than land, wind speeds pick up rapidly. Less weather data is available from the ocean areas, so detection may lag behind storm development. Extratropical cyclones tend to deepen quickly near the shore, which shortens the time available for communities to respond.

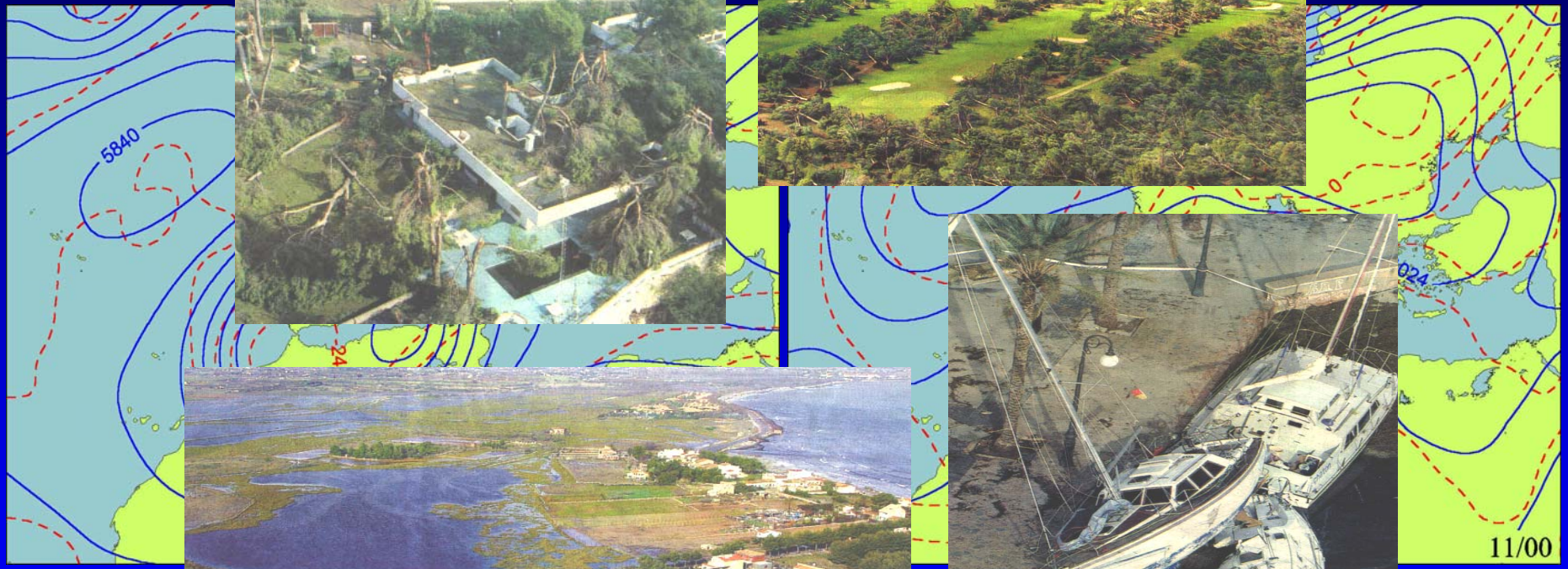
Hazards from extratropical cyclones include:

- Swells, storm surges, and huge waves that pound the coastline
- Very high winds generated by strong pressure gradients
- Coastal flooding
- Heavy rains, flooding, and flash flooding
- Heavy snow
- Mud slides
- Downbursts
- Tornadoes

Refer to the fact sheets on coastal floods, winter storms, and tornadoes for more information on these hazards.

An example: The November 2001 superstorm

Mid-Upper levels (H 500 / T 500)



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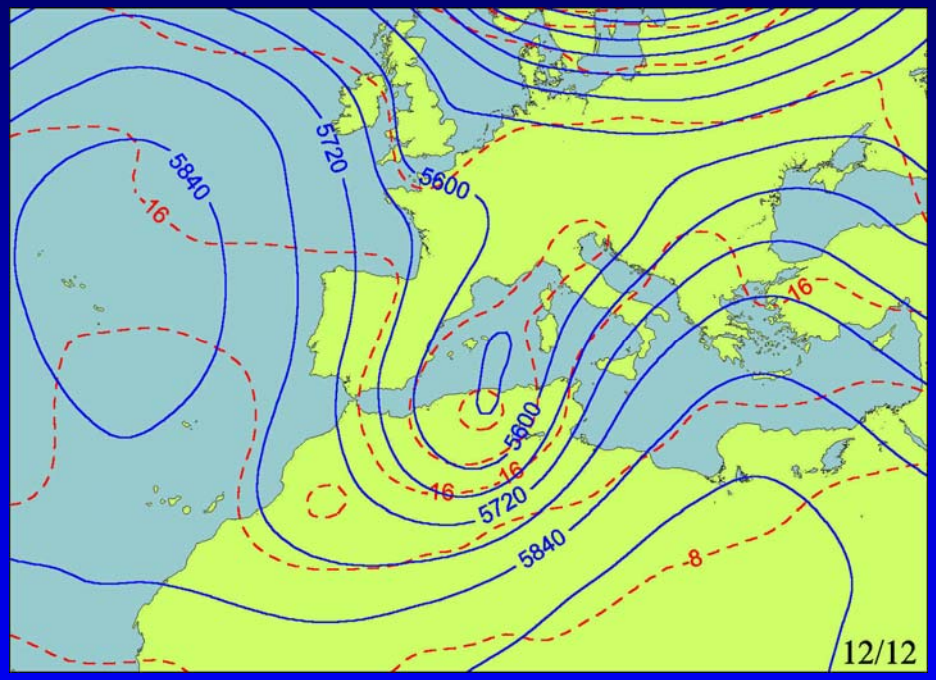
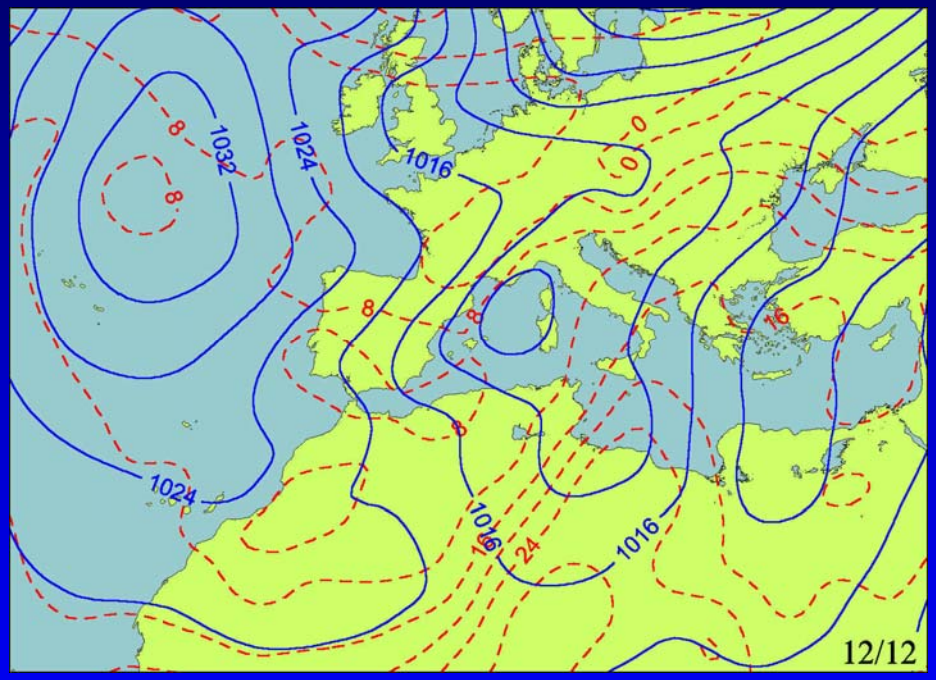


Low levels (SLP / T 925)



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BALEARES 24HORAS
Opinión
Illes Balears

illes balears

Sábado, 1 de noviembre de 2003 Actualizado a las 00:46

SIN PRECEDENTES.

El mar inunda Es Molinar y arroja rocas de más de un kilo a las calles de Ciutadella

«Nunca había visto así la playa de Cala Galdana», reconoce el alcalde de Ferreries - Una 'lluvia' de plásticos procedentes del vertedero cayó sobre los habitantes de Formentera

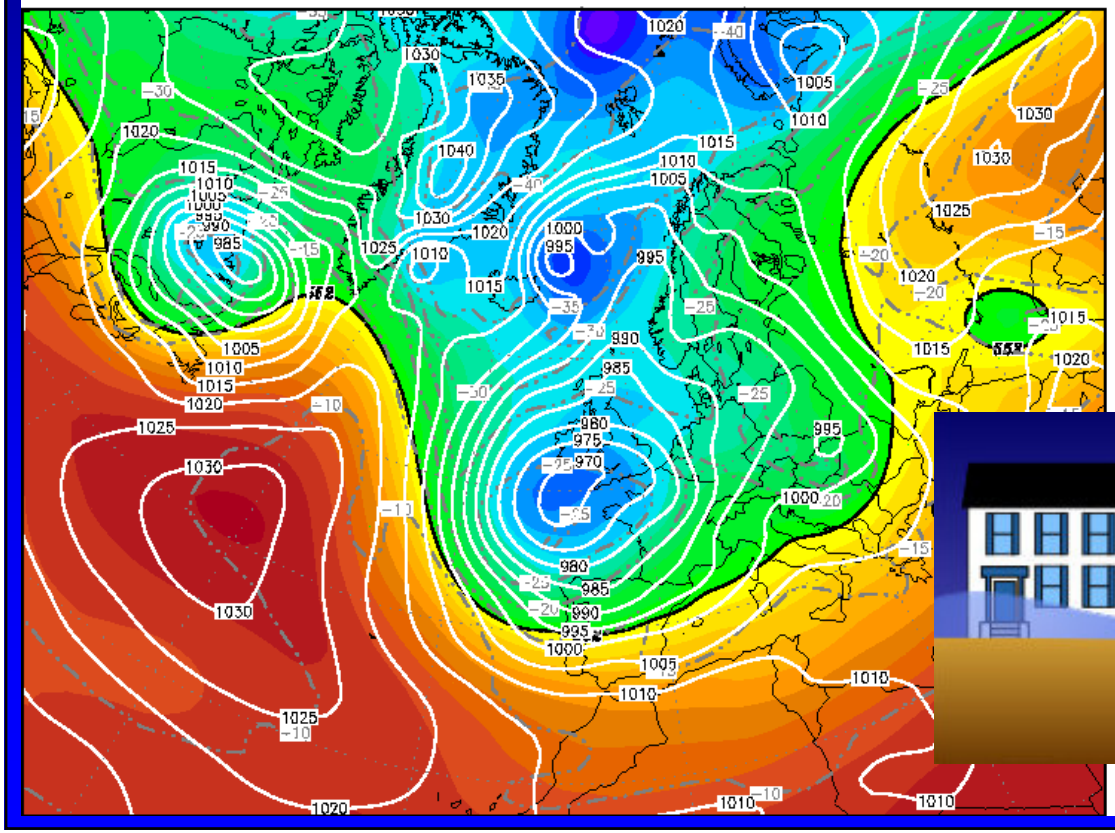
Olas de cinco metros y vientos de hasta 100 km/h obligan a cerrar todos los puertos de Baleares

Todos los puertos del archipiélago cerrados, tejas, cornisas y árboles caídos por doquier, barcos a la deriva tras soltarse de sus amarres... Estas fueron las principales causas del vendaval con vientos de 100 kilómetros por hora que todo el día de ayer azotó las Islas.

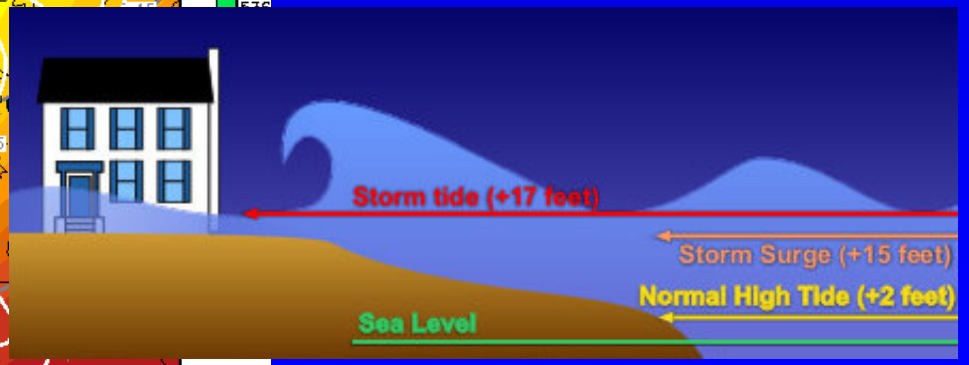
ra línea de Es Molinar
te barrio de Palma ya
cada vez que solpa
as y muchos de los
que deja entra el agua,

Init : Fri,31OCT2003 00Z Valid: Fri,31OCT2003 00Z

500 hPa Geopot.(gpdm), T (C) und Bodendr. (hPa)



Temporales marítimos



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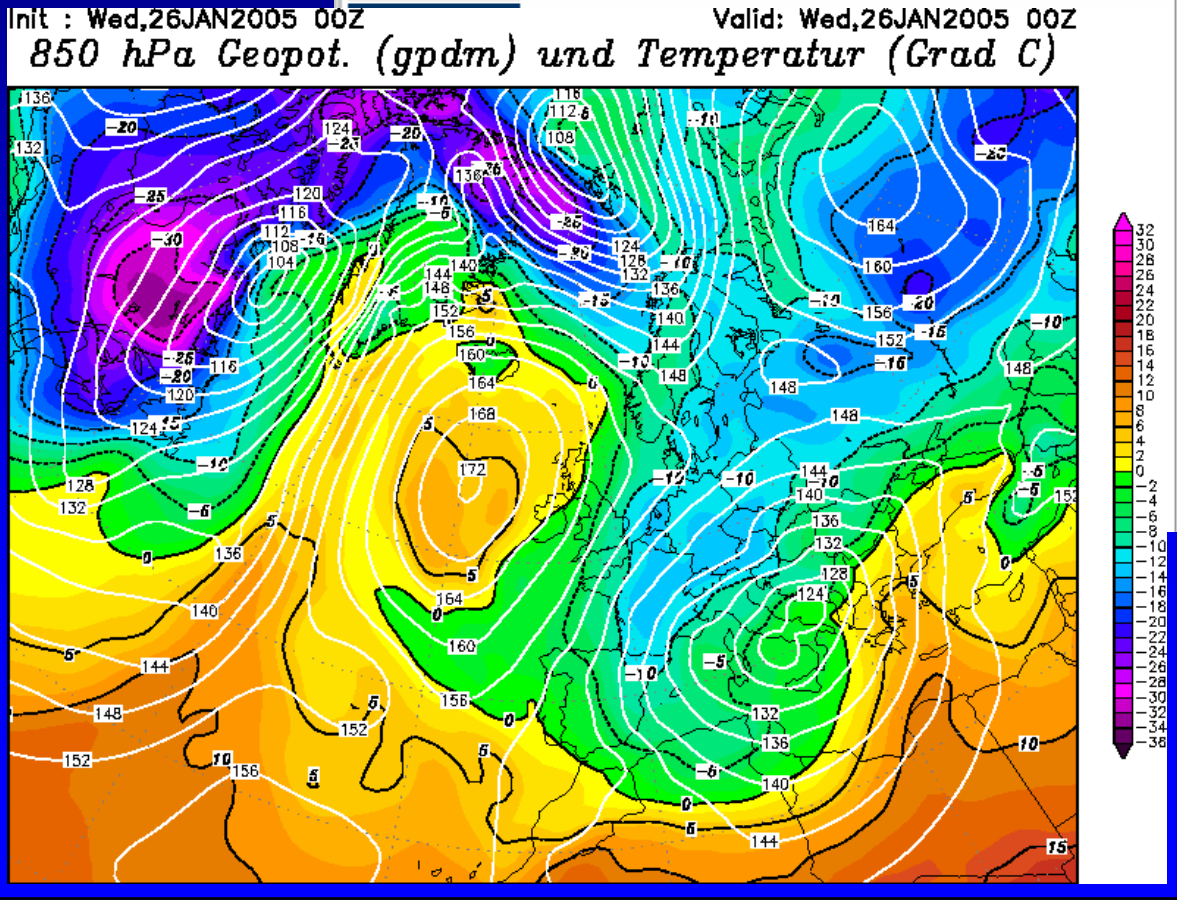
BALEARES 24HORAS

- Opinión
- Illes Balears
- Palma
- **Menorca**
- Part Forana
- Deporte
- Cultura
- **Ibiza y Formentera**

Miércoles, 26 de Enero de 2005 Actualizado a las 20:32

ULTIMA HORA / TEMPORAL

Baleares registra la tercera nevada más importante en los últimos 100 años



Una nevada histórica

La ola de frío que se ha instalado en la mayor parte de España está generando graves problemas en las comunicaciones. Hacia quince años que Baleares no recibía tanta cantidad de nieve. Los termómetros de Palma llegaban a registrar esta mañana hasta -3 grados. La nieve ha llegado a pie de playa./ PEP VICENS

BUSQUEDAS

Internet by ARIADNA

Buscar

otros buscadores

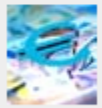
NO TE LO PIERDAS

MundOcio de Baleares

MUNDOCIO
La web del ocio en las Islas Baleares

Fora Vila Verd
L'aigua de Sa Costera

La Economía Balear
'Notable' para la política económica



NAUTICA
Llegamos a puerto

Tribuna de la Mediterrània
Hacia un nuevo

Olas de frío y nevadas

Winter Storms


NCAR / UCAR / NSF

Definition

Winter storms are extratropical storms that bring cold temperatures, precipitation, and possibly, high winds.

The following conditions can occur during winter storms:

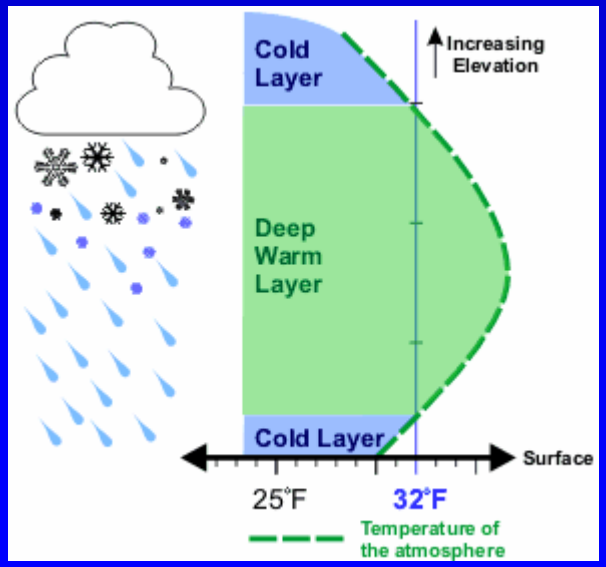
Snow is defined as a steady fall of snow for several hours or more.

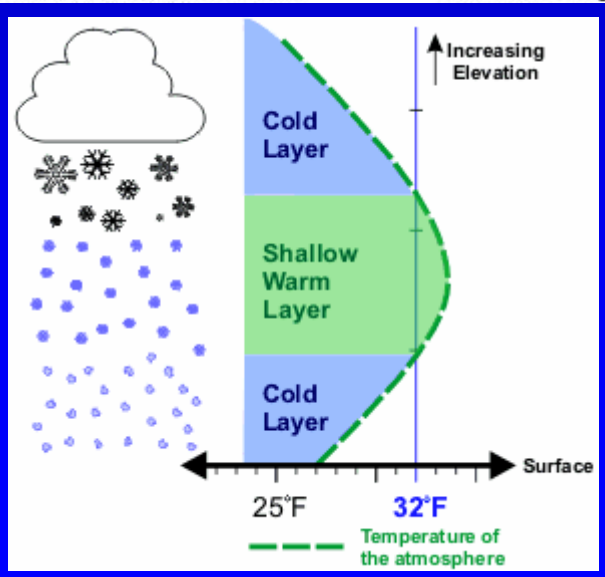
Heavy Snow generally means:

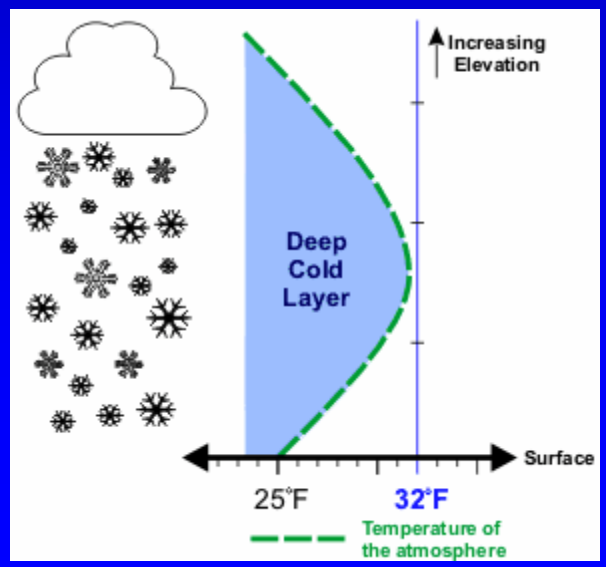
- Snowfall accumulating to 4 inches or more in depth in 12 hours or less
- Snowfall accumulating to 6 inches or more in depth in 24 hours or less

Snow Squalls are periods of moderate to heavy snowfall, intense, but of limited duration, accompanied by strong, gusty surface winds and possibly lightning.

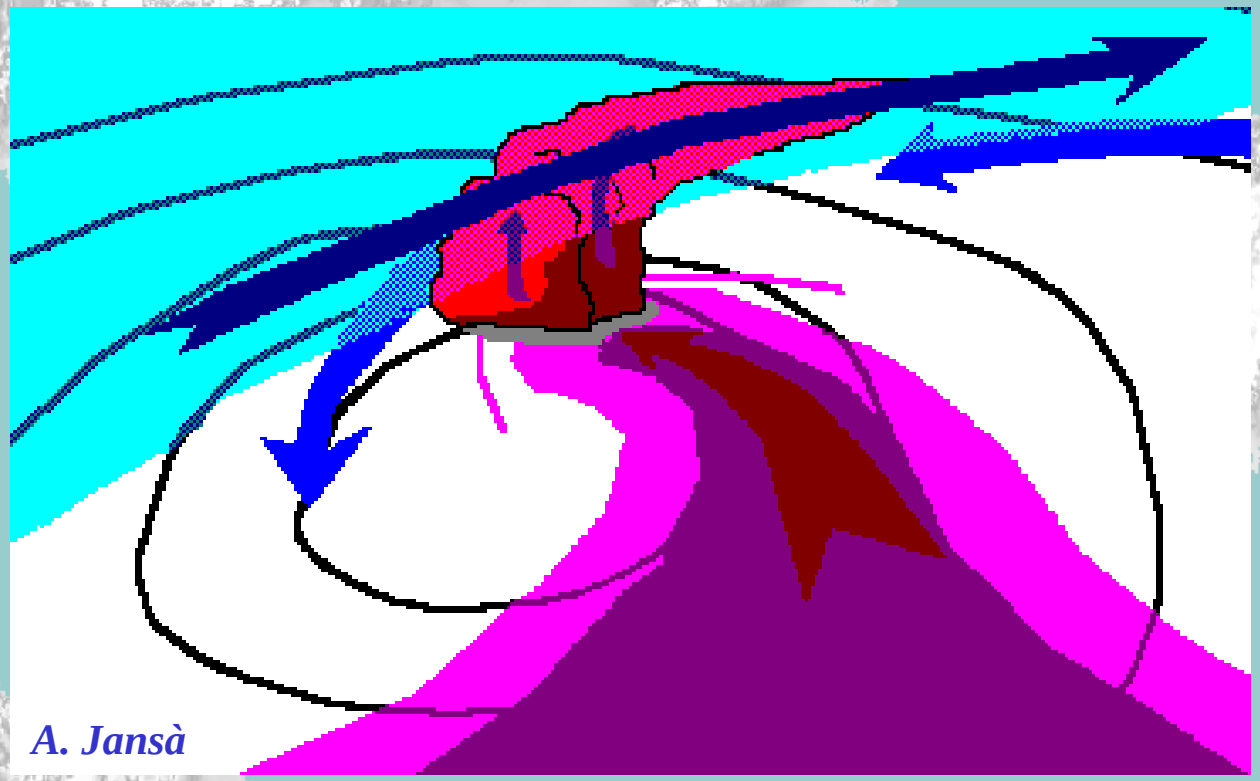

Cold Air
Warm Air
Cold Air
Rain
Freezing Rain
Sleet
Snow
Frozen precipitation melts into rain
Frozen precipitation melts in warm air…
…rain falls and freezes on cold surfaces as a sheet of ice
Frozen precipitation melts…
…refreezes into sleet before hitting ground
Snow falling into cold air never melts


Cold Layer
Increasing Elevation
Deep Warm Layer
Cold Layer
Surface
25°F
32°F
Temperature of the atmosphere


Increasing Elevation
Cold Layer
Shallow Warm Layer
Cold Layer
Surface
25°F
32°F
Temperature of the atmosphere


Increasing Elevation
Deep Cold Layer
Surface
25°F
32°F
Temperature of the atmosphere

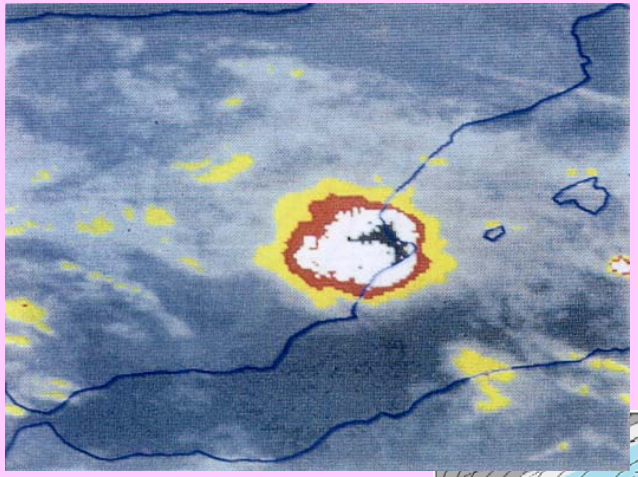
CICLÓN NO NECESARIAMENTE INTENSO …

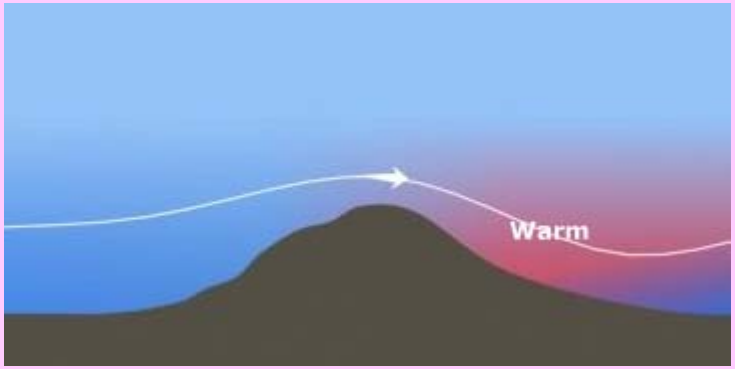


A. Jansà

GANDÍA (3-4 Nov. 1987)

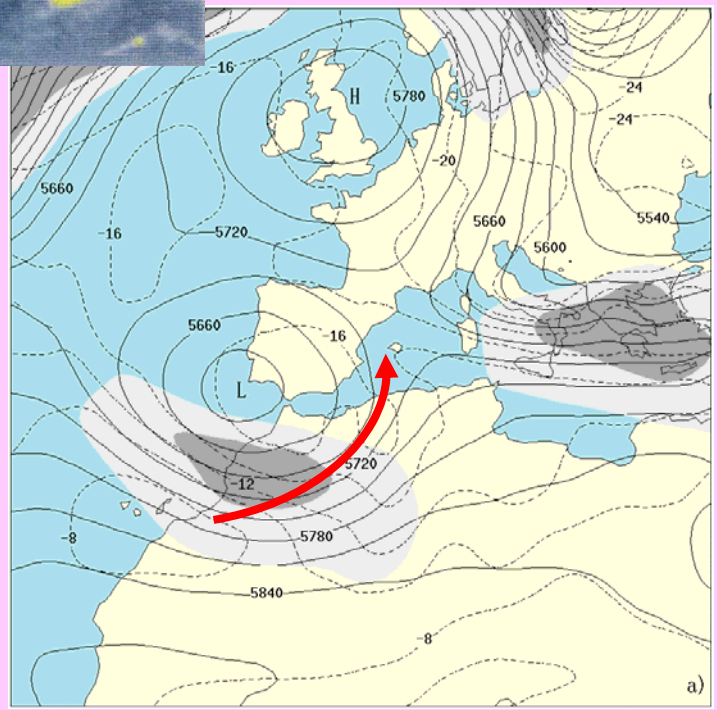
MCS (33 h)
Circular shape (~200 km diameter)
>800 mm / 36 h in **Gandía**



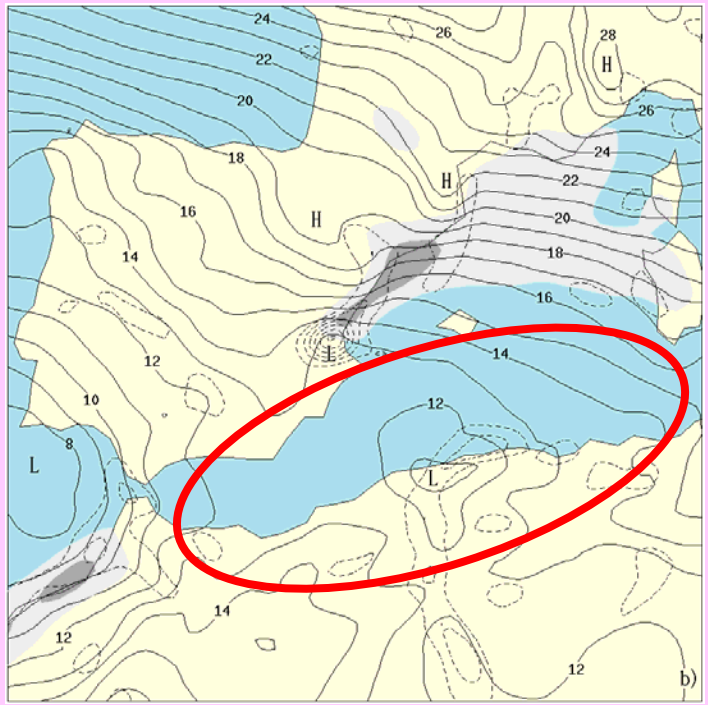


H ***L***

Bajas orográficas de sotavento



MID- UPPER LEVELS

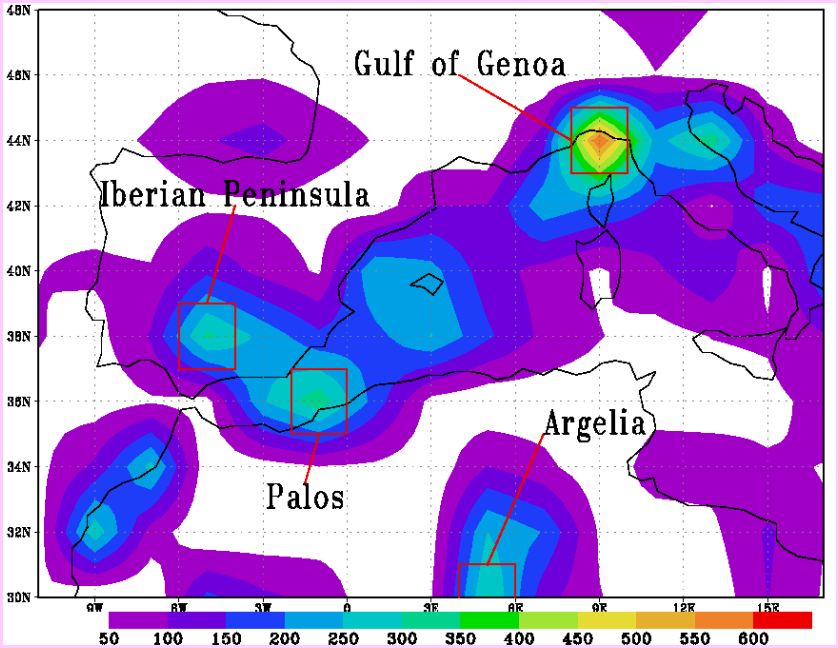


LOW LEVELS

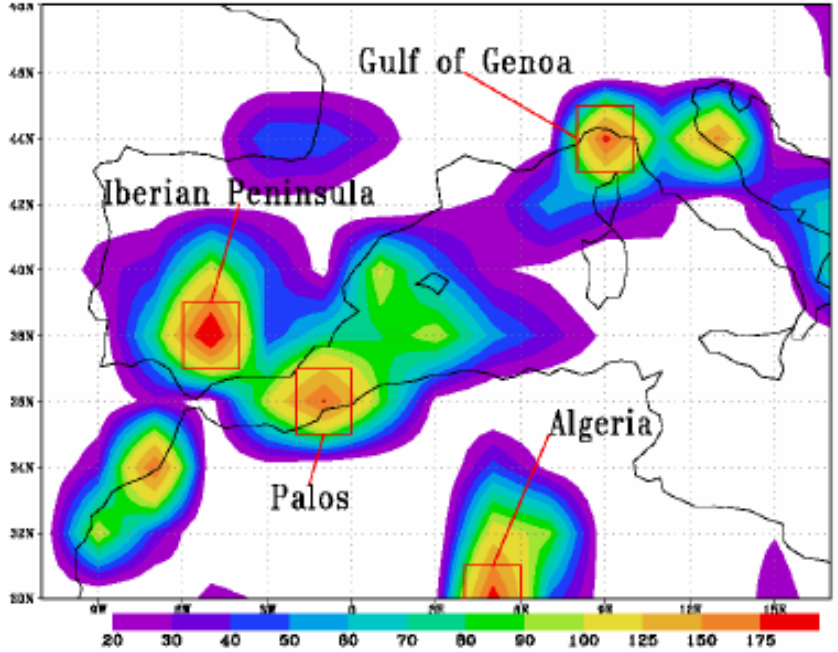
Source: INM – Balears

NUMBER OF CYCLONES
(June 1995 – May 2002)

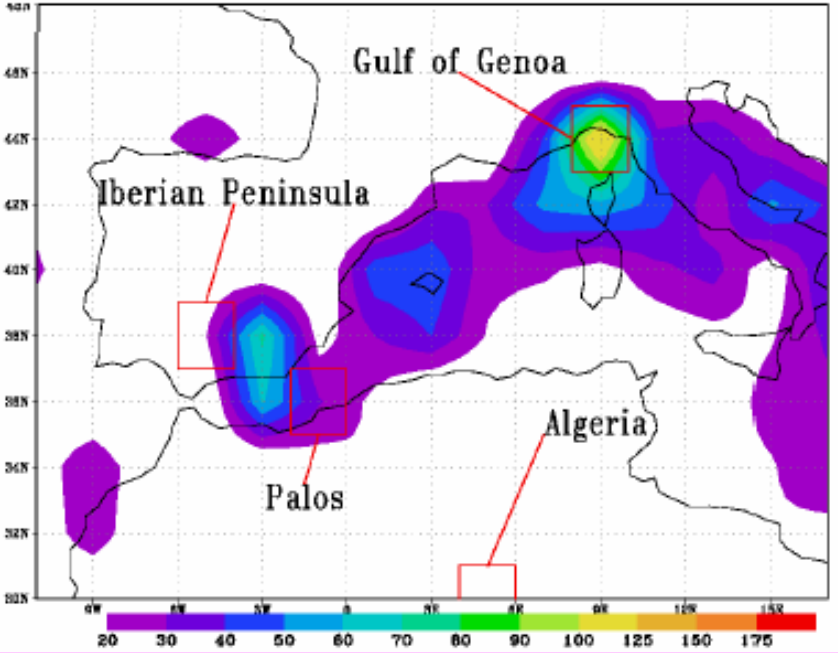
Total



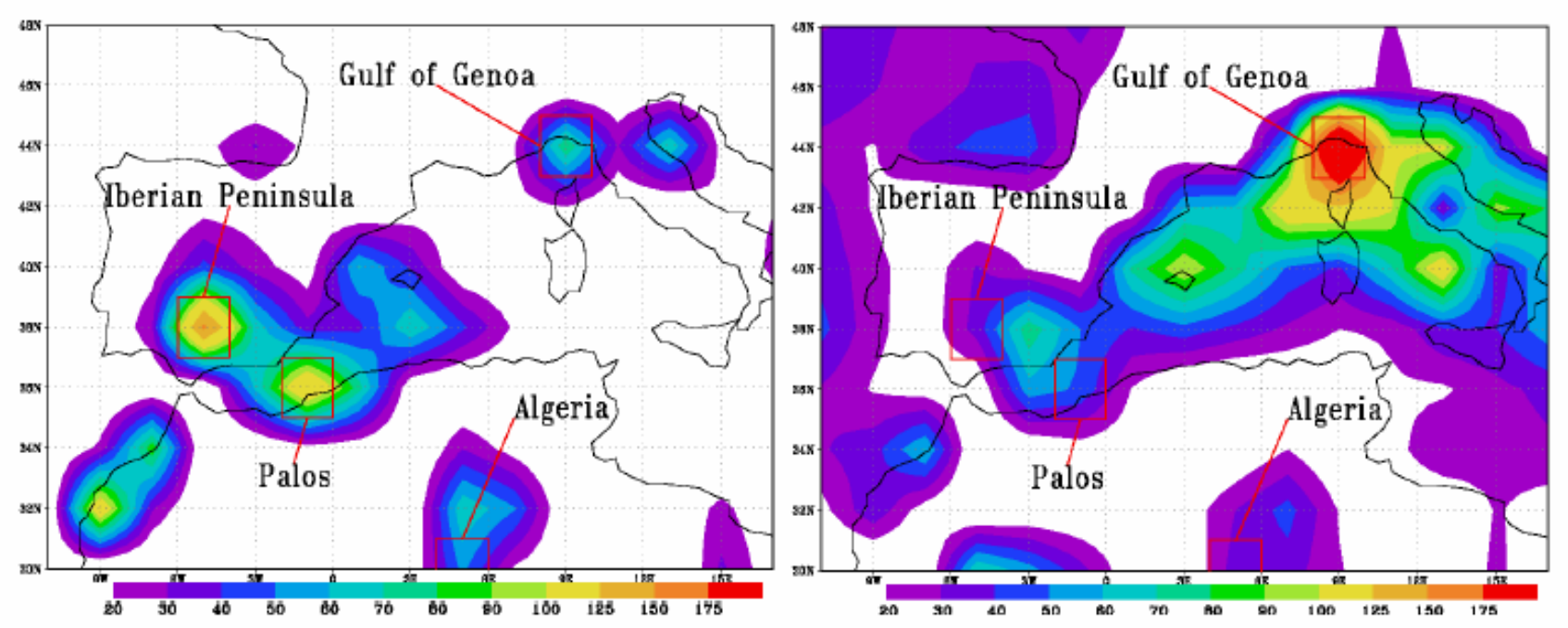
Summer



Winter

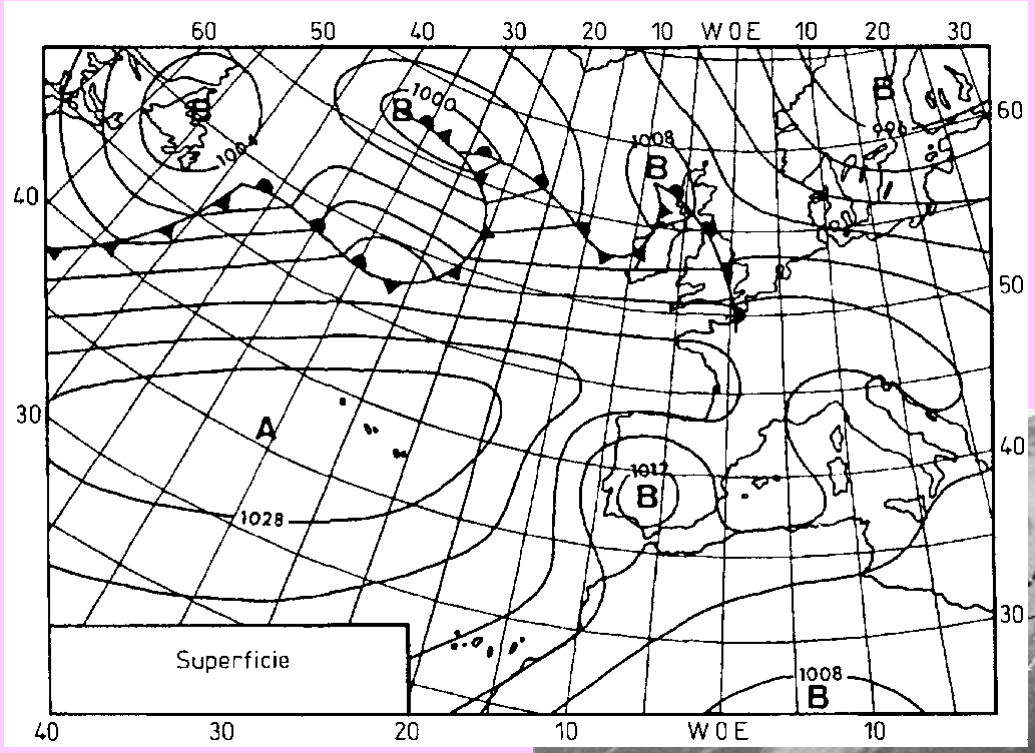


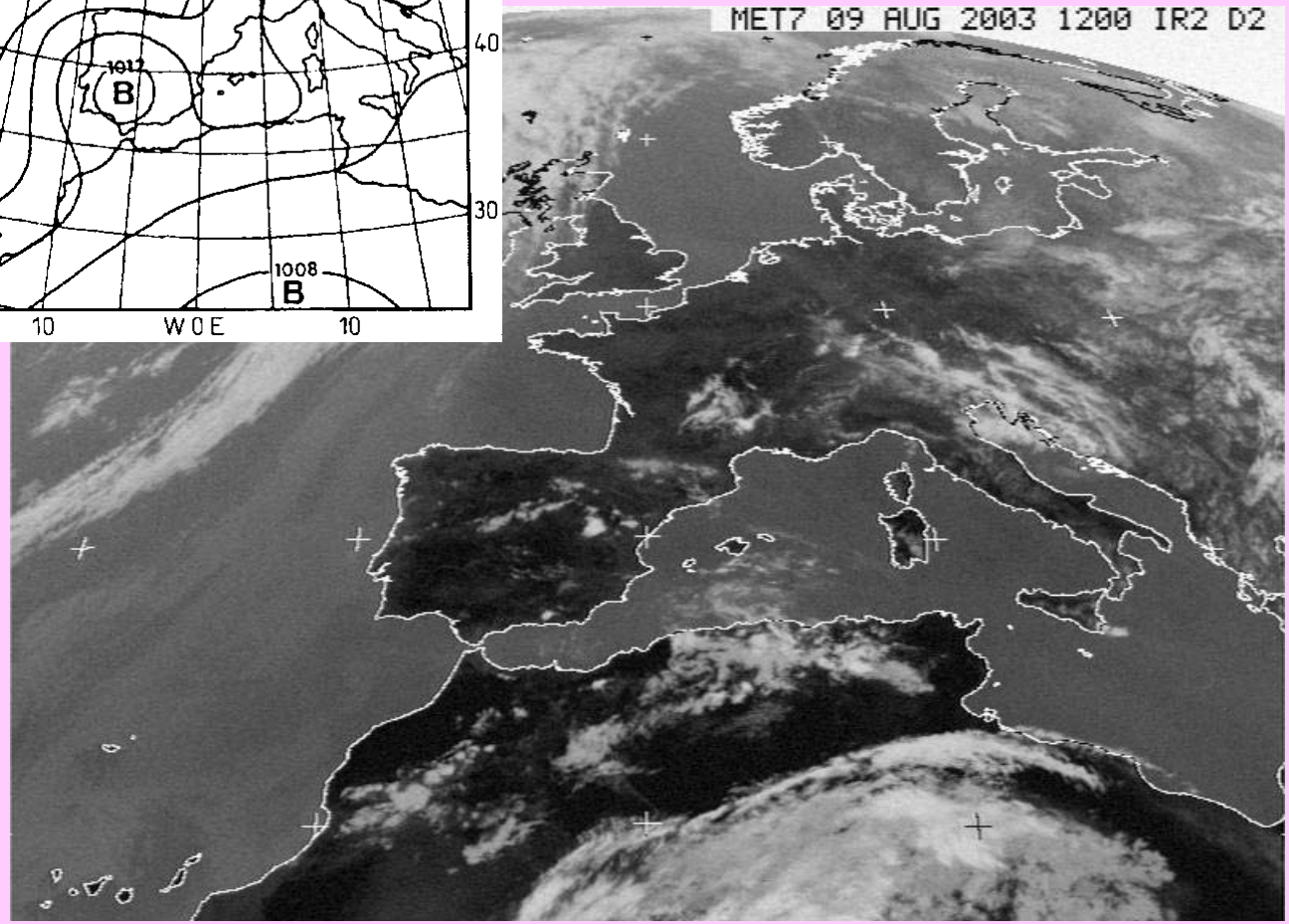
Shalow (1000-925 hPa) **Deep (1000-300 hPa)**



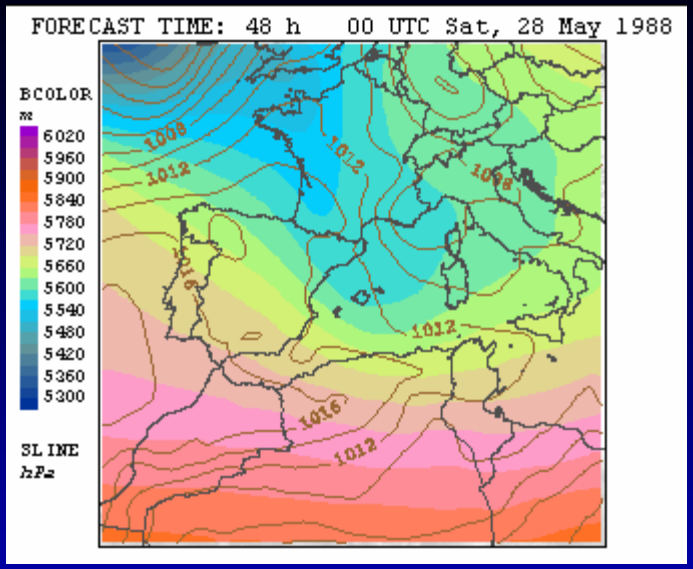
	Summer	*Autumn*	*Winter*	*Spring*	*G Genoa*	*Palos*	*Iberian*	*Algeria*
Shallow	**70.5**	**43.6**	**31.8**	**46.3**	**41.9**	**79.6**	**80.7**	**79.0**
Medium	**9.5**	**12.1**	**11.7**	**12.1**	**14.6**	**6.0**	**8.4**	**9.5**
Deep	**20.0**	**44.3**	**56.5**	**41.6**	**43.5**	**14.4**	**10.9**	**11.5**

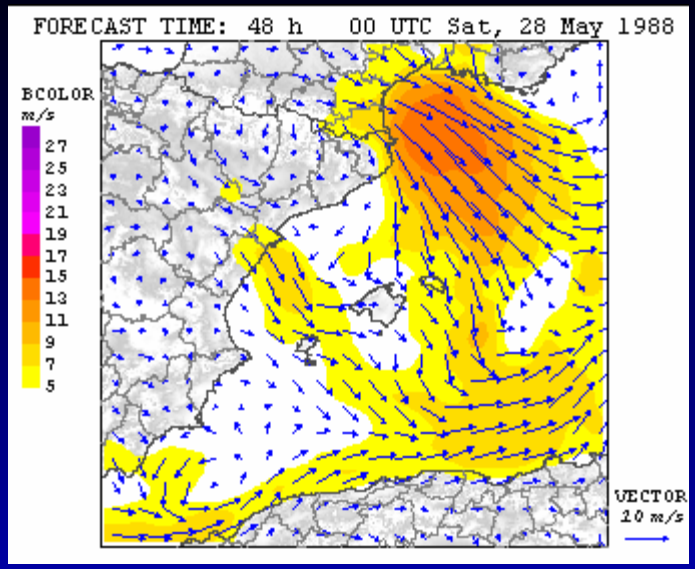
Bajas térmicas

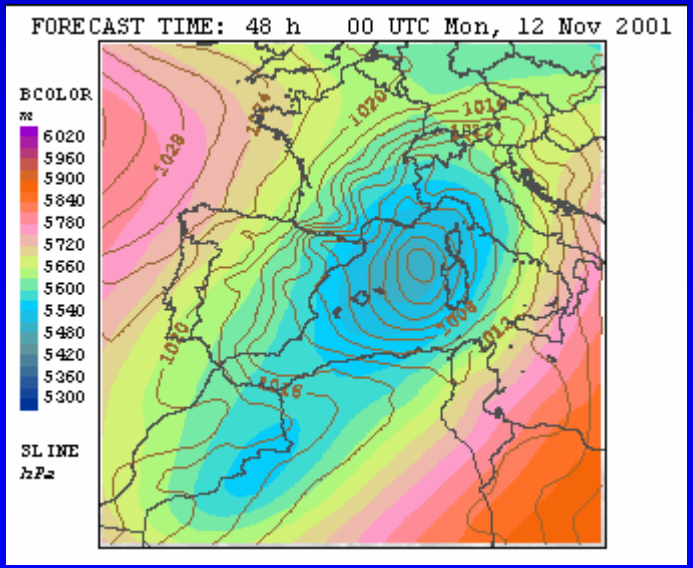


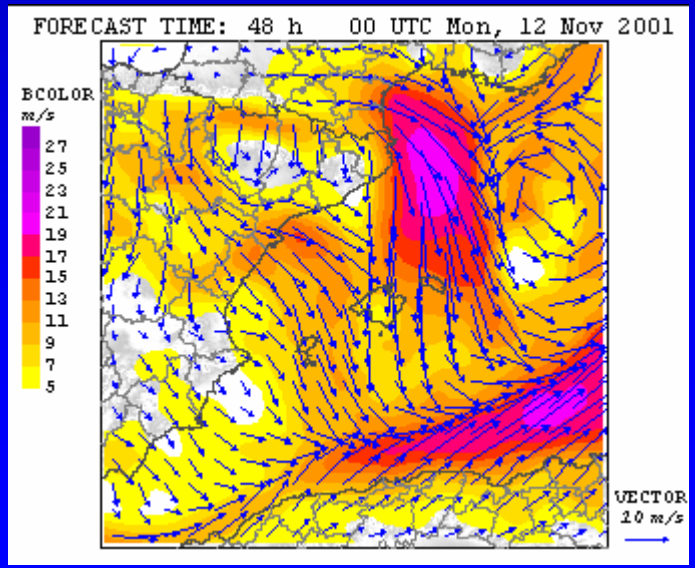


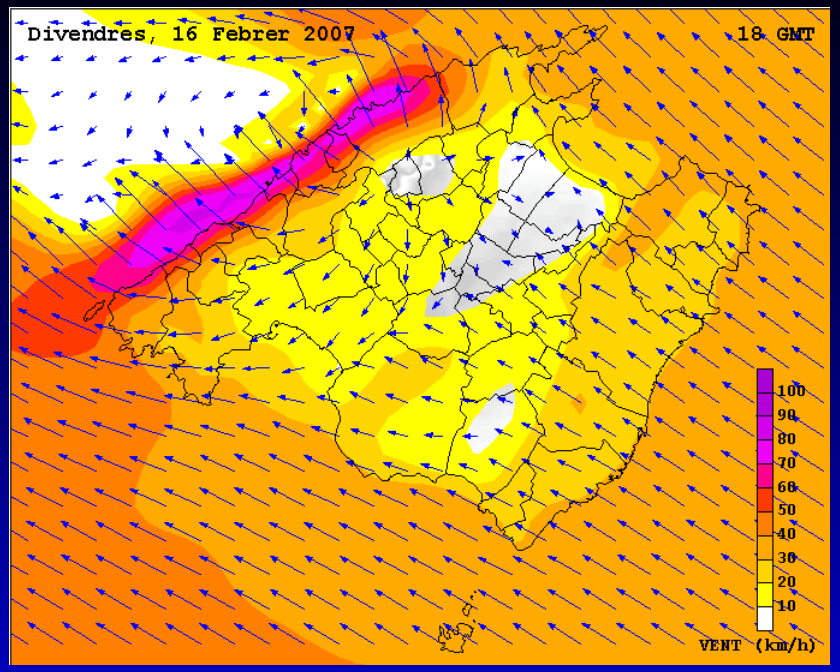
Vientos orográficos

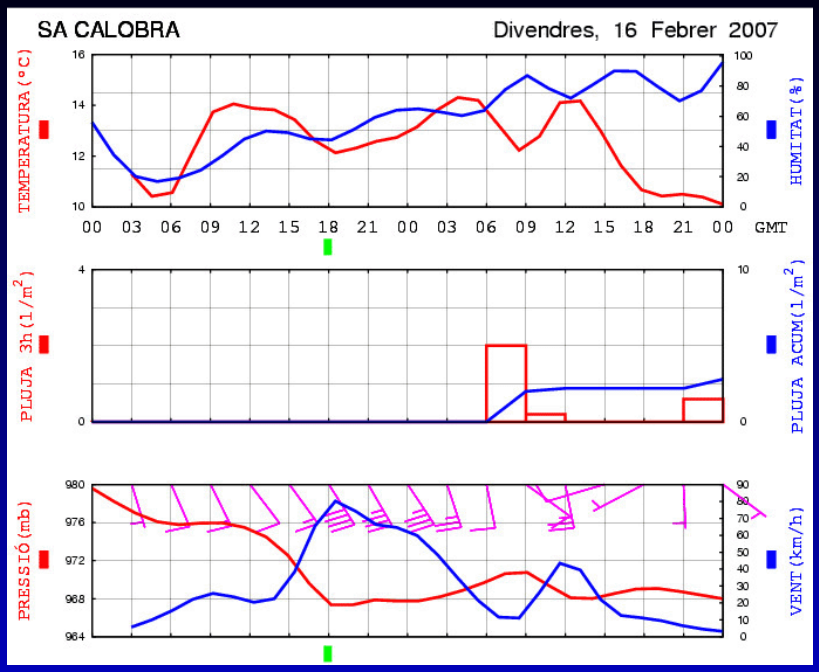


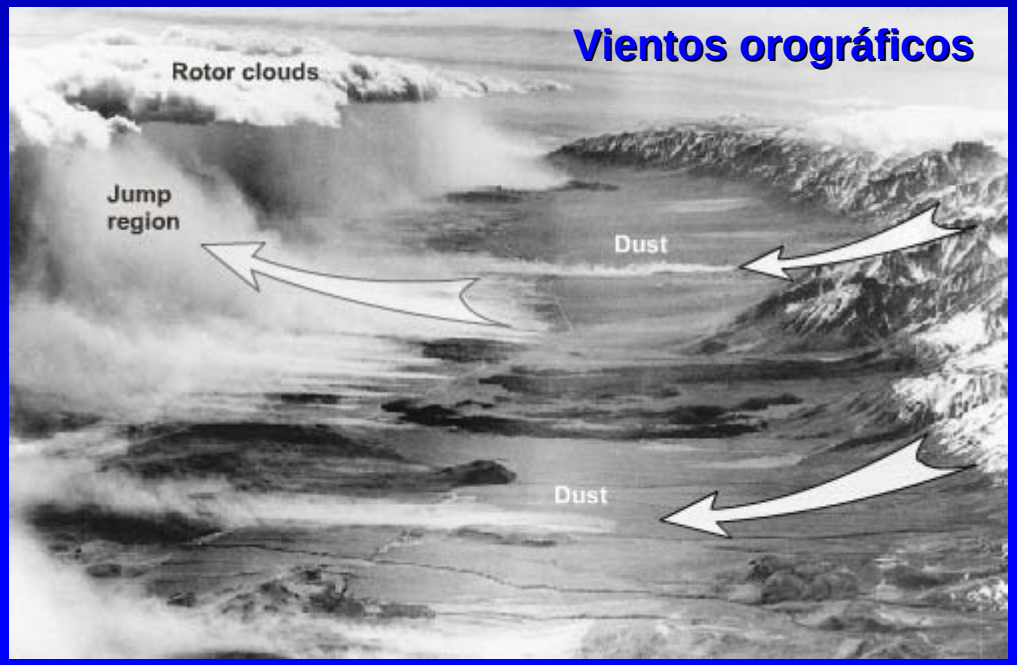


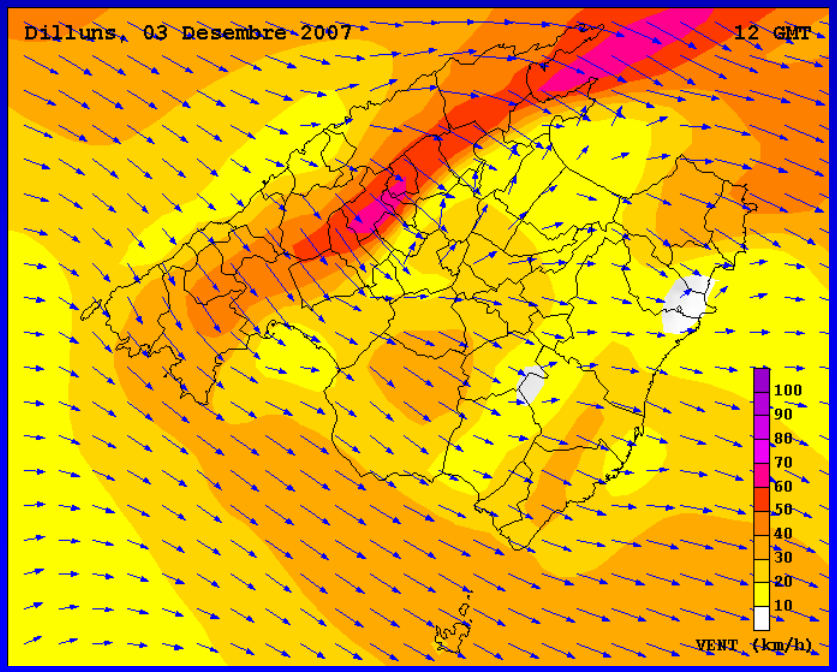





Divendres, 16 Febrer 2007
18 GMT
100
90
80
70
60
50
40
30
20
10
VENT (km/h)


SA CALOBRA
Divendres, 16 Febrer 2007
TEMPERATURA(°C)
HUMITAT(%)
00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 GMT
PLUJA 3h(l/m²)
PLUJA ACUM(l/m²)
PRESSIÓ(mb)
VENT(km/h)


Vientos orográficos
Rotor clouds
Jump region
Dust
Dust


Dilluns, 03 Desembre 2007
12 GMT
100
90
80
70
60
50
40
30
20
10
VENT (km/h)

ESTRUCTURA

1) Ideas previas

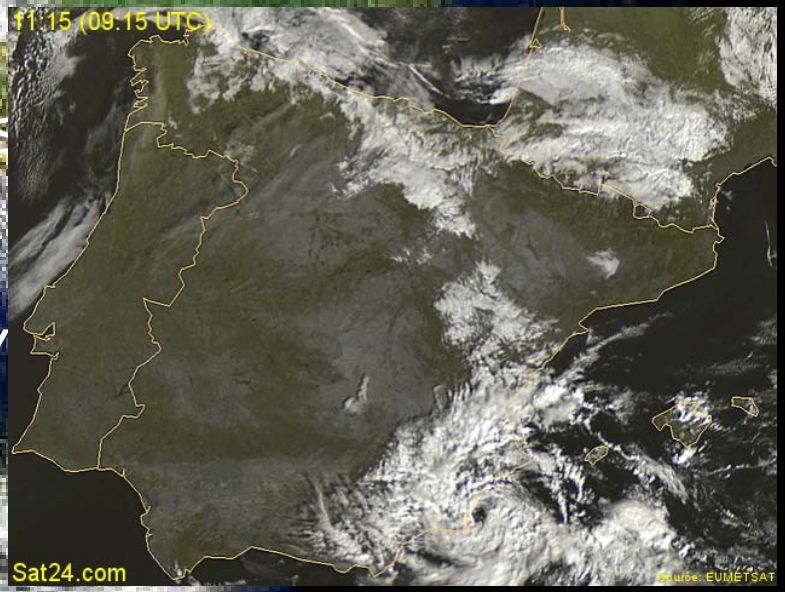
2) Ciclones extratropicales o de latitudes medias

3) Ciclones cuasitropicales o "medicanes"

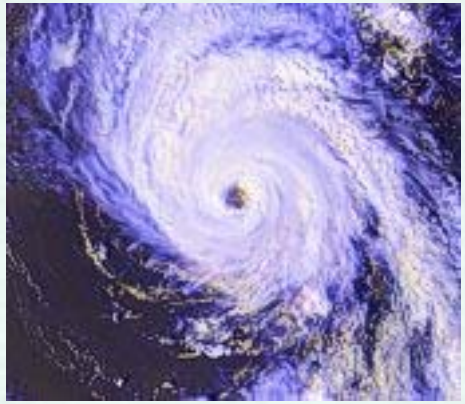
4) Relación estadística ciclones

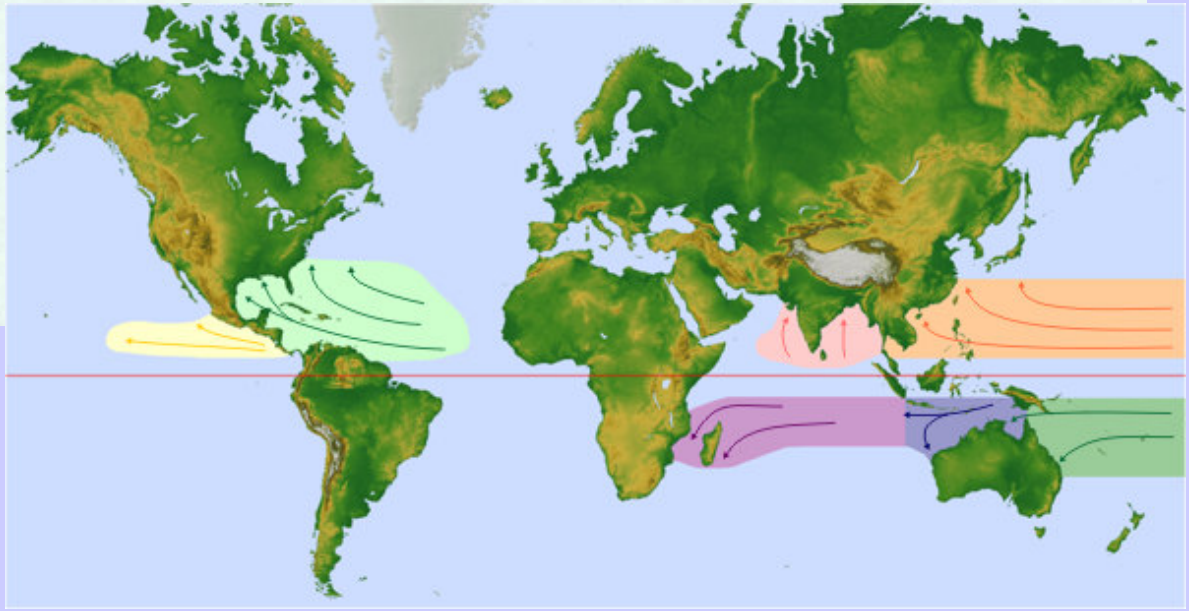
5) Tormentas y fenómenos sev

6) Otros riesgos climáticos



Tropical Cyclones





Definition

Tropical cyclones are coastal storms that form over the ocean, within the tropics. These storms cover a smaller area than extratropical coastal cyclones; the storm center is warmer than the surrounding air, and the strongest winds are about 10,000 feet above the ground.

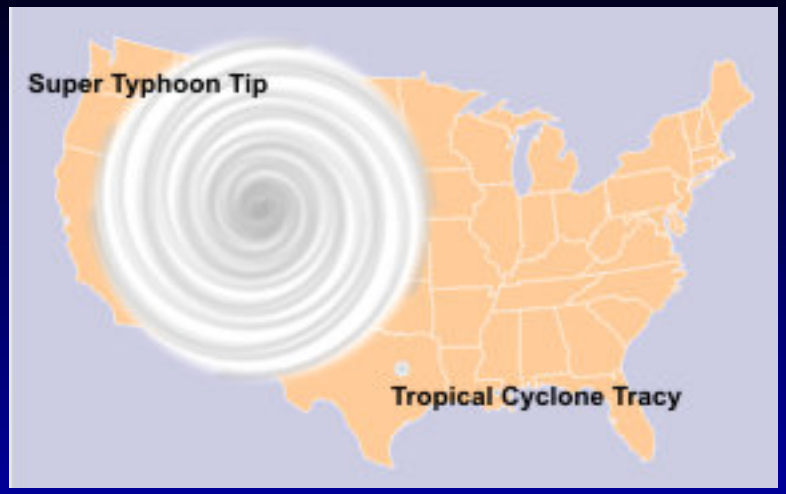
Tropical Cyclones:

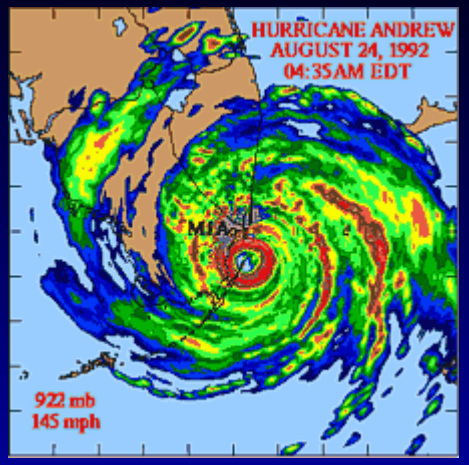
- Form over a tropical ocean
- Cover a smaller area (200-500 miles across)
- Have a storm center warmer than the surrounding air
- Have the strongest winds at about 10,000 feet

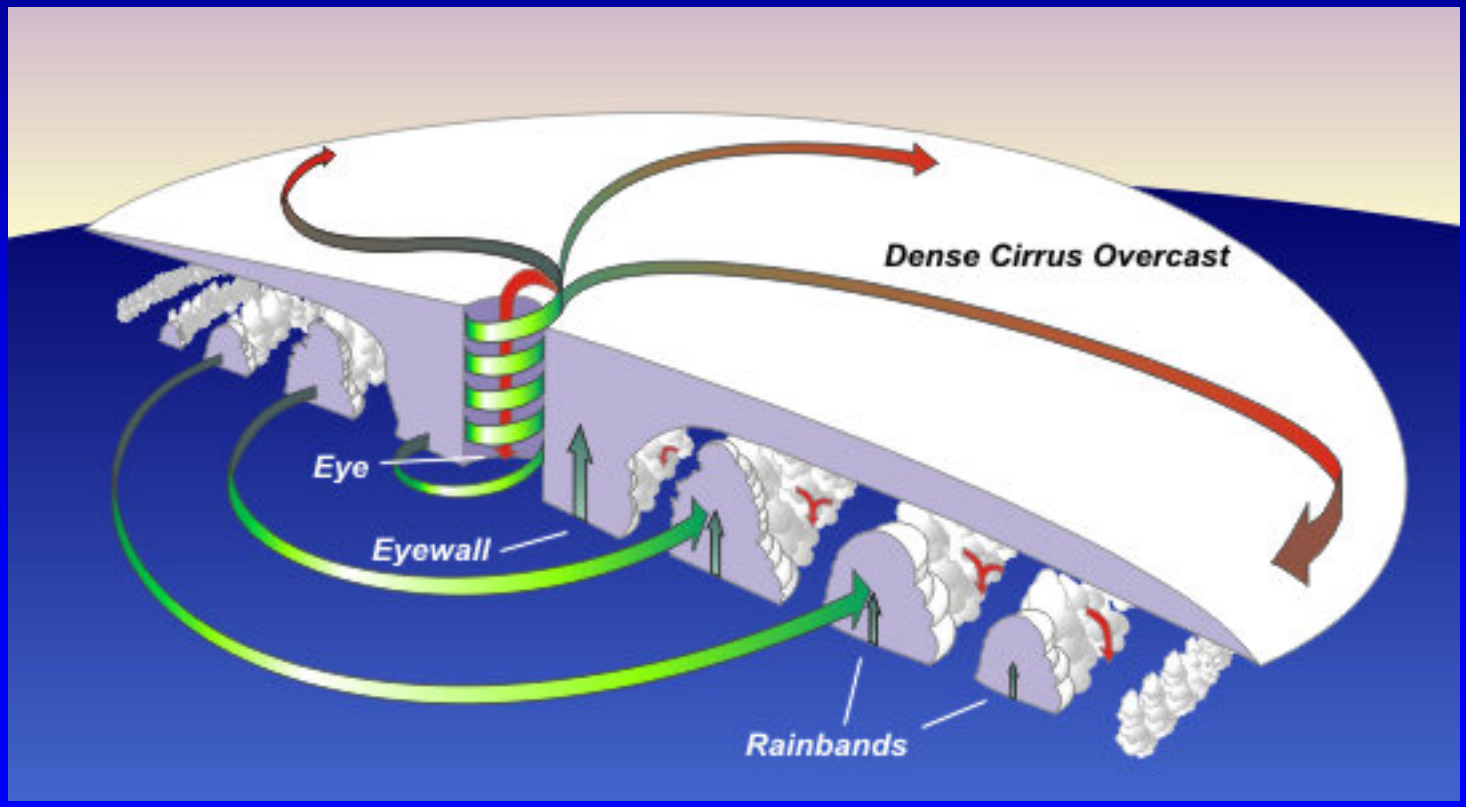
Tropical cyclones are categorized by wind speed as shown in the next table.

Category	Wind Speed
Tropical Depression	Maximum sustained winds near the surface less than 39 mph
Tropical Storm	Winds of 39-73 mph
Hurricane	Winds of 74 mph or more

In the Northern Hemisphere intense tropical cyclones are called hurricanes, a term that echoes colonial Spanish and Caribbean Indian words for evil spirits and big winds. (NOTE: A hurricane is called a typhoon if formed in the Western Pacific and a cyclone if formed in the Indian Ocean.) The storms are products of the tropical ocean and atmosphere, powered by the easterly trades and temperate westerlies and their fierce energy. Around the core, winds blow with lethal velocity, the ocean develops inundating surge, and as they move ashore, tornadoes may descend from the advancing thunderclouds.


Super Typhoon Tip
Tropical Cyclone Tracy


HURRICANE ANDREW
AUGUST 24, 1992
04:35AM EDT
MIAMI
922 mb
145 mph

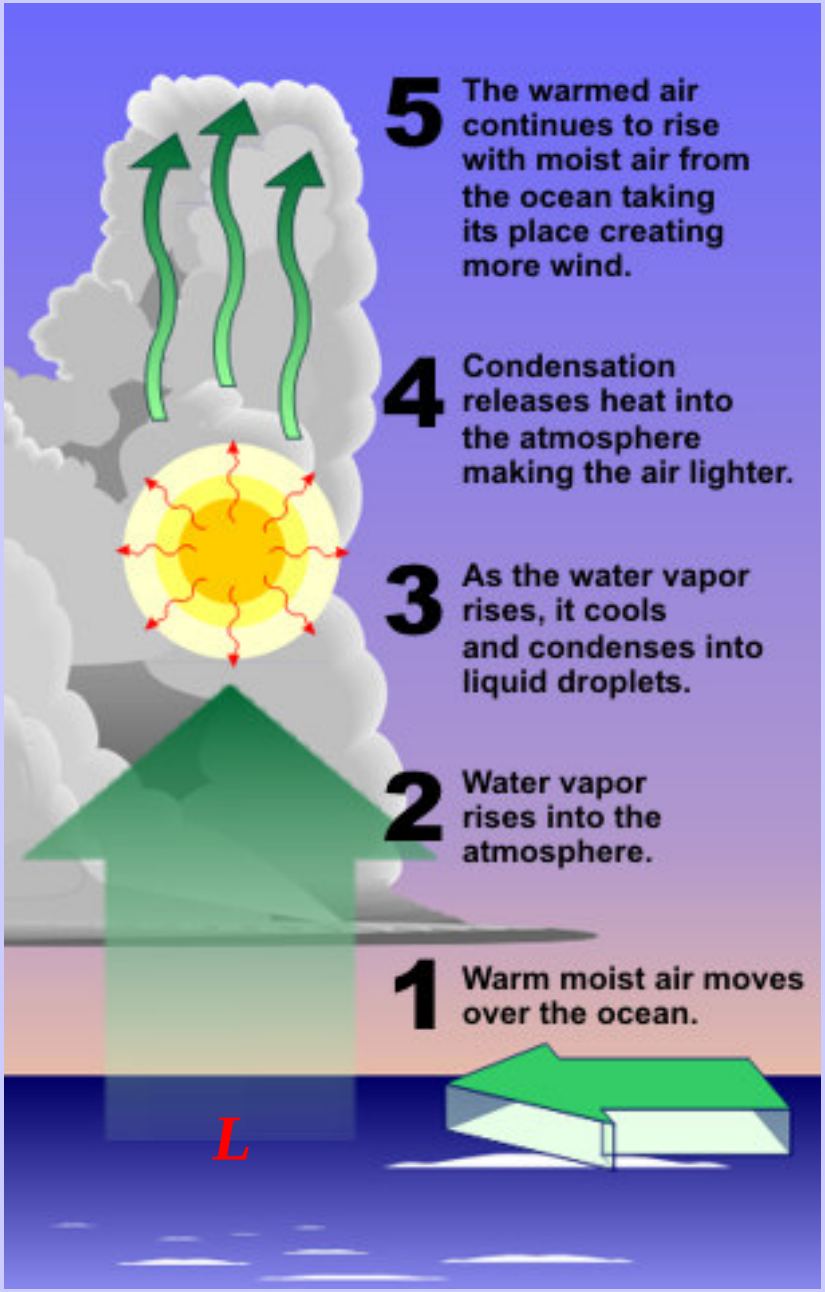

Dense Cirrus Overcast
Eye
Eyewall
Rainbands

The letters Q, U, X, Y, and Z are not included because of the scarcity of names beginning with those letters. If over 21 named tropical cyclones occur in a year, the Greek alphabet will be used following the "W" name. In addition, after major land-falling storms having major economic impact, the names are retired.

2006	2007	2008	2009	2010	2011*
Alberto	Andrea	Arthur	Ana	Alex	Arlene
Beryl	Barry	Bertha	Bill	Bonnie	Bret
Chris	Chantal	Cristobal	Claudette	Colin	Cindy
Debby	Dean	Dolly	Danny	Danielle	Dennis
Ernesto	Erin	Edouard	Erika	Earl	Emily
Florence	Felix	Fay	Fred	Fiona	Franklin
Gordon	Gabrielle	Gustav	Grace	Gaston	Gert
Helene	Humberto	Hanna	Henri	Hermine	Harvey
Isaac	Iris	Isidore	Ida	Igor	Irene
Joyce	Jerry	Josephine	Joaquin	Julia	Jose
Kirk	Karen	Kyle	Kate	Karl	Katrina
Leslie	Lorenzo	Lili	Larry	Lisa	Lee
Michael	Michelle	Marco	Mindy	Matthew	Maria
Nadine	Noel	Nana	Nicholas	Nicole	Nate
Oscar	Olga	Omar	Odette	Otto	Ophelia
Patty	Pablo	Paloma	Peter	Paula	Philippe
Rafael	Rebekah	Rene	Rose	Richard	Rita
Sandy	Sebastien	Sally	Sam	Shary	Stan
Tony	Tanya	Teddy	Teresa	Tomas	Tammy
Valerie	Van	Vicky	Victor	Virginie	Vince
William	Wendy	Wilfred	Wanda	Walter	Wilma

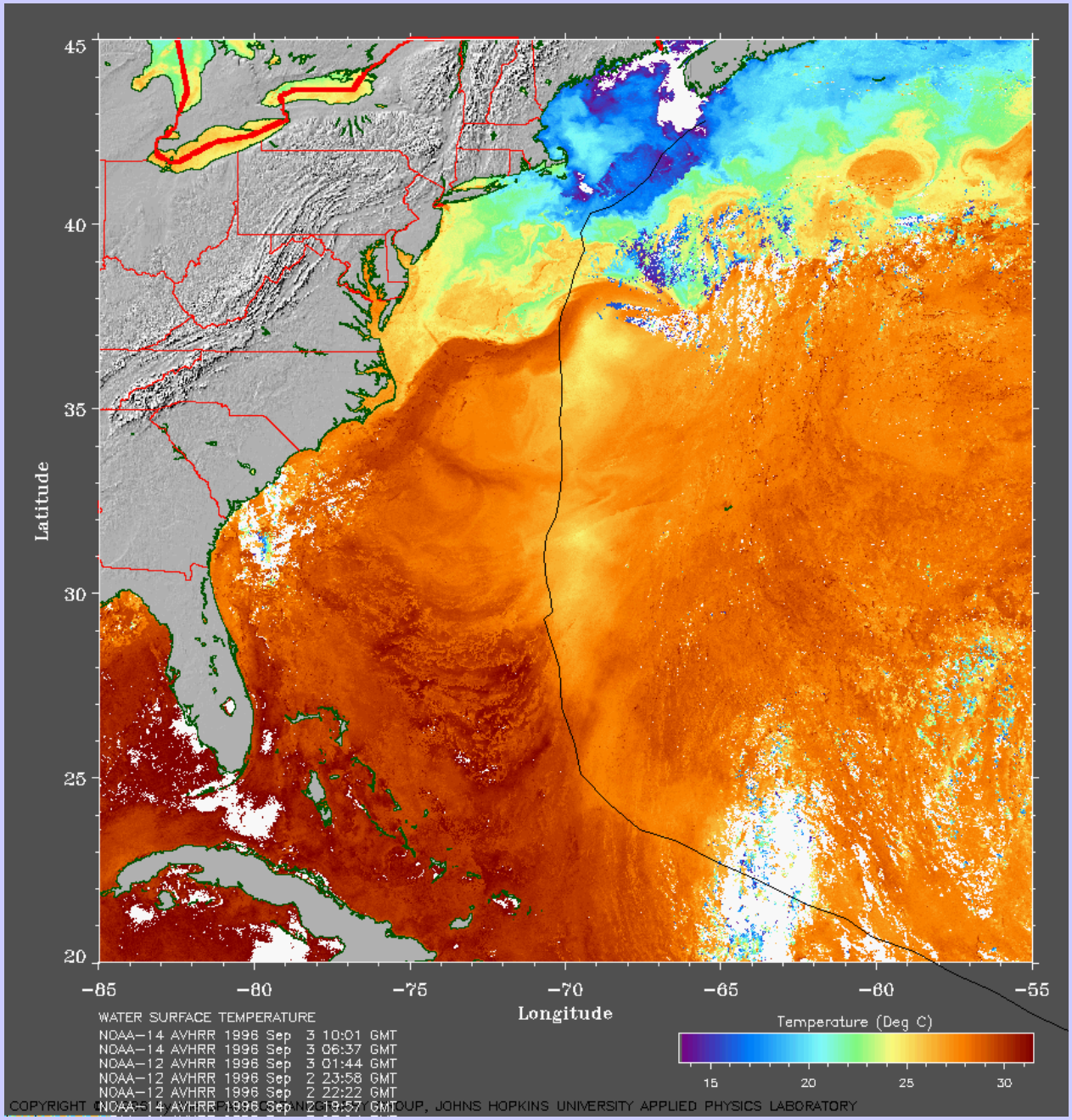
Greek Alphabet: Alpha, Beta, Gamma, Delta, Epsilon, Zeta, Eta, Theta, Iota, Kappa, Lambda, Mu, Nu, Xi, Omicron, Pi, Rho, Sigma, Tau, Upsilon, Phi, Chi, Psi, Omega

*This is also the names of storms for the 2005 hurricane season. Some of the names in this list may be retired when the Regional Association IV - Hurricane Committee, of the World Meteorological Organization, meets later this spring.

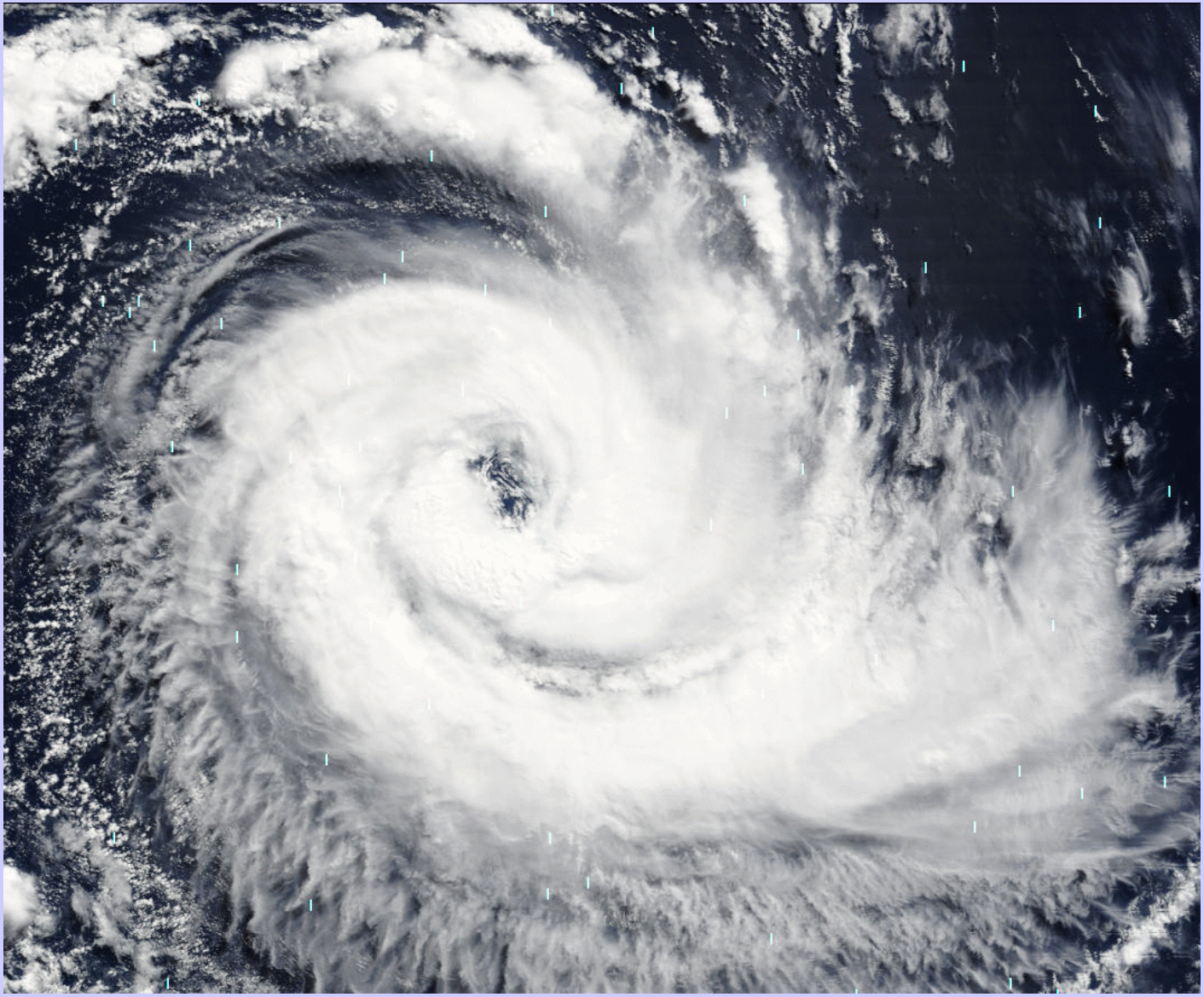


Escala Saffir-Simpson

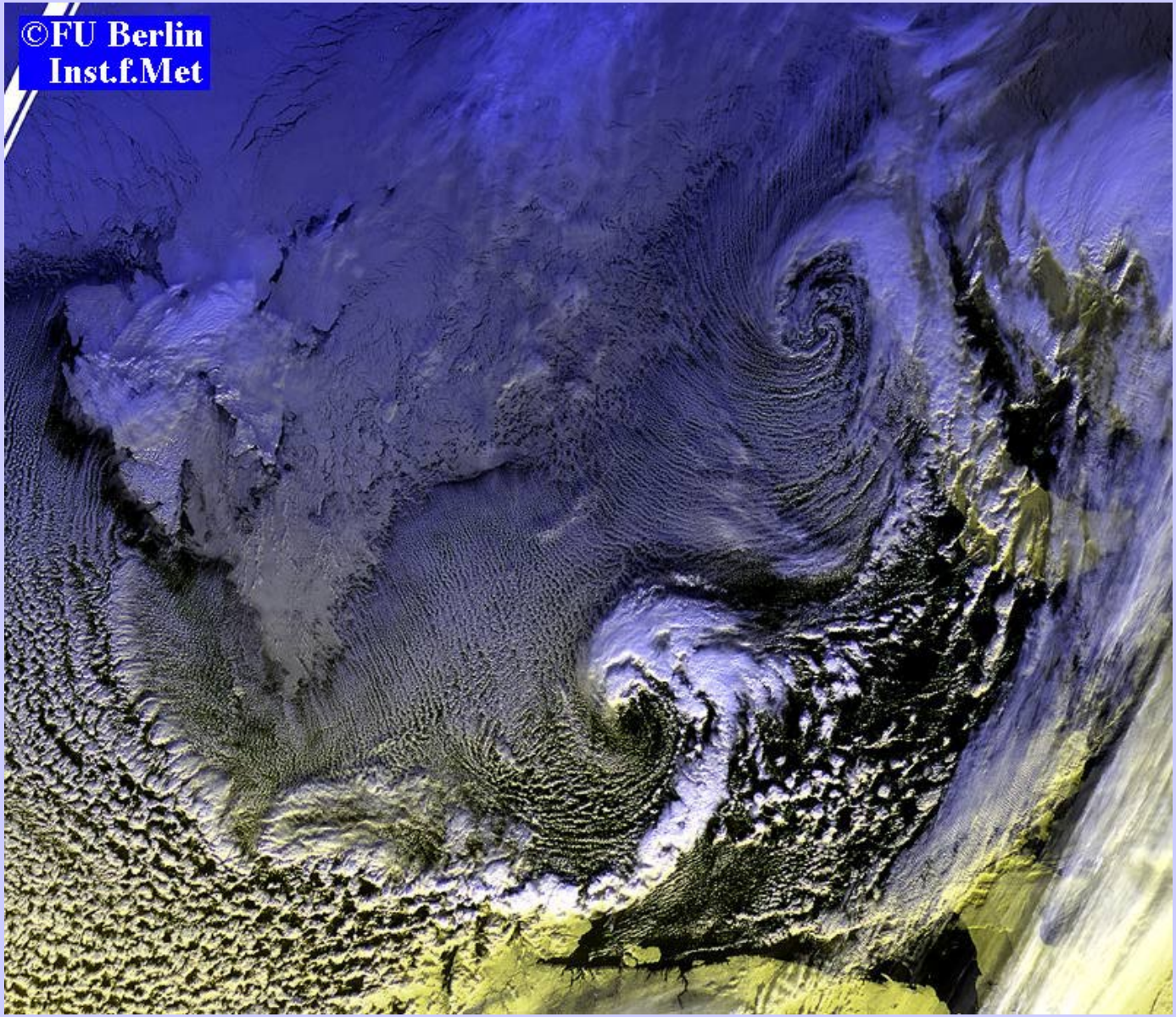
Cat.	Speed	Damage
1	**74-95 mph** 64-82 kts 119-153 km/hr	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs.
2	**96-110 mph** 83-95 kts 154-177 km/hr	Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers.
3	**111-130 mph** 96-113 kts 178-209 km/hr	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large tress blown down. Mobile homes and poorly constructed signs are destroyed.
4	**131-155 mph** 114-135 kts 210-249 km/hr	More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows.
5	Greater than **155 mph** 135 kts 249 km/hr	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage.


45
40
35
30
25
20
Latitude
−85
−80
−75
−70
−65
−60
−55
Longitude
WATER SURFACE TEMPERATURE
NOAA−14 AVHRR 1996 Sep 3 10:01 GMT
NOAA−14 AVHRR 1996 Sep 3 06:37 GMT
NOAA−12 AVHRR 1996 Sep 3 01:44 GMT
NOAA−12 AVHRR 1996 Sep 2 23:58 GMT
NOAA−12 AVHRR 1996 Sep 2 22:22 GMT
NOAA−14 AVHRR 1996 Sep 2 19:57 GMT
Temperature (Deg C)
15
20
25
30
COPYRIGHT
OUP, JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY

Huracán Catalina (Brasil, marzo 2004), formado a partir de una depresión fría en altura



Bajas Polares

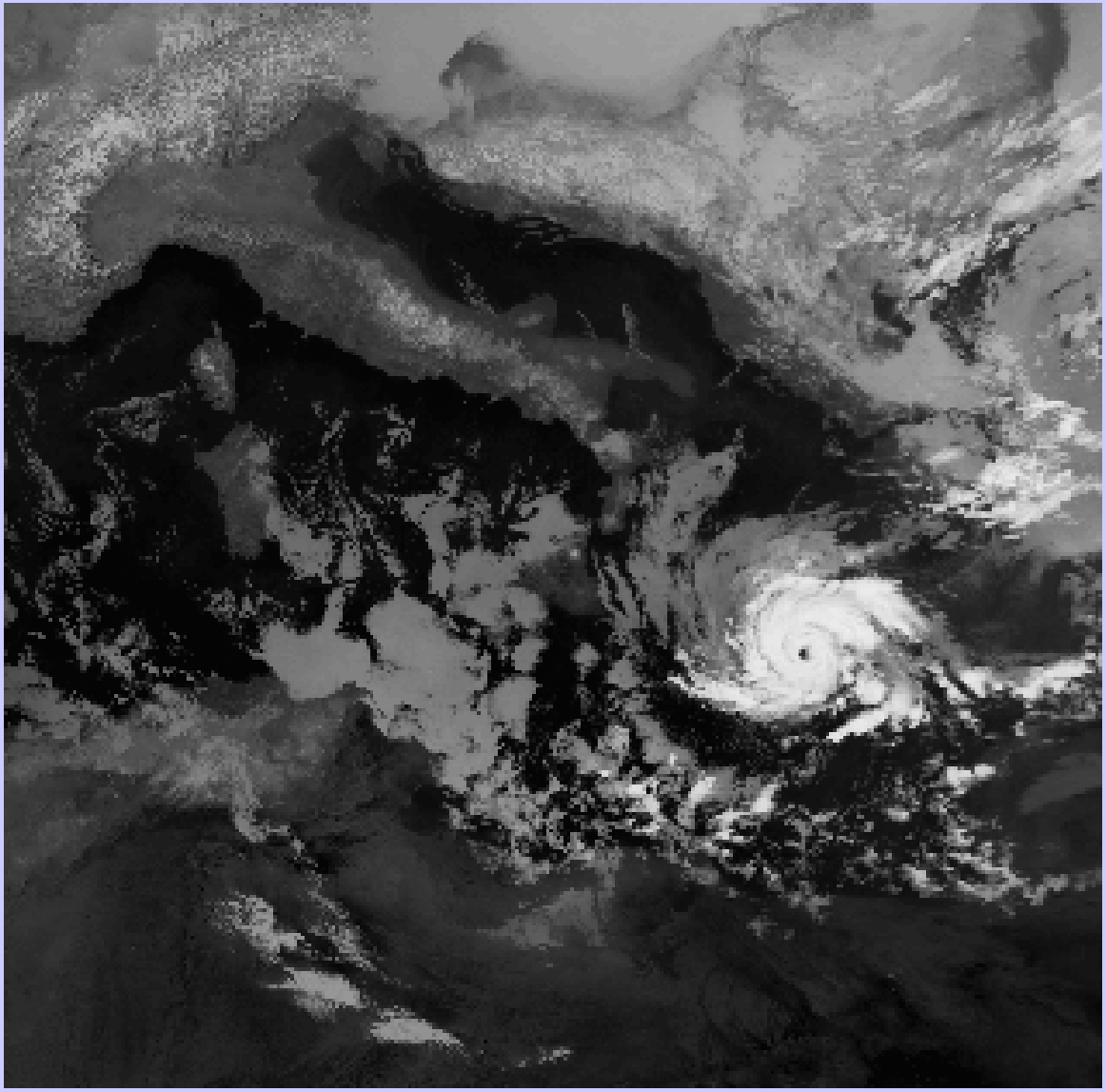



160W
60N
170W
160W
65N
170W

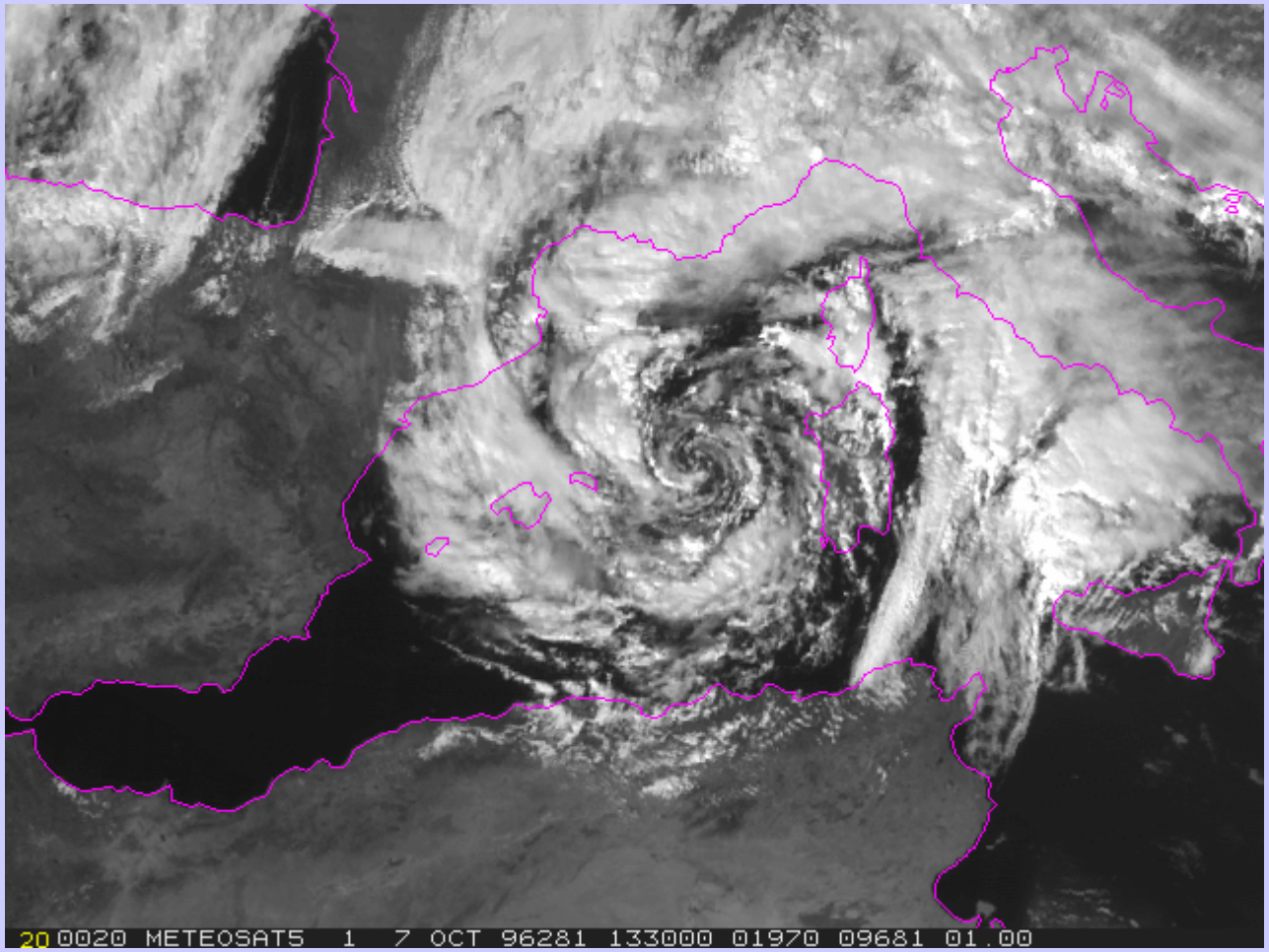
MEDICANES

- Varios por año en el conjunto de la cuenca mediterránea, rara vez alcanzando la categoría de huracán (120 km/h).
- Típicamente, se forman bajo el efecto de una depresión fría y aislada en los niveles medio-altos de la troposfera.
- Se sustentan en el elevado desequilibrio termodinámico aire-mar propiciado por la perturbación primaria. Son más frecuentes en otoño.

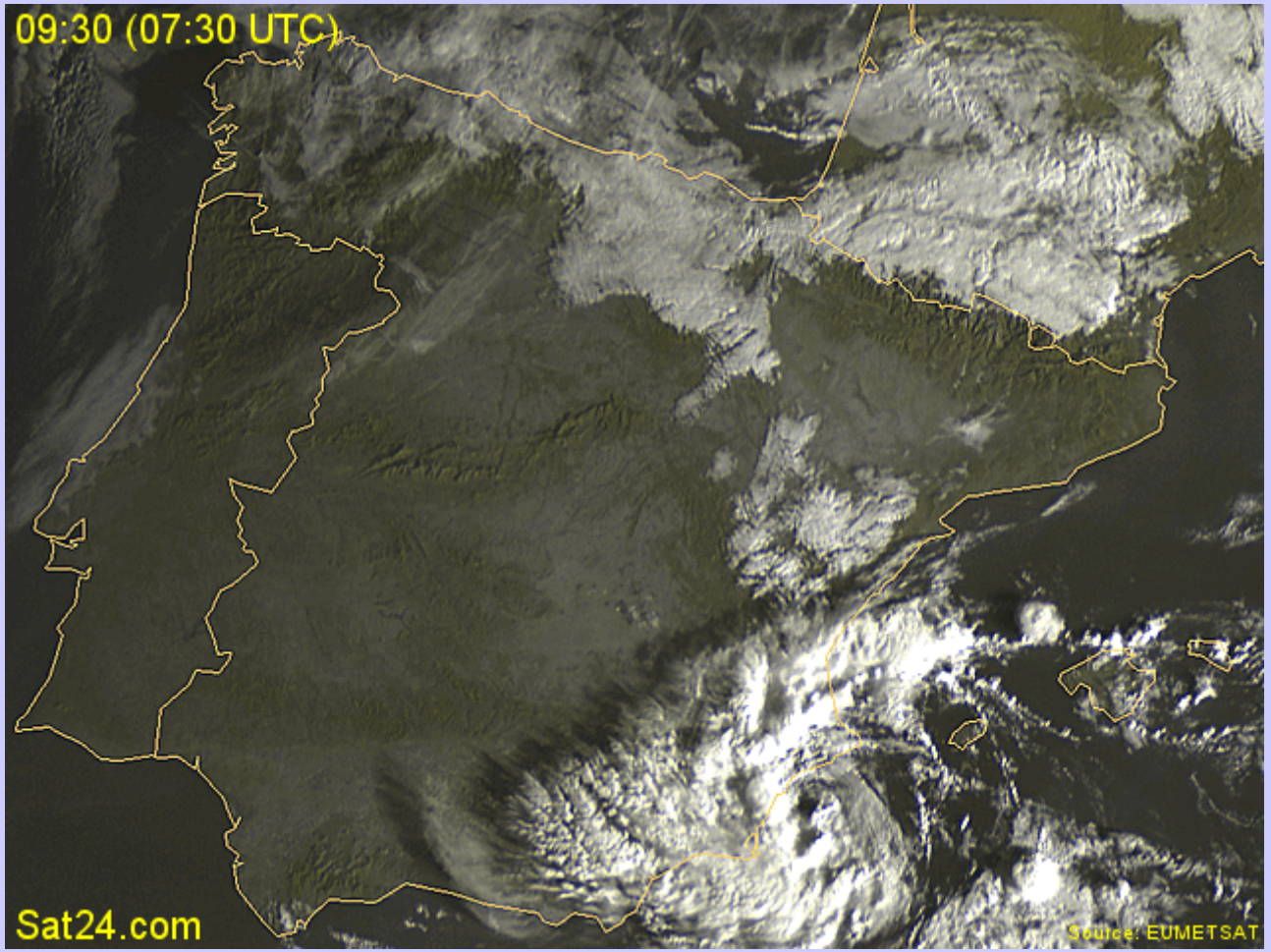
Medicane del 15-17 Enero 1995



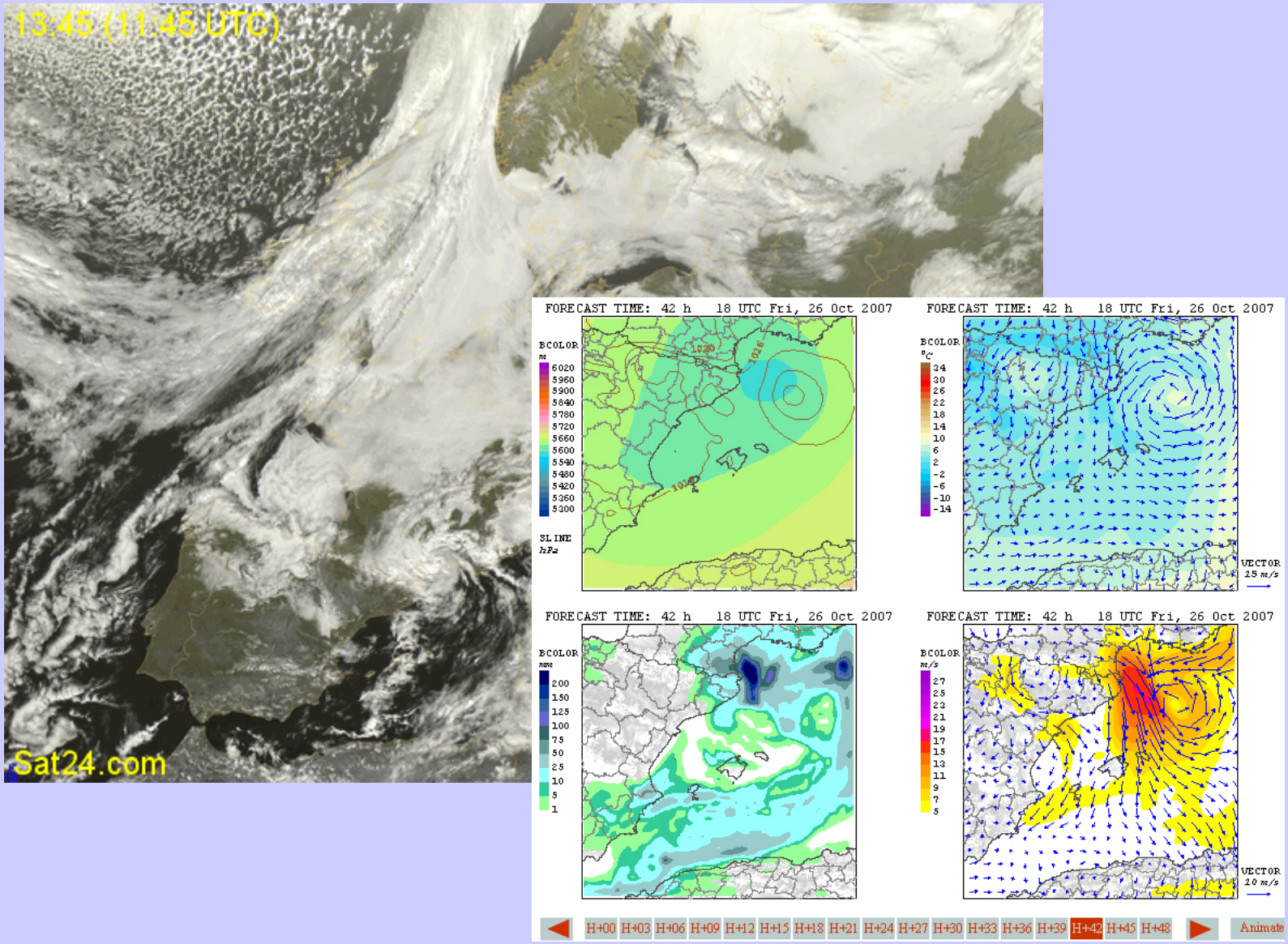
Medicane del 7-10 Octubre 1996



Medicane del 18 Octubre 2007



Medicane del 26 Octubre 2007



Diario de Ma

Palma, viernes 3 de octubre de 1986

Las pérdidas, aunque no han sido evaluadas, podrían ascender a varios cientos de millones

El ciclón destruyó unos veinte barcos de recreo en el Paseo Marítimo

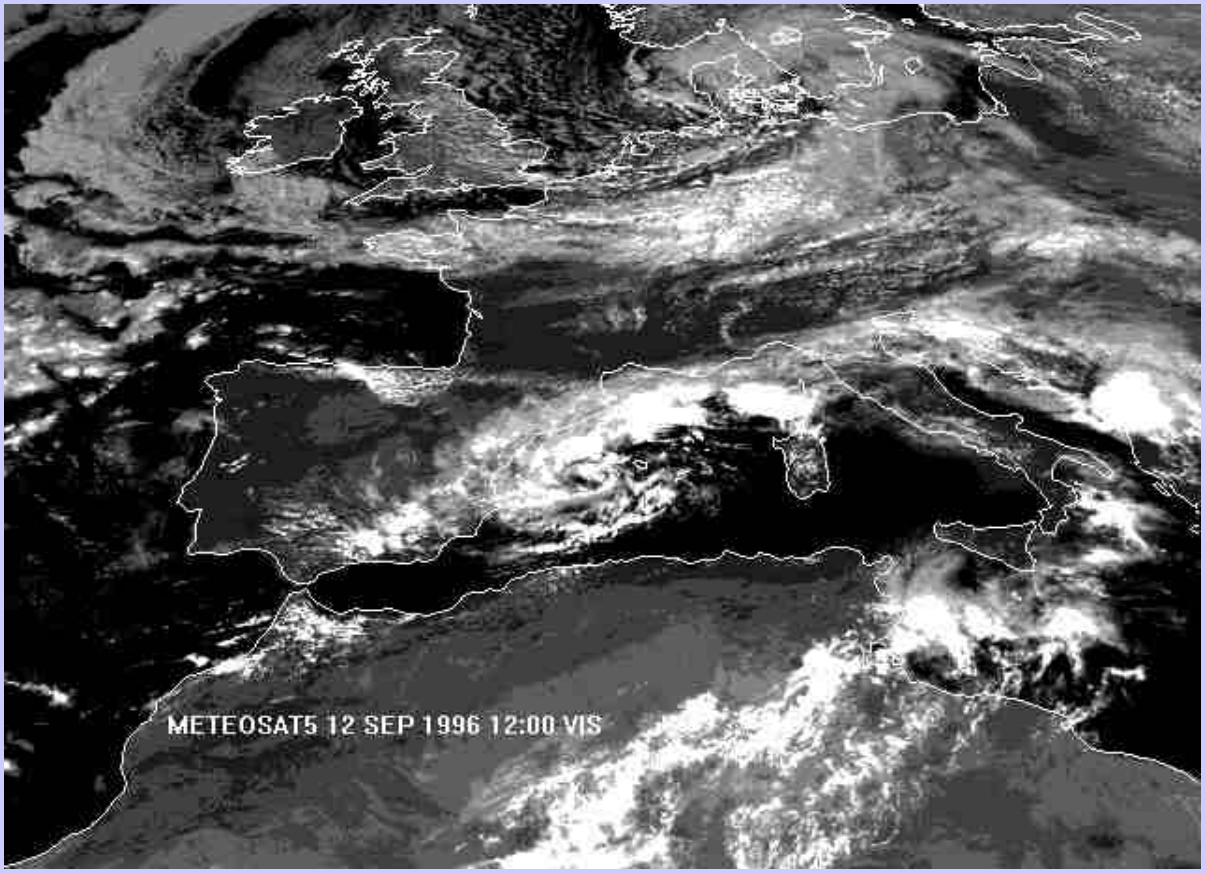
Mallorca se vió ayer sorprendida, a horas de la madrugada, con un viento do que llegó a alcanzar en ocasiones ic lómetros por hora, y que causó serios distintos puntos de la isla, afectando importante al Paseo Marítimo de Palma produjeron numerosos daños a una vei barcos allí amarrados. El viento comen sar estragos en la isla alrededor de las madrugada. Los daños causados pese ber sido evaluados puden ascender a va tos de millones. El fuerte viento estuvo a acompañado de fuertes precipitaciones garon a alcanzar en la zona de Sóller los por metro cuadrado. Tanto los bomb Palma como los efectivos de la Policía M se vieron obligados a llevar a cabo un trabajo desde las tres de la madrugad bien entrada la tarde. Las previsiones, los bomberos como de la Unidad de Inte inmediata, se vieron desbordadas, a c fenómeno climatológico. Dentro de P mayor actividad estuvo motivada por la árboles y postes del tendido eléctrico y te que afectaron a doce turismos aparcado cibir sobre sus carrocerías el impacto de ramas. Según las previsiones del institut nal de Meteorología, la "gota fría" puede afectando a la isla en las próximas horas.

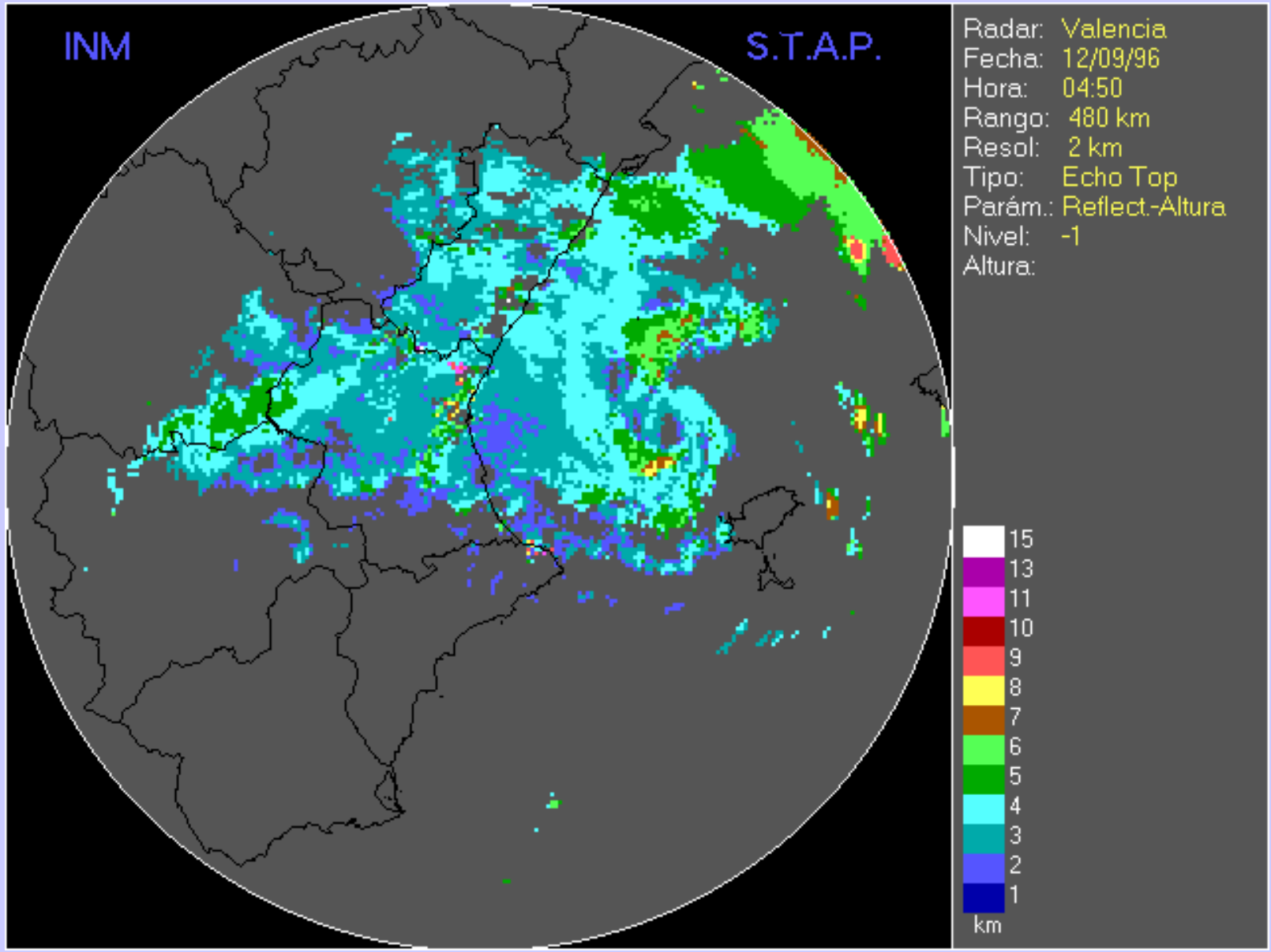
(Pá

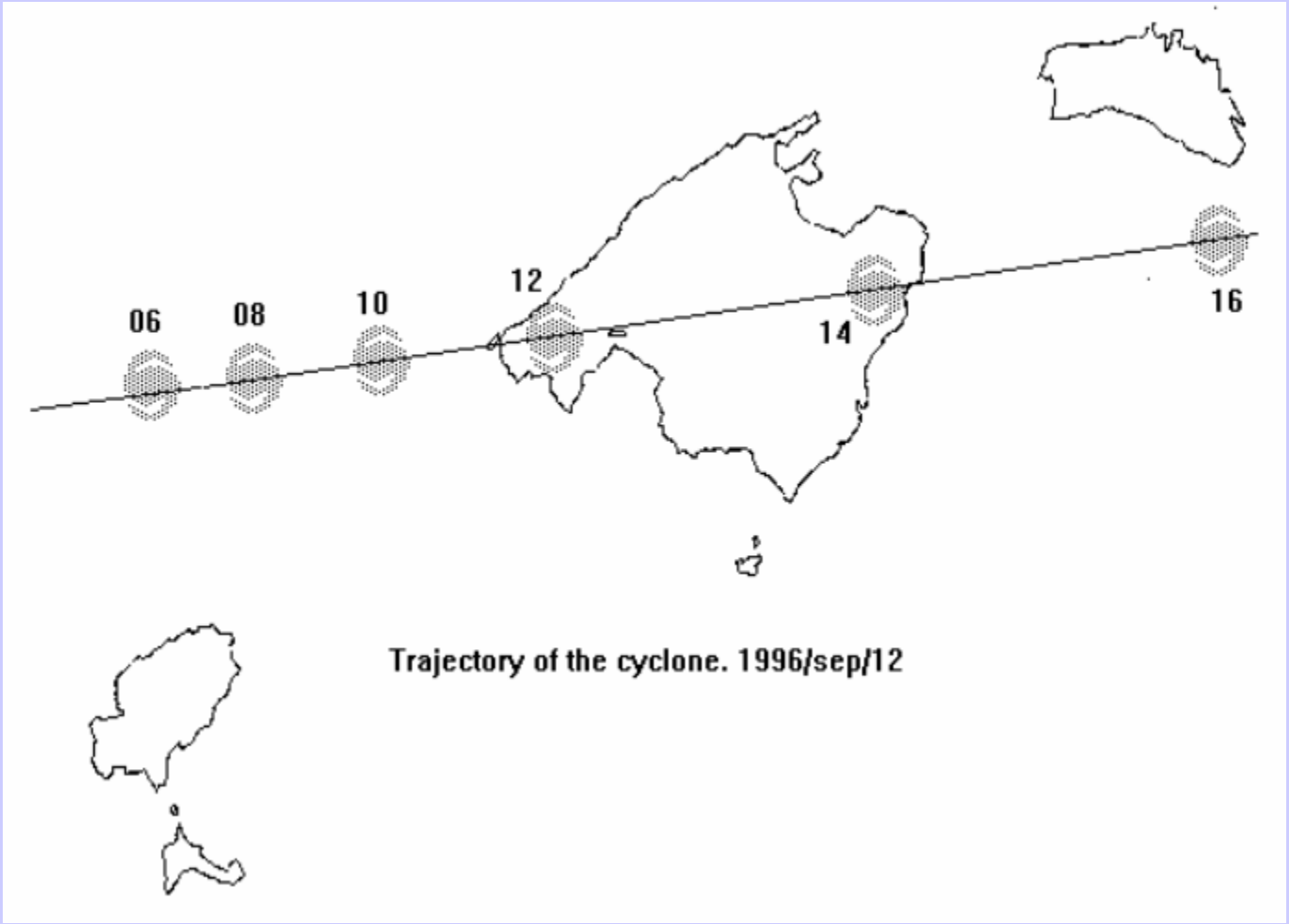
Destrozos en el puerto. – En el puerto el pequeño c causó estragos en embarcaciones. Algunas se hundier otras, a causa de la fuerza del viento, rompieron amarras sufrir posteriores y violentas colisiones contra los pantalan otros barcos, resultaron seriamente dañadas. Igualmente ron dañadas las instalaciones de "Baleares Náutica", los les quedaron prácticanente desmantriadas. *(Foto Lorenzo)*

3/10/1986

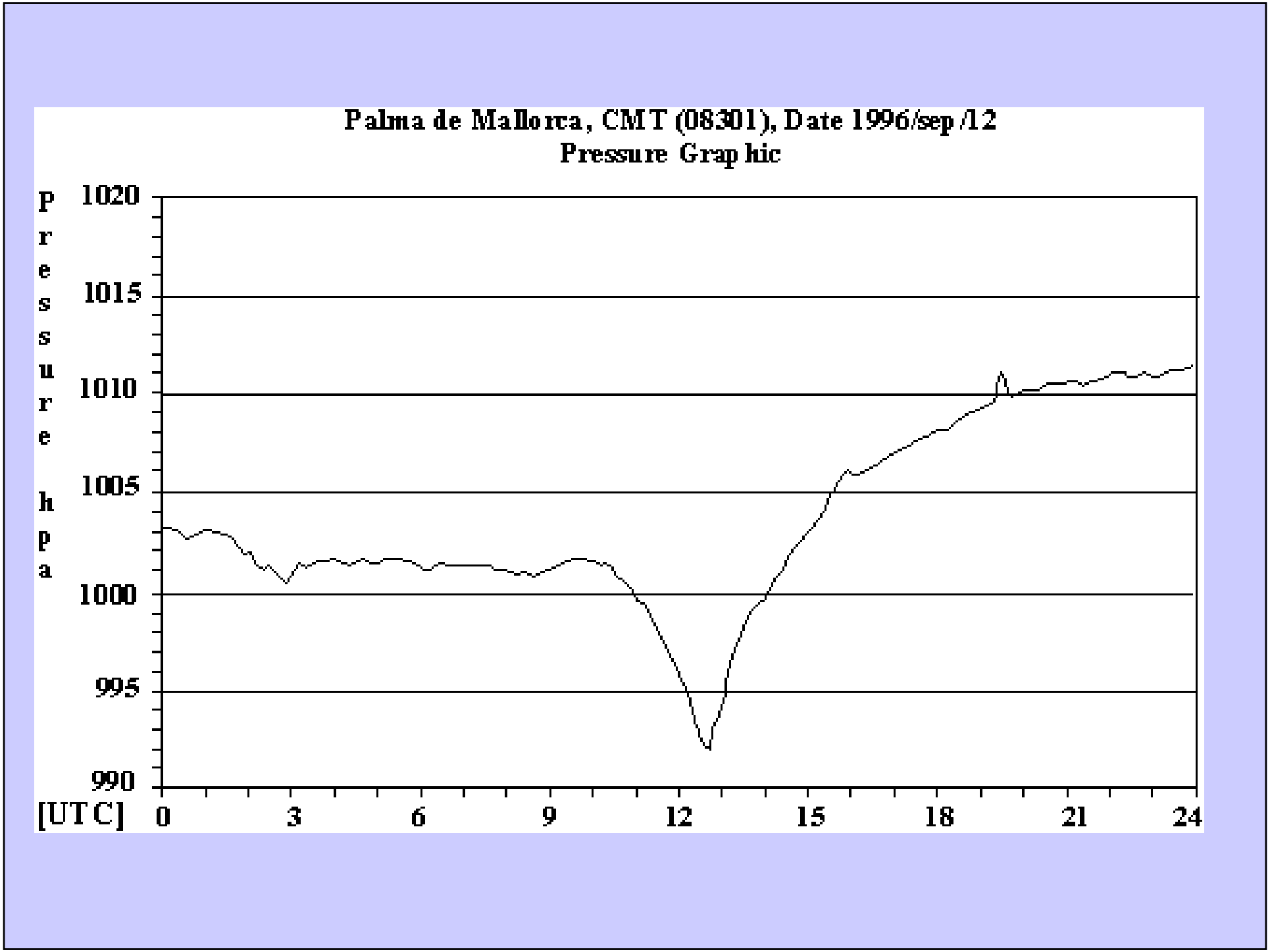
Medicane del 12 Septiembre 1996




INM
S.T.A.P.
Radar: Valencia
Fecha: 12/09/96
Hora: 04:50
Rango: 480 km
Resol: 2 km
Tipo: Echo Top
Parám.: Reflect.-Altura
Nivel: -1
Altura:
15
13
11
10
9
8
7
6
5
4
3
2
1
km

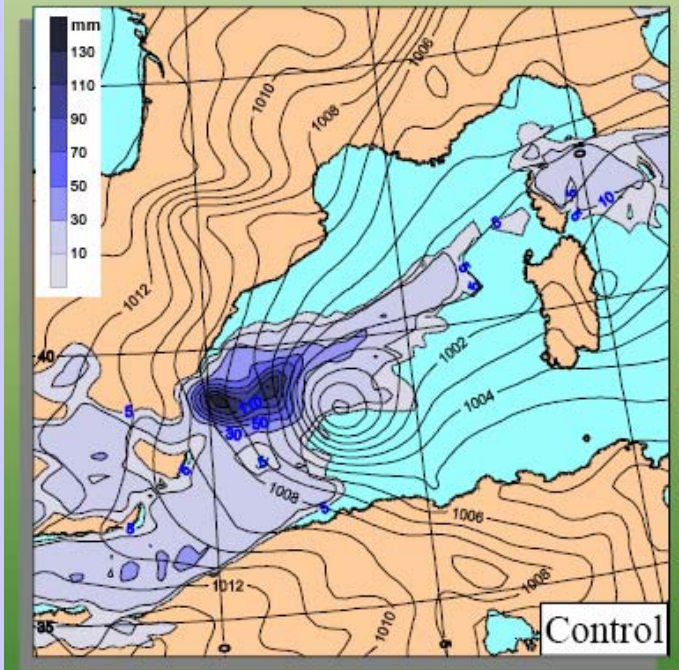


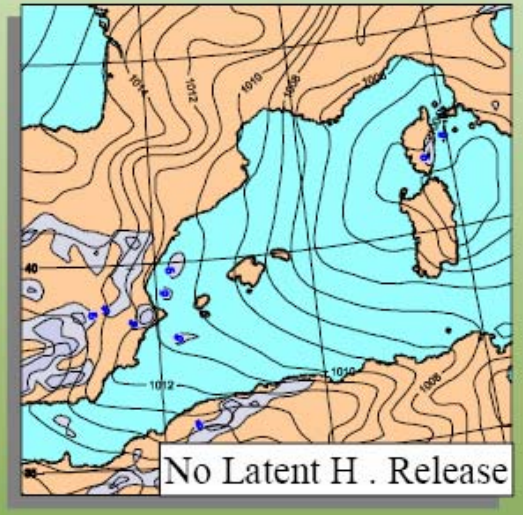
Trajectory of the cyclone. 1996/sep/12

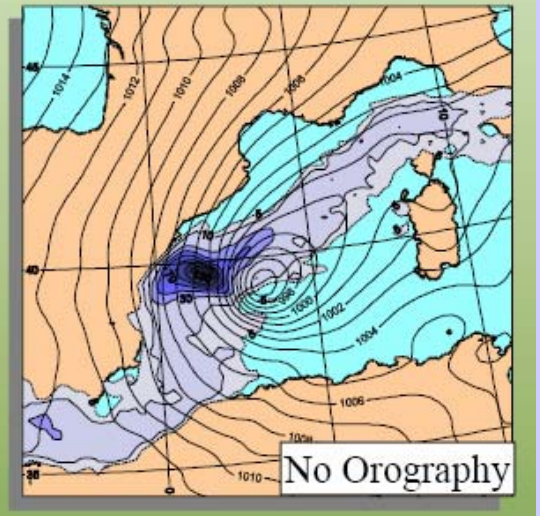

Palma de Mallorca, CMT (08301), Date 1996/sep/12
Pressure Graphic
pressure hpa
1020
1015
1010
1005
1000
995
990
[UTC]
0
3
6
9
12
15
18
21
24

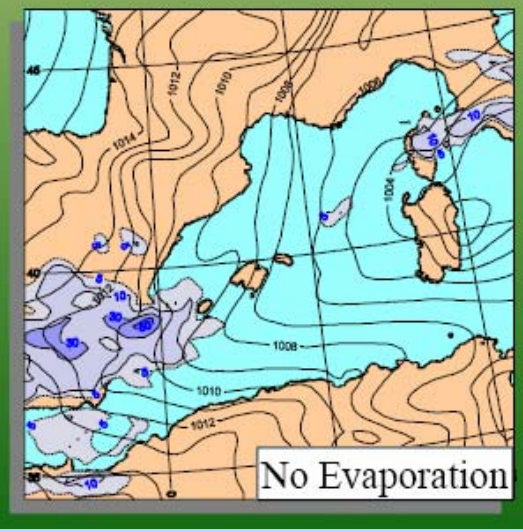
Sensitivity

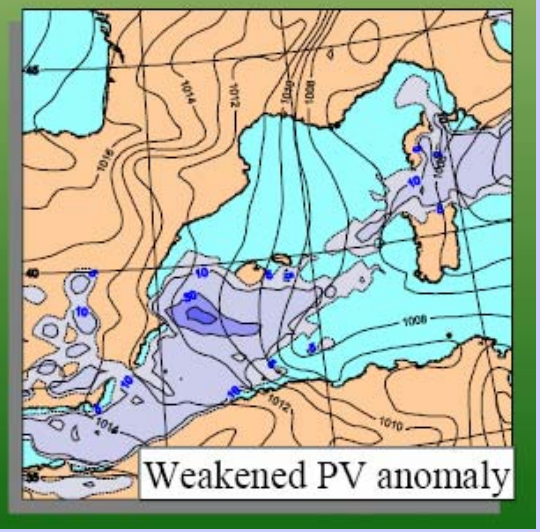
- Results of the sensitivity experiments in terms of surface pressure and accumulated precipitation at 1200 UTC:





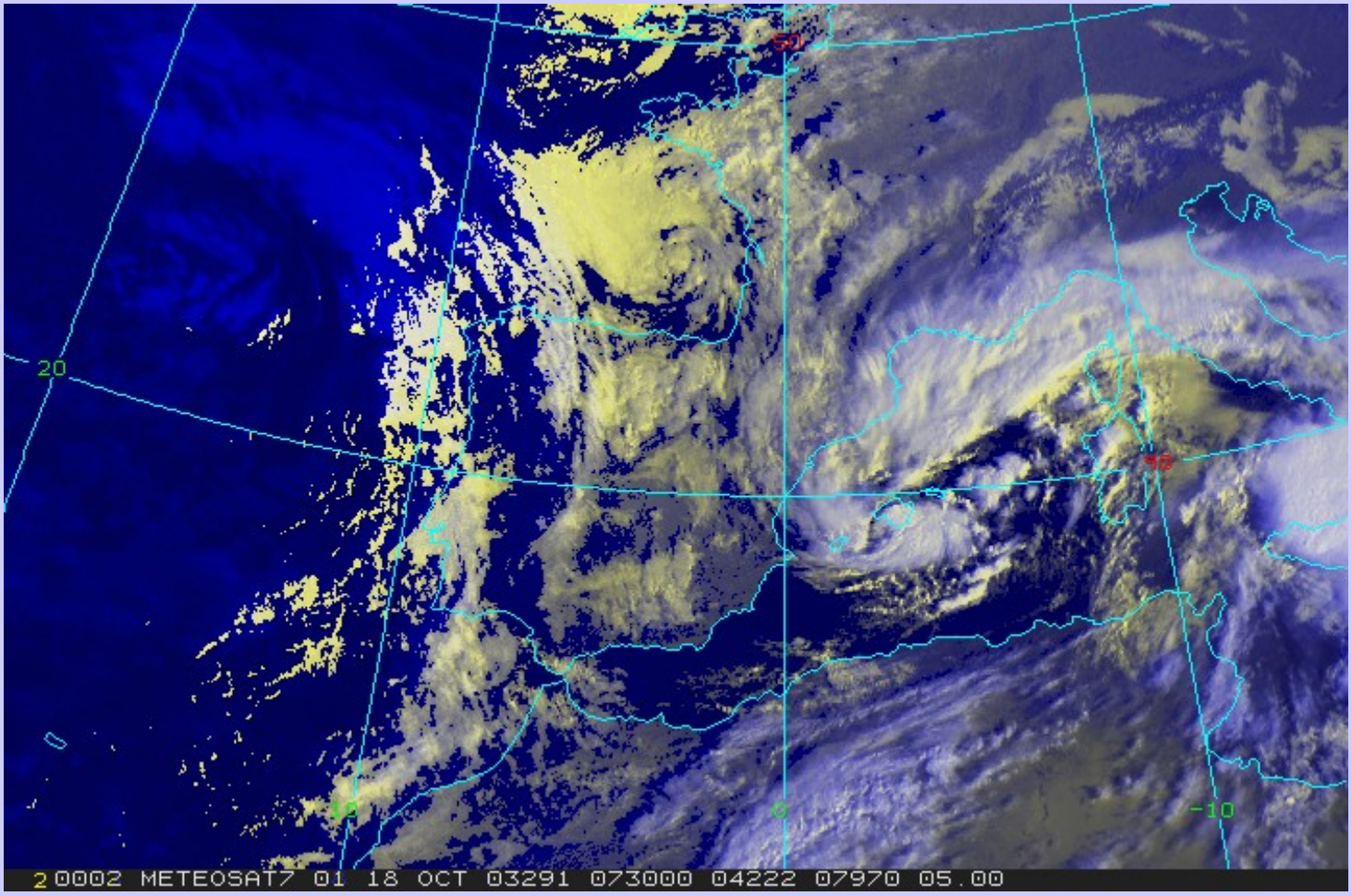


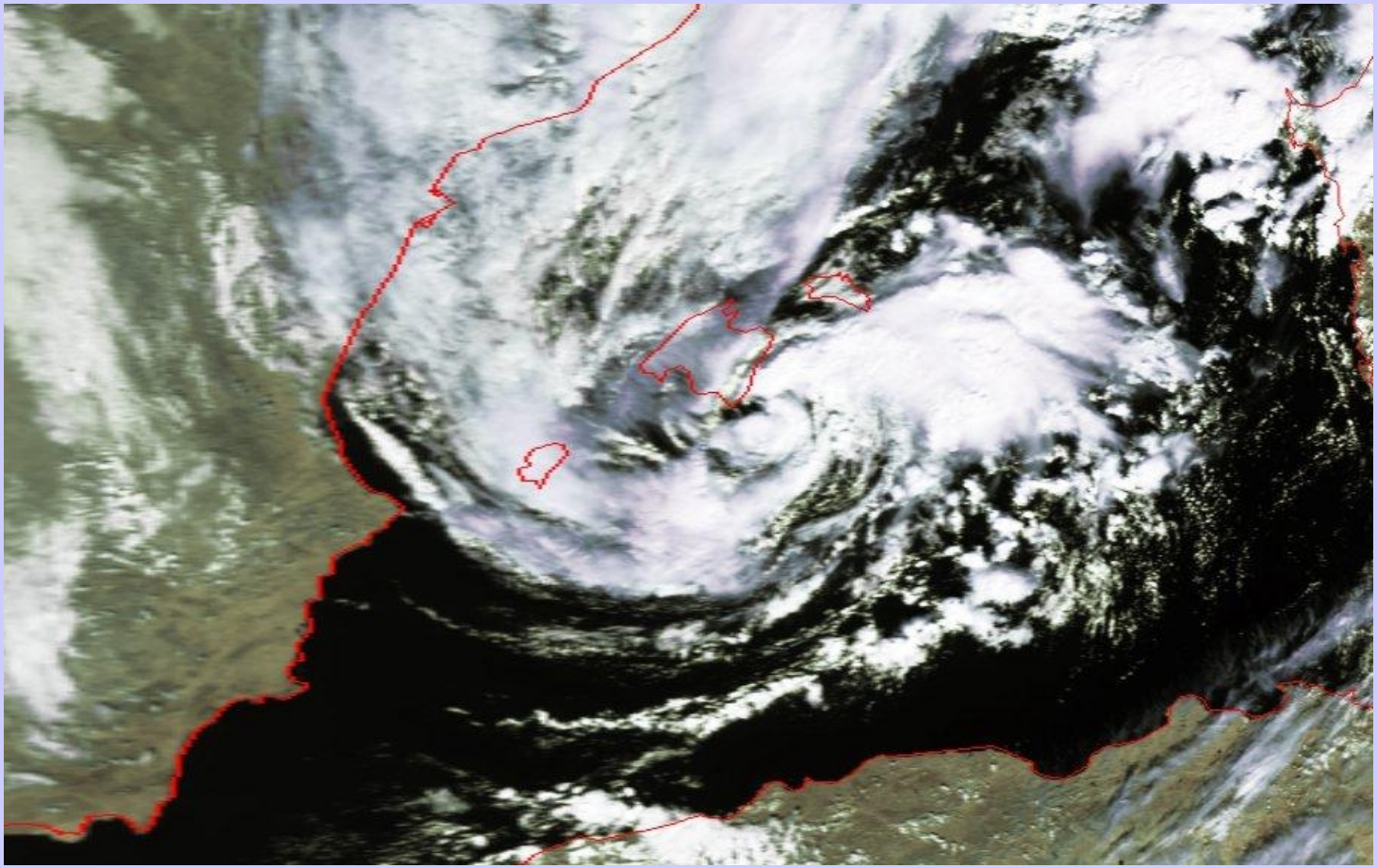


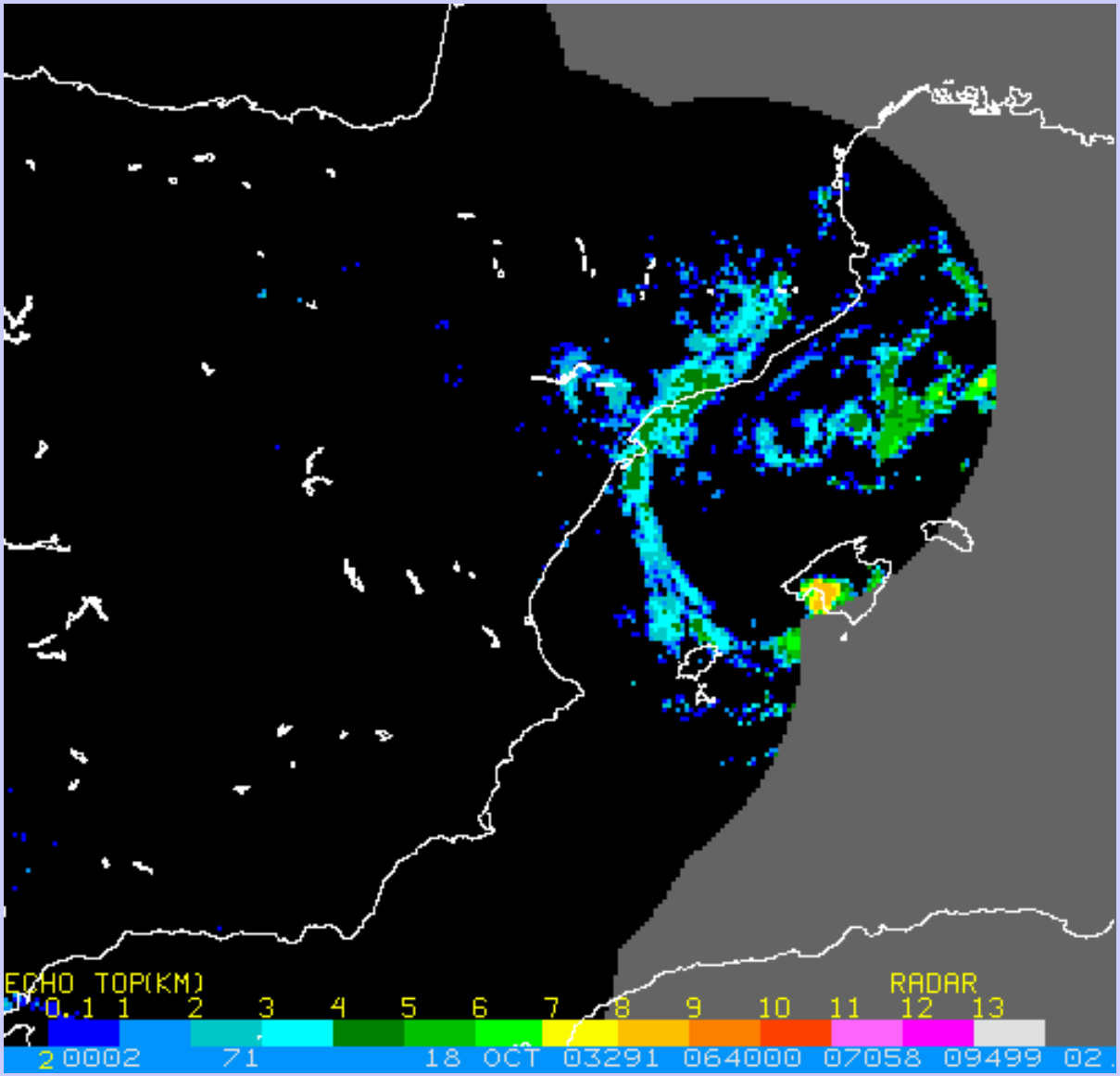


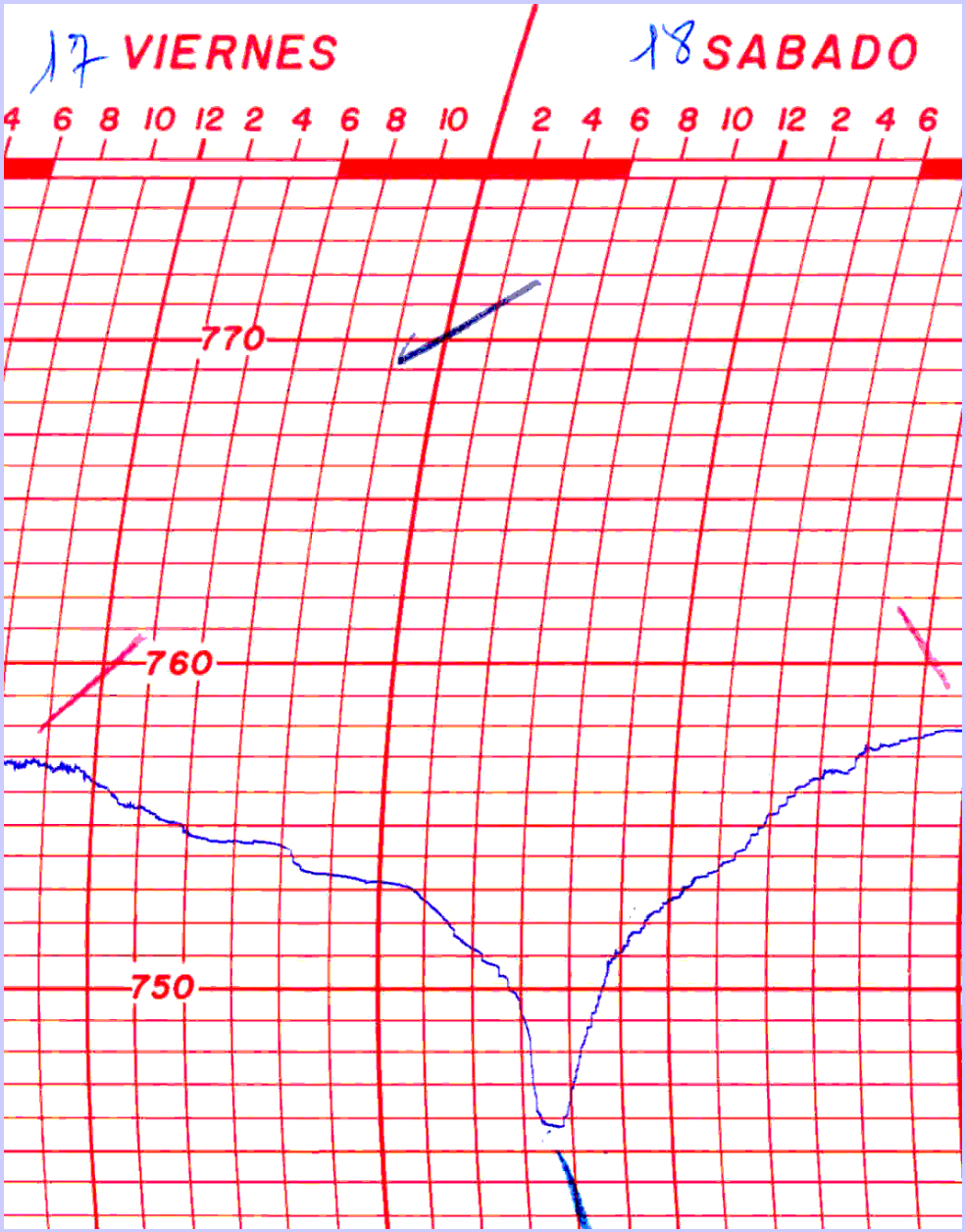
Simulaciones numéricas del Medicane de 12 Septiembre 1996 (Homar et al. 2003)

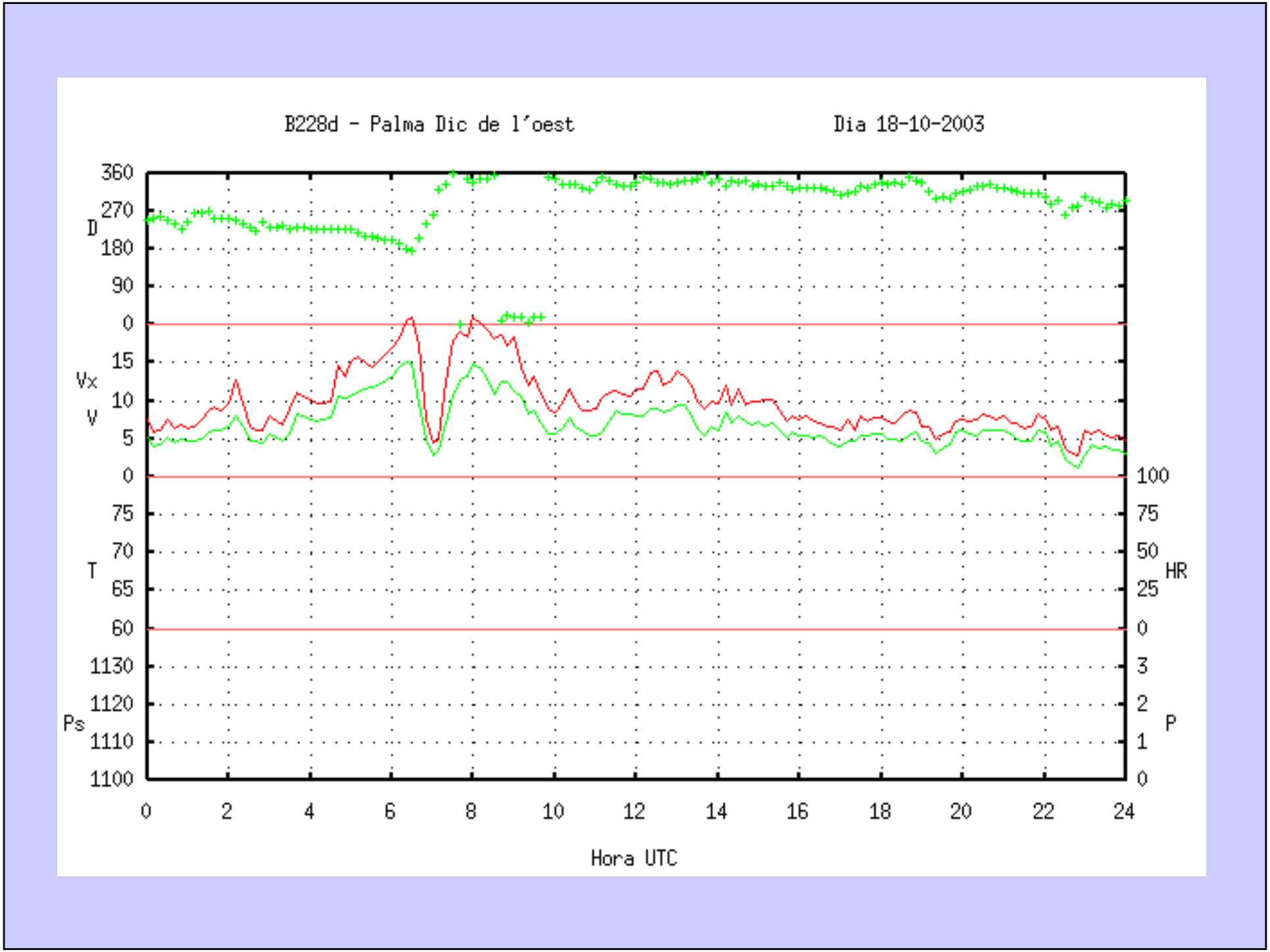
Medicane del 18 Octubre 1996






ECHO TOP(KM)
0.1 1 2 3 4 5 6 7 8 9 10 11 12 13
RADAR
2 0002 71 18 OCT 03291 064000 07058 09499 02


17 VIERNES
18 SABADO
4 6 8 10 12 2 4 6 8 10 2 4 6 8 10 12 2 4 6
770
760
750

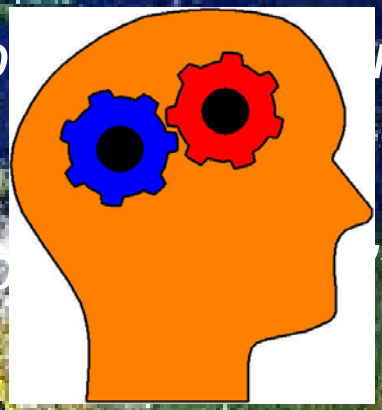

B228d - Palma Dic de l'oest
Dia 18-10-2003
D
360
270
180
90
0
Vx
V
15
10
5
0
T
75
70
65
60
Ps
1130
1120
1110
1100
100
75
50
25
0
HR
3
2
1
0
P
0
2
4
6
8
10
12
14
16
18
20
22
24
Hora UTC

ESTRUCTURA

1) Ideas previas

2) Ciclones extratropicales o *medias*

3) Ciclones cuasitropicales o *”*



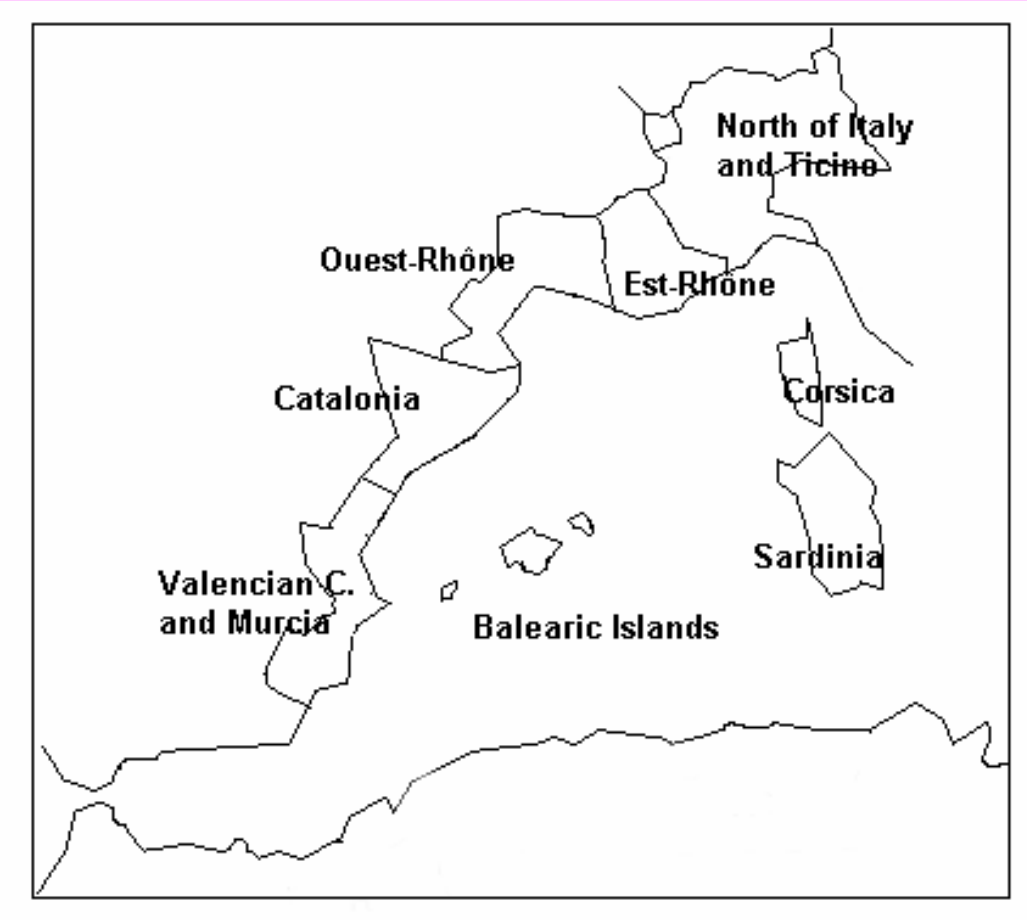
4) Relación estadística ciclones – lluvias intensas

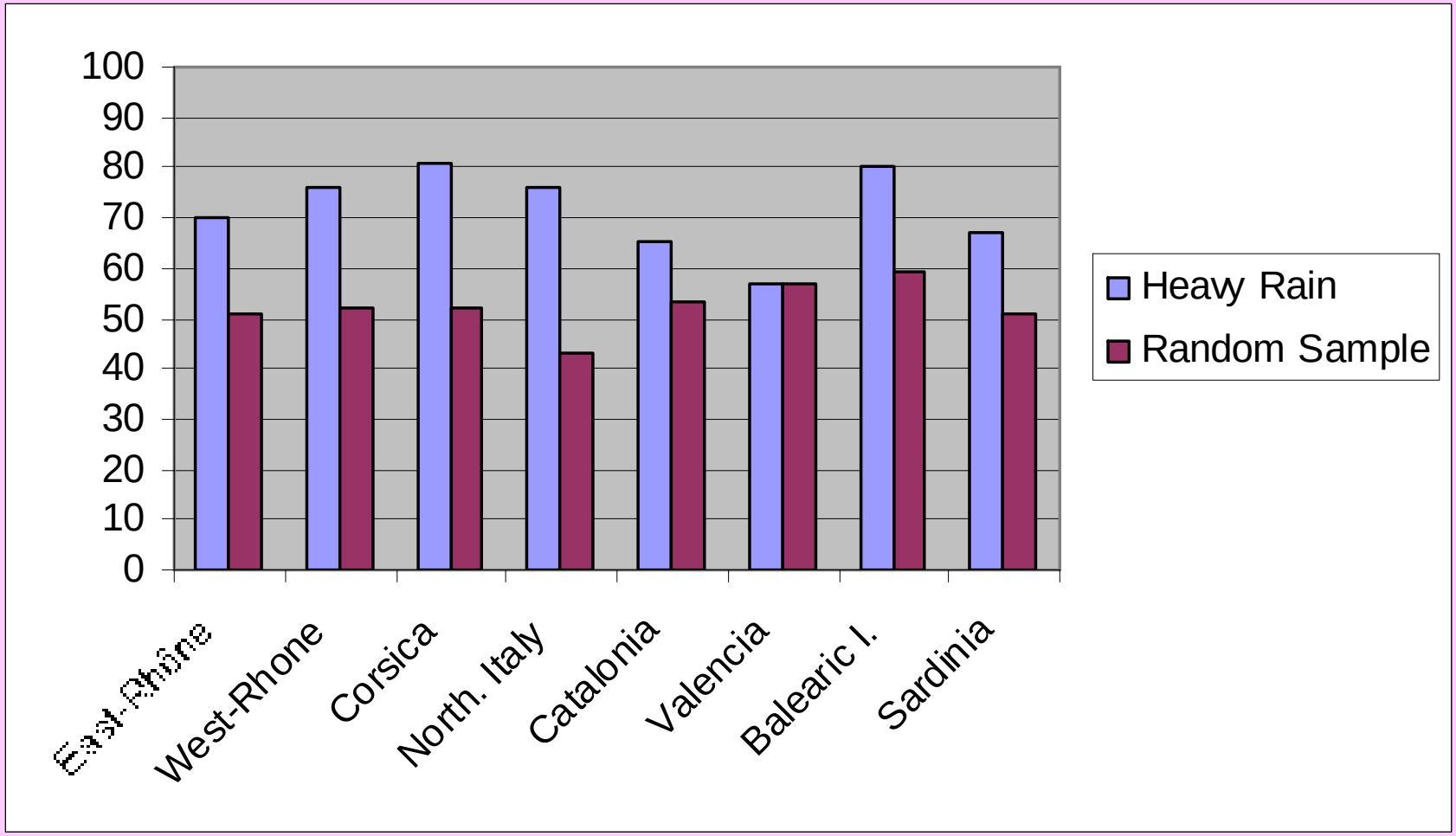
5) Tormentas *nos severos*

6) Otros riesgos climáticos

Source: INM – Balears

Collection of 300 ***heavy rain events*** (>60 mm/24h) in ***8 regions***:

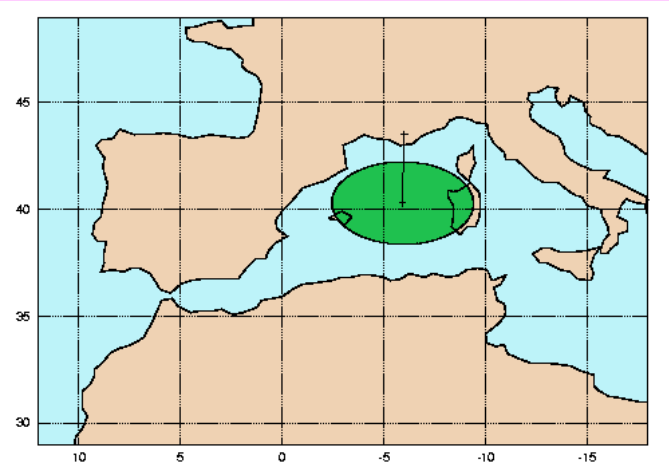




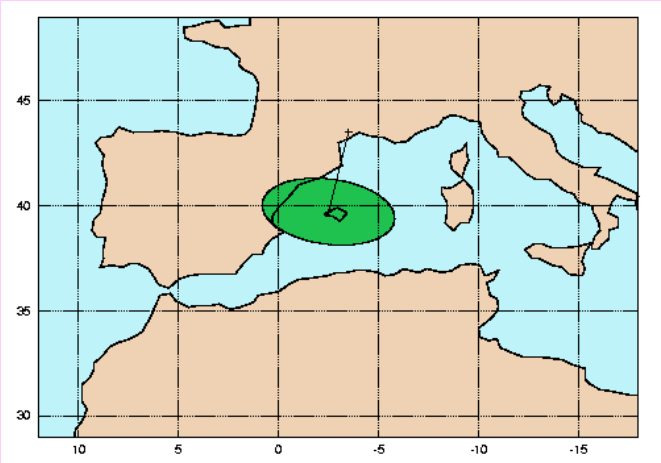
Frequency (%) of cyclonic centres within a 600 km radius

for the 8 regions: heavy rain events and random sample of events

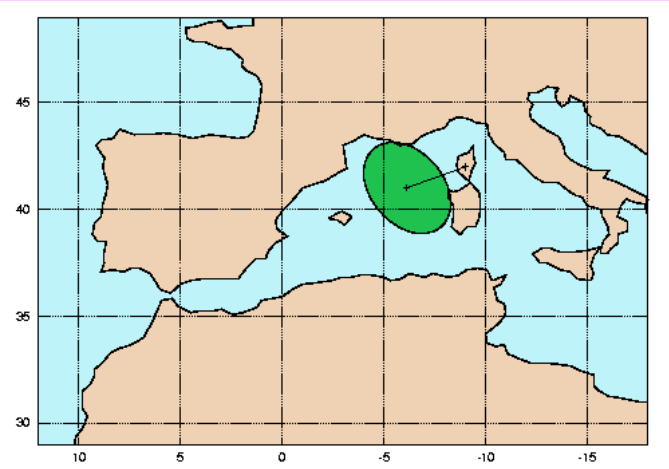
Simultaneity Cyclone-Heavy Rain



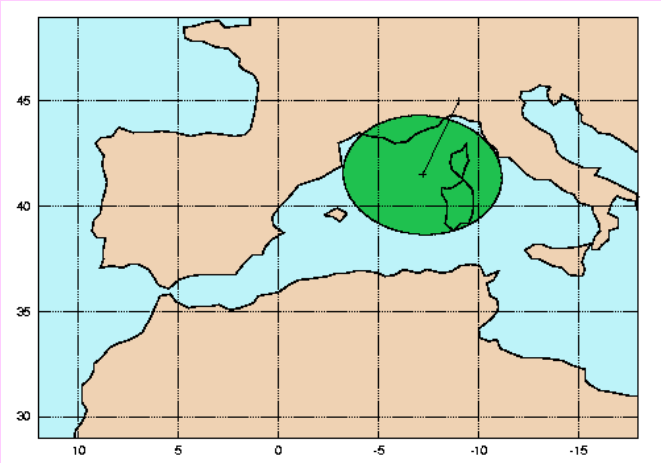
East-Rhône



West-Rhône

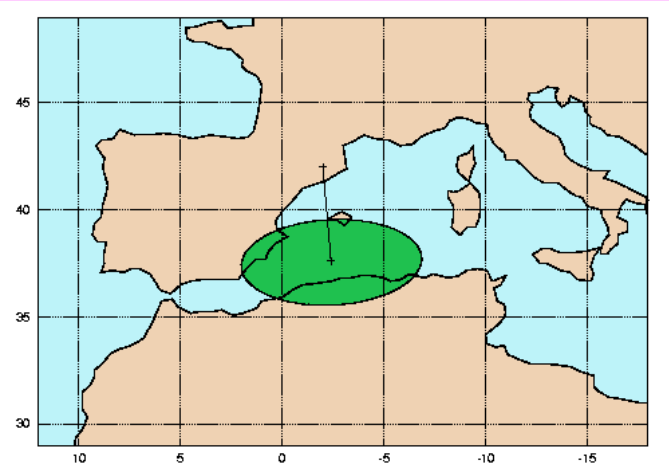


Corsica

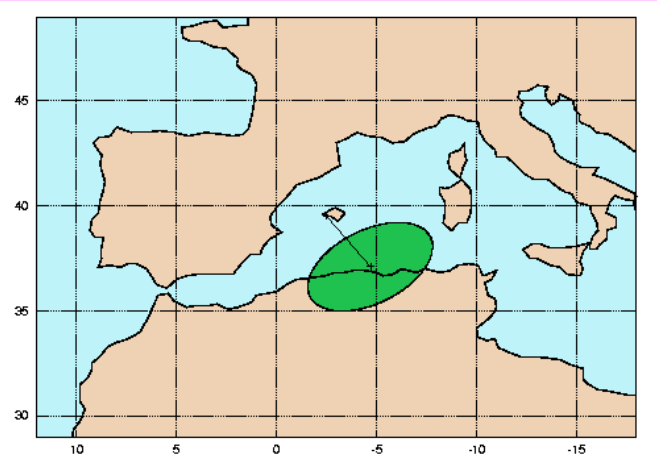


North Italy and Ticino

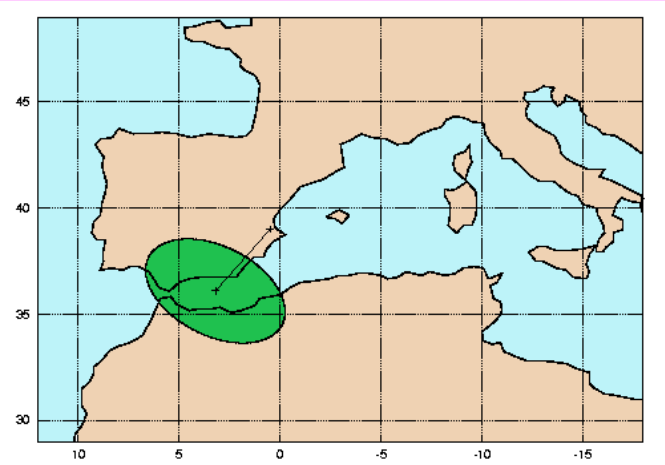
Simultaneity Cyclone-Heavy Rain



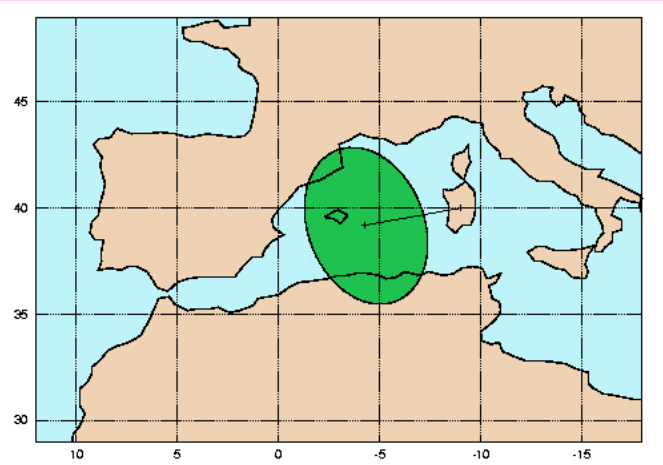
Catalonia



Balearic Islands

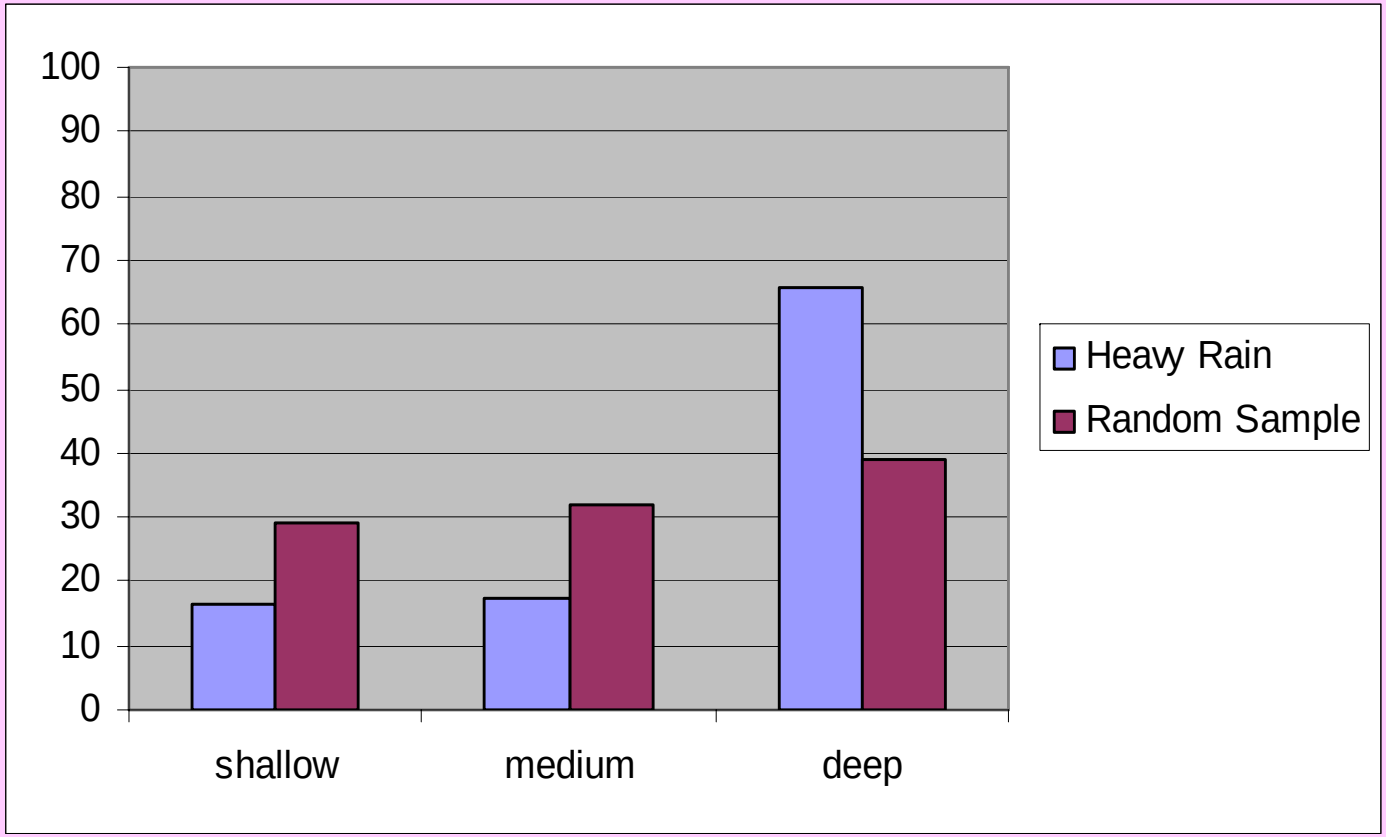


Valencia

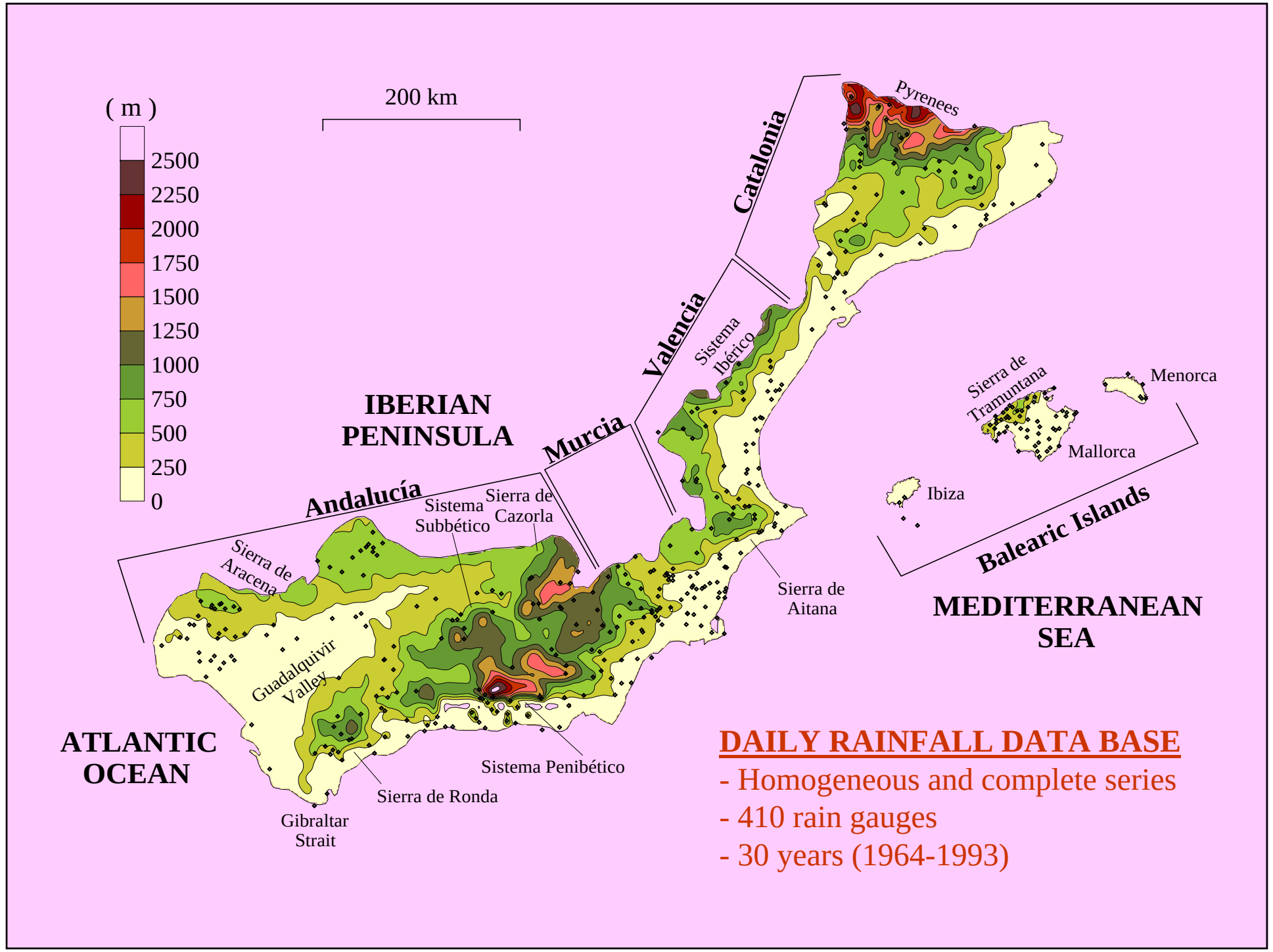


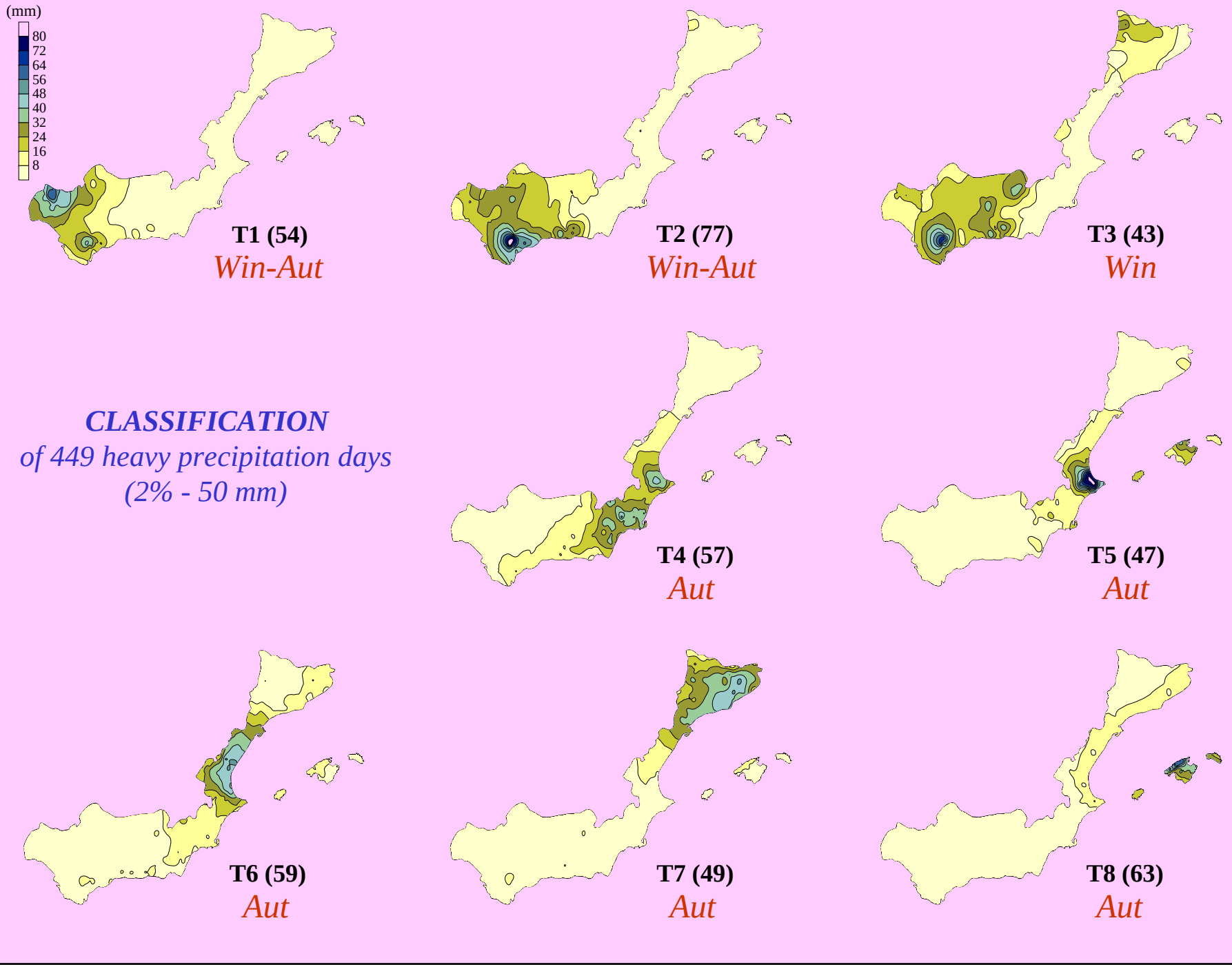
Sardinia

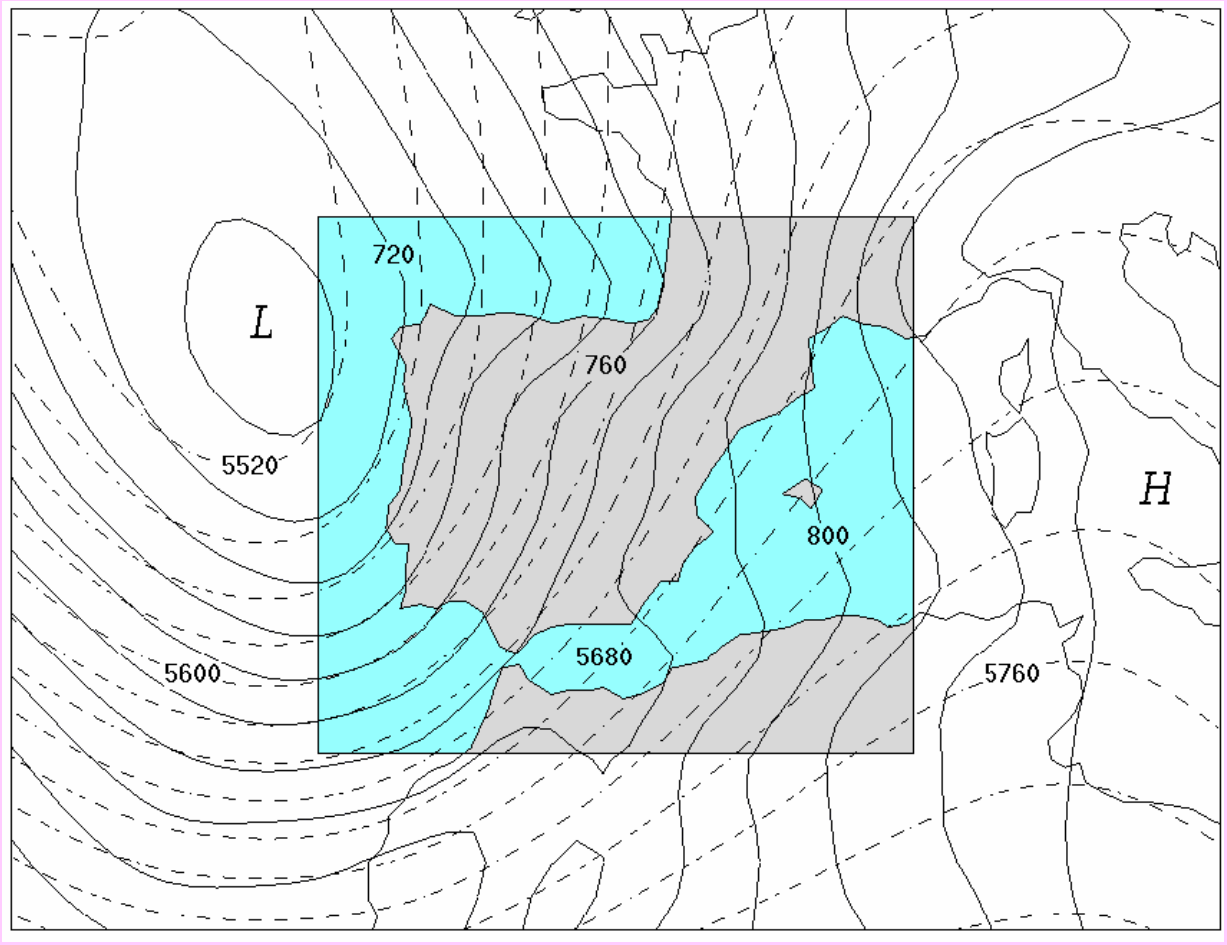
Tridimensional structure of cyclones

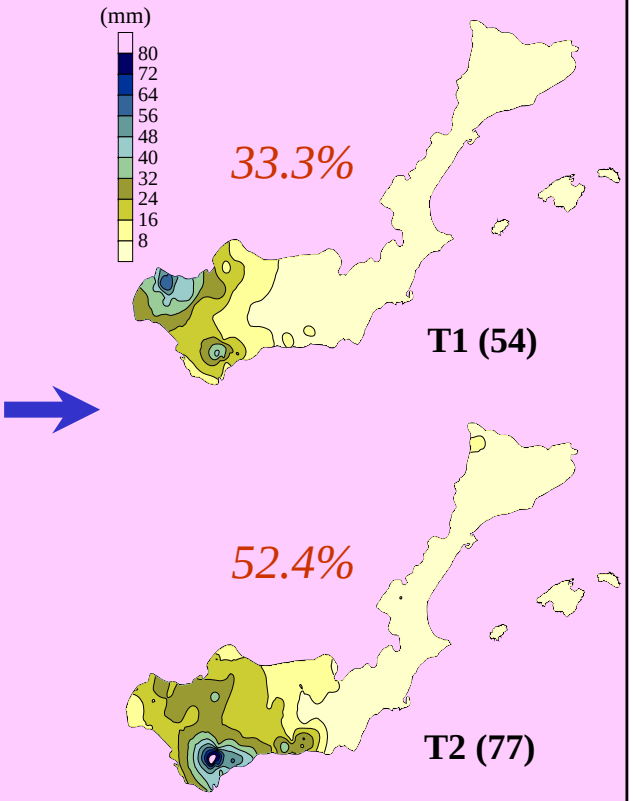


Frequency (%) of cyclone depth for all the closest cyclones:
heavy rain events and a random sample of events


(m)
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
200 km
IBERIAN PENINSULA
Catalonia
Valencia
Murcia
Andalucía
Pyrenees
Sistema Ibérico
Sierra de Tramuntana
Menorca
Mallorca
Ibiza
Balearic Islands
Sistema Subbético
Sierra de Cazorla
Sierra de Aracena
Guadalquivir Valley
Sierra de Aitana
MEDITERRANEAN SEA
ATLANTIC OCEAN
Sistema Penibético
Sierra de Ronda
Gibraltar Strait
DAILY RAINFALL DATA BASE
- Homogeneous and complete series
- 410 rain gauges
- 30 years (1964-1993)


(mm)
80
72
64
56
48
40
32
24
16
8
T1 (54)
Win-Aut
T2 (77)
Win-Aut
T3 (43)
Win
CLASSIFICATION
of 449 heavy precipitation days
(2% - 50 mm)
T4 (57)
Aut
T5 (47)
Aut
T6 (59)
Aut
T7 (49)
Aut
T8 (63)
Aut

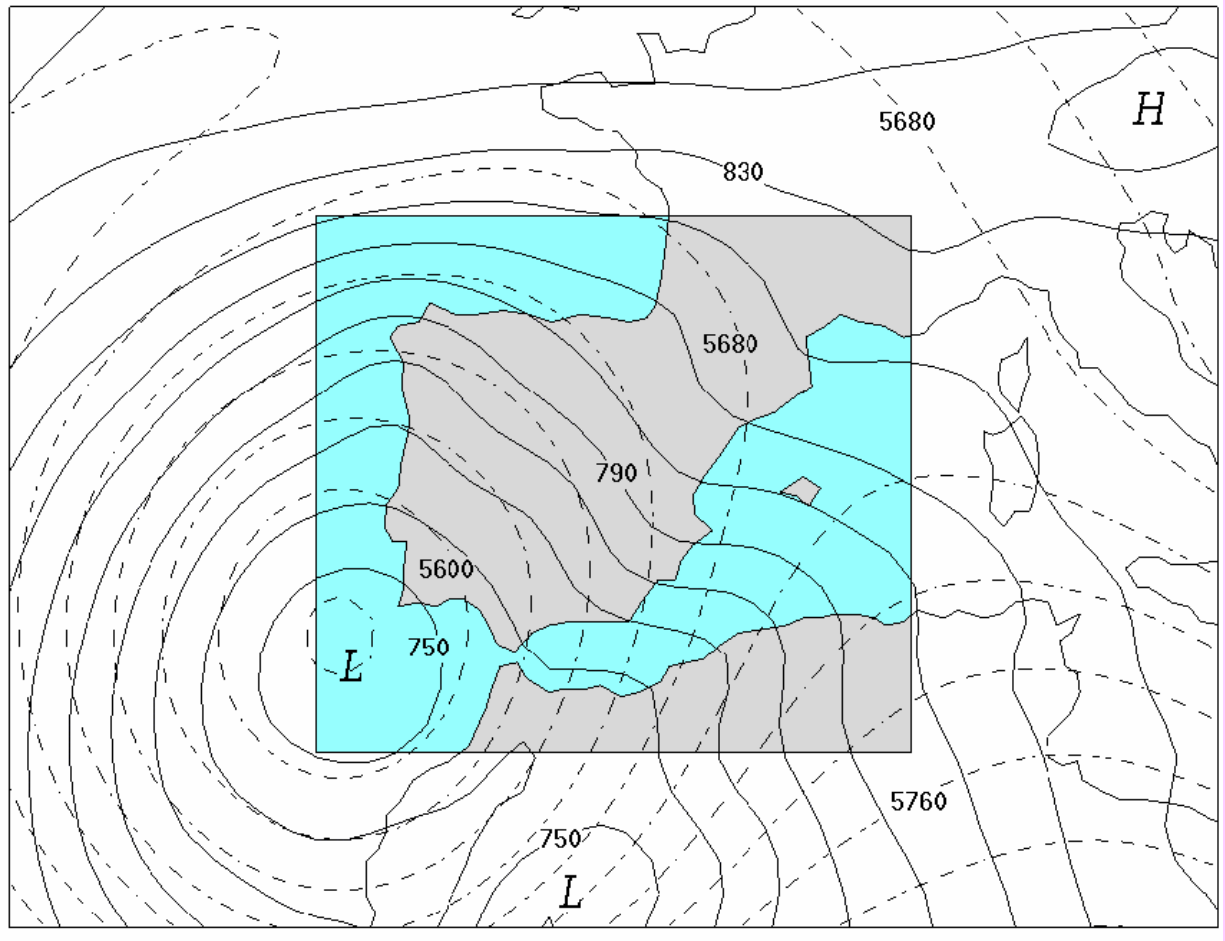


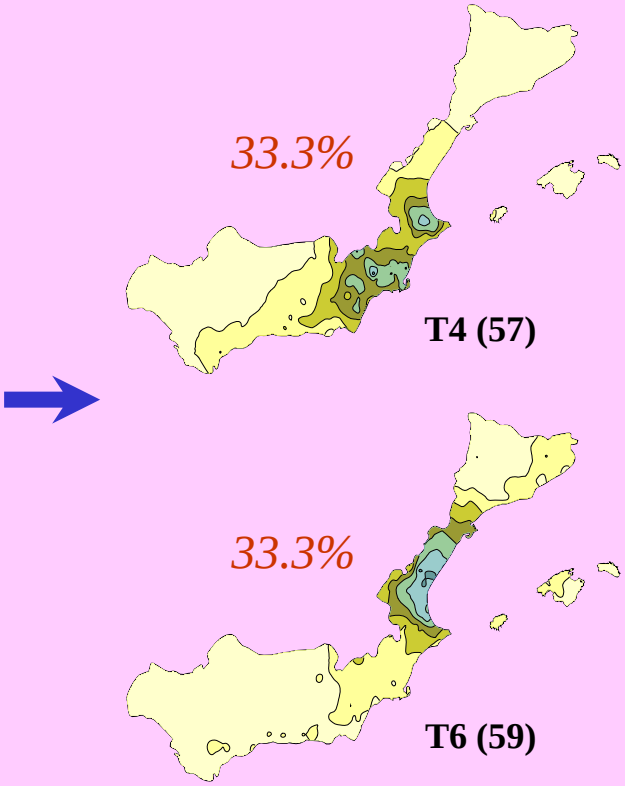


AP3

Aut *54.8%*

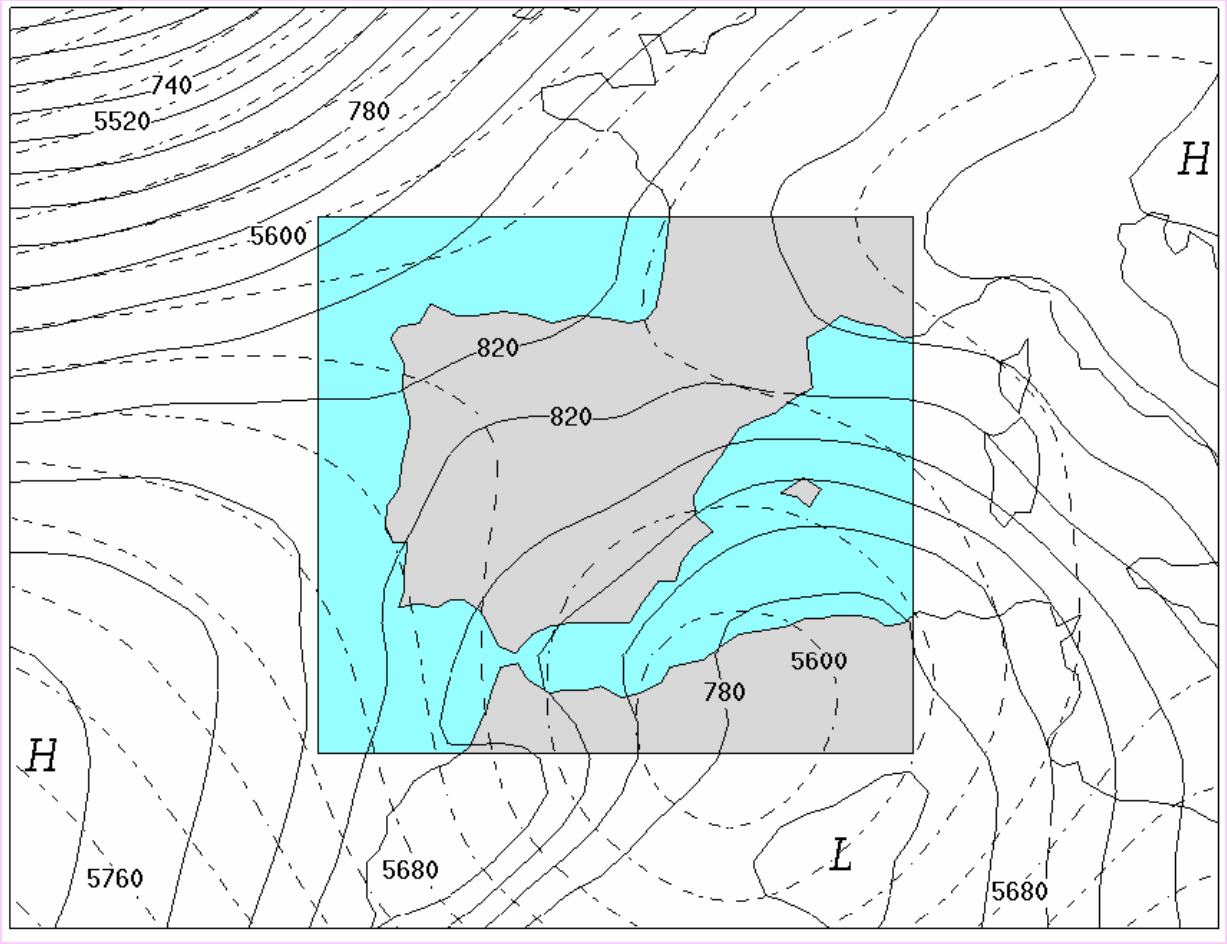
Heavy *25.0%*

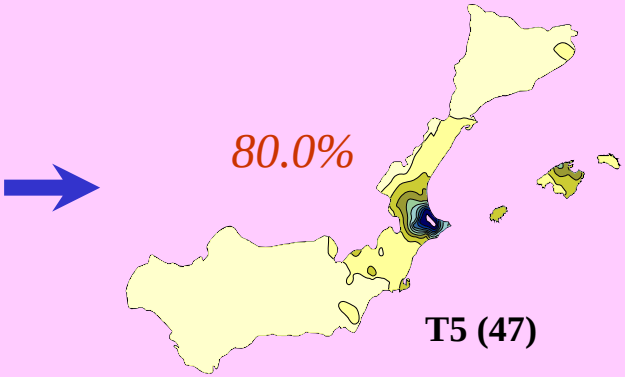




AP6

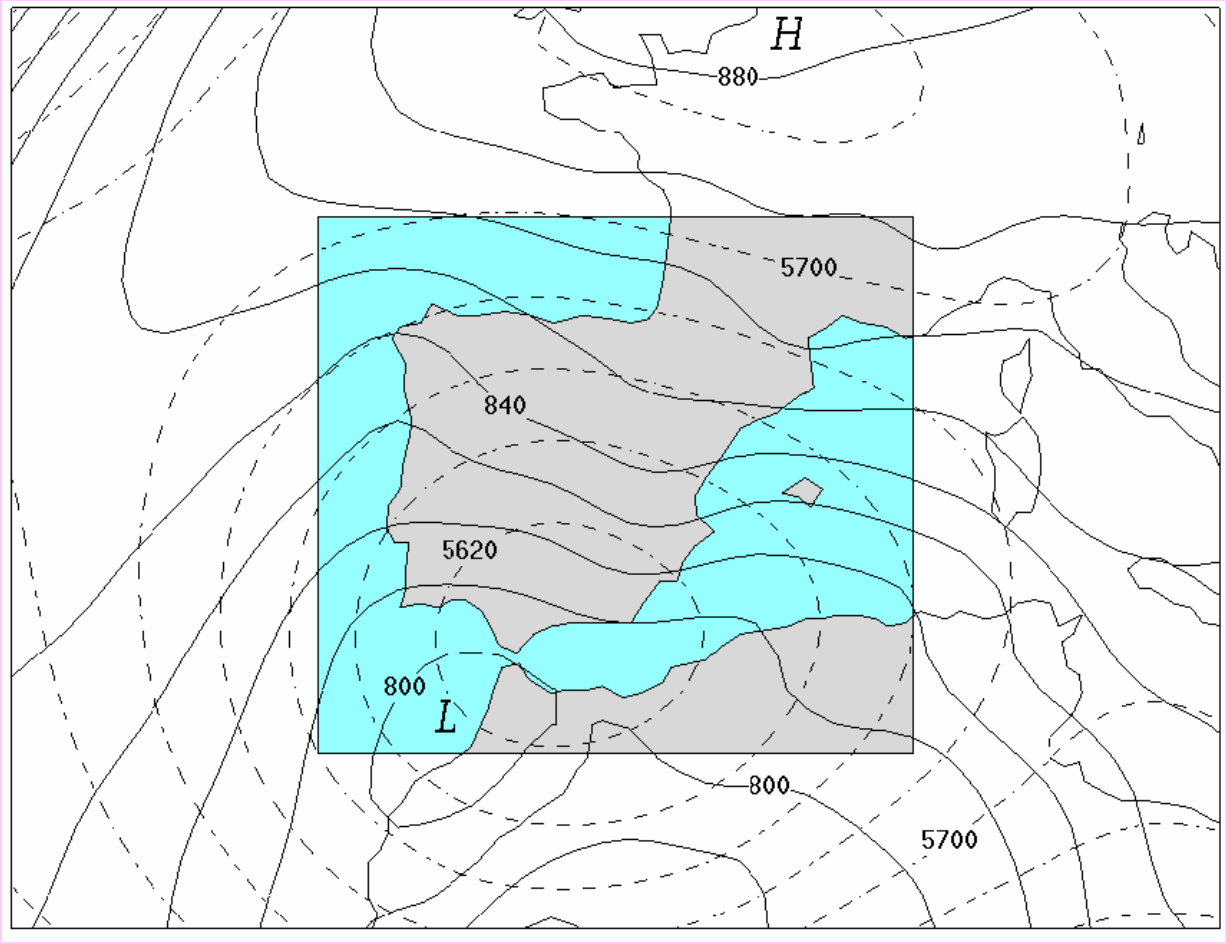
Spr *33.3%*
Heavy *23.1%*

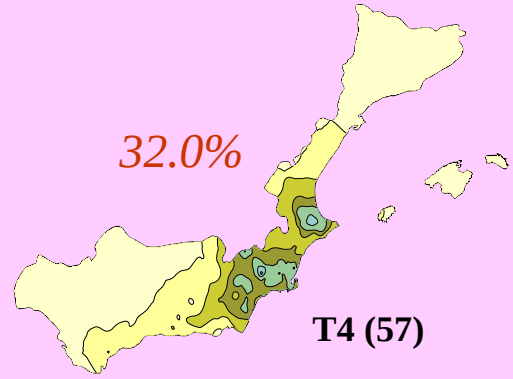




AP12

***Win** 47.8% - **Aut** 34.8%*
***Heavy** 21.7%*

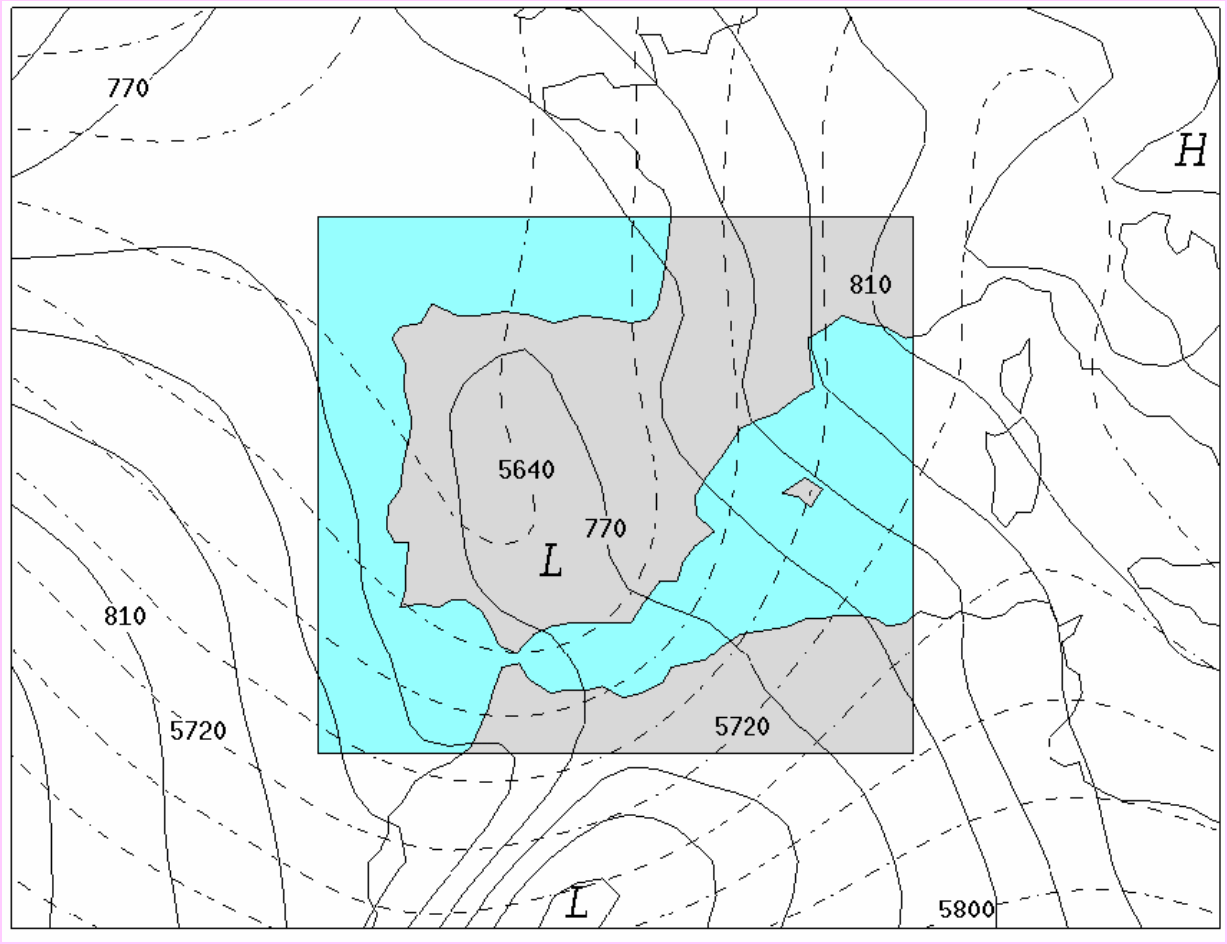


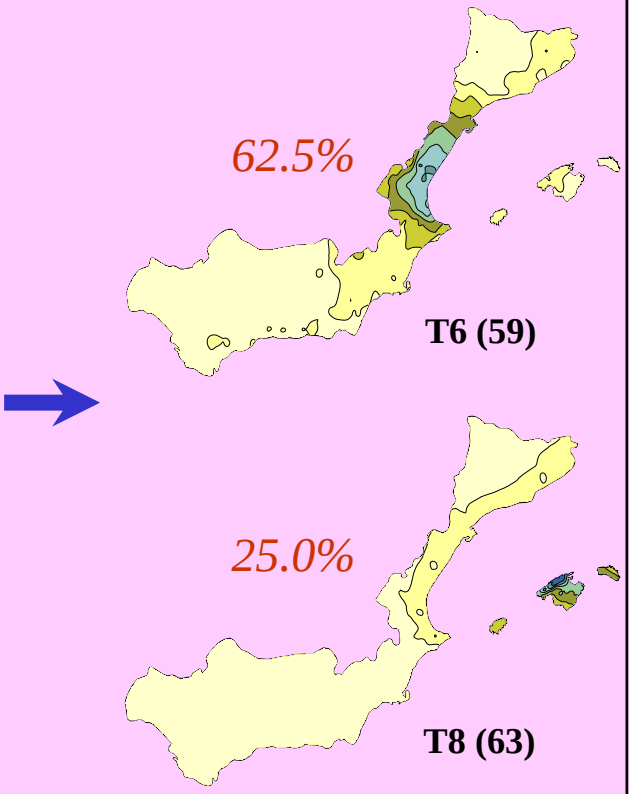


AP13

Win *53.0%*

Heavy *37.9%*



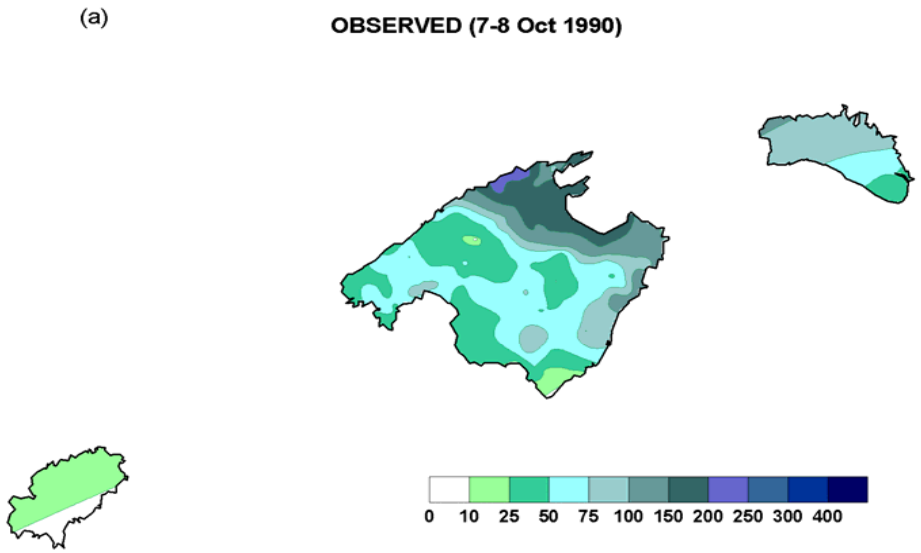


AP15

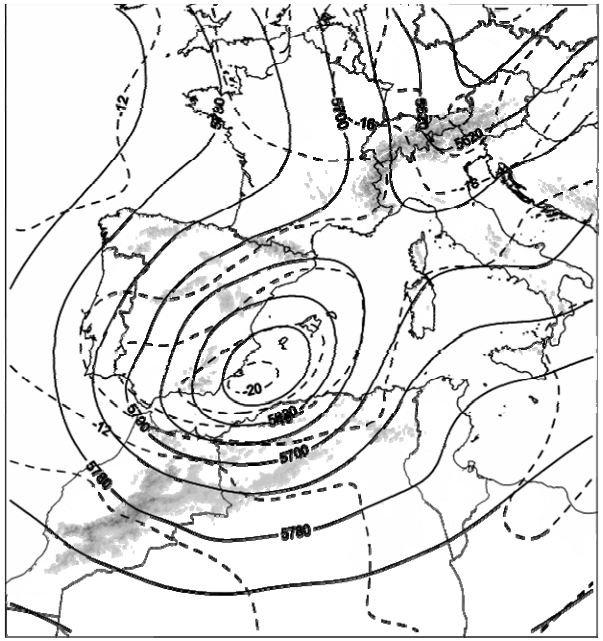
Aut *40.0%* - ***Spr*** *32.0%*

Heavy *32.0%*

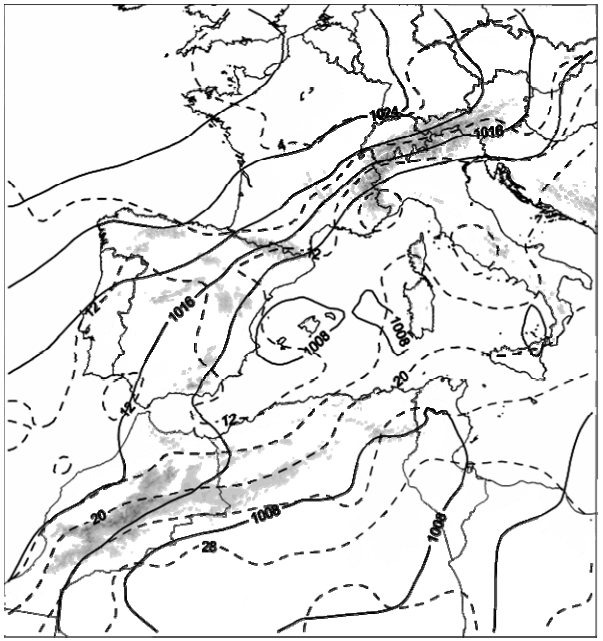
(a)


OBSERVED (7-8 Oct 1990)
0 10 25 50 75 100 150 200 250 300 400

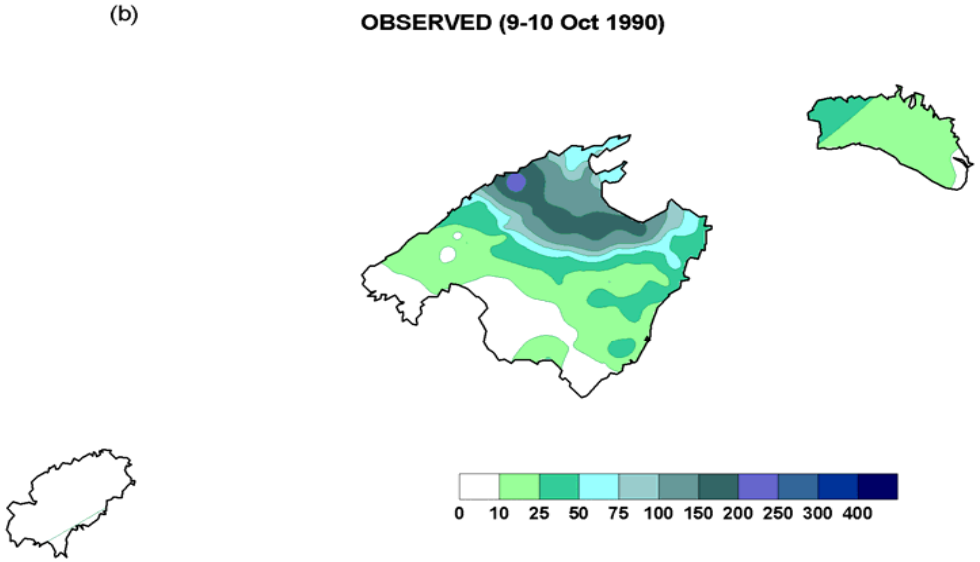
(a)


5700
5760
5820
5880
5940
6000
6060
-20
-16
-12
-8
-4
0
4
8

(b)


1004
1008
1012
1016
1020
1024
1028
-20
-16
-12
-8
-4
0
4
8
12
16
20
24
28

(b)


OBSERVED (9-10 Oct 1990)
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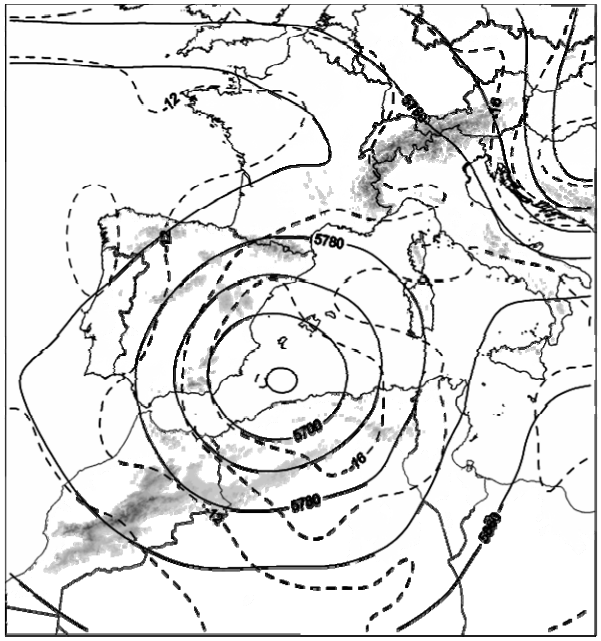
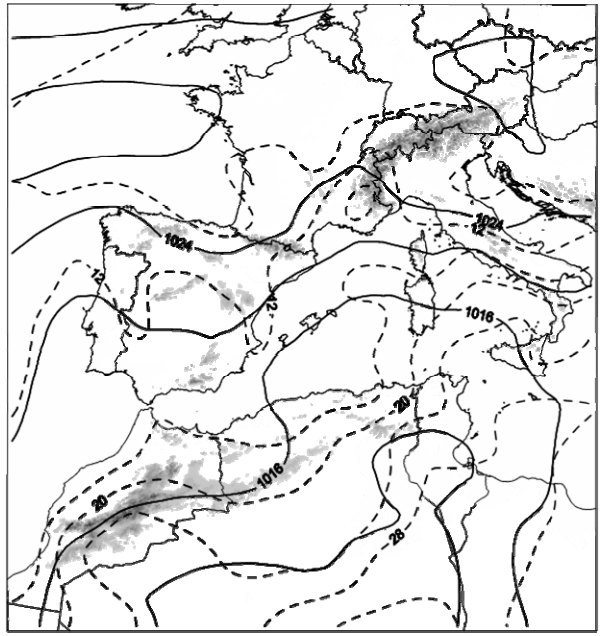
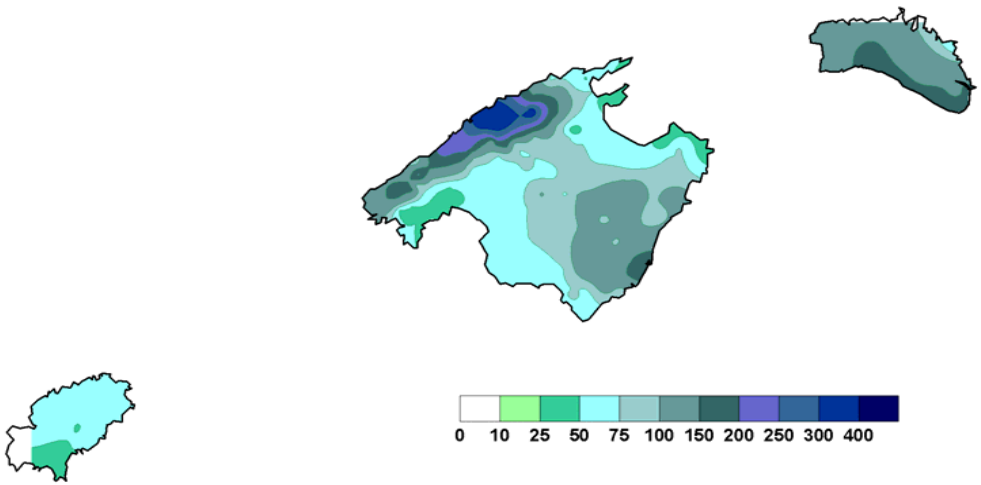
(c)


5760
5790
5820
-10
-12

(d)


1024
1016
20
28

(c)


OBSERVED (10-11 Nov 2001)
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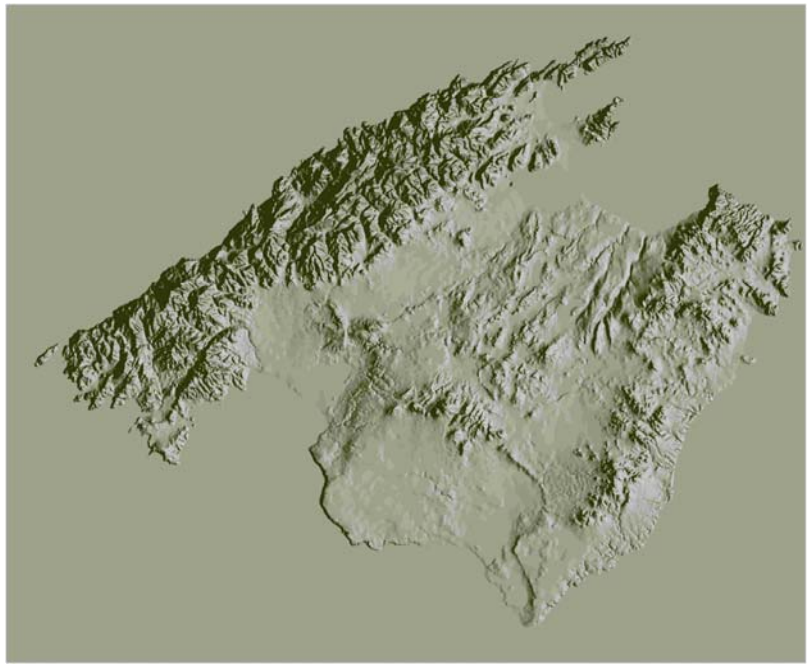
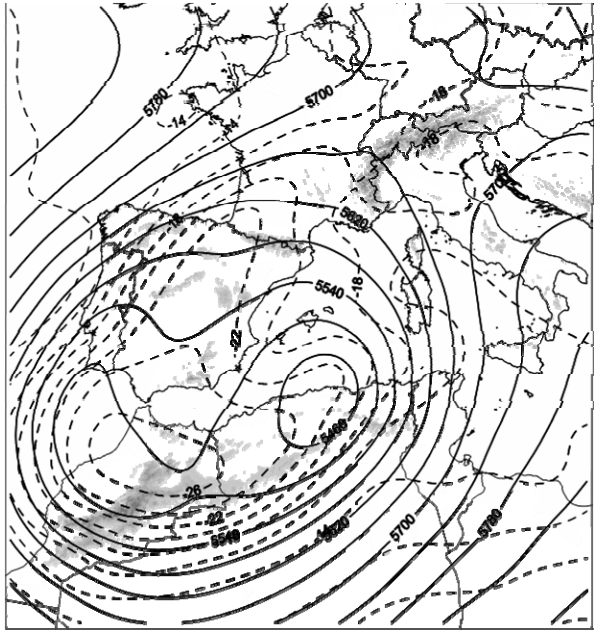
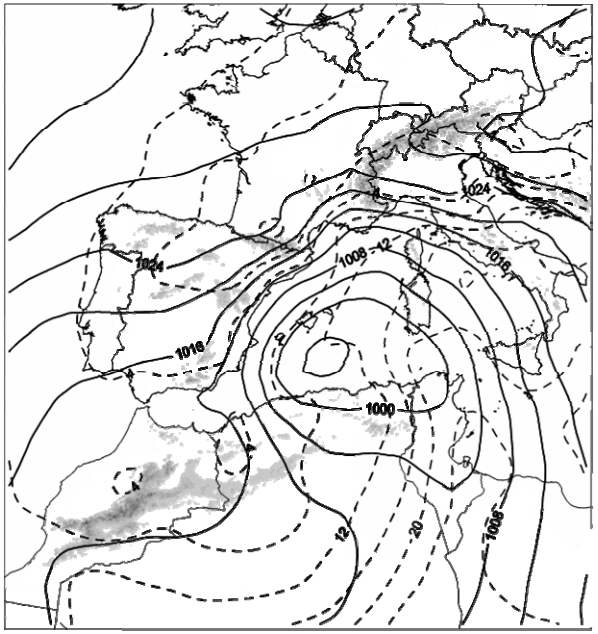


(e)

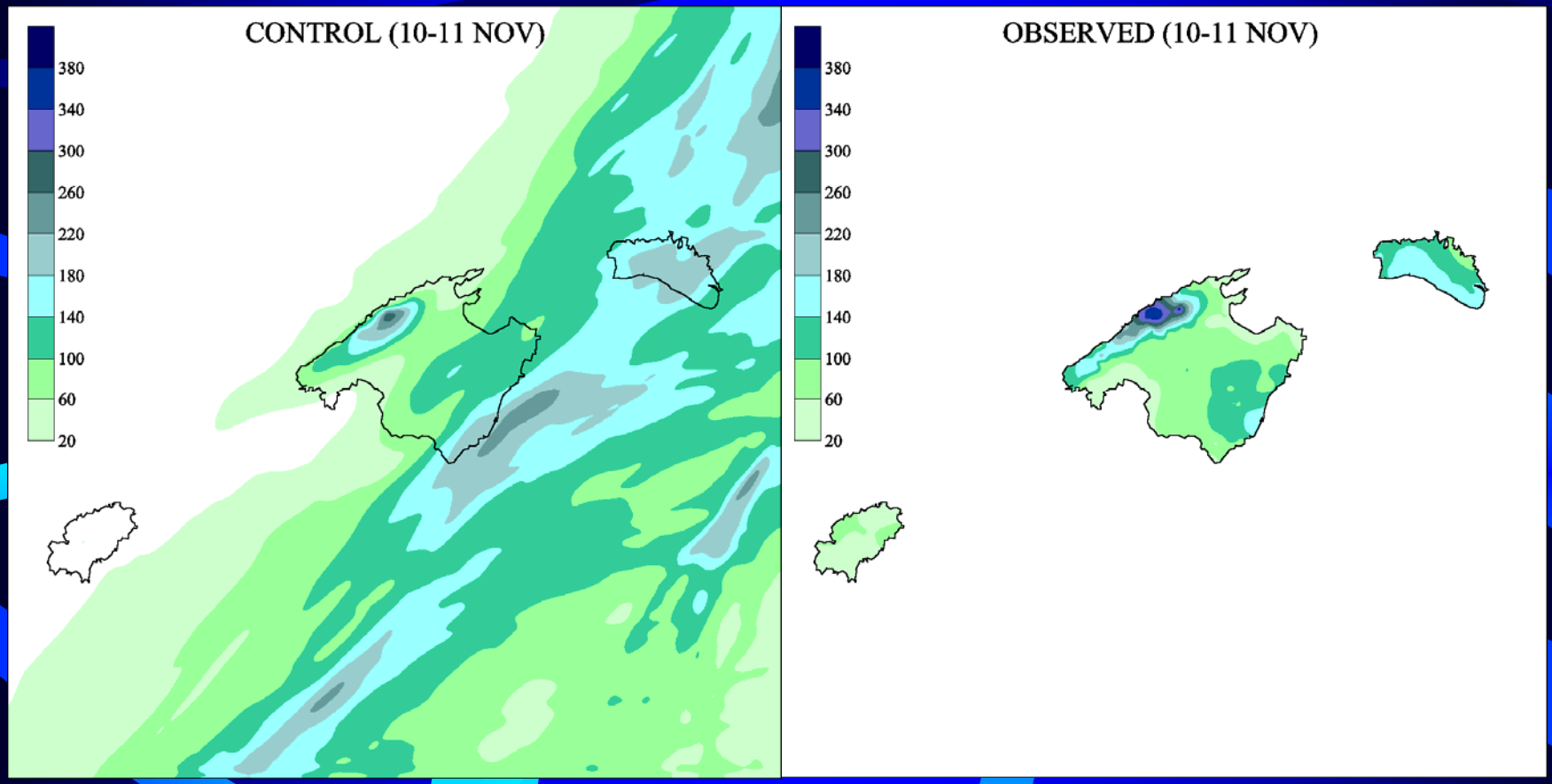

5700
5700
5540
5700

(f)


1024
1009
1016
1000
1008

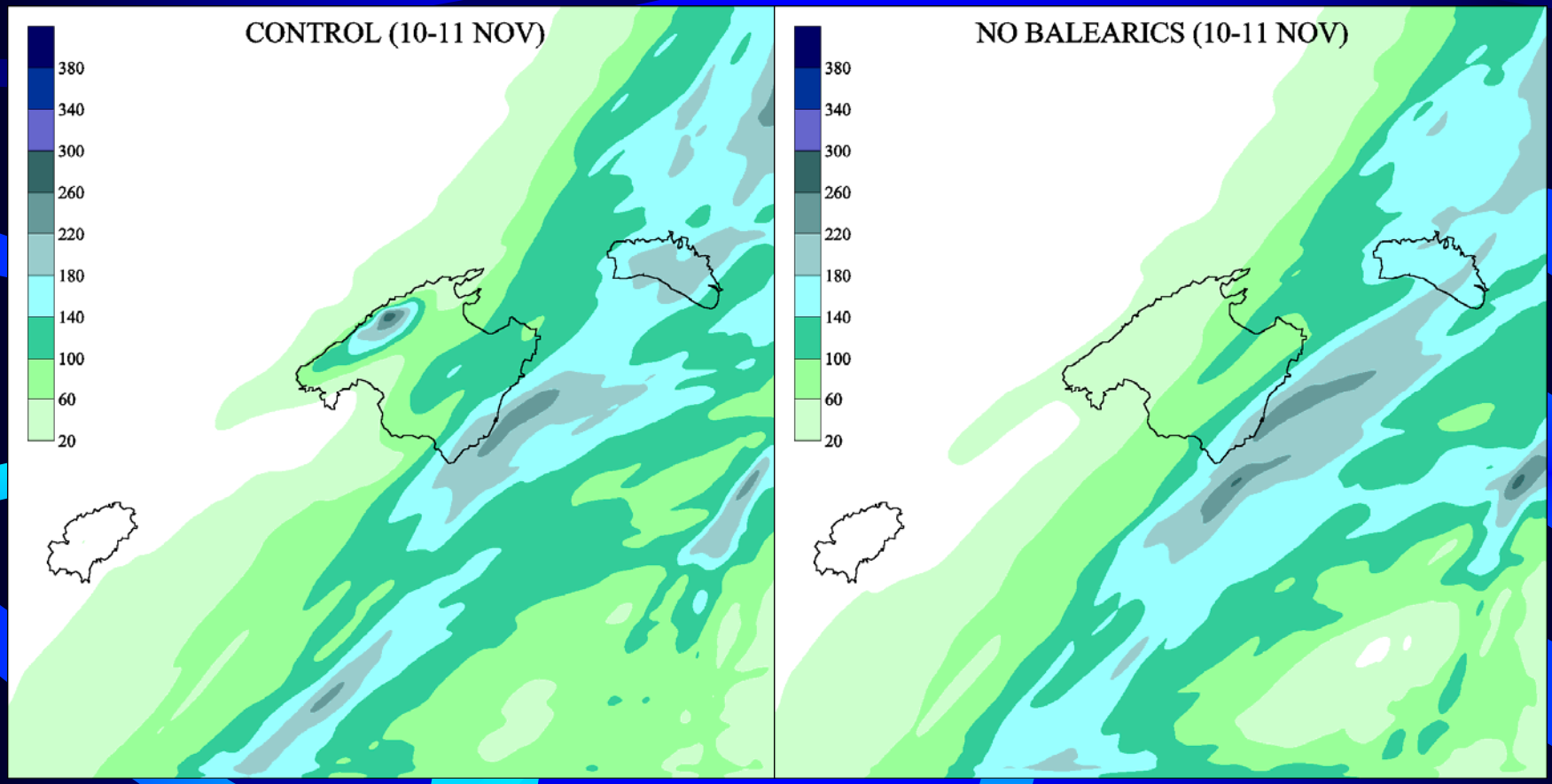
2-km CONTROL
(MM5 simulation)

Observed rainfall
(Instituto Nacional de
Meteorología)

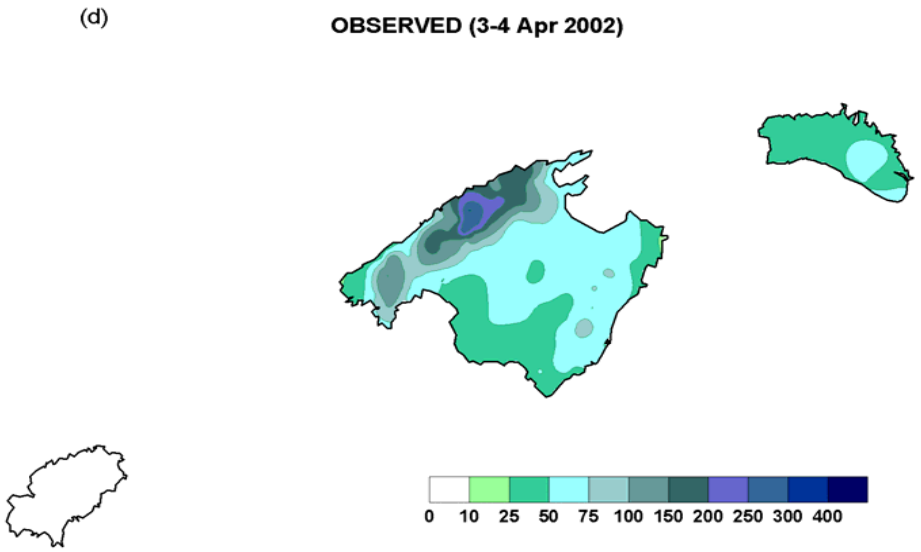


2-km CONTROL
(MM5 simulation)

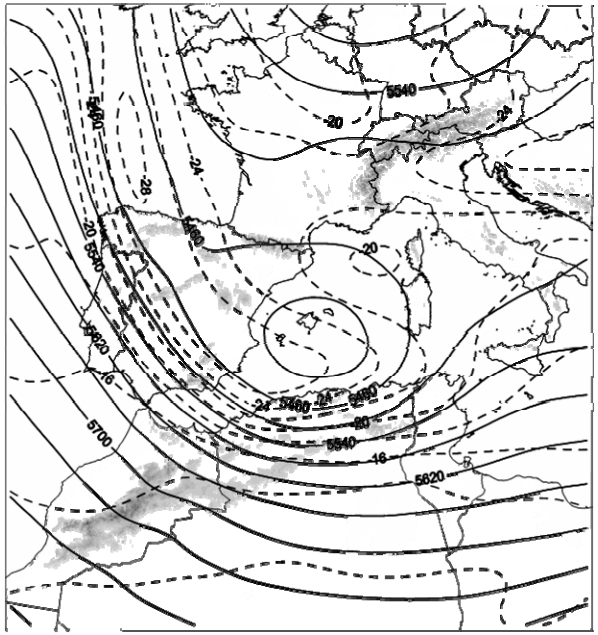
2-km No ORO
(MM5 simulation)



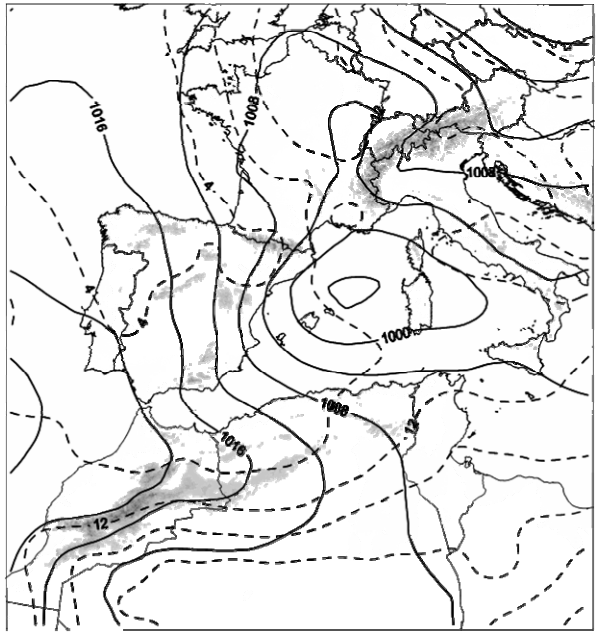
(d)


OBSERVED (3-4 Apr 2002)
0 10 25 50 75 100 150 200 250 300 400

(g)


5460
5500
5540
5580
5620
5660
5700
-20
-24
-28
-16
-12
-8
-4
0
4
8
12
16
20
24

(h)


1000
1004
1008
1012
1016
1020
4
8
12

Flash Floods

NCAR / UCAR / NSF

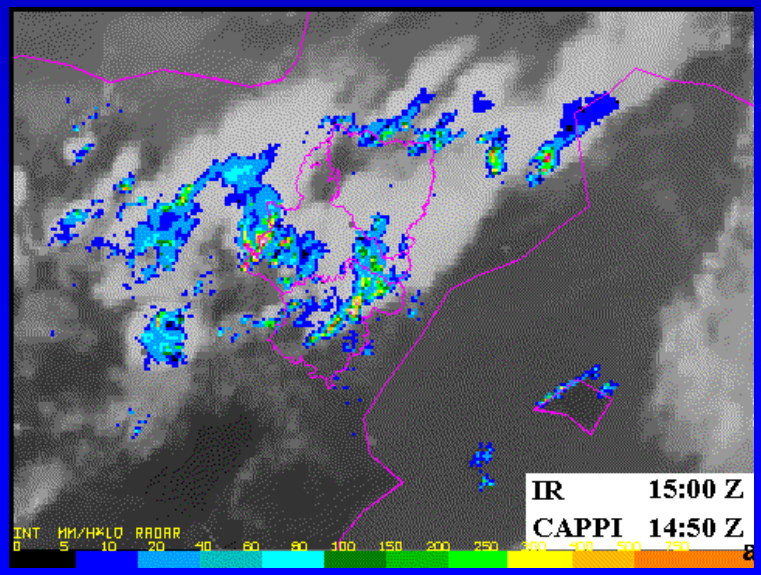
Definition

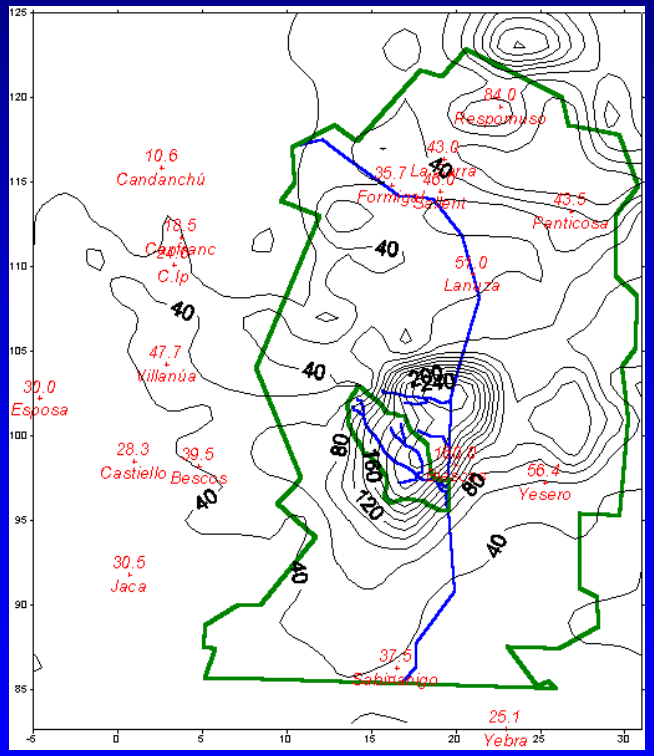
A flash flood occurs suddenly, within a short time (from minutes to less than 6 hours) after a causative event. Flash floods are the number one weather-related killer in the U.S. Nearly half of all flash-flood fatalities are auto related.

Causative events include heavy rains from slow moving thunderstorms, dam or levee failure, or the sudden release of water from the breakup of an ice jam. Intense, short-duration rainfall on impervious areas, such as urban areas or certain soils, also causes flash floods.

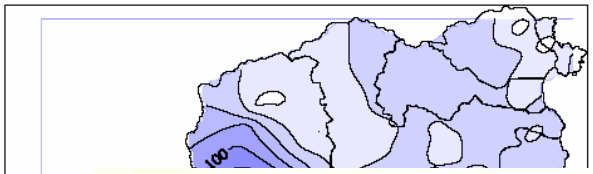
Flash floods are most prevalent on small streams, generally draining areas ranging in size from a few square miles to several hundred square miles. The most dangerous flash floods are usually associated with steep mountain streams, canyons, and desert washes where they can manifest themselves as a wall of water traveling downstream.

An example: The Biescas event (7th August 1996)





An example: The Llobregat episode (9-10th June 2000)



Characteristics

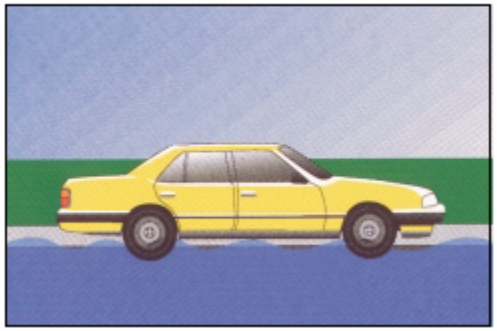
Rainfall intensity and duration affect the potential for flash floods. Other non-meteorological factors that could affect an area's ability to absorb water include the topography, soil conditions, and ground cover.

Topography is important, especially when there are steep slopes. Gravity rapidly moves the water to the lowest point(s), reducing the time the runoff is susceptible to being absorbed by the ground, as well as funneling water from larger areas into the lowest region.

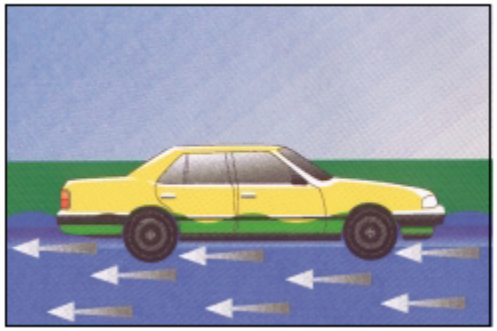
Some soils can absorb runoff more effectively (i.e., sand is better than clay) and reduce runoff. Soils covered with vegetation tend to retard runoff, and mitigate rapid accumulation of water at low points. Wet soils have limited capability to absorb runoff, so rainfall is more effective in causing flooding when soils are moist. Frozen soils also do not allow for absorption of runoff. Finally, some soils, such as clay, that have been "baked" by long periods of hot, dry conditions, often have little capability to absorb runoff.

The most severe flash floods can roll boulders, tear out trees, destroy buildings and bridges, and scour out new channels. However, less serious flash flooding is still capable of taking lives. As little as a foot of moving water is enough to sweep a car into deeper flood waters. Also, children playing in flood waters, especially near culverts and drainage pipes, can be swept away. Other hazards associated with flash floods include:

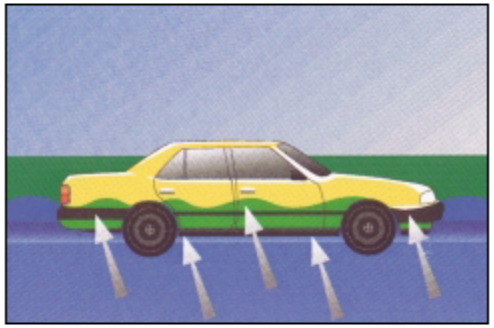
- **Sudden release of huge walls of water** - Floating debris or ice can collect at an obstruction and restrict the flow of water. Pressure builds up behind the jam, and when the pressure bursts through, a huge wall of water of up to 30 feet is released, causing tremendous destruction.
- **Debris flows** - Debris caught in the water flow acts as battering rams, causing additional destruction.
- **Mud slides** - Flash floods can also trigger mud slides in areas with clay soils, saturated soils, or little ground cover.



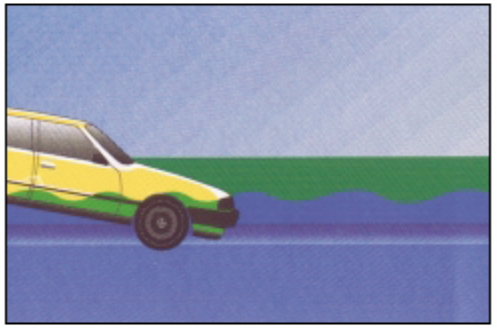
Water weighs 62.4 lbs. per cubic foot and typically flows downstream at 6 to 12 miles an hour.



When a vehicle stalls in the water, the water's momentum is transferred to the car. For each foot the water rises, 500 lbs. of lateral force are applied to the car.



But the biggest factor is buoyancy. For each foot the water rises up the side of the car, the car displaces 1,500 lbs. of water. In effect, the car weighs 1,500 lbs. less for each foot the water rises.



Two feet of water will carry away most automobiles.

Riverine Floods

Definition

Whereas flash floods occur quickly after an upstream event, riverine flooding is a longer-term event that may last a week or more.

Flooding along rivers and streams is natural and inevitable. Some floods occur seasonally when winter or spring rains, coupled with melting snows, fill river basins with too much water, too quickly. Torrential rains from hurricanes or tropical systems also can produce river and stream flooding.

Flooding on a non-leveed stream occurs when overbank flows are of sufficient magnitude to cause considerable inundation of land and roads. Flooding on a leveed stream occurs when the stream level rises above the levee. Flooding also can occur if the levee fails. The ability of the levee to withstand flooding depends on the design standards used when constructing the levee. Many private (mostly agricultural) levees are not intended to withstand major floods.

Characteristics

Riverine flooding is normally the result of a combination of meteorological and hydrological factors. Although excessive rainfall alone can cause flooding, the most severe riverine floods usually have multiple causative factors. These factors may include:

- Heavy prolonged rainfall from large-scale storms or a series of large-scale storms
- Heavy rainfall from a near-stationary or slow-moving thunderstorm complex
- Saturated soil conditions from previous rainfall events
- High existing river flows from previous rainfall events
- Extreme cold temperatures followed by thawing, leading to river ice jams
- Rapid snowmelt. Snowmelt floods can develop over periods ranging from several hours to several days, depending upon the part of the country, the water content of the snow, and temperatures during the melting period. The combination of large-scale storm rainfall and rapidly melting snow can cause severe flooding
- Silt buildup in river channels during previous storm events that reduces the capacity of the river to carry water

The dangers of riverine floods are similar to coastal and flash floods. Dangers include:

- Damaged or destroyed buildings and vehicles
- Uprooted trees causing power and utility outages
- Drowning, especially people trapped in cars
- Contamination of drinking water
- Dispersion of hazardous materials
- Interruption of communications and/or transportation systems

An example: The Central Europe Floods (August 2002)

Bratislava

Prague

Dresden

METEOROLOGIA

La 'gota fría' amenaza a las comunidades del Mediterráneo

!!!

Fuertes vientos y lluvias torrenciales serán los protagonistas de las próximas horas

2.1. La gota fría como "comodín" meteorológico

Se entiende, coloquialmente, como gota fría a ***cualquier situación meteorológica*** que lleve o pueda llevar asociada lluvias intensas, efectos desastrosos, preferentemente en la época otoñal y en la zona mediterránea, independientemente del marco sinóptico donde se desarrollan las precipitaciones. Esta "entidad" o concepto (¡¡¡que no definición!!!) no está basada en aspectos meteorológicos precisos.

Este término está arraigado, sobre todo, en algunos medios de comunicación que tratan de explicar de forma llana y simplista situaciones de lluvias fuertes y dañinas.

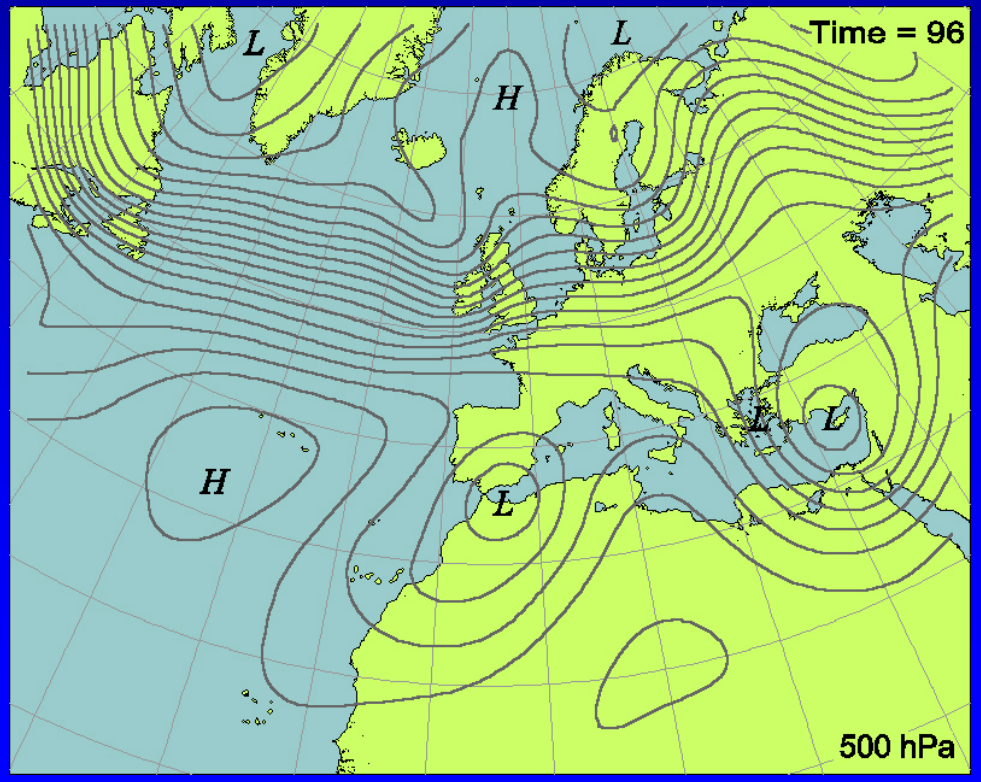
Estamos acostumbrados a oír que lluvias cuantiosas, que se han registrado en un lugar determinado, se han producido porque la gota fría ha barrido o afectado a dicha zona. La gota fría se asocia vulgarmente con inestabilidad atmosférica. En esta acepción subyace el hecho de que la gota fría es sinónimo de la presencia de aire muy frío en niveles medios y esto, unido al aire cálido de Mediterráneo en la época otoñal (o incluso durante la primavera-verano sobre las tierras soleadas peninsulares), bastaría para explicar los acontecimientos de fuerte inestabilidad y de carácter tormentoso. ***La gota fría es, conceptualmente, una perturbación o ente "comodín".***

Es fácil de demostrar, puntualmente y climatológicamente, que **muchas situaciones de gota fría no llevan asociadas lluvias intensas y catastróficas**. De la mismas forma, **episodios adversos de lluvias y vientos fuertes en el área mediterránea pueden estar ligados a otro tipo de fenomenología distinta a las gotas frías,** donde las

"Una depresión cerrada en altura que se ha aislado y separado completamente de la circulación asociada al chorro, y que se mueve independientemente de tal flujo llegando, a veces, a ser estacionaria o, incluso, retrograda (su desplazamiento es, en estos casos, de dirección este-oeste)".

Caso real (21 de Octubre de 2000, 00 UTC):

- Formación de una “gota fría” al sur de la Península Ibérica que dura varios días
- Lluvias intensas sobre el este peninsular que provocan inundaciones y graves daños



ESTRUCTURA

1) Ideas previas

2) Ciclones extratropicales c

les o "medicanes"

ciclones – lluvias

5) Tormentas y fenómenos severos

6) Otros riesgos climáticos

Thunderstorms

Definition

A local storm

- Produced by a cumulonimbus cloud
- Always accompanied by lightning and thunder
- Often accompanied by gusty winds, heavy rain, and occasionally by hail
- Sometimes violent at the surface

Category	Wind Speed	Precipitation
Ordinary	< 35 knots (40 mph)	Variable
Approaching Severe	> 35 knots (40 mph)	Hail > 1/2 inch
Severe	> 50 knots (58 mph)	Hail > 3/4 inch

Characteristics

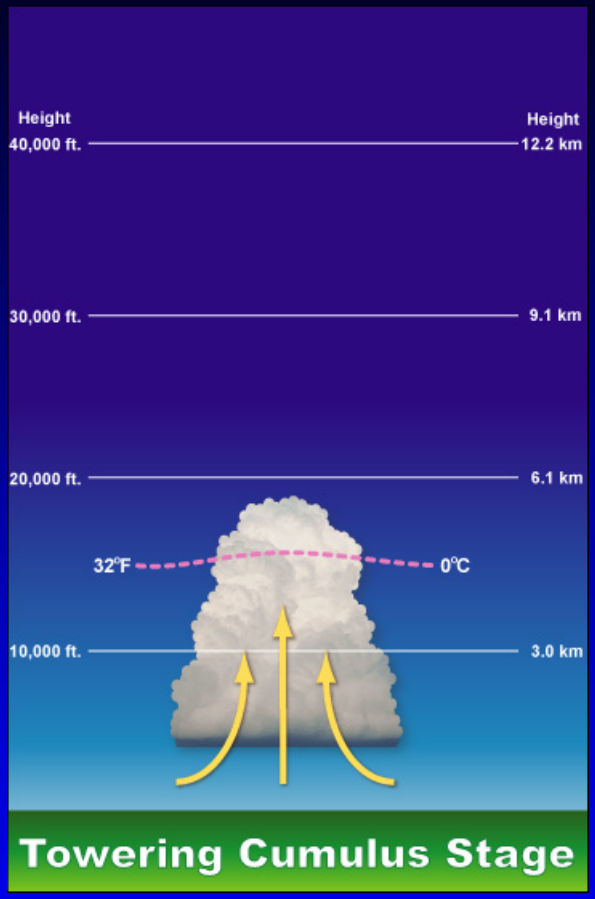
Contributing Factors

- **Moisture** comes from large bodies of water, large vegetated or irrigated areas, or previous storms.
- **Instability** is related to the temperature profile of the atmosphere relative to the moisture of the air mass. If the mid to upper atmosphere is cool (more dense) while the lower atmosphere is moist (less dense), then the lower atmosphere becomes buoyant and unstable and wants to rise, thereby initiating convection. The more unstable the air mass, the more severe the convection. The NWS uses Lifted Index (LI) and Convective Available Potential Energy (CAPE) to indicate atmospheric instability.
- **Lift** is required to initiate convection. Lift can be caused by fronts, heat rising from the earth's surface, topography (upslope flow), dryline boundaries, outflow boundaries from previous storms, and sea breezes.

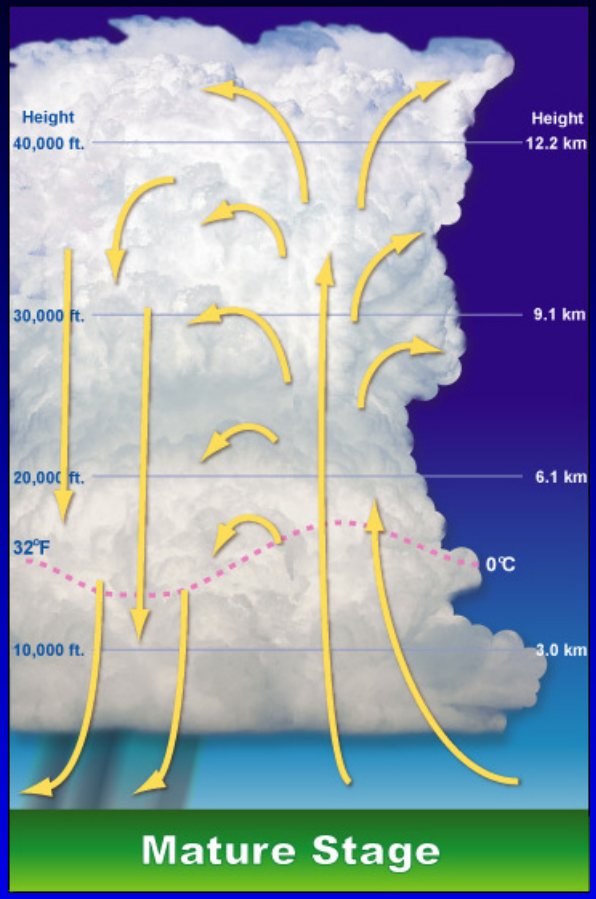
Stages of Development

- **Developing** - A towering cumulus cloud develops as air rises. The cloud extends to about 20,000 feet above the level of freezing temperatures. Usually there is little if any rain, but occasionally lightning occurs during this stage, which lasts about 10 minutes.
- **Mature** - During this stage, the storm builds to heights of 40,000 feet or more. This is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The mature stage lasts an average of 10 to 20 minutes, but may last much longer.
- **Dissipating** - Downdrafts begin to choke off the supply of air that feeds the storm; the storm stops building, loses height, and dissipates. Rainfall decreases in intensity, but some thunderstorms produce a burst of strong winds in this stage, and lightning remains a danger.

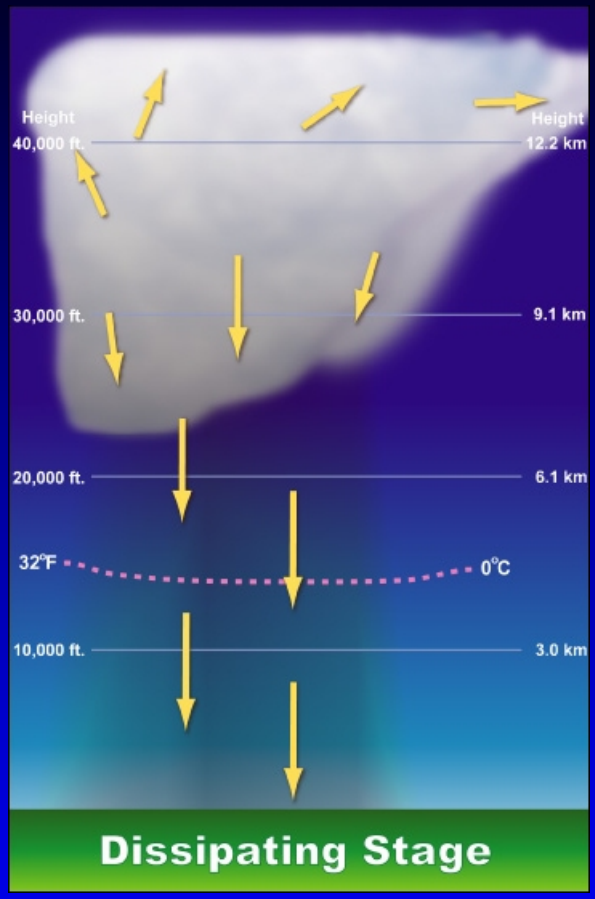
Single Cell



Towering Cumulus Stage



Mature Stage



Dissipating Stage

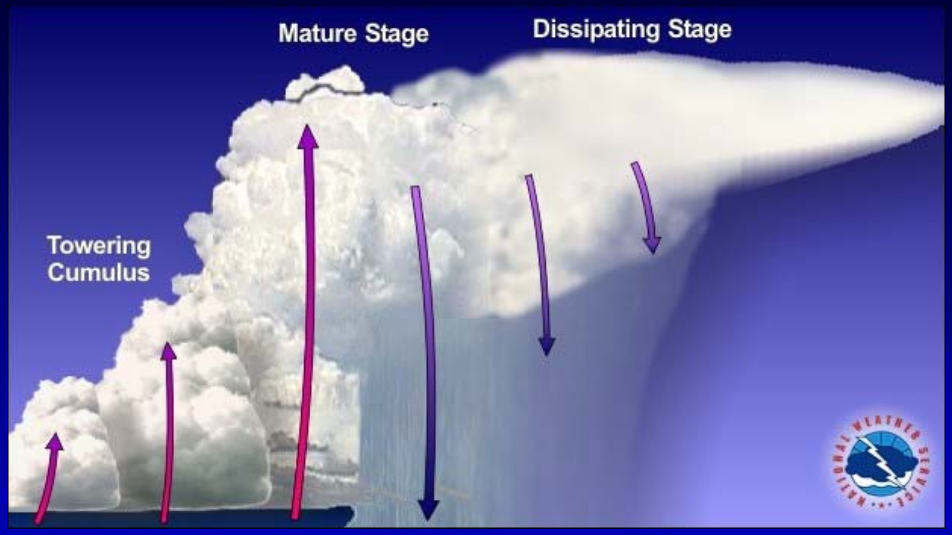
Types

- **Single Cell** - Short-lived storms (20 to 30 minutes) that cover a limited area (a few square miles). These storms are relatively uncommon.
- **Multicell** - The most common type, multicell thunderstorms are an organized cluster of two or more single cell storms. Air flowing out of one storm fuels other storms, causing new storms to develop on the right or rear storm flank every 5 to 15 minutes.
- **Supercell** - Supercells are relatively uncommon but produce the most severe weather, last the longest (1 to 6 hours), and travel 200 miles or more. These storms can cause winds of more than 78 mph, giant hail (e.g., 2 inches), and significant tornado activity. Supercells produce updrafts of 56 to 112 mph that coexist with sustained downdrafts. Together, the updrafts and downdrafts act to extend the storm's duration.
- **Squall Lines** - A line or band of active thunderstorms, a squall line may extend over 250 to 500 miles, may be from 10 to 20 miles wide, and consist of many laterally aligned cells that do not interfere with one another. The cells may be any combination of types (ordinary to severe, single cell to supercell). Squall lines may form along cold fronts, but often form as much as 100 miles ahead of an advancing cold front in the warm sector of an extratropical storm. They often trail a large, flat cloud layer that brings significant rain after the storms pass.

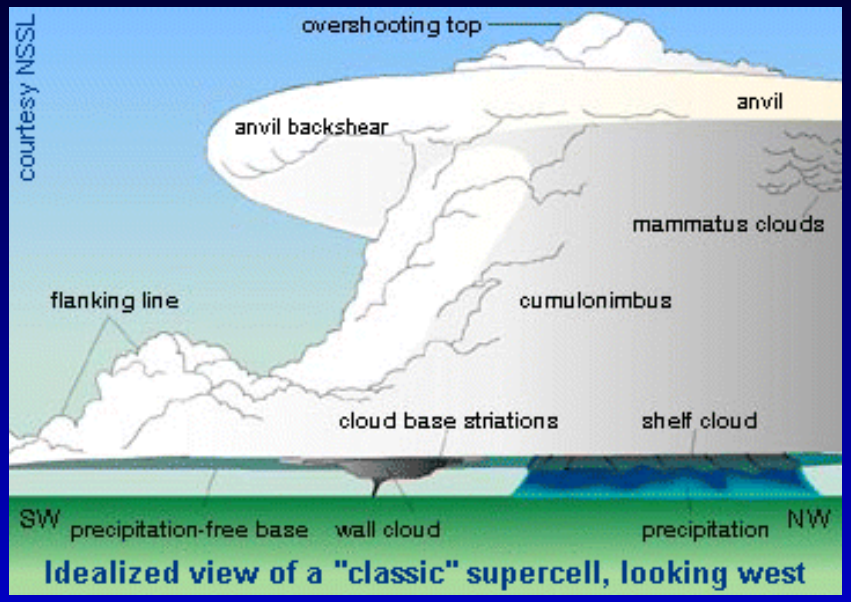
Associated Hazards

- Lightning
- Hail
- Damaging winds
- Heavy rain causing flash flooding
- Tornadoes
- Lightning-caused fire

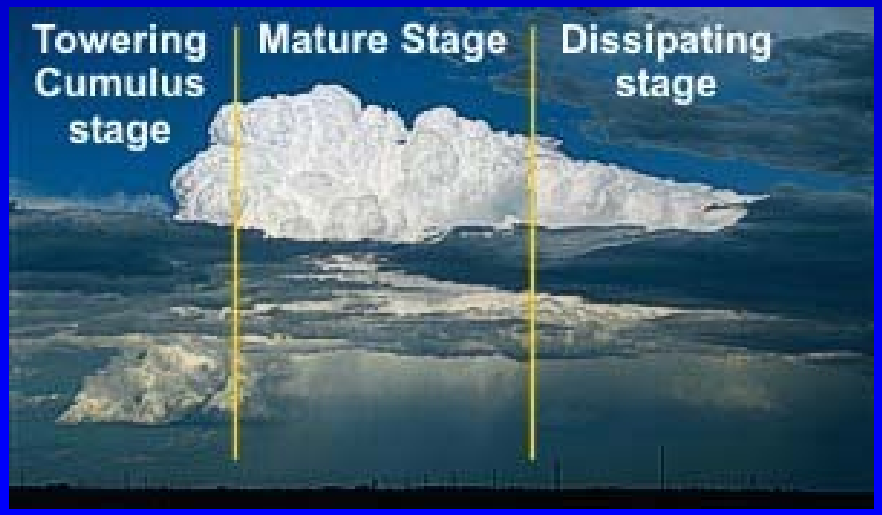
Multicell



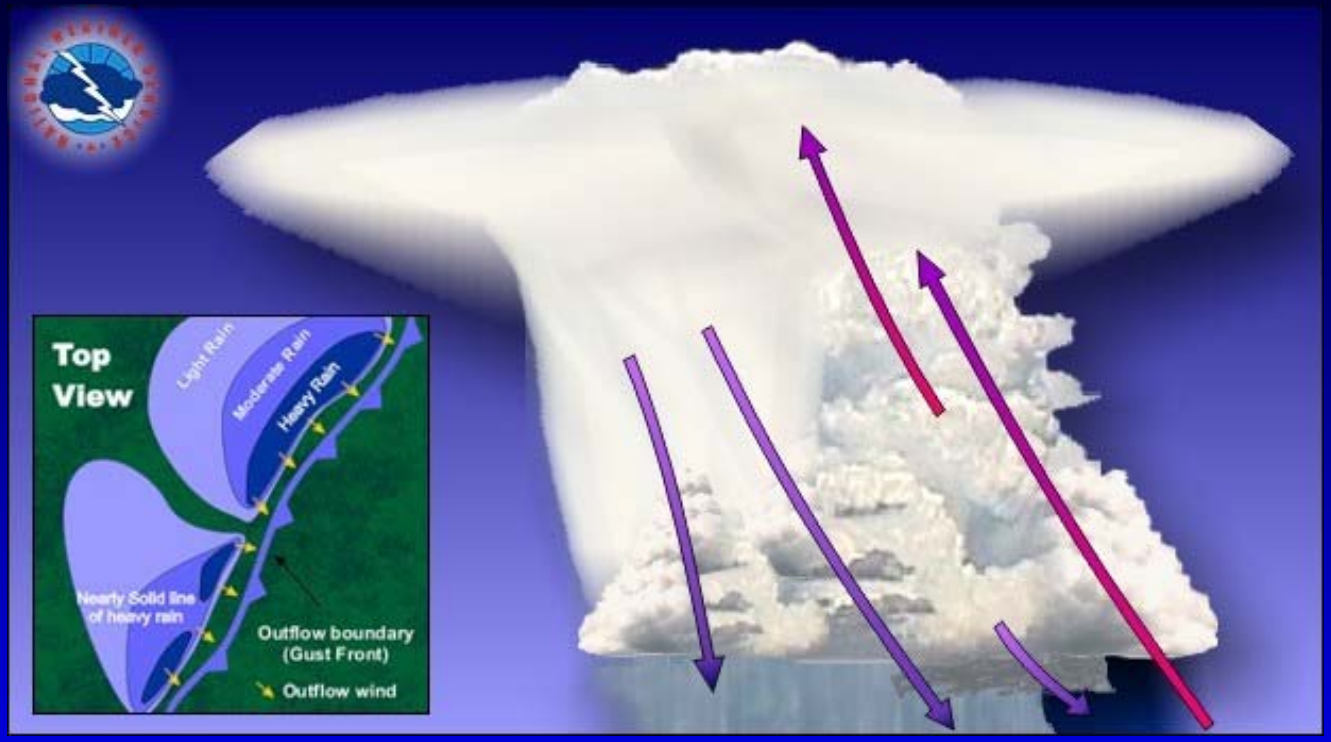
Supercell



Idealized view of a "classic" supercell, looking west



Squall Line



Damaging winds

Sucesos

La tormenta

La tormenta

En el´polígono de Can Valero el desastre fue mayúsculo: volaron los tejados de algunas naves y decenas de coches quedaron destrozados. Foto: SEBASTIÀ AMENGUAL

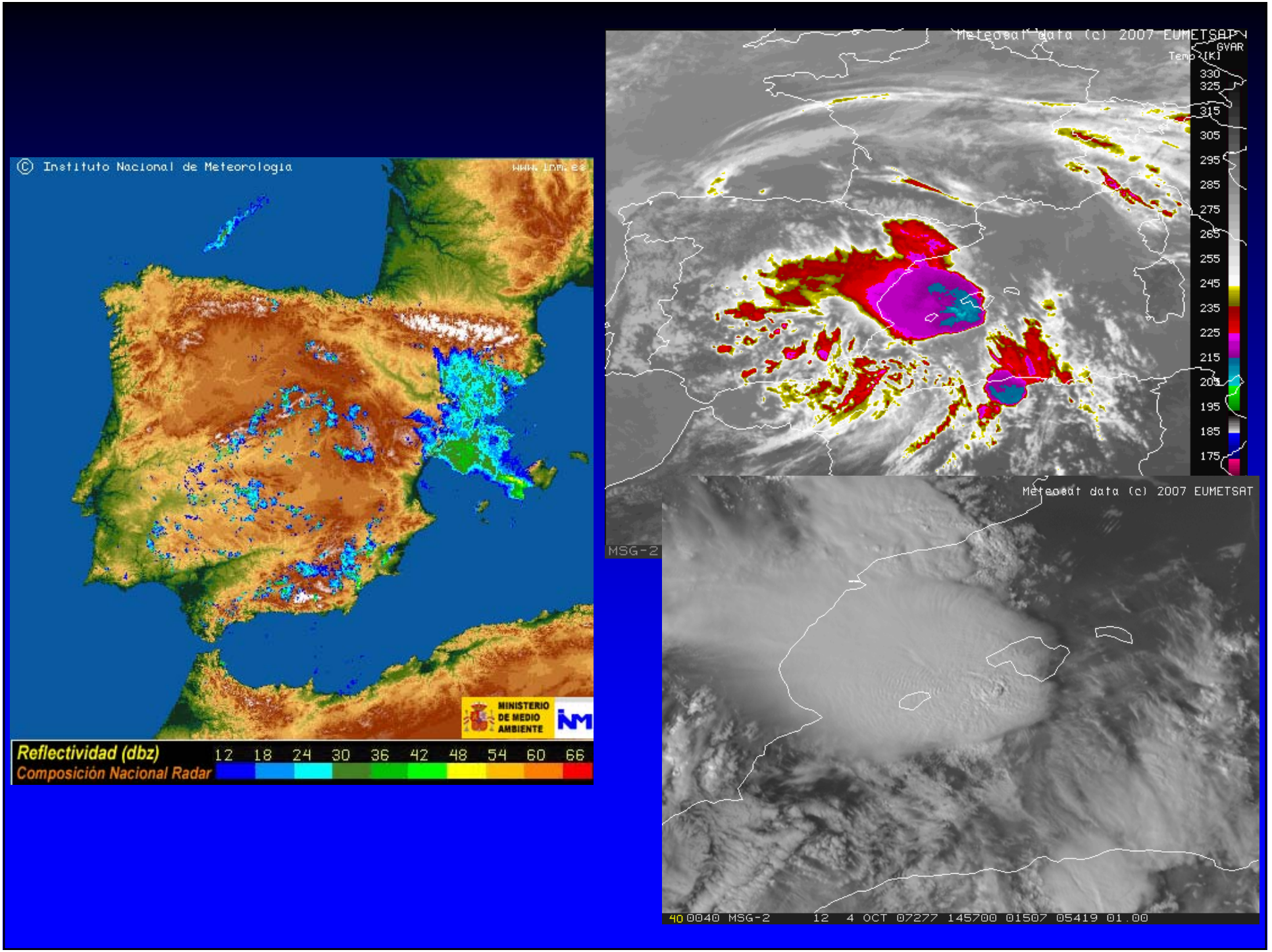
Catastrófico

Una tormenta huracanada trae el caos a Palma en apenas quince minutos y deja un balance desolador

JAVIER JIMÉNEZ

Oscureció. Una gran nube negra entró por la bahía, cubrió Palma y desató el desastre. En Sólo quince minutos la capital balear padeció un calvario. Las consecuencia de la tormenta huracanada han sido catastróficas: una veintena de heridos, uno de ellos crítico; cientos de coches dañados; miles de árboles arrancados; torres de alta tensión derribadas ventanas reventadas; naves industriales devastadas; caos histórico de tráfico; escap de gas; inundaciones; torrentes a punto de desbordarse; colegios afectados; el estadio Son Moix con el techo destruido; parte del psiquiátrico evacuado; accidentes múltiples; incendios en casas; retrasos en el aeropuert

4/10/2007


© Instituto Nacional de Meteorologia
www.inm.es
MINISTERIO DE MEDIO AMBIENTE
Reflectividad (dbz)
12 18 24 30 36 42 48 54 60 66
Composición Nacional Radar
Meteosat data (c) 2007 EUMETSAT
GVAR
Temp [K]
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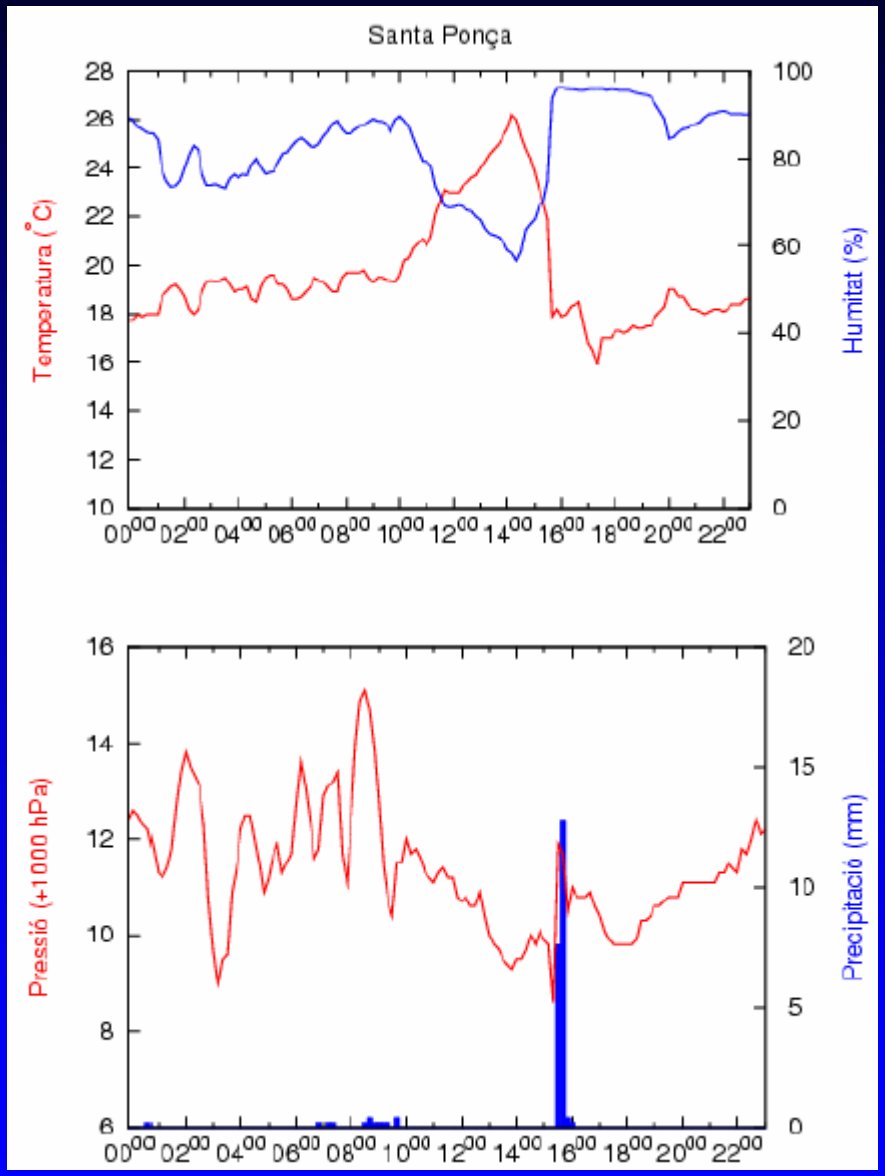
Santa Ponça
Temperatura (°C)
Humitat (%)
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Pressió (+1000 hPa)
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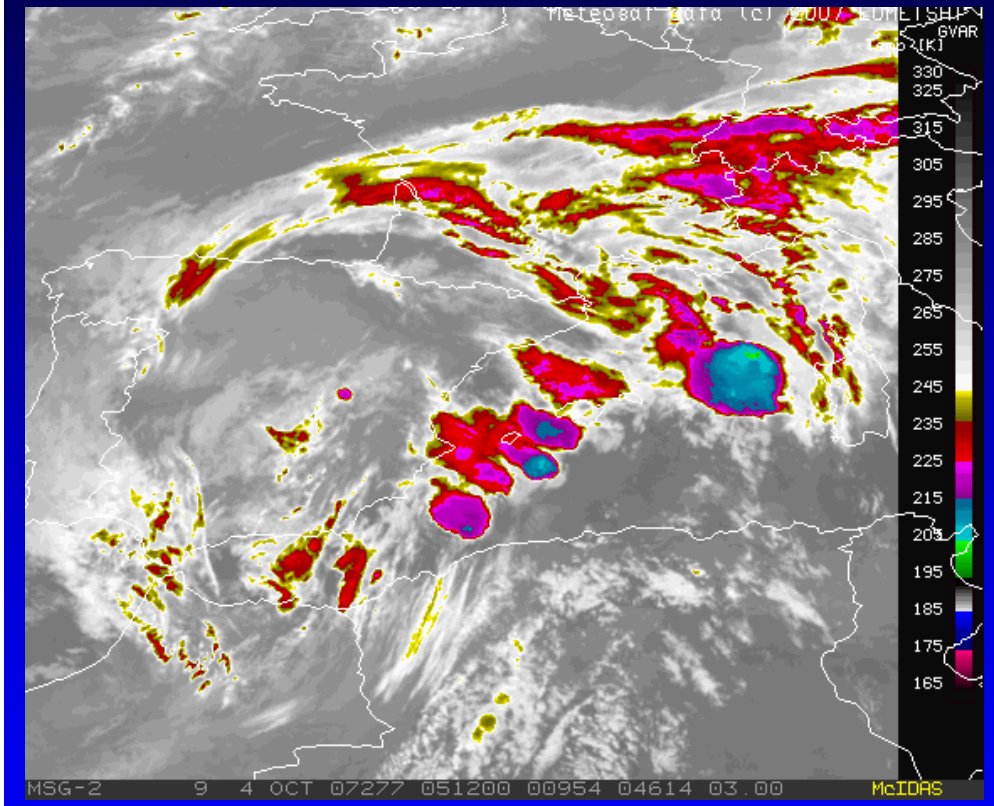
GVAR
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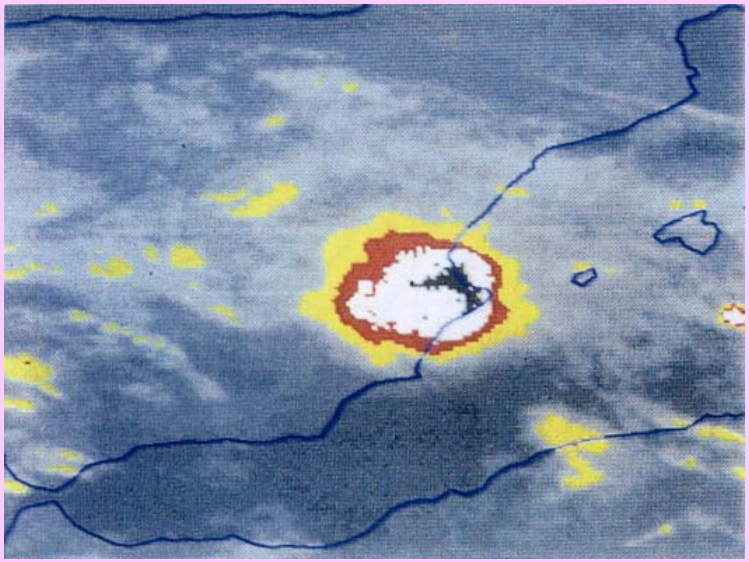
MSG-2 9 4 OCT 07277 051200 00954 04614 03.00
McIDAS

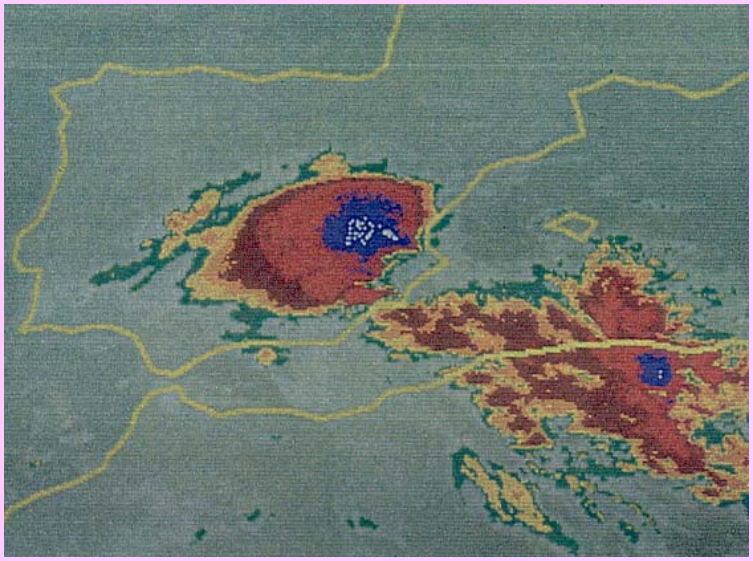
GANDIA (3-4 Nov. 1987)

MCS (33 h)
Circular shape (~200 km diameter)
>800 mm / 36 h in **Gandia**

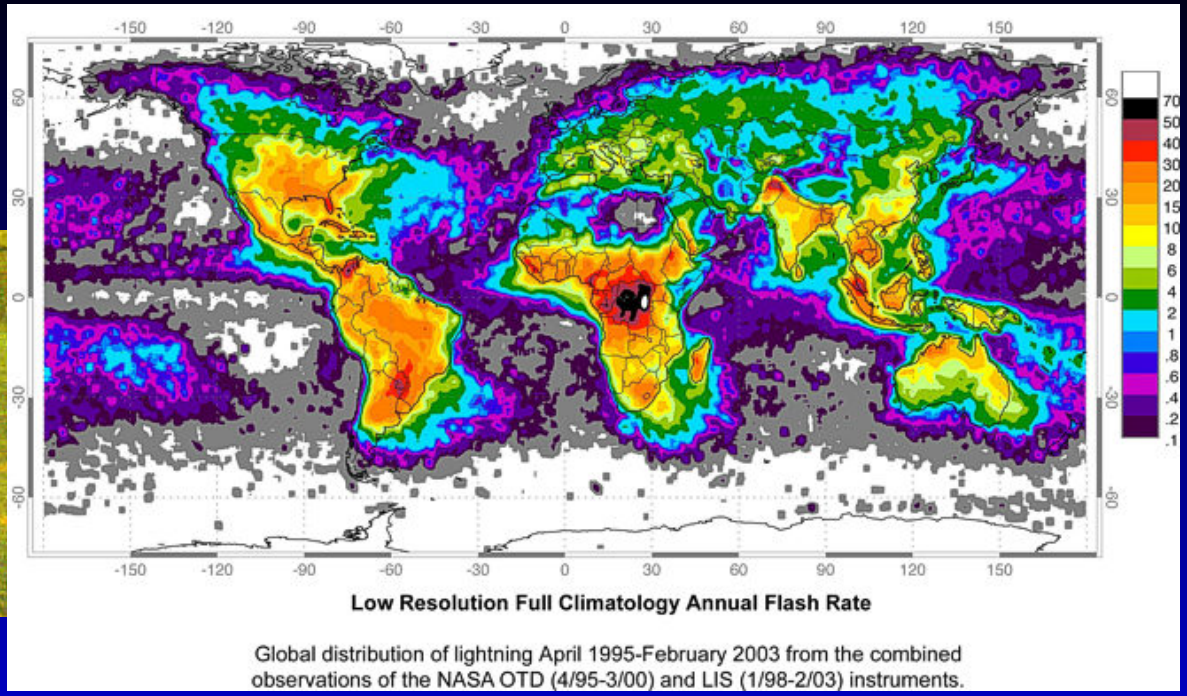


TOUS (20 Oct. 1982)

MCC (>12 h)
>400 mm
Dam breaking in **Tous**



Mesoscale convective systems



Low Resolution Full Climatology Annual Flash Rate

Global distribution of lightning April 1995-February 2003 from the combined observations of the NASA OTD (4/95-3/00) and LIS (1/98-2/03) instruments.











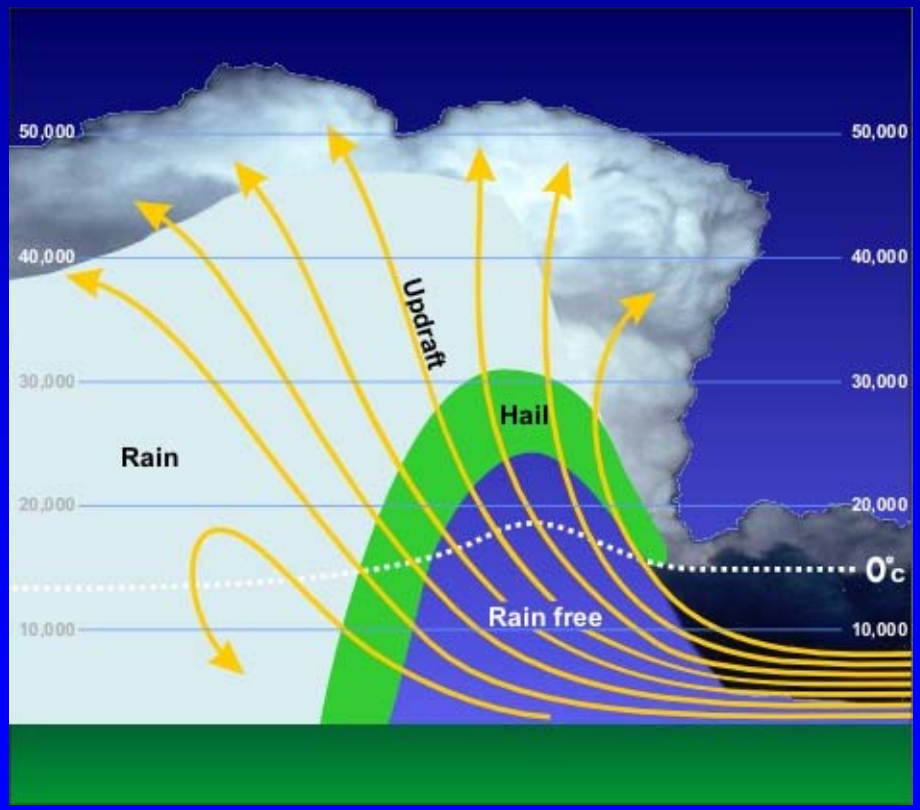
Consell

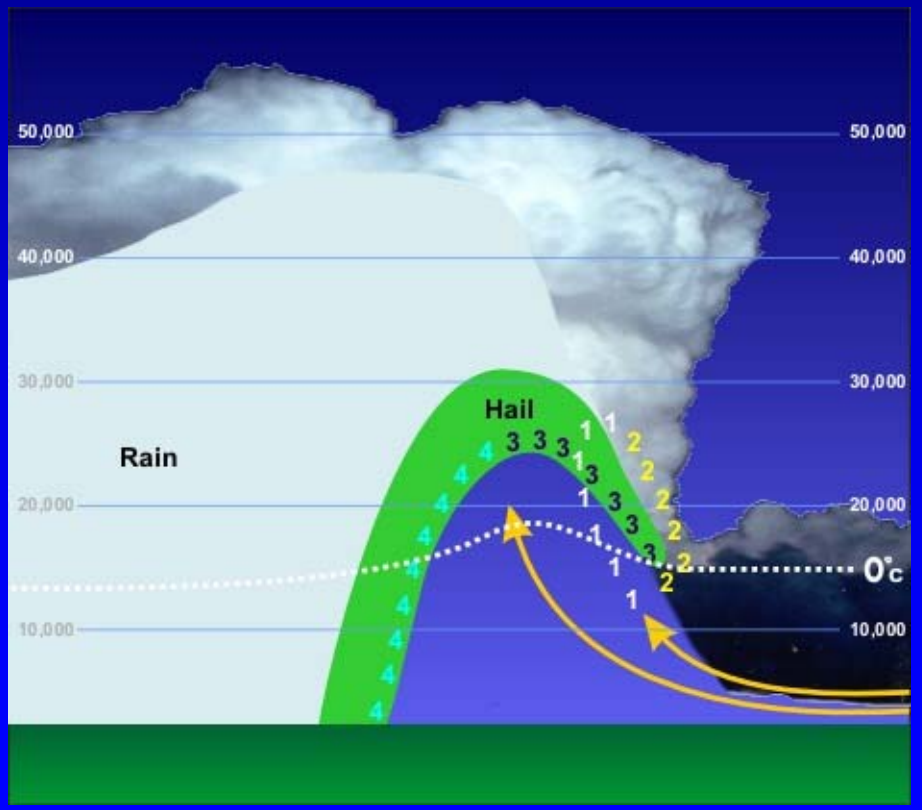
Un centenar de cotxes, teulades i finestres fets malbé a les Balears a causa d'una pedregada

2/09/2003

Actualitzat a les 10:51 h

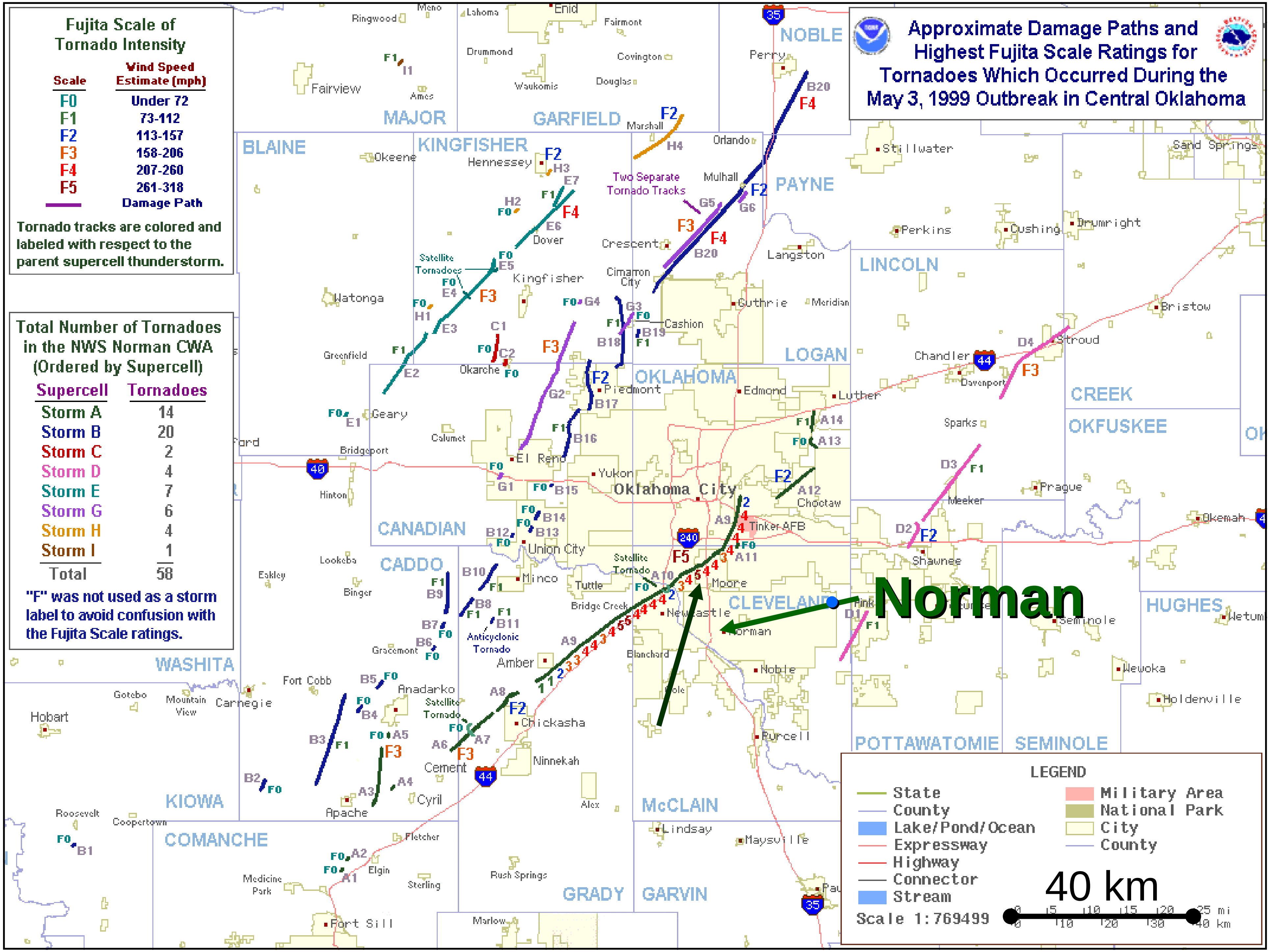
Una forta pedregada ha despertat aquesta nit molts veïns de Consell, a Mallorca. La tempesta ha estat curta, però intensa, i ha fet malbé un centenar de cotxes, teulades, arbres i vidres de portes i finestres. Aquest dimarts, encara se'n podien veure les conseqüències mentre els propietaris afectats ja reparaven els desperfectes.



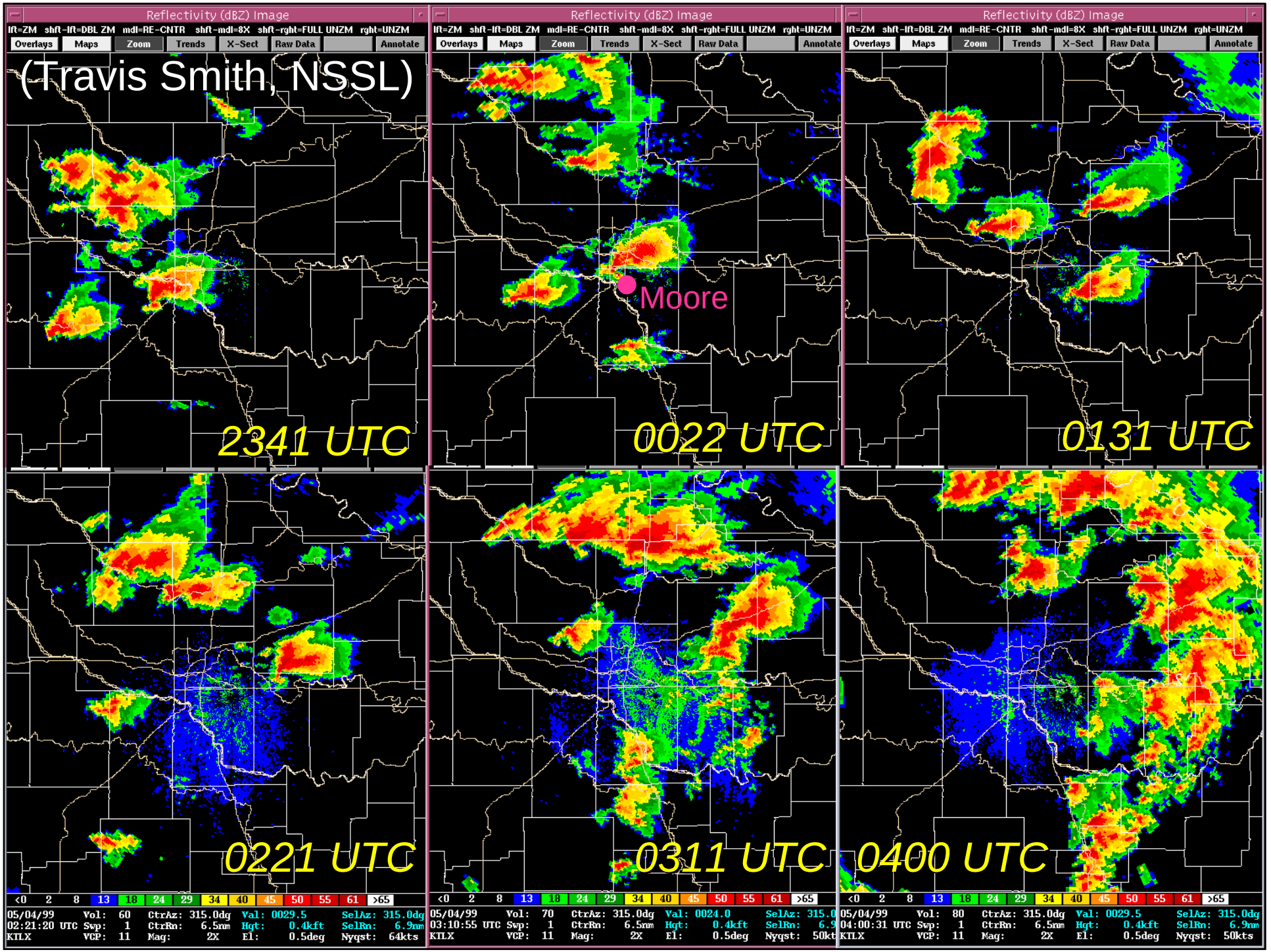


An example: The severe hail storm in Alcañiz (16th August 2003)


"Tornado Alley"
Tornadoes



Approximate Damage Paths and Highest Fujita Scale Ratings for Tornadoes Which Occurred During the May 3, 1999 Outbreak in Central Oklahoma
Fujita Scale of Tornado Intensity
Scale | Wind Speed Estimate (mph)
F0 Under 72
F1 73-112
F2 113-157
F3 158-206
F4 207-260
F5 261-318
Damage Path
Tornado tracks are colored and labeled with respect to the parent supercell thunderstorm.
Total Number of Tornadoes in the NWS Norman CWA (Ordered by Supercell)
Supercell | Tornadoes
Storm A 14
Storm B 20
Storm C 2
Storm D 4
Storm E 7
Storm G 6
Storm H 4
Storm I 1
Total 58
"F" was not used as a storm label to avoid confusion with the Fujita Scale ratings.
Norman
Oklahoma City
LEGEND
State
County
Lake/Pond/Ocean
Expressway
Highway
Connector
Stream
Military Area
National Park
City
County
40 km
Scale 1:769499

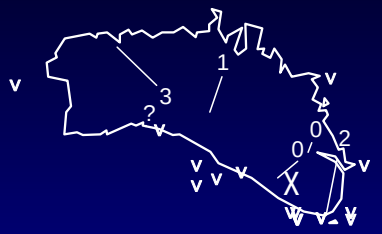

Reflectivity (dBZ) Image
lft=ZM shft-lft=DBL ZM mdl=RE-CNTR shft-mdl=8X shft-rght=FULL UNZM rght=UNZM
Overlays Maps Zoom Trends X-Sect Raw Data Annotate
(Travis Smith, NSSL)
2341 UTC
Moore
0022 UTC
0131 UTC
0221 UTC
0311 UTC
0400 UTC
<0 2 8 13 18 24 29 34 40 45 50 55 61 >65
05/04/99 02:21:20 UTC KTLX Vol: 60 Swp: 1 VCP: 11 CtrAz: 315.0dg CtrRn: 6.5nm Mag: 2X Val: 0029.5 Hgt: 0.4kft El: 0.5deg SelAz: 315.0dg SelRn: 6.9nm Nyqst: 64kts
05/04/99 03:10:55 UTC KTLX Vol: 70 Swp: 1 VCP: 11 CtrAz: 315.0dg CtrRn: 6.5nm Mag: 2X Val: 0024.0 Hgt: 0.4kft El: 0.5deg SelAz: 315.0 SelRn: 6.9 Nyqst: 50kt
05/04/99 04:00:31 UTC KTLX Vol: 80 Swp: 1 VCP: 11 CtrAz: 315.0dg CtrRn: 6.5nm Mag: 2X Val: 0029.5 Hgt: 0.4kft El: 0.5deg SelAz: 315.0dg SelRn: 6.9nm Nyqst: 50kts

7/9/2005

1989-1999: 27 tornadoes and 54 waterspouts

F-scale	Class	Wind speed		Description
		mph	km/h	
F0	weak	40-72	64-116	gale
F1	weak	73-112	117-180	moderate
F2	strong	113-157	182-253	Significant
F3	strong	158-206	254-332	severe
F4	violent	207-260	333-419	devastating
F5	violent	261-318	420-512	incredible

Majorca



Minorca

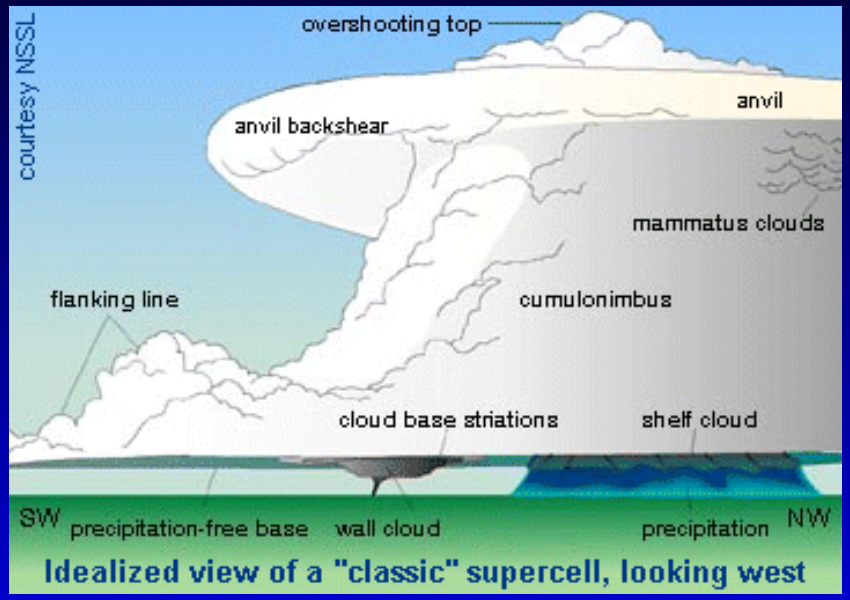
Ibiza

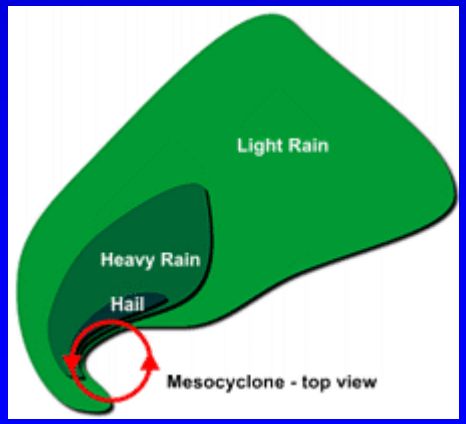
Formentera

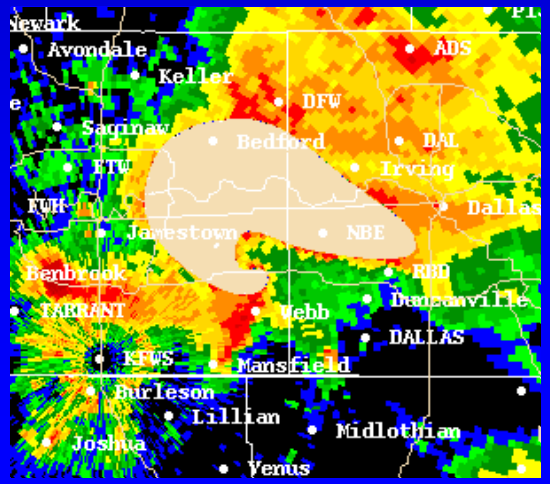
12/10/2004

0km 10km 20km 30km 40km

Supercell Mesocyclone







Un ladrón apuñala dos veces a una mujer de 78 años en su casa del Port de Sóller ■ (Pág. 17)

Ultima Hora

el fruitiuego

UNA FAMILIA DE ES PONT D'INCA NOU, GANADORA DE 500 EUROS

Medio centenar de casas sufrieron ayer graves daños a causa de los vientos huracanados

Un 'cap de fibló' golpea el Port de Valldemossa

▶ VENDAVAL
Un tornado de apenas diez minutos de duración llevó el caos al núcleo costero

▶ INUNDACIONES
En Palma y en diversos pueblos de la Isla se registraron inundaciones por las lluvias

▶ CULTIVOS
El fuerte viento y el granizo han echado a perder varias cosechas en la comarca del Pla

(Págs. 14 a 16)

LOCAL

El Govern bajará sus impuestos en 2005 para abaratar la vivienda ■ ..... (Pág. 20)

El 51 por ciento de las habitaciones de Son Llàtzer serán individuales ■ ..... (Pág. 24)

SUCESOS

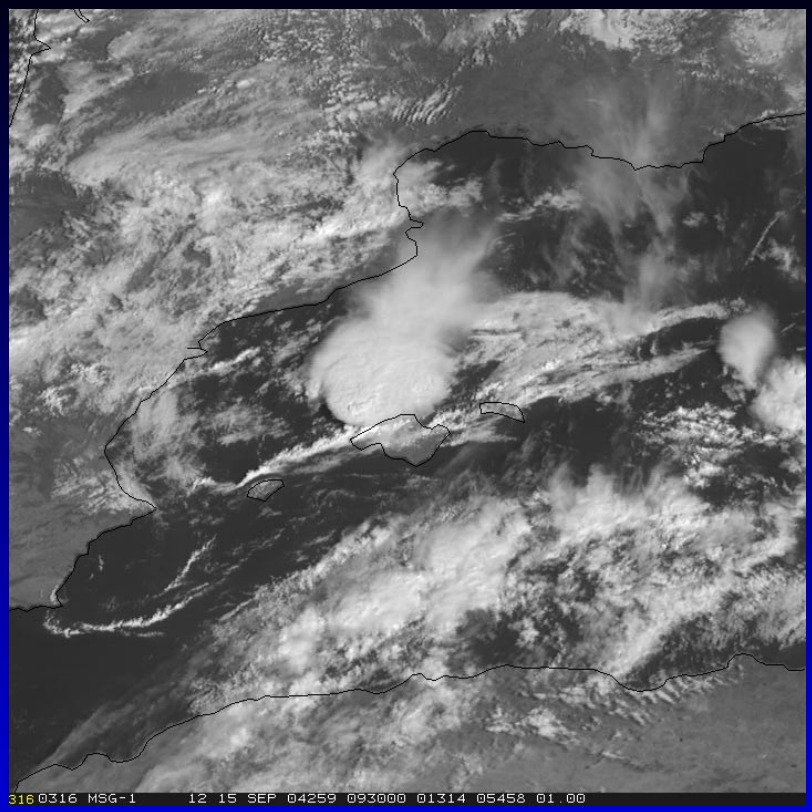
Ingresa en la UCI una joven que estuvo a punto de ahogarse en Illetes ■ ..... (Pág. 19)

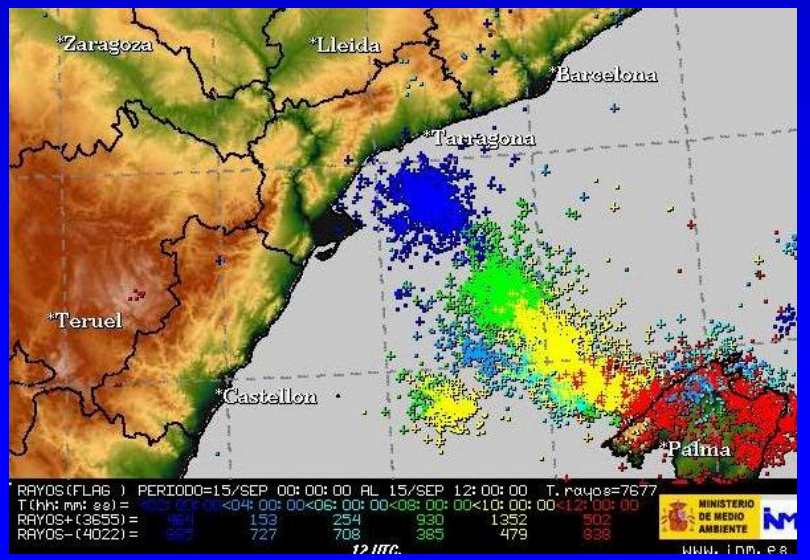
NACIONAL

La comisión del 11-M cita a declarar a Aznar por unanimidad ■ ..... (Págs. 3 y 4)

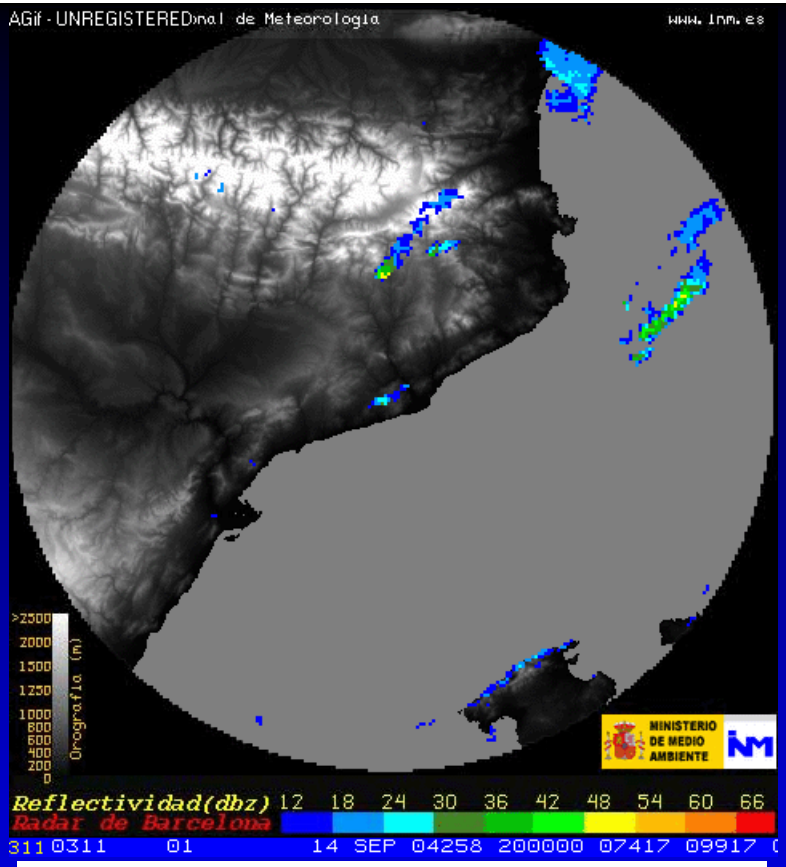
HOY MALLORCA Y MOTOR

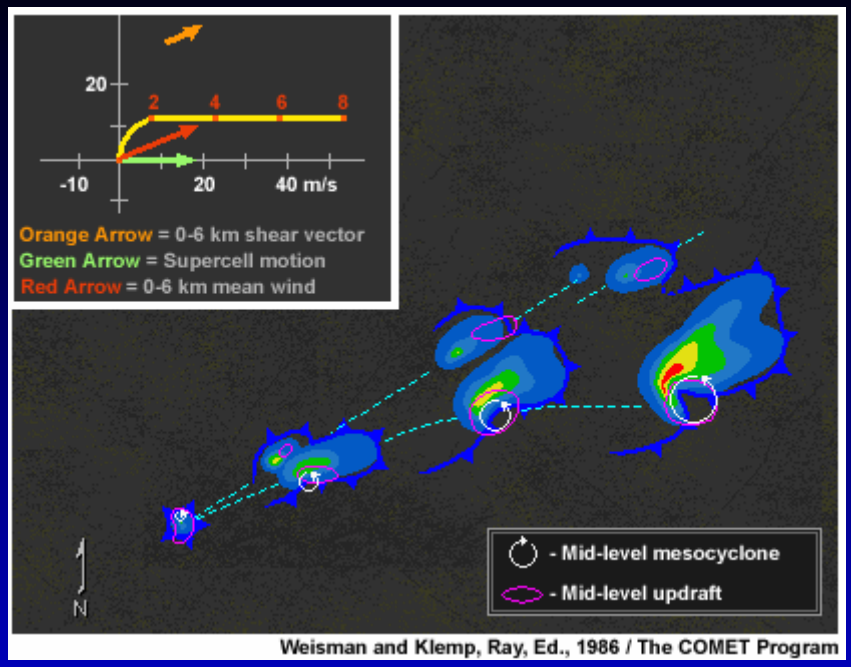
HOY LIDL

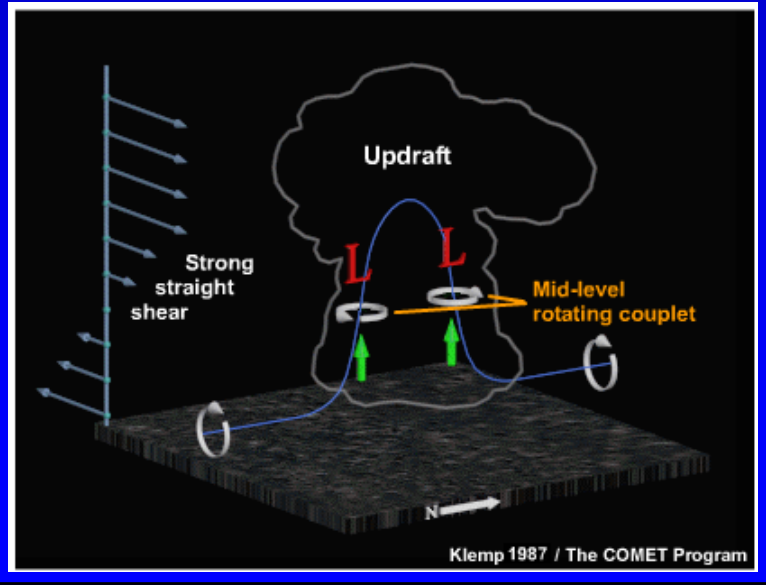




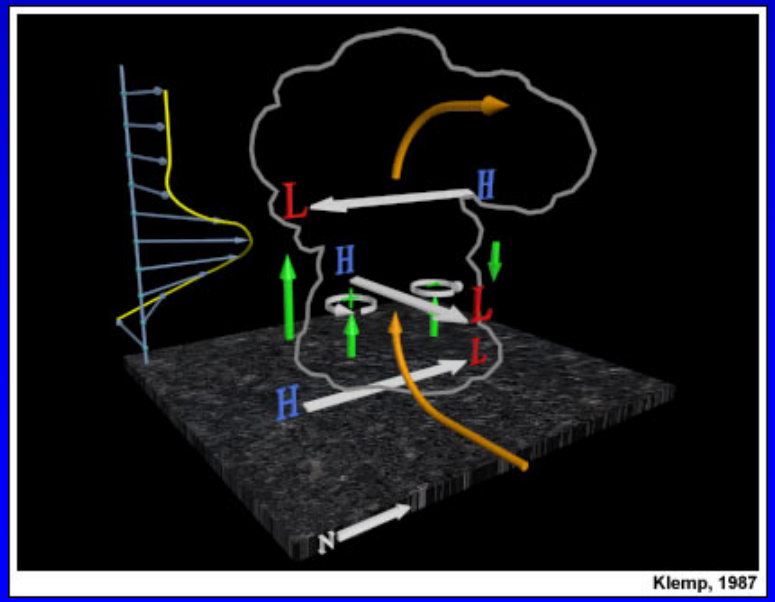
15/09/2004







"Clockwise" vertical shear



ESTRUCTURA

1) Ideas previas

2) Ciclones extratropicales o de latitudes medias

3) Ciclones cuasitropicales o "medicanes"

4) Relación estadística ciclones – lluvias intensas

5) Tormentas y fenóme

6) Otros riesgos climáticos

Excessive Cold

Definition

What is considered an excessively cold temperature varies according to the normal climate of a region (e.g., in a relatively warm climate, temperatures just below or at freezing can be hazardous). Excessive cold may accompany or follow winter storms—or can occur without storm activity.

Characteristics

Freezing temperatures can cause problems with burst pipes and automobiles that will not start, but the greatest danger is to people. Prolonged exposure to extreme cold can lead to frostbite, hypothermia, and death.

- **Frostbite** is damage to body tissue caused by that tissue being frozen. Frostbite causes a loss of feeling and a white or pale appearance in the extremities.
- **Hypothermia** is low body temperature. Normal body temperature is 98.6ºF. When body temperature drops to 95ºF, however, immediate medical help is needed. Hypothermia also can occur with prolonged exposure to temperatures above freezing.

Of winter deaths attributed to exposure to cold:

- 50 percent are people over 60 years old
- Over 75 percent are male
- About 20 percent occur in the home

Cold air temperatures combined with wind create the wind-chill effect. Wind chill is based on the rate of heat loss from exposed skin caused by combined effects of wind and cold. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Forecasters use a **wind-chill index** as a guide to heat loss resulting from wind and cold. Wind chills for given temperatures and wind speeds are shown in the table below.

Wind-Chill Index						
Temperatures						
Wind	25°	20°	15°	10°	5°	0°
15 mph	2°	-5°	-11°	-18°	-25°	-31°
20 mph	-3°	-10°	-17°	-24°	-31°	-39°
25 mph	-7°	-15°	-22°	-29°	-36°	-44°
30 mph	-10°	-18°	-25°	-33°	-41°	-49°

WIND SPEED km/h	Air Temperature (°C)																	
	Calm	4	2	-1	-4	-7	-9	-12	-15	-18	-21	-23	-26	-29	-32	-34	-37	-40	-43
8	2	-1	-4	-7	-11	-14	-17	-21	-24	-27	-30	-33	-37	-40	-43	-47	-49	-53
16	1	-3	-6	-9	-13	-16	-20	-23	-27	-30	-33	-37	-41	-44	-47	-51	-54	-58
24	0	-4	-7	-11	-14	-18	-22	-25	-28	-32	-36	-39	-43	-46	-50	-53	-57	-61
32	-1	-4	-8	-12	-15	-19	-23	-26	-30	-34	-37	-41	-44	-48	-52	-56	-59	-63
40	-1	-5	-9	-13	-16	-20	-24	-27	-31	-35	-38	-42	-46	-50	-53	-57	-61	-64
48	-2	-6	-9	-13	-17	-21	-24	-28	-32	-36	-39	-43	-47	-51	-55	-58	-62	-66
56	-2	-6	-10	-14	-18	-22	-26	-29	-33	-37	-41	-44	-48	-52	-56	-60	-63	-67
64	-3	-7	-11	-14	-18	-22	-26	-30	-34	-38	-42	-46	-49	-53	-57	-61	-64	-68
72	-3	-7	-11	-15	-19	-23	-27	-31	-34	-38	-42	-46	-50	-54	-58	-62	-66	-69
80	-3	-7	-11	-16	-19	-23	-27	-31	-35	-39	-43	-47	-51	-55	-59	-63	-67	-71
89	-4	-8	-12	-15	-19	-24	-28	-32	-36	-39	-43	-48	-52	-56	-59	-63	-67	-72
97	-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	-44	-48	-52	-56	-60	-64	-68	-72

What is important about the wind chill besides feeling colder than the actual air temperature? The lower the wind chill temperature, the greater you are at risk for developing frost bite and/or hypothermia.

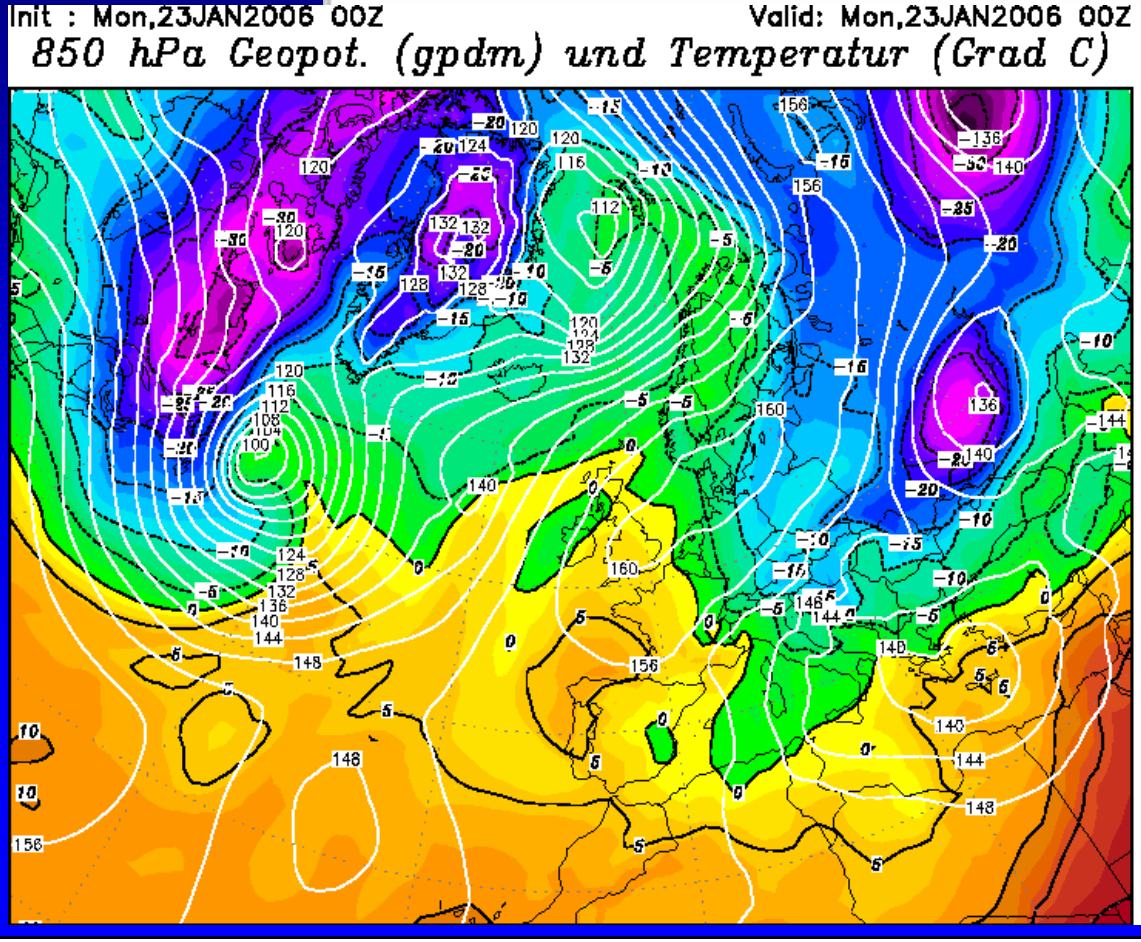
Frostbite occurs when your body tissue freezes. The most susceptible parts of the body are fingers, toes, ear lobes, and the tip of the nose. Hypothermia occurs when body core temperature, normally around 98.6°F (37°C) falls below 95°F (35°C). The following table shows how fast frostbite can occur at various wind chill temperatures.

Wind Chill	Cold Threat
-6°C to 4°C	COLD. Unpleasant.
-17°C to -7°C	VERY COLD. Very unpleasant.
-28°C to -18°C	BITTER COLD. Frostbite possible. Exposed skin can freeze within 5 minutes.
-56°C to -29°C	EXTREMELY COLD. Frostbite likely. Exposed skin can freeze within 1 minute. Outdoor activity becomes dangerous.
-57°C and lower	FRIGIDLY COLD. Exposed skin can freeze in 30 seconds.

ZONAS A MENOS DE 35 GRADOS BAJO CERO

La ola de frío en Europa Central deja casi 200 muertos

Actualizado miércoles 25/01/2006 12:40 (CET)



Un hombre descansa tumbado sobre agua mineral caliente en la playa de Barna (Bulgaria). (Foto: EFE)

ADEMÁS

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60 segundos | Edición impresa | Opinión | Callejero | Servicios | Multimedia | Charlas | Tienda

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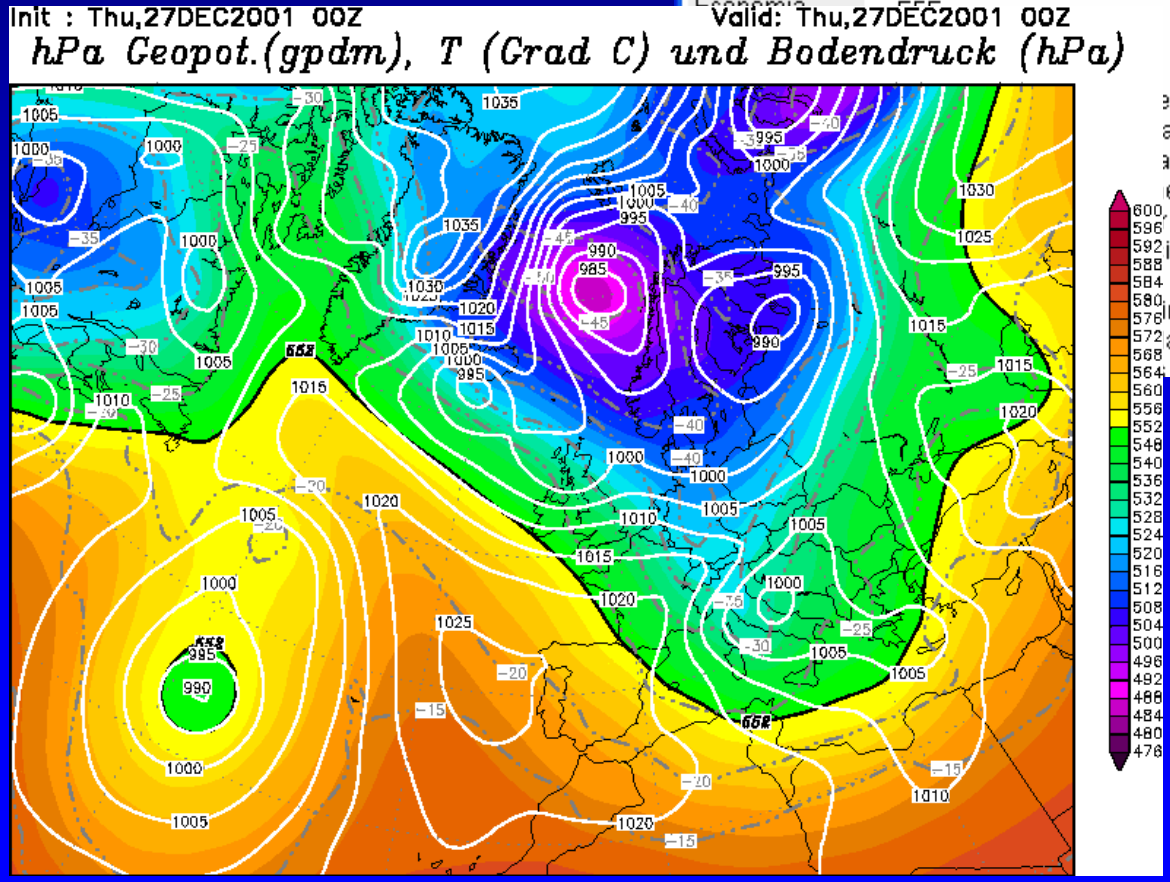
ULTIMAS NOTICIAS
España
Crisis en USA
Internacional
Sociedad

sociedad

Jueves, 27 de Diciembre de 2001 Actualizado a las 01:08 (CET)

OLA DE FRIO Y NIEVE

El hielo y la niebla complican el tráfico, aunque el temporal comienza a remitir



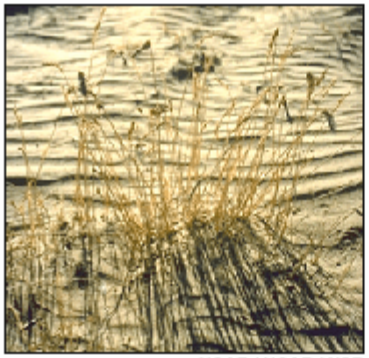
hielo y la niebla, así
, complican el tráfico
arreteras españolas y
atro comunidades,
enzará a remitir en las
de hoy se suavizarán
ialmente las mínimas.

rección General de
a dificultan la
de Asturias, Castilla y

Accidente en Ourense provocado por una placa de hielo. (EFE)

ANTICICLÓN:
Heladas y nieblas

Excessive Heat



NCAR / UCAR / NSF

Definition

What is considered excessive heat varies according to the normal climate of a region. Tropical air masses can raise summer temperatures high above the average for an area. Sudden rises in temperature—when people don't have a chance to acclimatize—or prolonged heat waves increase death rates. People die from excessive heat.

Excessive heat occurs from a combination of high temperatures (significantly above normal) and high humidities. At certain levels, the human body cannot maintain proper internal temperatures and may experience heat stroke. The "Heat Index" (HI) is a measure of the effect of the combined elements on the body.

A daytime HI reaching 105ºF or above, with nighttime lows at or above 80ºF, for two consecutive days may significantly impact public safety and, therefore, generally requires the issuance of an advisory or warning by local NWS offices.

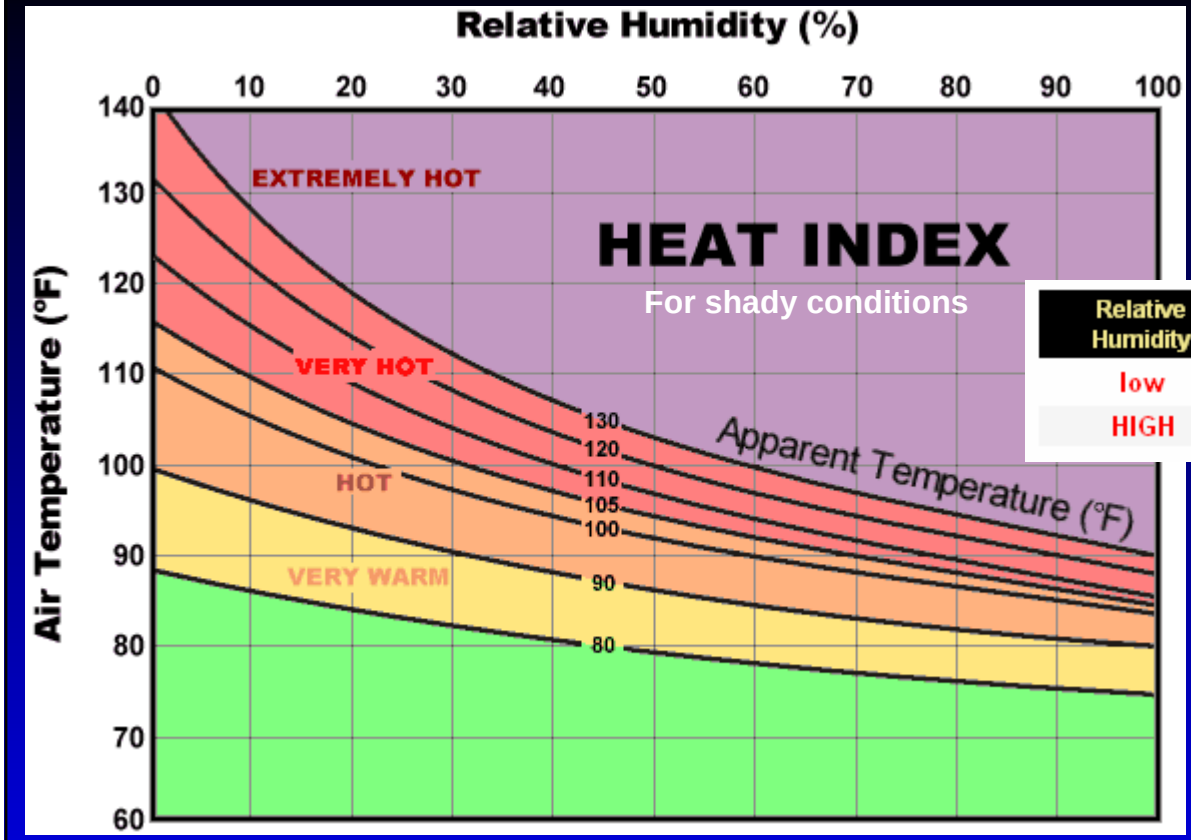
Characteristics

There are some practical problems that can result from high temperatures, such as overheated car engines, "brown-outs" from overuse of electricity for air conditioning, and changes in airplanes' performance. As with extreme cold, however, the major danger of extreme heat is to humans and animals. Heat-related ailments can range from annoying conditions to life-threatening situations, such as:

- **Heat Cramps** - Muscle cramps, especially in the legs after exercising, are caused by imbalances in body salt.
- **Fainting** - Exercising in the heat can cause a rapid drop in blood pressure, resulting in fainting.
- **Heat Exhaustion** - Loss of fluid and salt through excessive sweating can lead to dizziness, overall weakness, and a rise in body temperature. This can result from normal activity during several days of a heat wave or strenuous activity in extreme temperatures.
- **Heatstroke** - If heat exhaustion is not treated, the body temperature may rise to 105ºF or more and heatstroke may occur. A heatstroke victim may exhibit lethargy, confusion, or unconsciousness and is at risk of dying.

When the air is humid, the "apparent temperature" is even higher. Forecasters use the Heat Index (also called the Humidity Index) to show apparent temperature.

Heat Index								
Temperatures								
Humidity	75°	80°	85°	90°	95°	100°	105°	110°
40%	74°	79°	86°	93°	101°	110°	122°	135°
50%	75°	81°	88°	96°	107°	120°	135°	150°
60%	76°	82°	90°	100°	114°	132°	149°	163°
70%	77°	85°	93°	106°	124°	144°	161°	--
80%	78°	86°	97°	113°	136°	157°	166°	--
90%	79°	88°	102°	122°	150°	170°	--	--



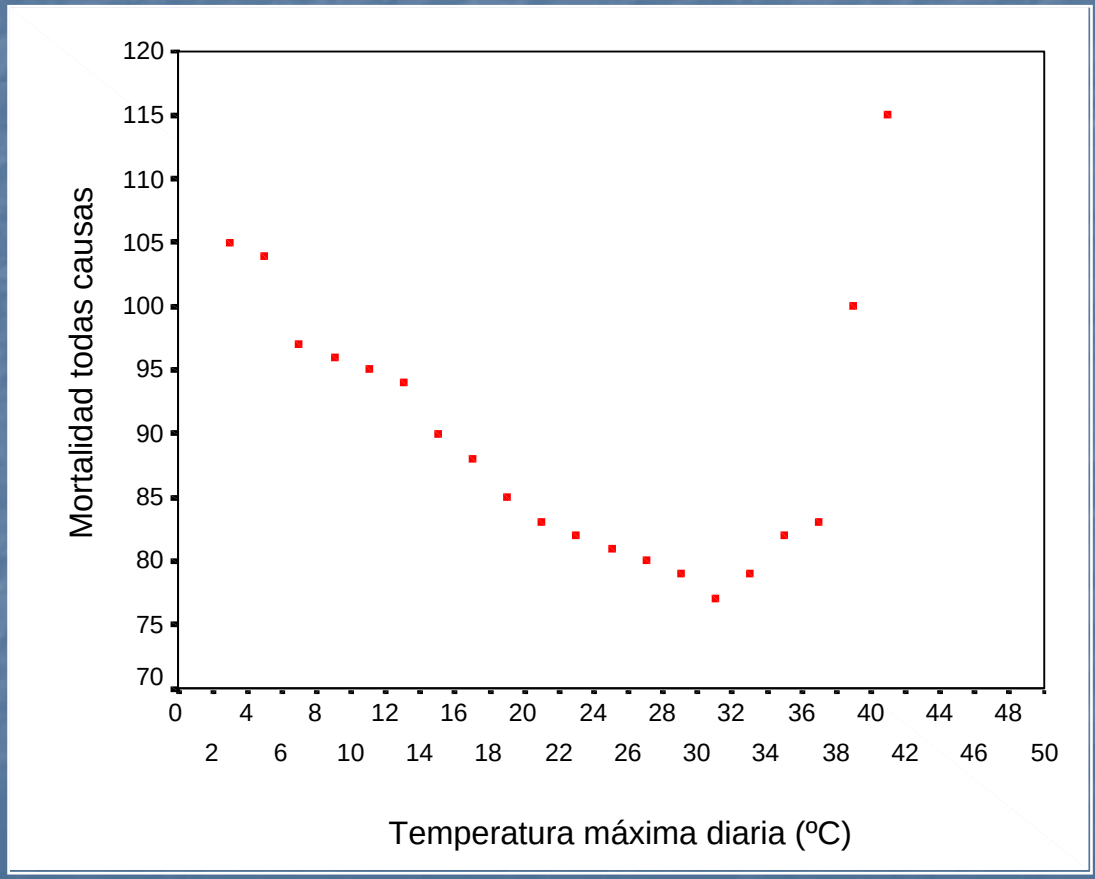
Relative Humidity	Capacity for air to hold water	Amount of Evaporation	HEAT removed from the body
low	LARGER	HIGHER	MORE
HIGH	smaller	lower	less

Farenheit	Celsius
0.00	-17.78
8.00	-13.33
16.00	-8.89
24.00	-4.44
32.00	0.00
40.00	4.44
48.00	8.89
56.00	13.33
64.00	17.78
72.00	22.22
80.00	26.67
88.00	31.11
96.00	35.56
104.00	40.00
112.00	44.45
120.00	48.89
128.00	53.34
136.00	57.78
144.00	62.23

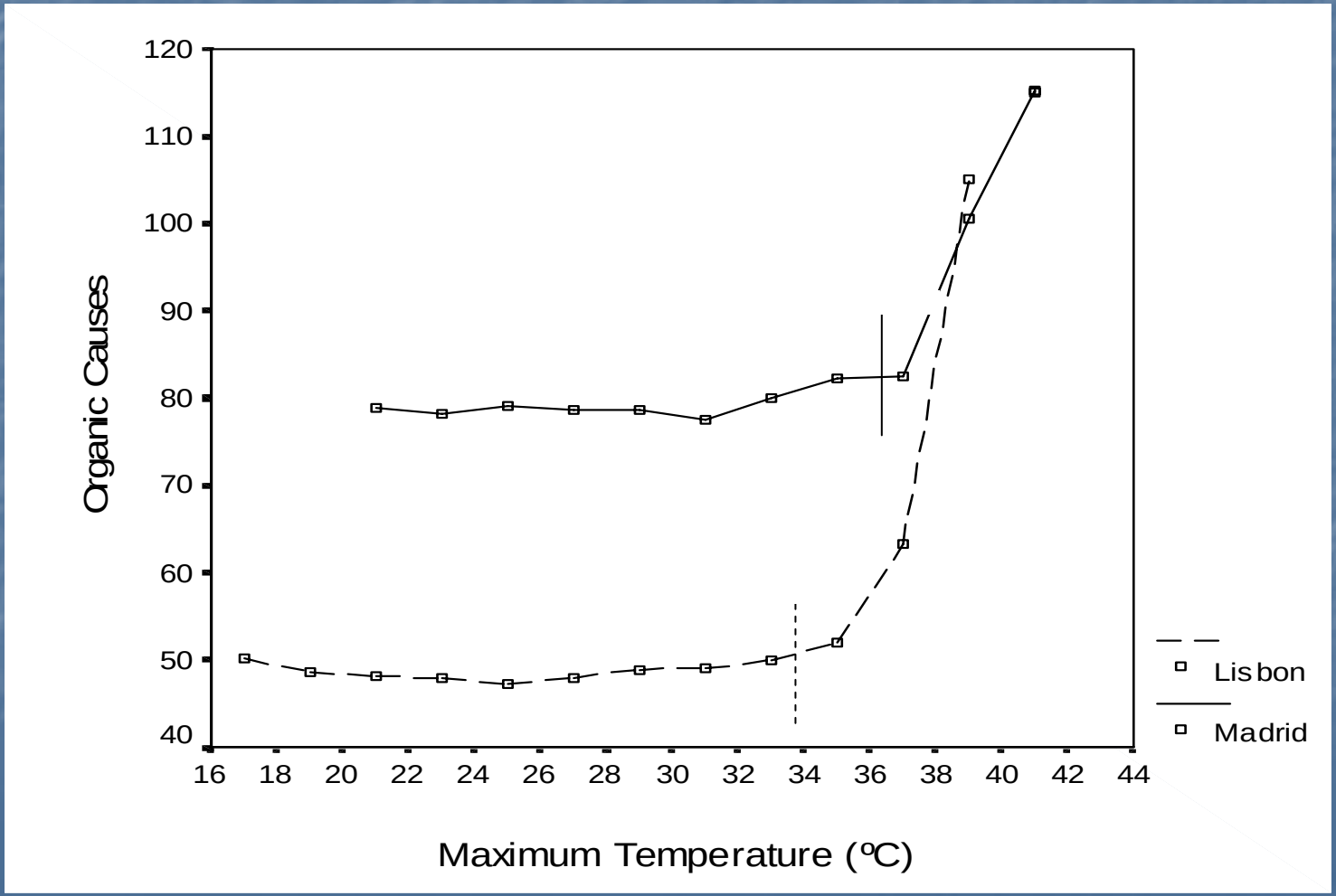
The chart below tells you the risk to the body from continued exposure to the excessive heat.

	Classification		General Affect on People in High Risk Groups
I	Extremely Hot	130°F or Higher	Heat/Sunstroke **HIGHLY LIKELY** with continued exposure
II	Very Hot	105°F - 130°F	Sunstroke, heat cramps, or heat exhaustion **LIKELY**, and heatstroke **POSSIBLE** with prolonged exposure and/or physical activity
III	Hot	90°F - 105°F	Sunstroke, heat cramps, or heat exhaustion **POSSIBLE** with prolonged exposure and/or physical activity
IV	Very Warm	80°F - 90°F	Fatigue **POSSIBLE** with prolonged exposure and/or physical activity

RELACIÓN ENTRE LA TEMPERATURA Y LA MORTALIDAD. MADRID.

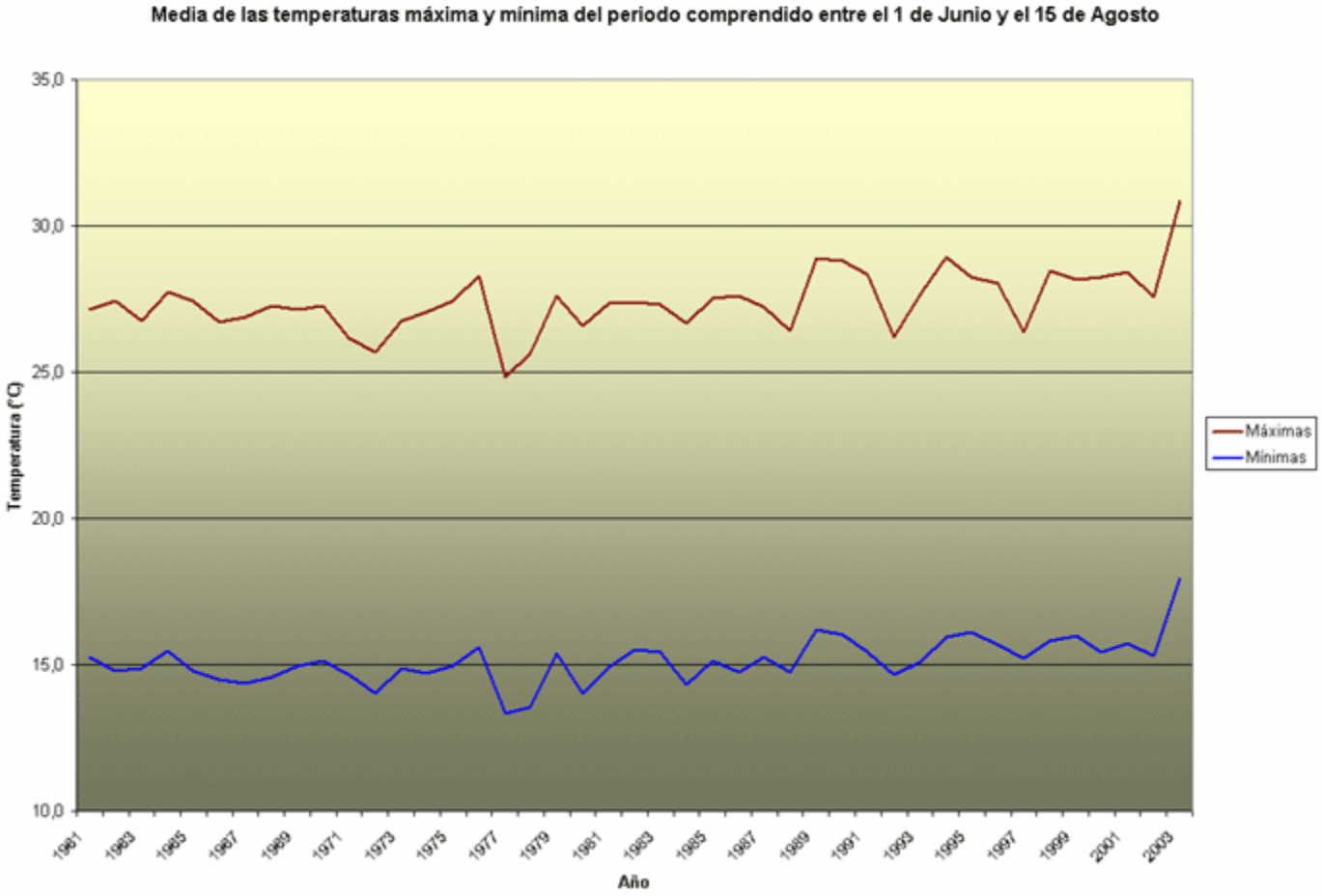


Relación entre la mortalidad y la temperatura en días extremadamente cálidos en Lisboa - Madrid.



Ola de calor. Verano de 2003

La ola de calor que ha afectado a prácticamente toda España en este verano ha constituido sin duda un episodio excepcional desde el punto de vista climatológico. Una de sus características más acusadas ha sido la persistencia de las altas temperaturas. En la mayor parte de la cuenca mediterránea las altas temperaturas, tanto máximas como mínimas, han estado por encima de los valores propios del clima prácticamente sin solución de continuidad desde primeros de junio hasta finales de agosto. En otras áreas el fin de la ola ha tenido lugar hacia mediados de agosto, y hubo alguna semana de "respiro" al principio de julio.



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- Economía
- Deportes
- Cultura

sociedad

Martes, 12 de Agosto de 2003

Actualizado a las 13:23 (CET) - Internet time @516 by swatch

50 MUERTOS EN LA REGIÓN DE PARÍS

Europa sufre una intensa ola de calor

YAIZA PERERA

r sigue asfixiando a los
etros continúan
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este panorama, que
s no experimentará
mos días, aparecen
ncia ya han saltado
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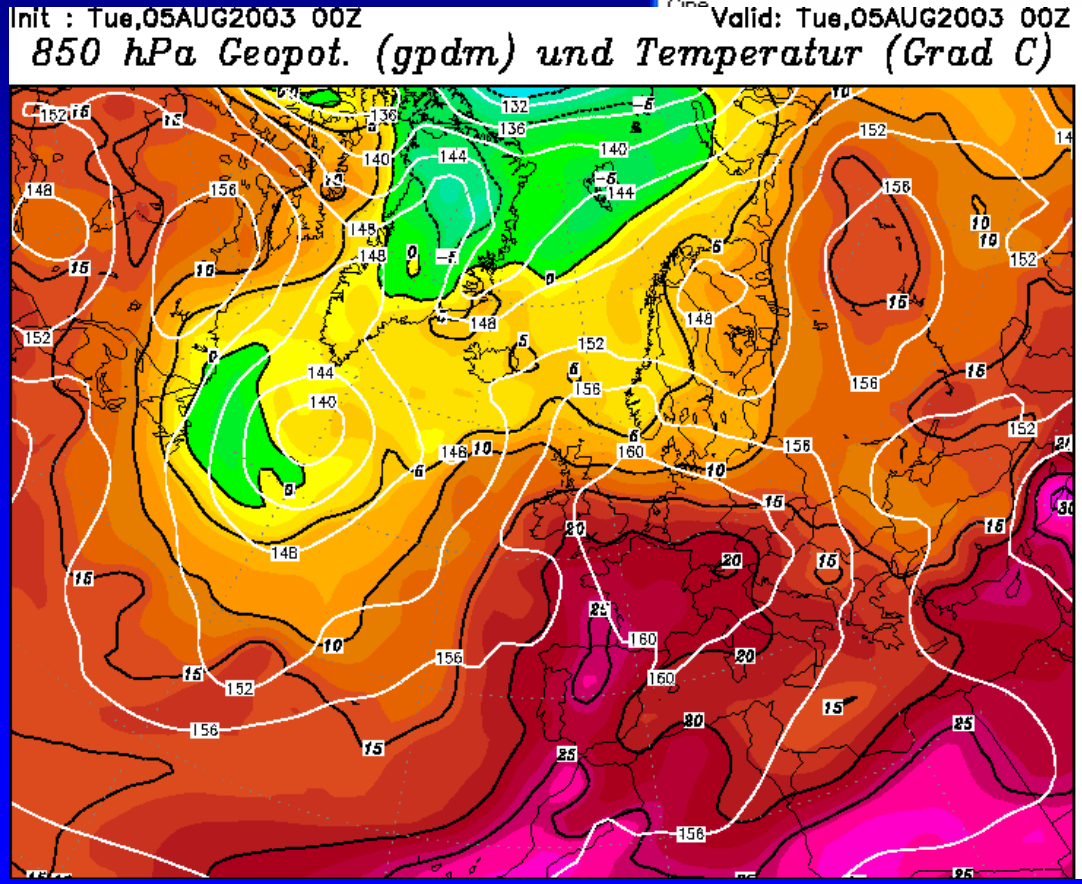
semanas en toda
a hasta la Península
stán sedientos, la
su pico más alto y se
los glaciares de los

Las llamas arrasan un bosque en el centro de Portugal. (AFP)

ADEMÁS...

- **Un nuevo fallecido en Córdoba eleva a 11 los muertos por la ola de calor en Andalucía**



ANTICICLÓN:
Olas de calor

Fog

Definition

Fog is defined as water droplets suspended in the air at the earth's surface. Fog is often hazardous when the visibility is reduced to 1/4 mile or less.

Characteristics

Thick fog reduces visibility, creating a hazard to motorists as well as to air traffic. Airports may close because of heavy fog.

The intensity and duration of fog varies with the location and type of fog—from early morning ground fog that burns off easily to prolonged valley fog that lasts for days. Generally, strong winds tend to prevent fog formation. The table below summarizes several scenarios for the formation, intensity, and duration of fog.

Type of Fog	Factors	Description	Effects
Ground Fog	• Clear nights • Stable air (winds less than 5 mph) • Small temperature-dewpoint spread	Heat radiates away from the ground, cooling the ground and surface air. When the air cools to its dewpoint, fog forms (usually a layer of less than 100-200 feet).	Common in many areas, ground fog burns off with the morning sun.
Valley Fog	• Cold surface air and weak winter sun • May follow a winter storm or prolonged nighttime cooling	Fog can build to a height of more than 1,500 feet. Weak sun may evaporate lower levels of the fog but leave upper levels in place.	Found in valleys (especially in the West) in winter, valley fog can last for days, until winds are strong enough to push out the cold air.
Advection Fog	• Horizontal wind • Warm, humid air • Winter temperatures	Wind pushes warm humid air over the cold ground or water, where it cools to the dewpoint and forms fog.	Advection fog can cover wide areas of the central U.S. in winter. It may be thick enough to close airports.
Upslope Fog	• Winds blowing up hills or mountains • Humid air	As humid air pushed up hills and mountains, it cools to its dewpoint and forms fog, which drifts up the mountain.	Upslope fog is common and widespread in the Great Plains, where land slopes gently upward toward the Rockies.
Sea Smoke, Steam Fog	• Body of water • Air much colder than water • Wind	As cold air blows over warmer water, water evaporates into the cold air, increasing the humidity to the dewpoint. Vapor condenses, forming a layer of fog 1 to 2 feet thick over the water.	This type of fog forms on fall days over ponds and streams.
Precipitation Fog	• Warmer air • Cool rain	Some rain evaporates, and the added vapor increases the air to its dewpoint. The vapor then condenses into fog.	Precipitation fog forms on cool, rainy days.

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publicidad

elmundotienda.com

BALEARES 24HORAS

Opinión

Illes Balears

Palma

illes balears

Domingo, 21 de marzo de 2004 Actualizado a las 01:49

PALMA

La niebla en Son Sant Joan obliga a cancelar un vuelo y a desviar otros 13 a Maó y Eivissa

La bruma impidió varios aterrizajes en las pistas del aeropuerto palmesano desde las 5.30 hasta las 9 horas La compañía más afectada fue Air Berlin, que tuvo que redirigir 7 aviones

BUSQUEDAS

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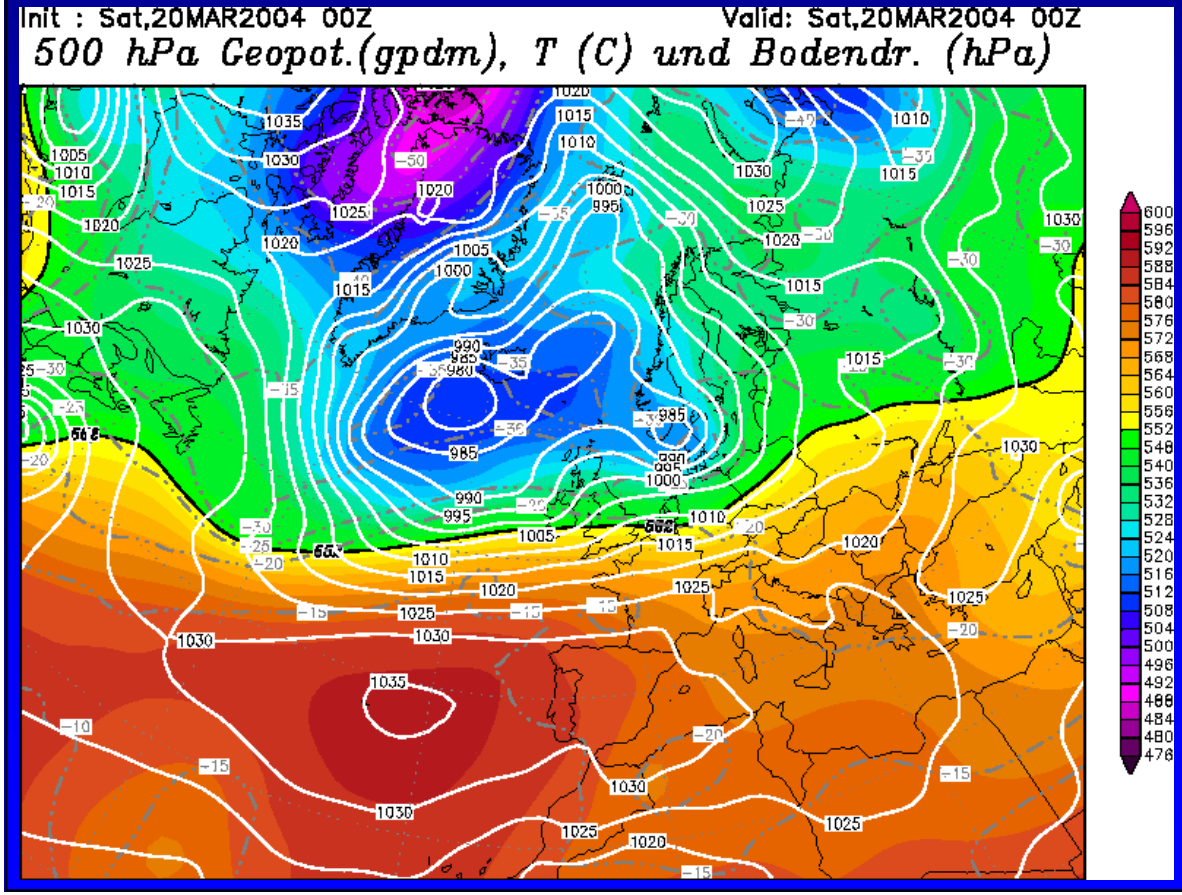
Buscar

otros buscadores

LA VIDA MÁS FÁCIL



ANTICICLÓN:
Nieblas

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ÚLTIMA HORA
España

sociedad

Viernes, 14 de Marzo de 2003

Actualizado a las 07:42 (CET) - Internet time @320 by swatch

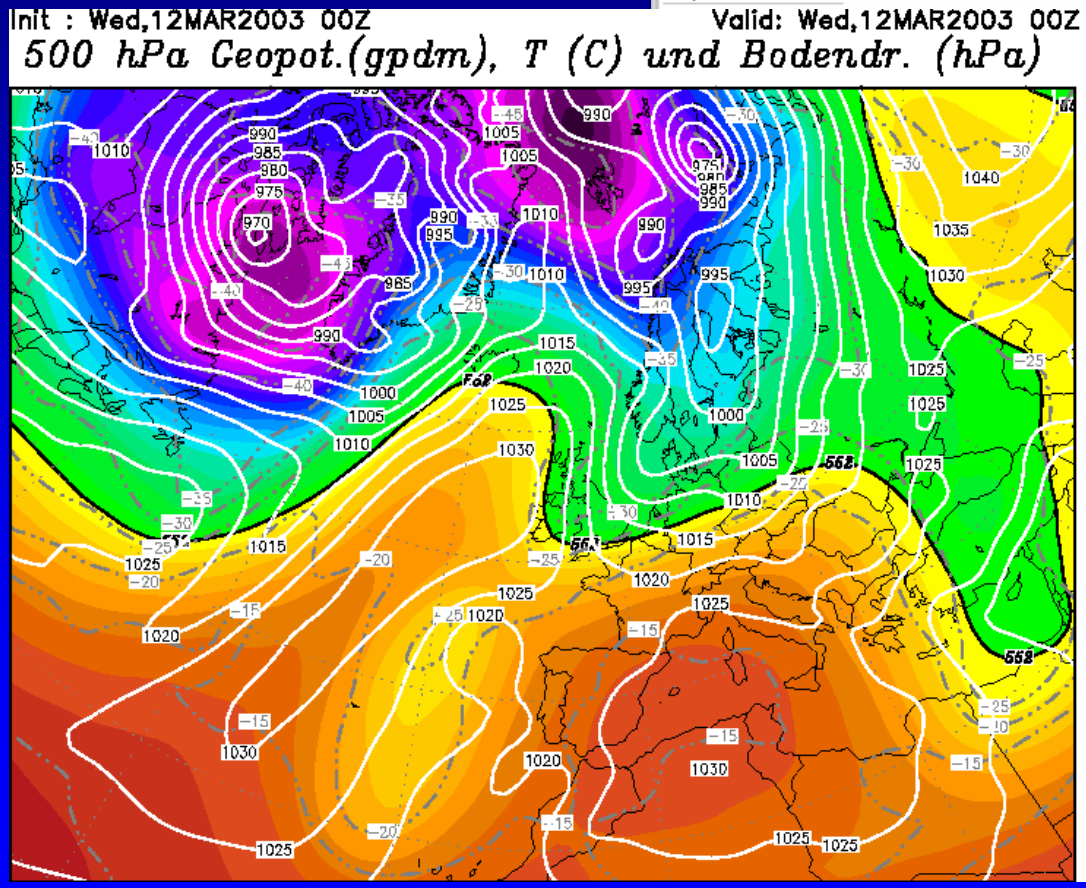
LA CAUSA PARECE SER LA NIEBLA

Al menos 14 muertos en el choque de 250 vehículos en Italia

El suceso ha tenido lugar en la A4, que recorre parte del norte del país

rsonas han muerto y
as -10 de ellas
icular accidente **en el**
e 250 vehículos han
un momento de
demás, un camión que
s de hidrógeno **ha**
aunque un helicóptero
explotara.

Un camión con bombonas de gas, accidentado. (AP)



ANTICICLÓN:
Nieblas


GRACIAS POR
VUESTRA ATENCIÓN !!!