Sailing Weather

Penny Tranter

19 January 2017

Heart of England Offshore Cruising Association
HOEOCA

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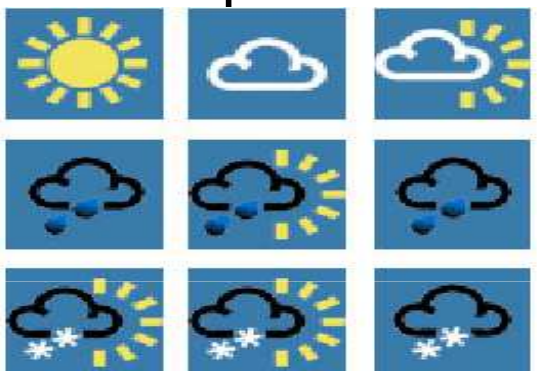
Weather and climate

The difference between ‘weather’ and ‘climate’?

- Weather is the state of the atmosphere at a particular place and time



- Climate is the average weather condition of a particular part of the world (often over many decades)

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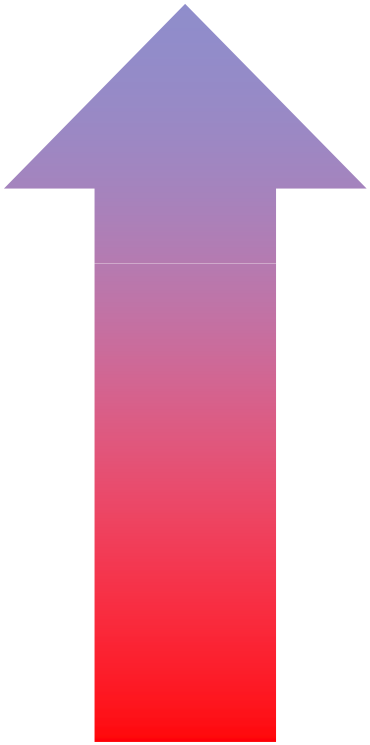
Up and down

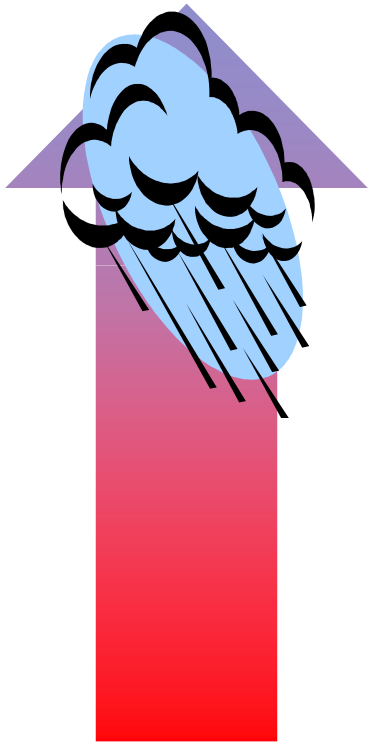
Cool air (holds less water)



Warm air (holds more water)

Up and down

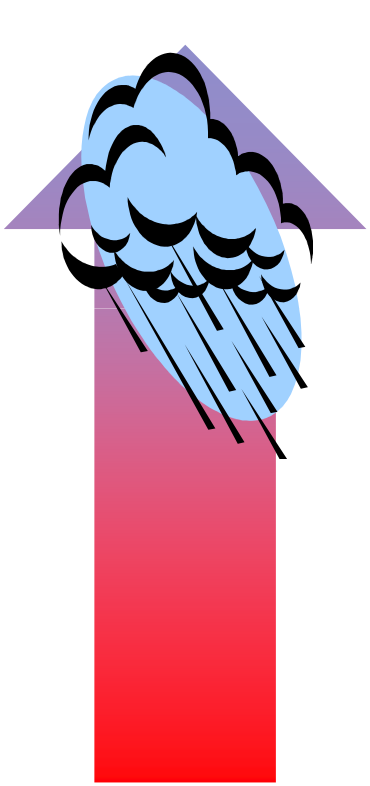
Cool air (holds less water)

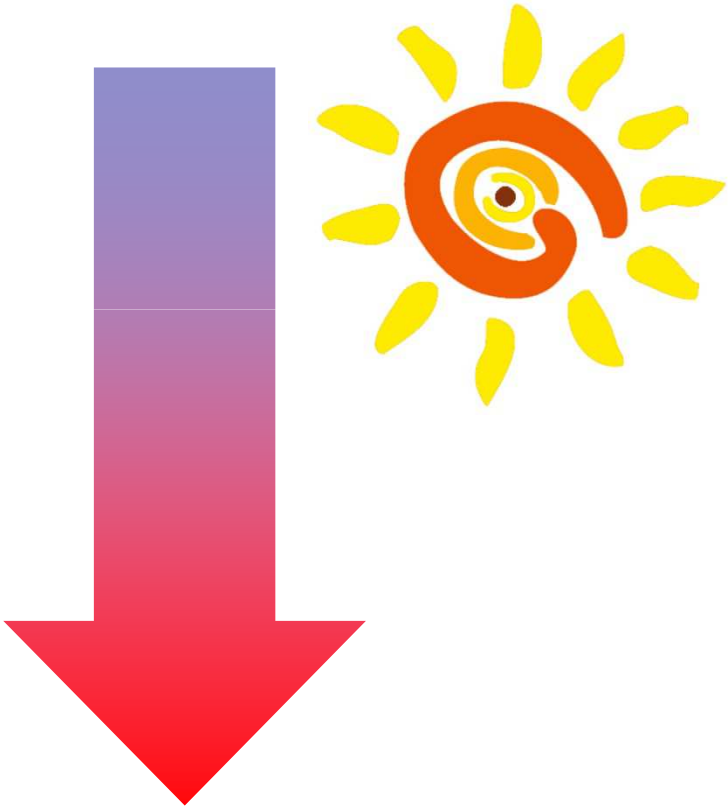


Water condenses out as cloud/rain

Warm air (holds more water)

Up and down

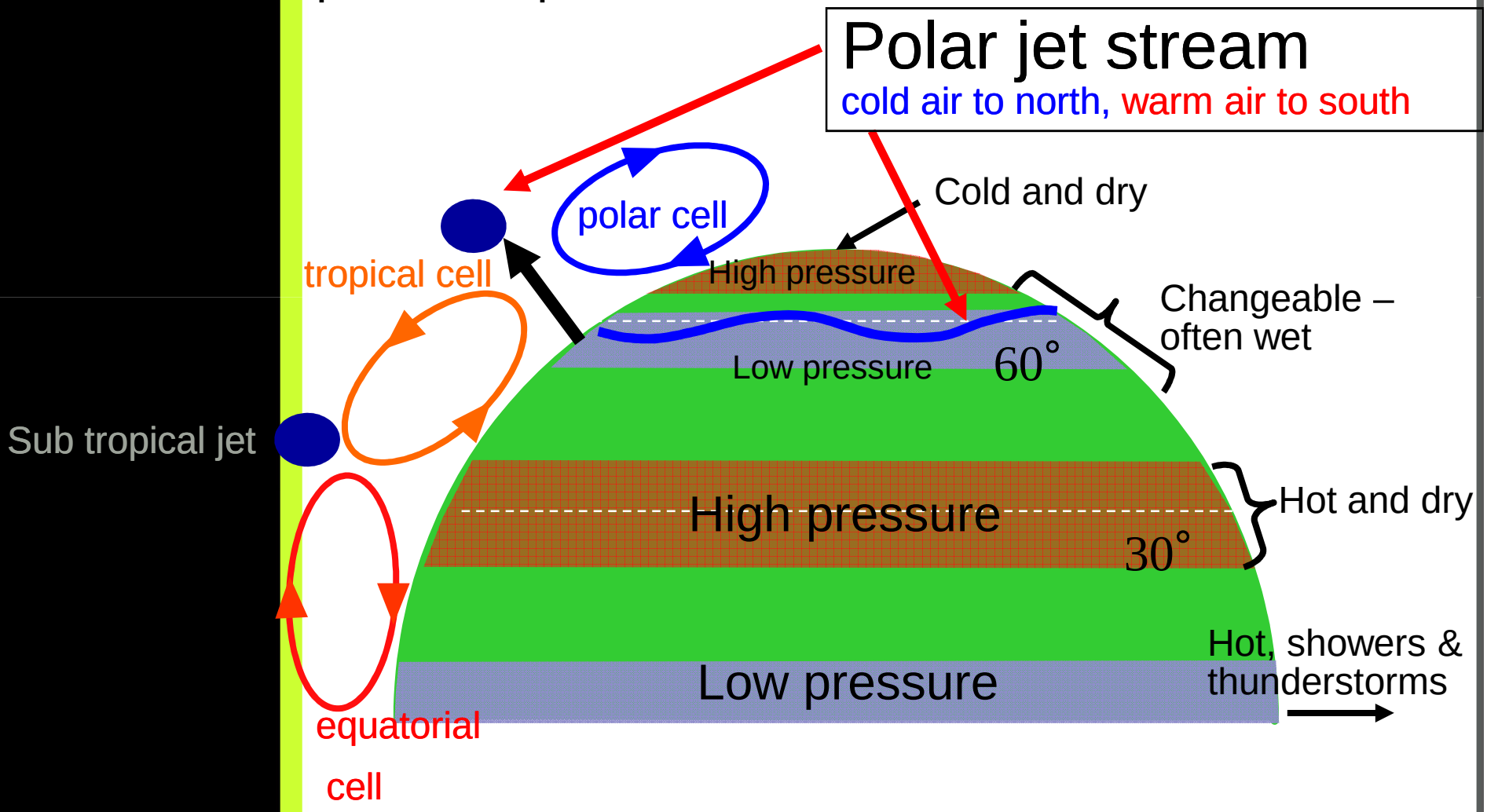




Low pressure High Pressure

Climate zones

Climate - the average weather conditions of a particular part of the world



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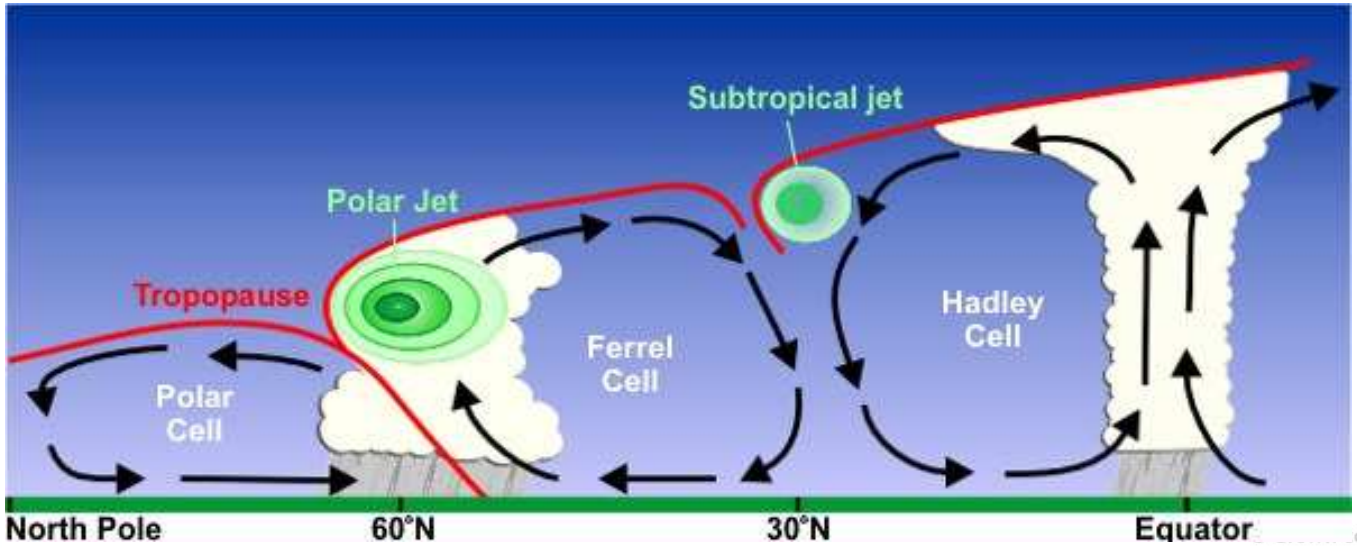
Polar jet stream

- Fast flowing, narrow, meandering air current high up, just below tropopause (usually around 30,000ft/~9,000m/~300mb) with variable speed, BUT not continuous

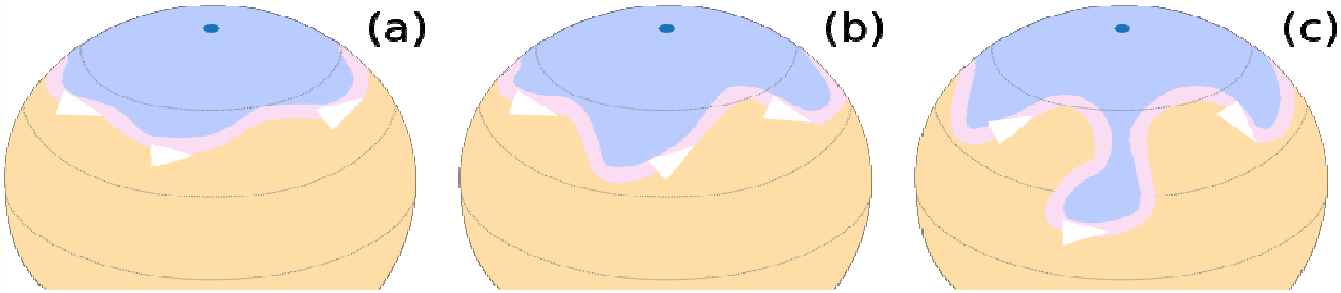
- 80 knots plus, occasionally over 200 knots

- Most intense in late autumn, winter and early spring across UK



Polar jet stream

- Always moving and changing shape/speed – like a waving ribbon



- Meanders (Rossby Waves) of polar jet stream developing (a), (b); then finally detaching a "drop" of cold air (c)

Polar jet stream

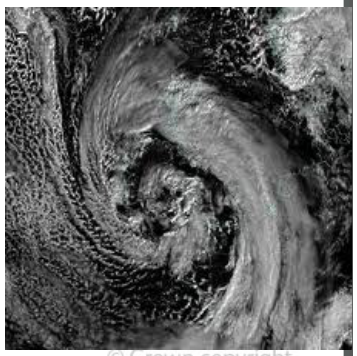
- Instrumental in development of low and high pressure areas in high latitudes

- Iterative loop – jet stream forms low pressure –> which in turn affects size, shape and speed of jet stream overhead -> forms new pressure pattern etc

Airmasses

Airmasses need to sit quietly for a long time over a large area to develop…under high pressure

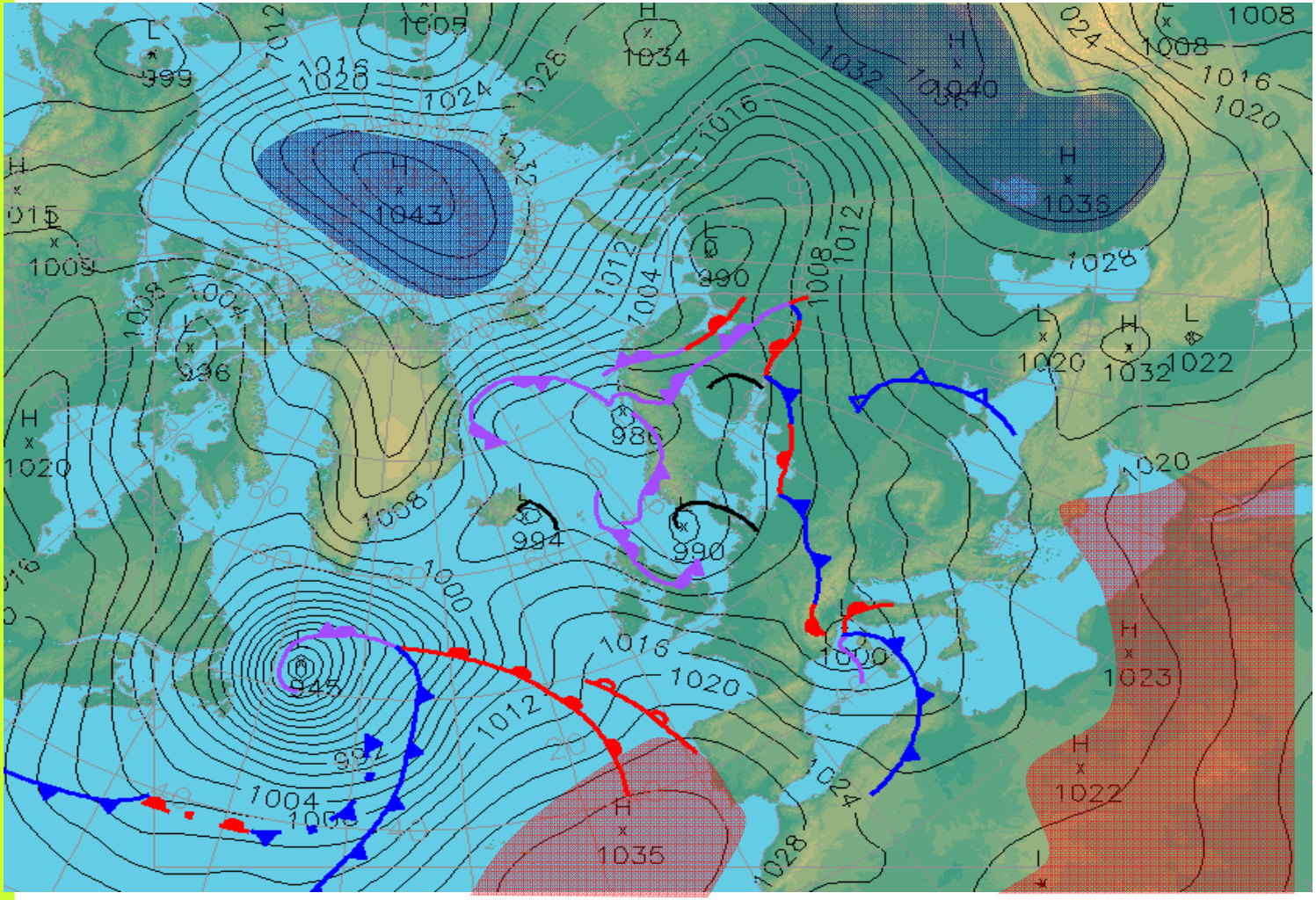
- Airmasses are characterised by temperature and moisture content
- Cold areas lead to **cold** airmasses
- Warm areas lead to **warm** airmasses
- Over oceans leads to **moist** airmasses
- Development over land lead to **dry** airmasses
- What about our area (mid-latitudes)?
- Not suitable, too much movement ie low pressure areas



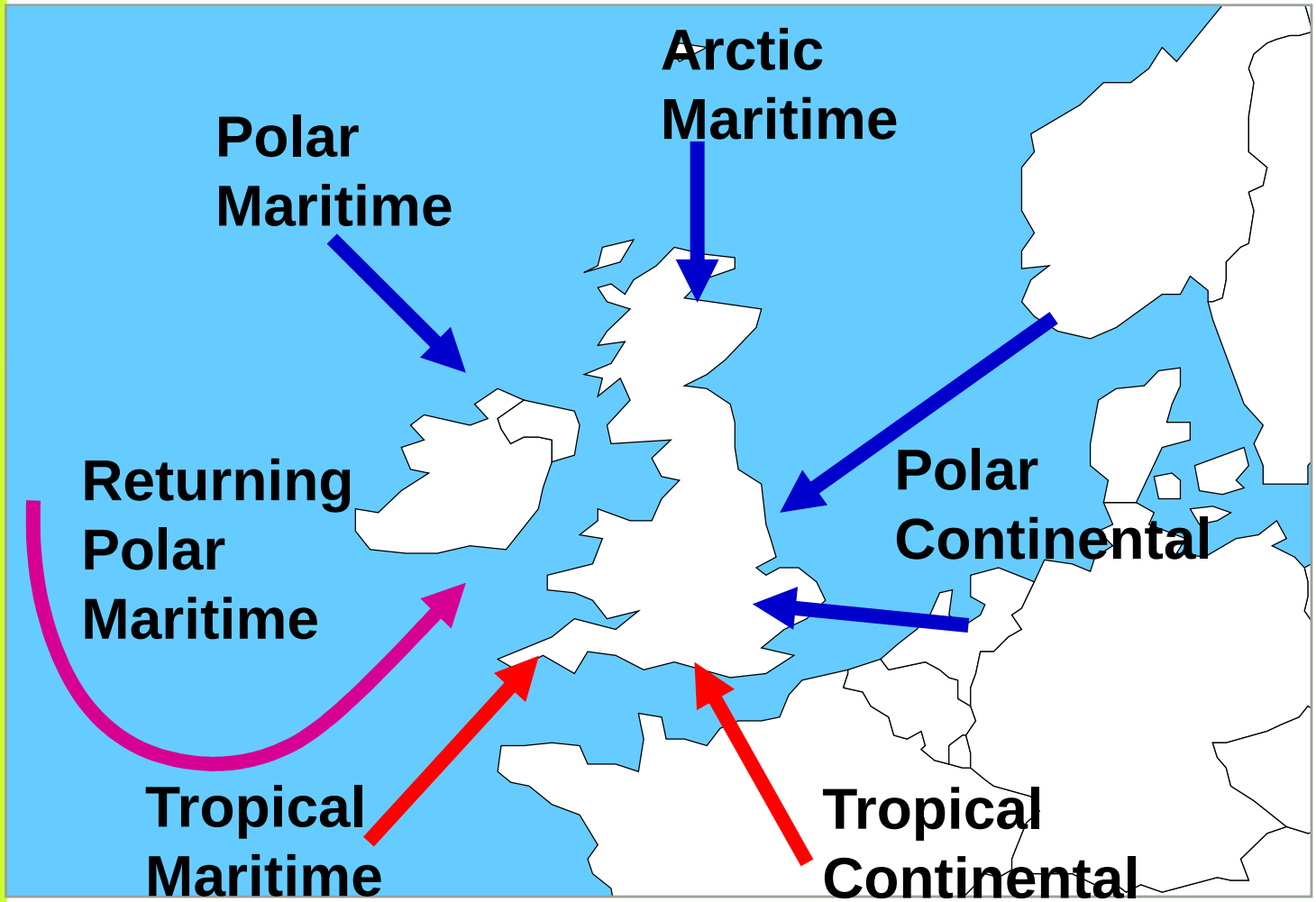
Four types of source region

- Warm and moist - Tropical ocean
- Known as Tropical maritime
- Warm and dry - Desert regions
- Known as Tropical Continental
- Cold and moist – Arctic/Atlantic ocean
- Known as Polar Maritime
- Cold and dry - Canada and Siberia
- Known as Polar Continental

Source regions



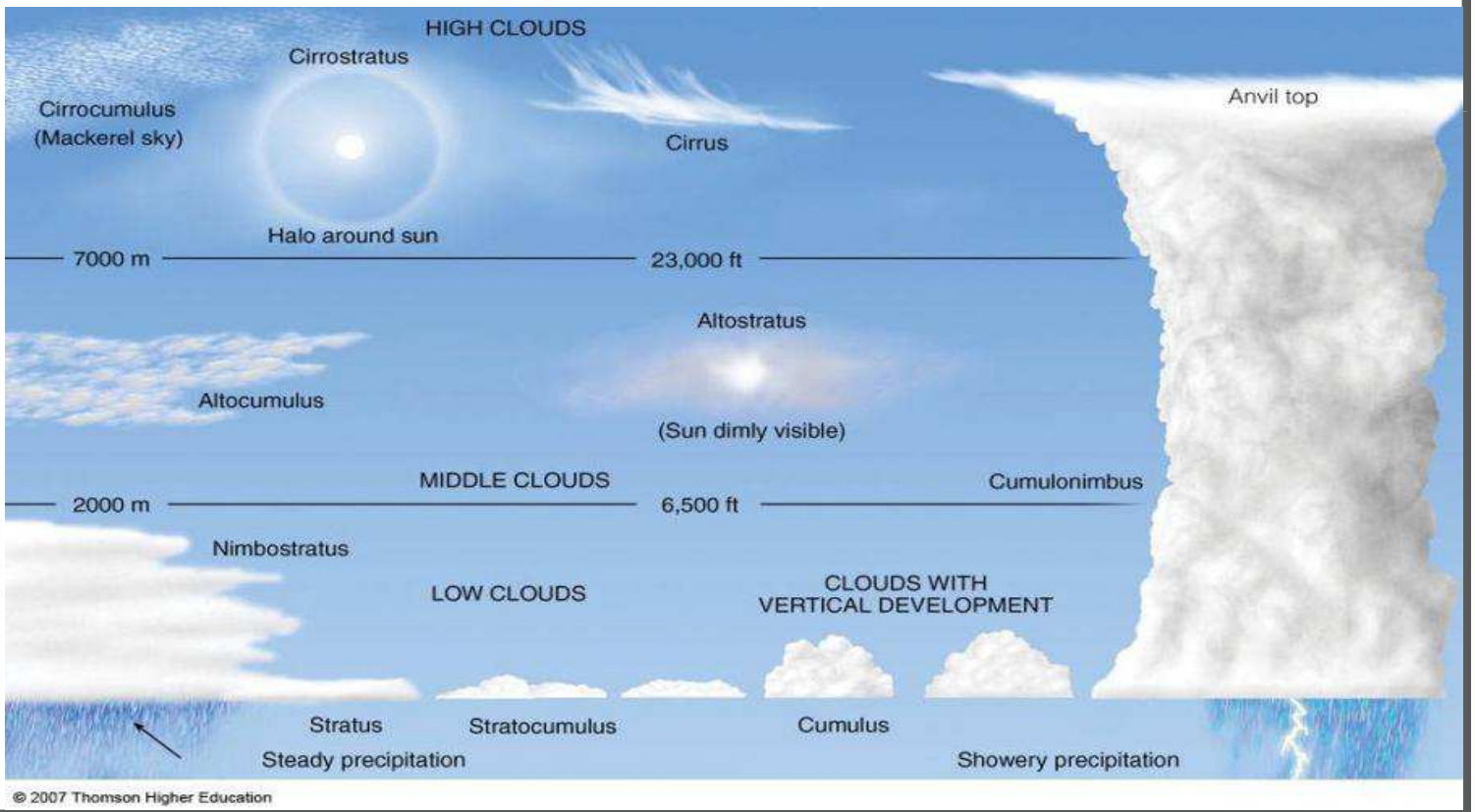
British Isles Airmasses



Clouds

Clouds

- What are they made of and what can they tell us about the weather?
- 10 basic types – split into 3 categories
- Categories are high, medium and low



Low Clouds - Cumulonimbus

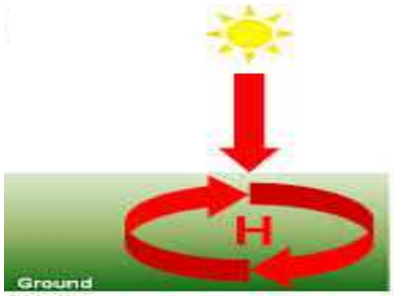
- Very high and large heaped cloud – water at bottom and ice at top
- Characteristic anvil shape to the top
- Most dangerous cloud for anyone who works or is active outdoors
- Source of heavy showers, thunderstorms, tornadoes/ waterspouts, hail, squall lines and very gusty winds



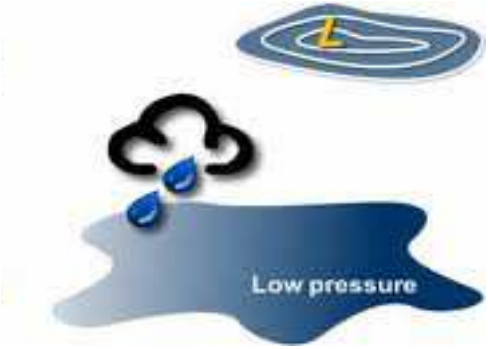
Clouds and low pressure systems

Difference between high and low pressure areas

- Air descending down through the atmosphere usually results in dry, settled conditions over the Earth's surface



- Air rising upwards through the atmosphere leads to disturbed weather, bringing rain



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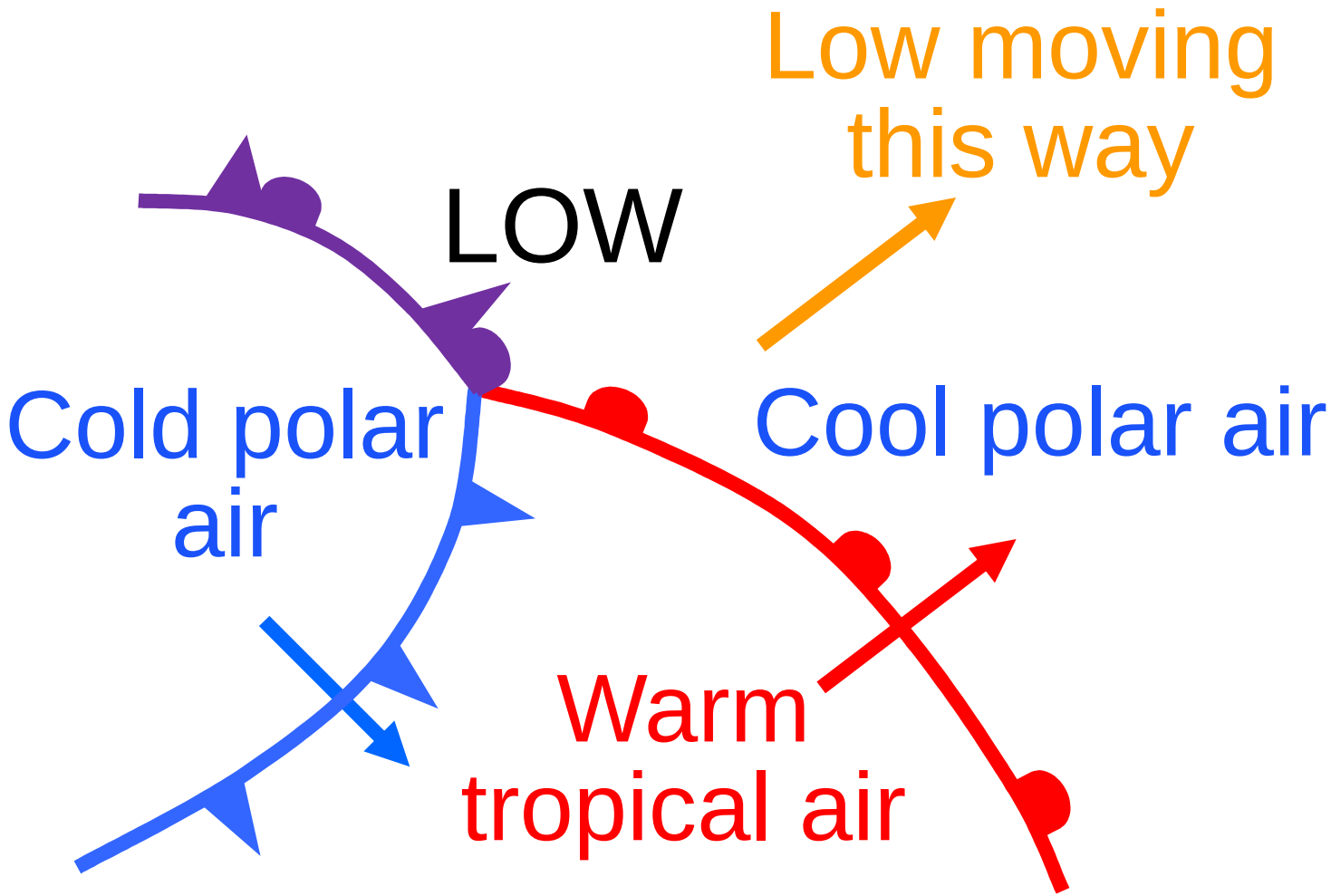
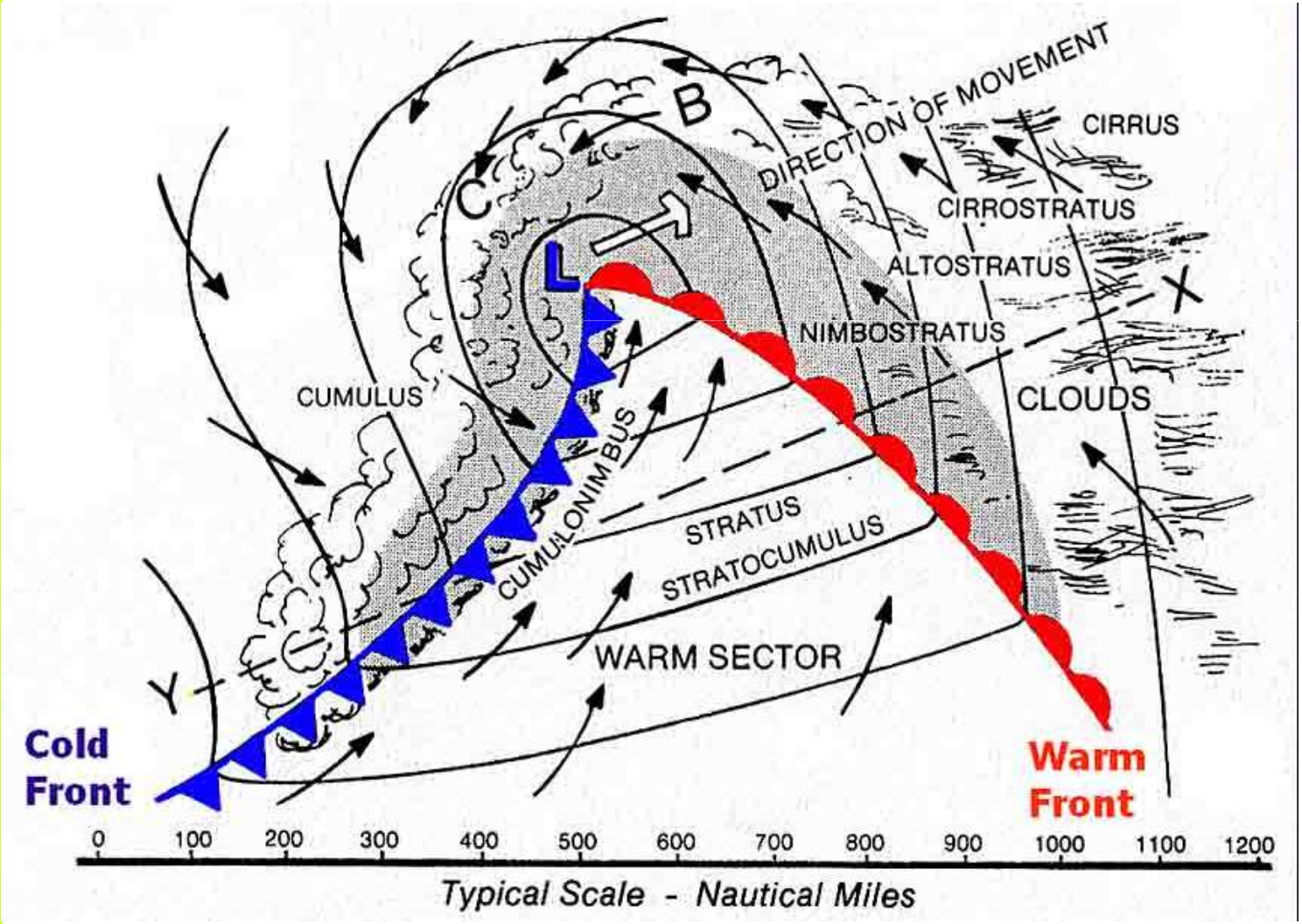
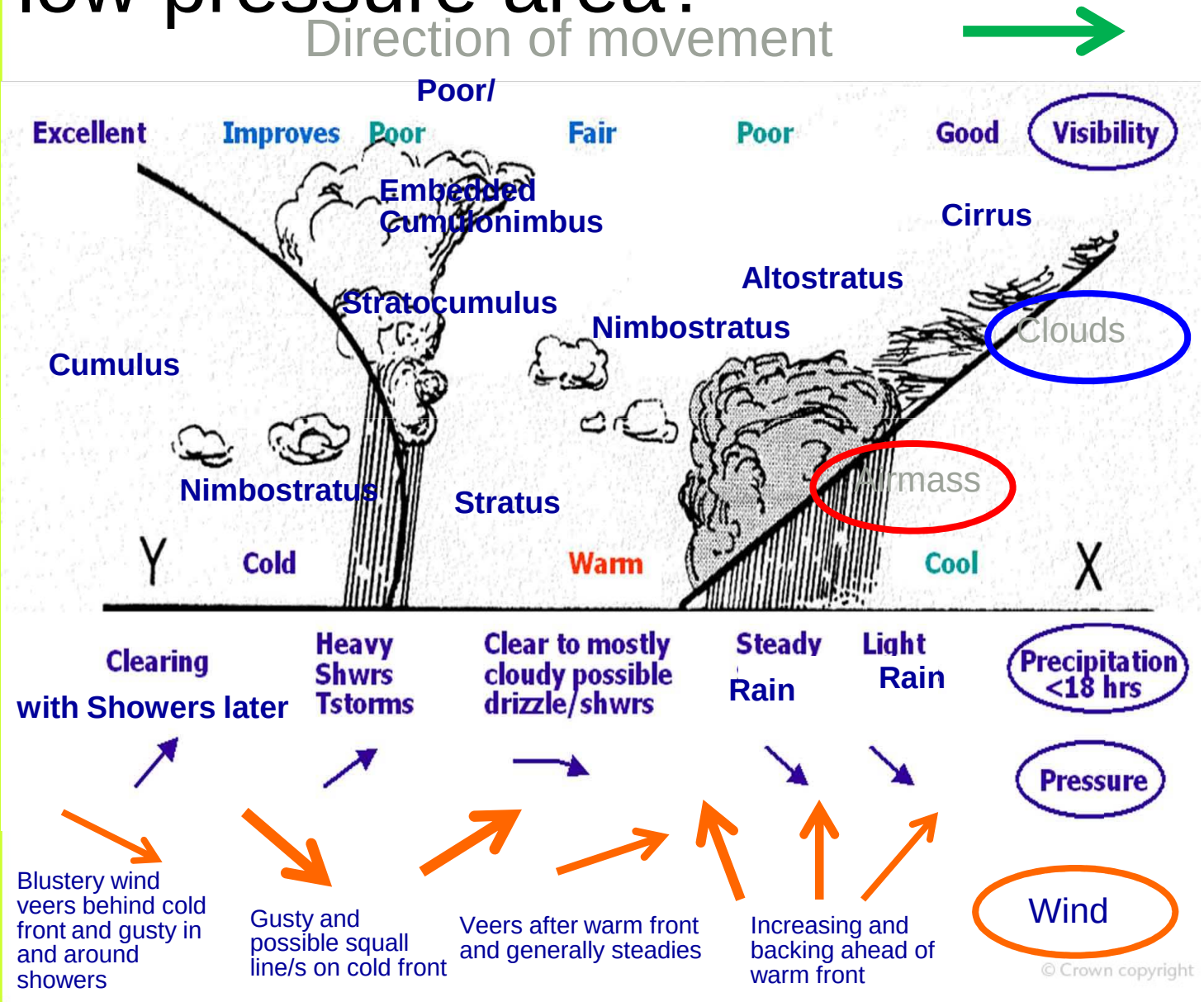
Which way is the low pressure and its fronts moving?



And the clouds around the low pressure and with its fronts?



What clouds and weather on a low pressure area?



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“Ring around the moon … rain soon”

“Mackerel skies and mares’ tails make tall ships carry low sails”

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Warm front approaching

Met Office

Marine observations | Latest | Map | Last 24 hours - Text | Last 24 hours - Graphical

Mount Batten - Last 24 hours

Change Location ...

Thu 6 Feb | **Fri 7 Feb**

Download past 24 hours observations

Time	Weather	Wind speed & direction (knots)	Visibility (n.miles)	Humidity (%)	Pressure (hPa)	Air Temp. (°C)	Sea Temp. (°C)	Dew Pt. Temp. (°C)	Wave Height (metres)	Wave Period (seconds)
1100 UTC		14	12	69	998	9	NO DATA	3	N/A	N/A
1200 UTC		16	12	69	998	9	NO DATA	4	N/A	N/A
1300 UTC		18	16	66	997	9	NO DATA	3	N/A	N/A
1400 UTC		17	3	80	997	8	NO DATA	5	N/A	N/A
1500 UTC		22	14	82	996	7	NO DATA	4	N/A	N/A
1600 UTC		20	8	85	994	8	NO DATA	6	N/A	N/A
1700 UTC		24	9	81	993	8	NO DATA	5	N/A	N/A
1800 UTC		25	7	85	992	8	NO DATA	5	N/A	N/A

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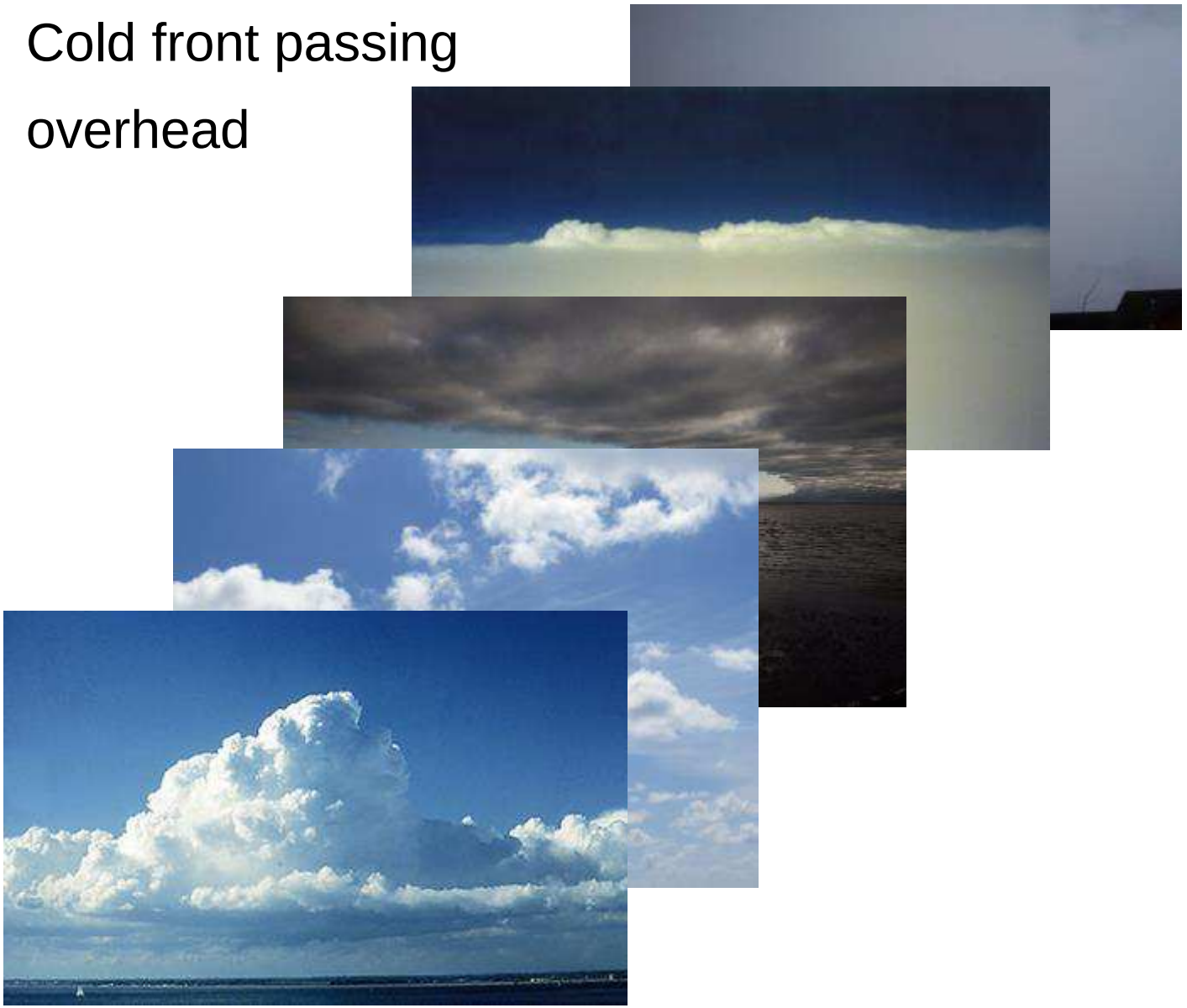
Cold front passing overhead



Post cold front...

Shoeburyness - Last 24 hours

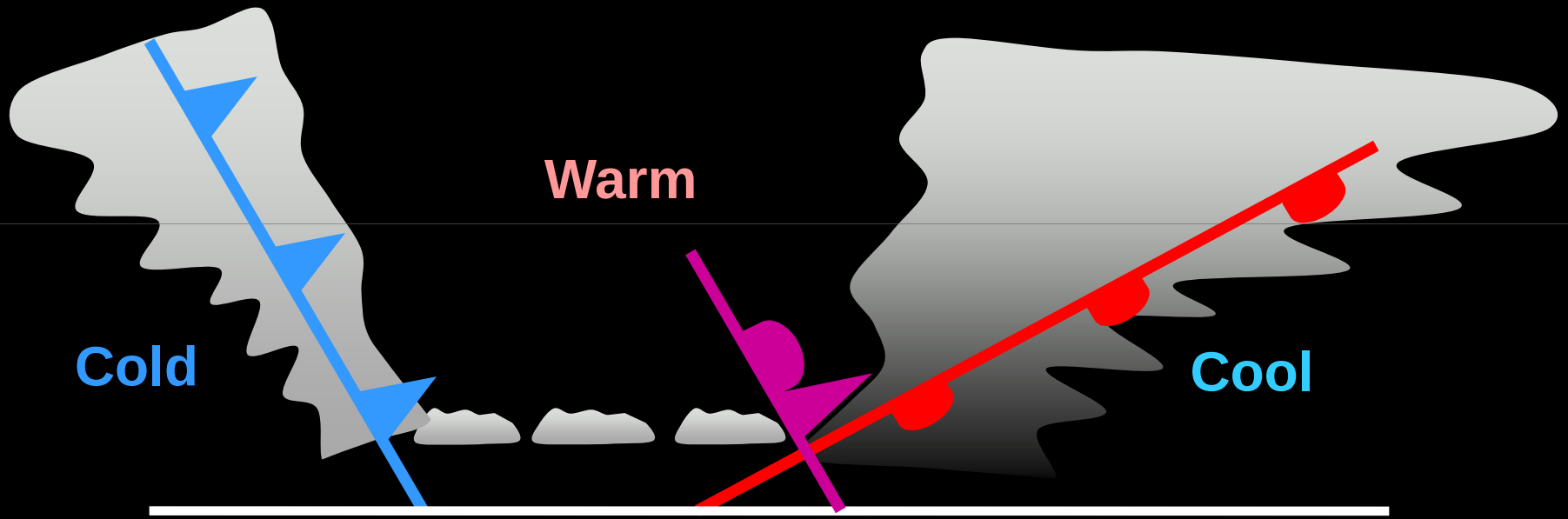
Change Location ...

Thu 20 Feb | **Fri 21 Feb**

Download past 24 hours observations

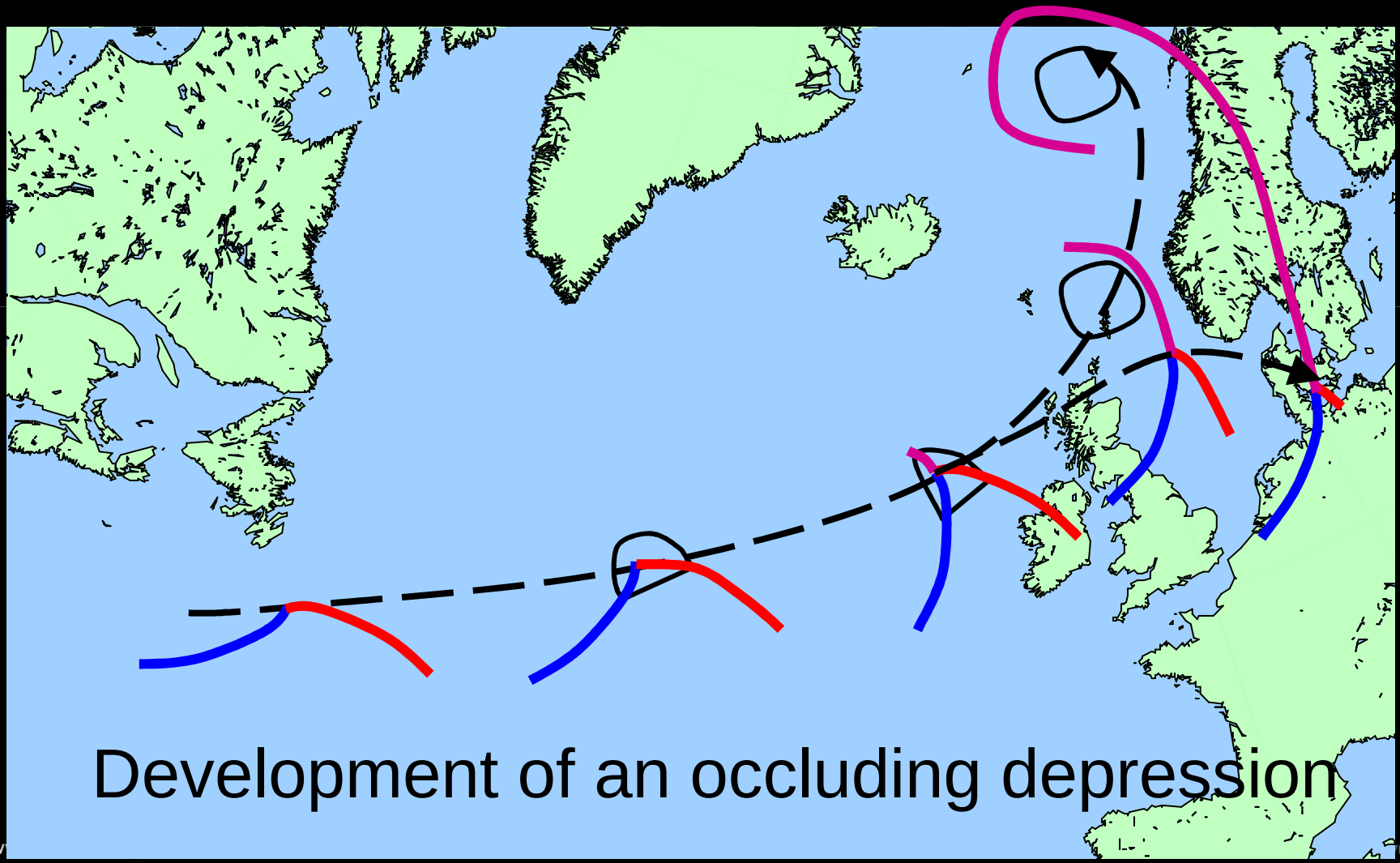
Time	Weather	Wind speed & direction (knots)	Visibility (n.miles)	Humidity (%)	Pressure (hPa)	Air Temp. (°C)	Sea Temp. (°C)	Dew Pt. Temp. (°C)	Wave Height (metres)	Wave Period (seconds)
0000 UTC		8	9	83	1001	7	NO DATA	4	N/A	N/A
0100 UTC		7	11	81	1001	7	NO DATA	4	N/A	N/A
0200 UTC		6	12	83	1001	6	NO DATA	3	N/A	N/A
0300 UTC		6	15	85	1001	6	NO DATA	3	N/A	N/A
0400 UTC		7	22	84	1002	6	NO DATA	3	N/A	N/A
0500 UTC		8	19	85	1002	5	NO DATA	3	N/A	N/A
0600 UTC		8	22	84	1002	5	NO DATA	2	N/A	N/A
0700 UTC		9	22	84	1003	4	NO DATA	2	N/A	N/A
0800 UTC		8	22	80	1004	5	NO DATA	2	N/A	N/A
0900 UTC		10	15	78	1004	6	NO DATA	2	N/A	N/A
1000 UTC		11	19	73	1005	7	NO DATA	2	N/A	N/A

One last thing…Occluded fronts

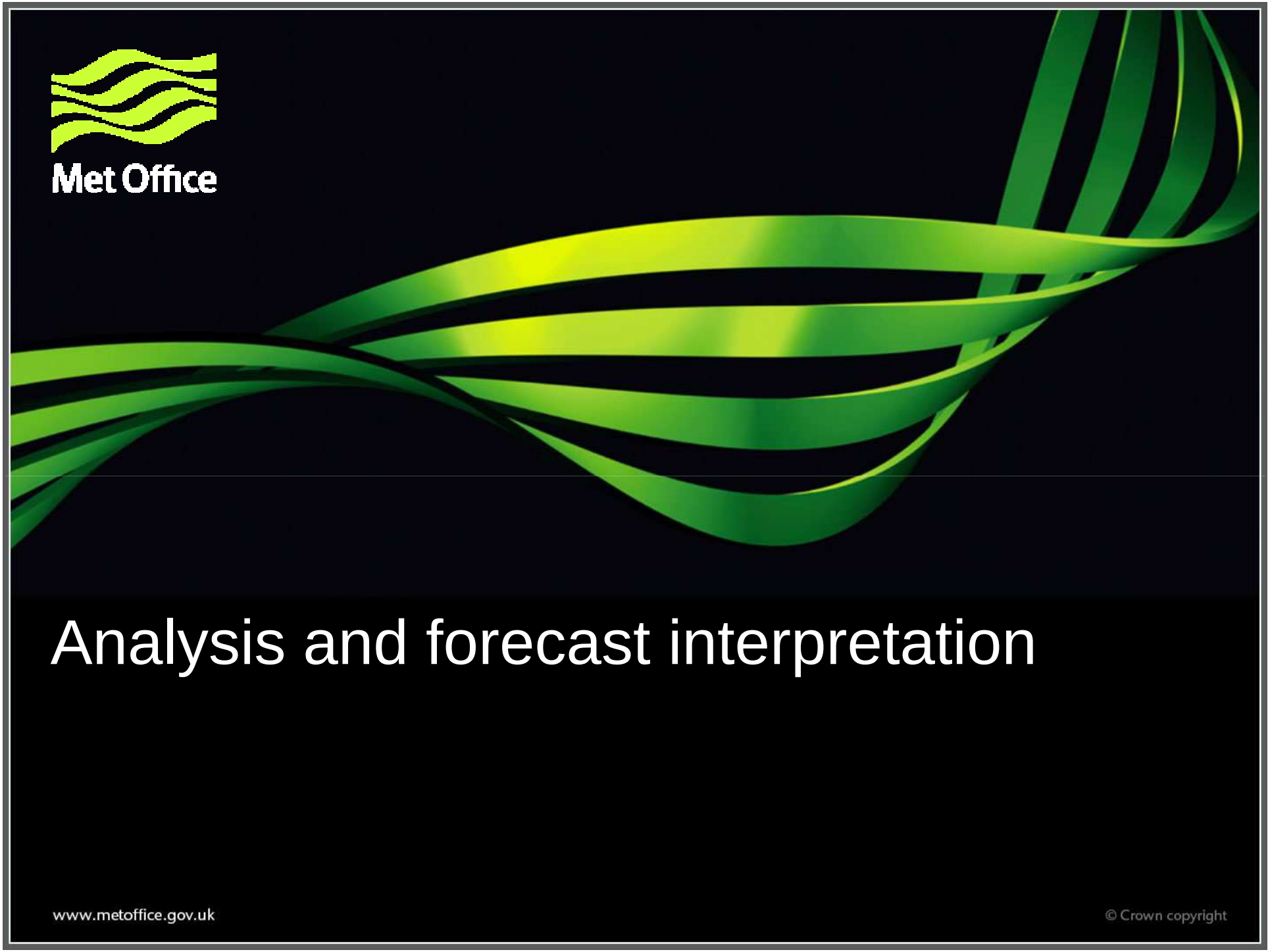


Occlusion ≈ hidden

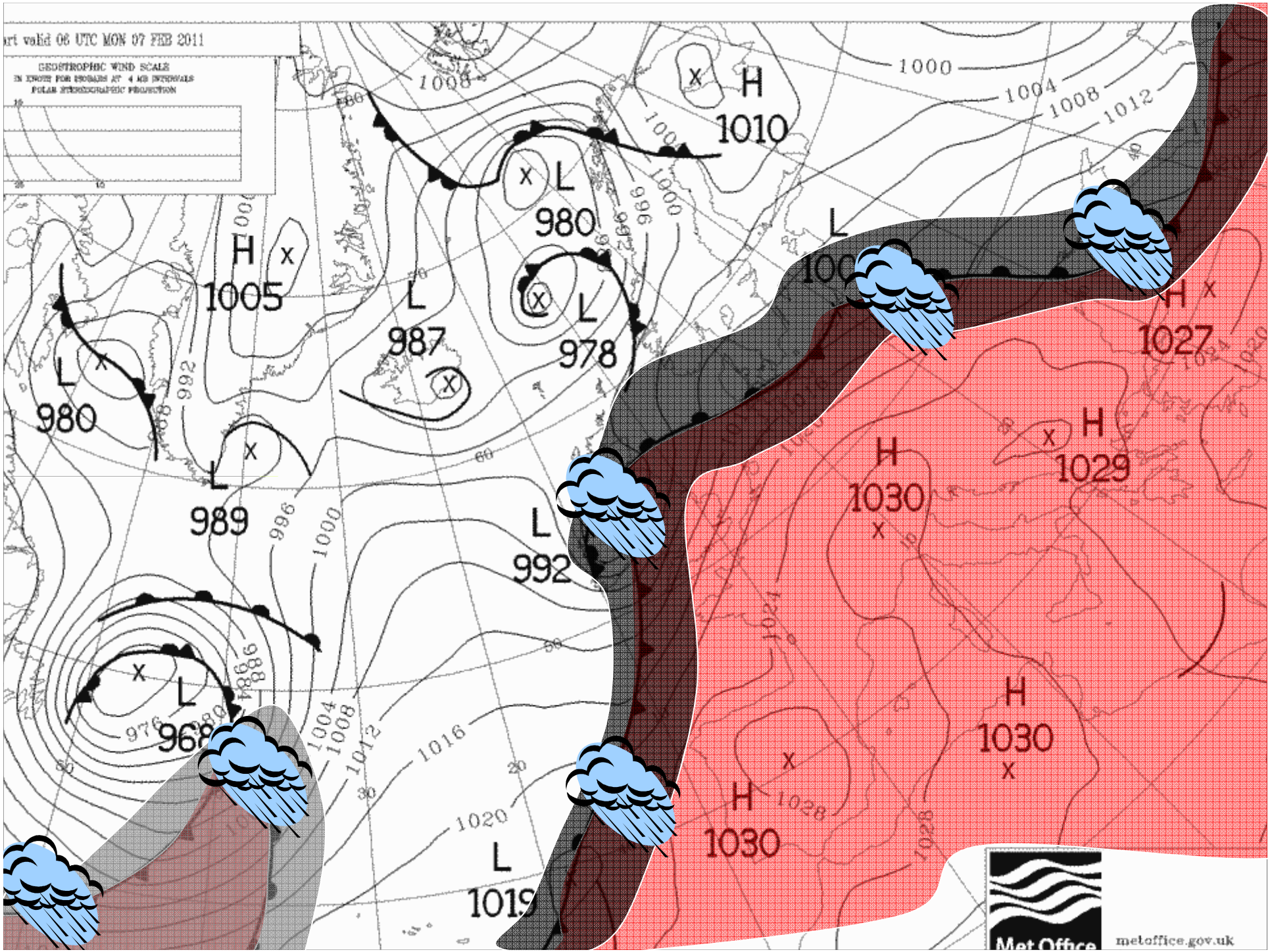
Life cycle of a weather system



Development of an occluding depression



Analysis and forecast interpretation


rt valid 06 UTC MON 07 FEB 2011
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
H 1010
L 980
H 1005
L 987
L 978
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H 1027
H 1030
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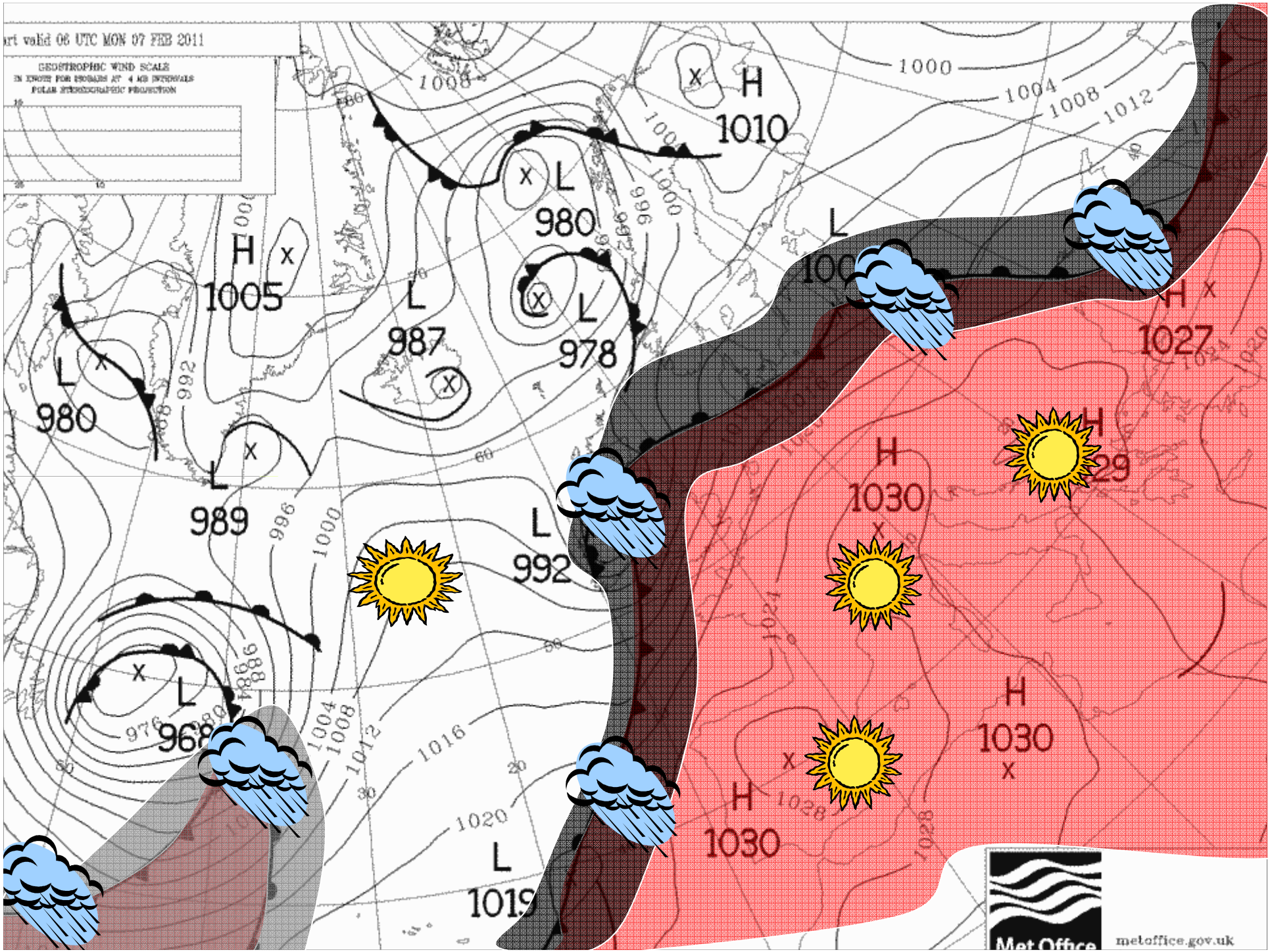
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H 1010
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H 1027
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1000
1004
1008
1012
1016
1020
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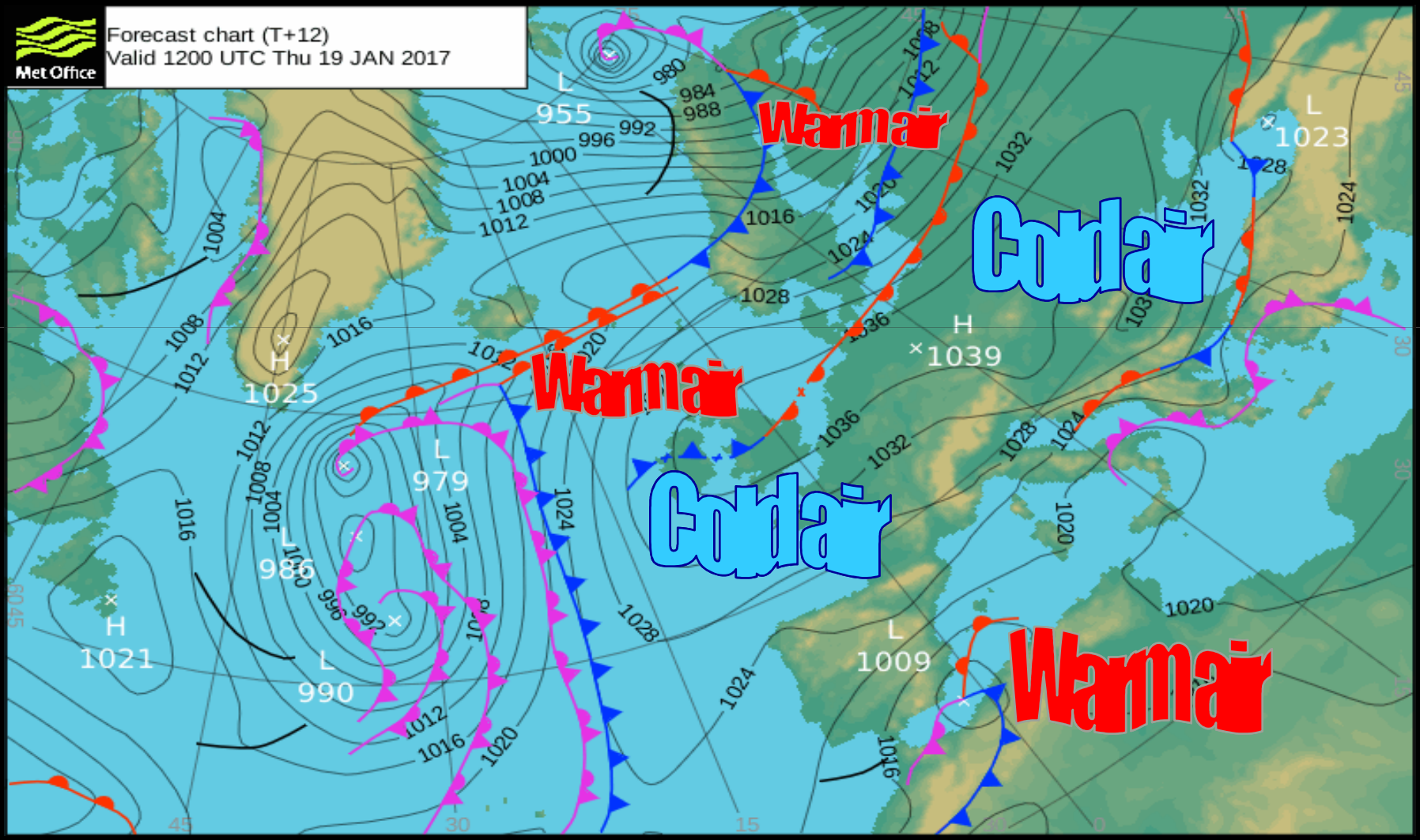
TODAY!


Met Office
Forecast chart (T+12)
Valid 1200 UTC Thu 19 JAN 2017
Warm air
Cold air
Warm air
Cold air
Warm air
L 955
L 979
L 986
L 990
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H 1025
H 1039
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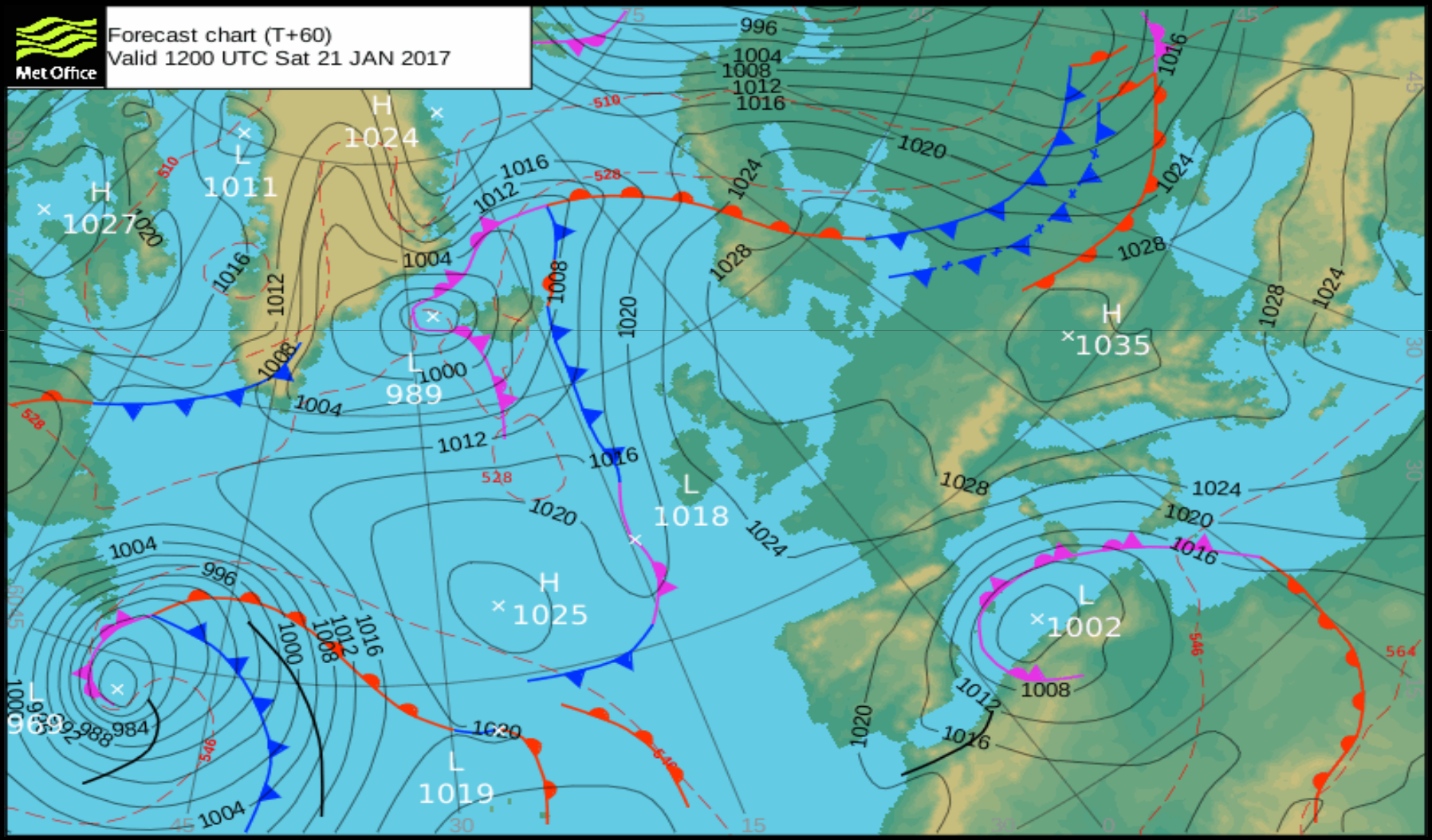
SATURDAY


Met Office
Forecast chart (T+60)
Valid 1200 UTC Sat 21 JAN 2017
H 1024
L 1011
H 1027
L 989
H 1035
L 1018
H 1025
L 1002
L 969
L 1019
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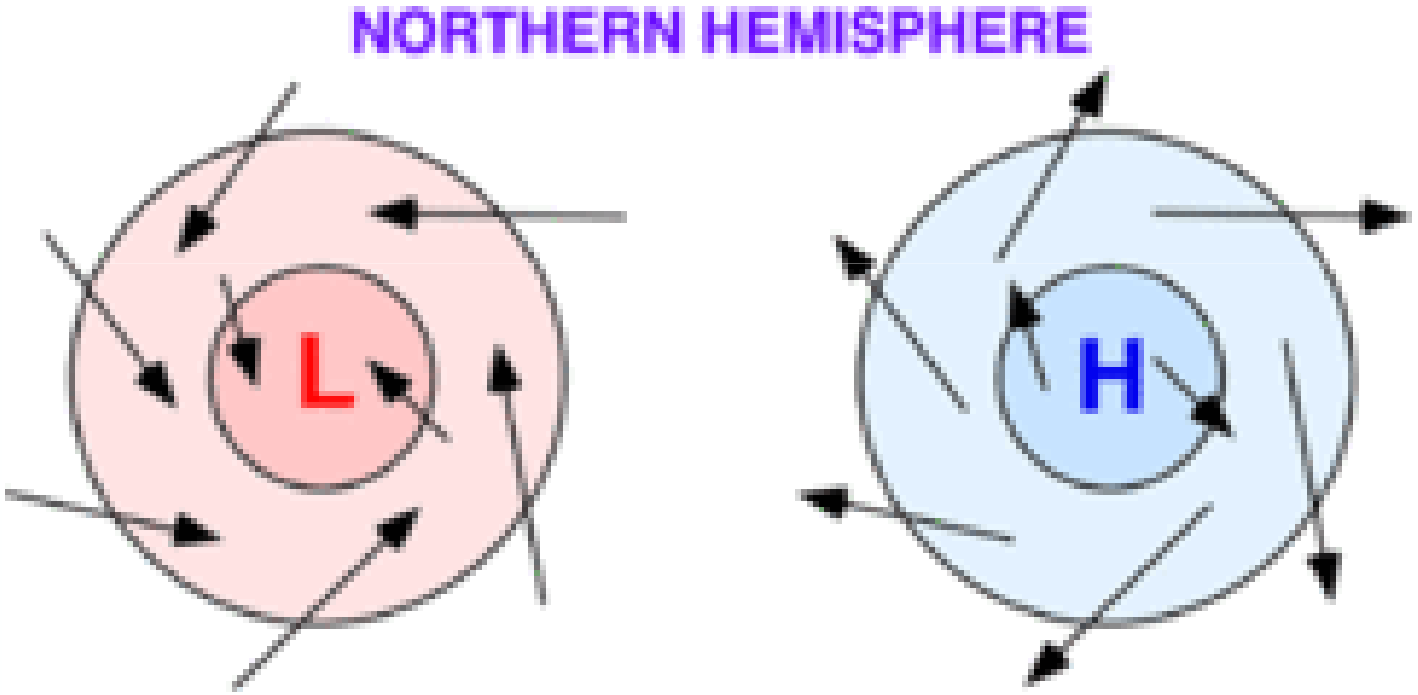
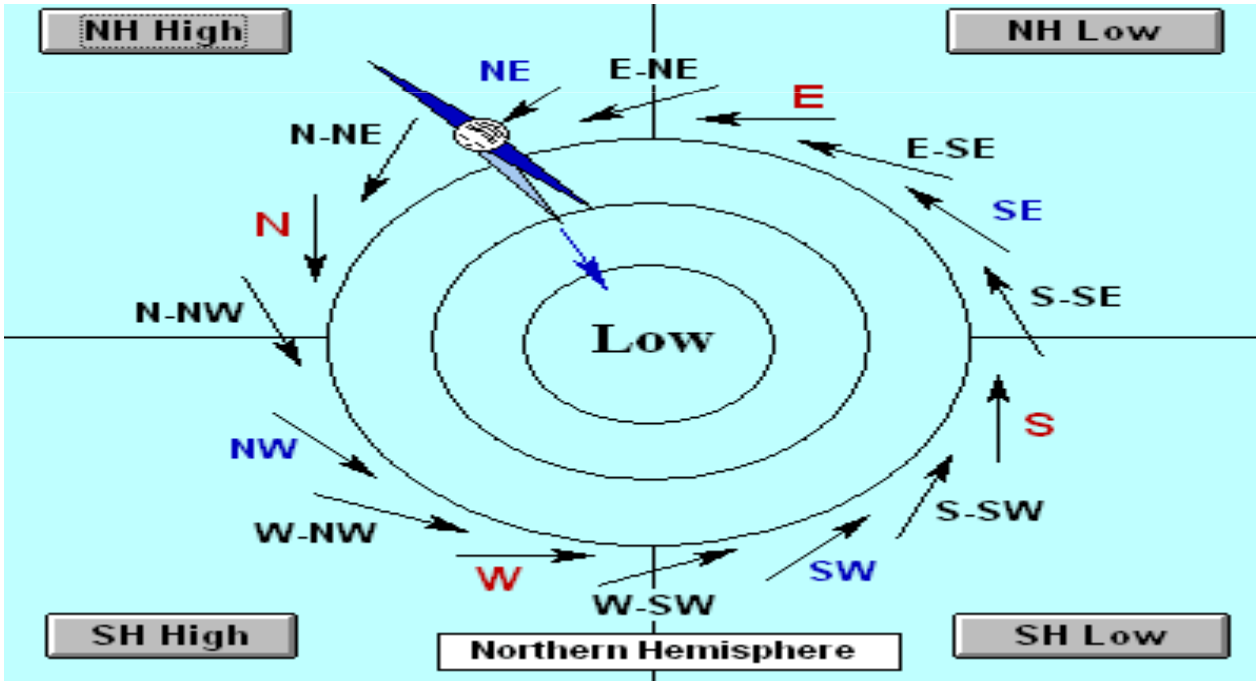
Winds and weather

Which way do the winds blow?



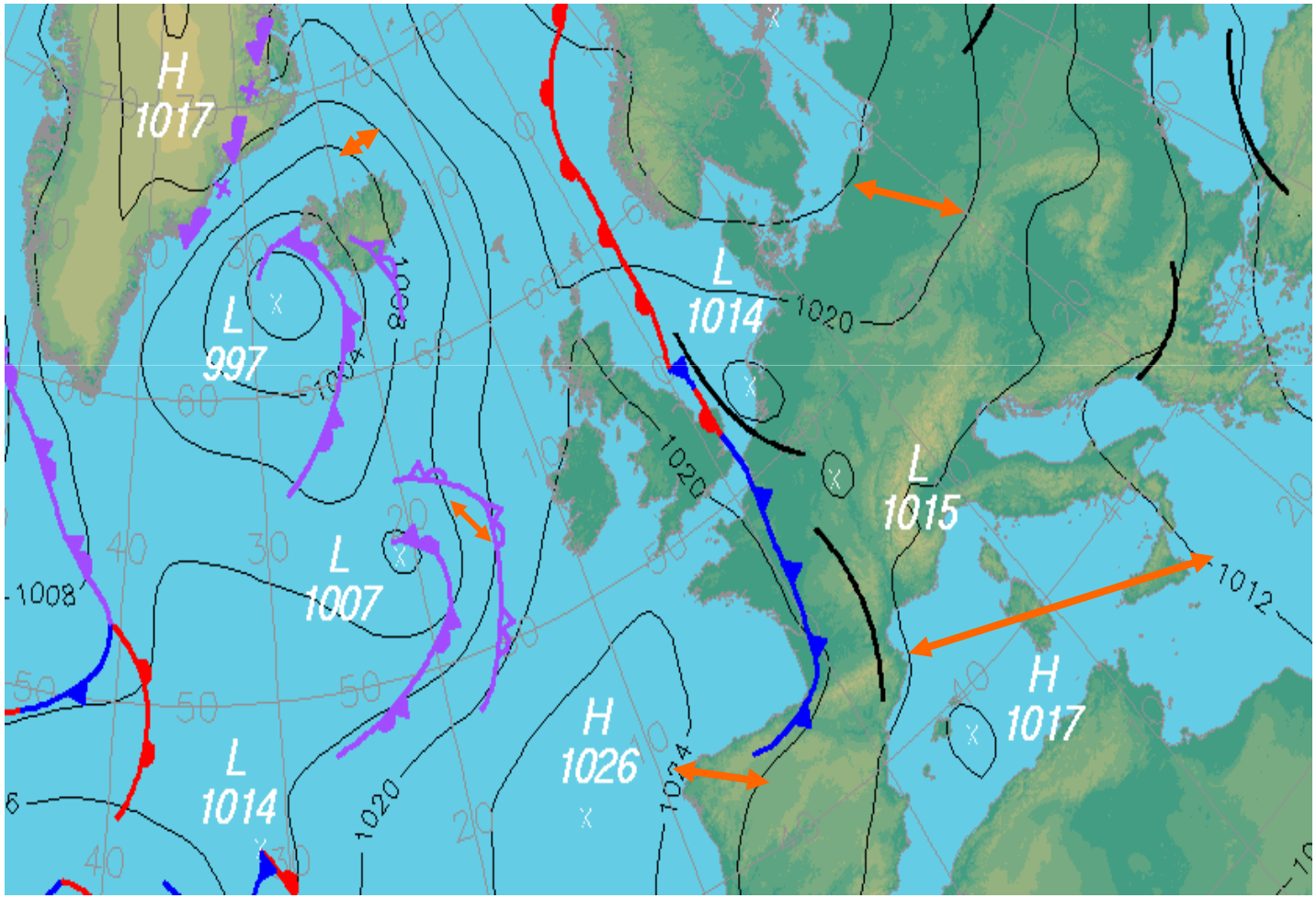
Winds around low pressure

- Buys-Ballot law – when you are standing with your back to the wind the area of low pressure is on your left (in the Northern Hemisphere)
- Around a low pressure area winds go in an anti-clockwise direction (in the Northern Hemisphere)



- Opposite around an area of high pressure!

Wind speed



Wind speed - closer the isobars the stronger the wind

Barometric pressure and winds

Beaufort Scale and its meaning

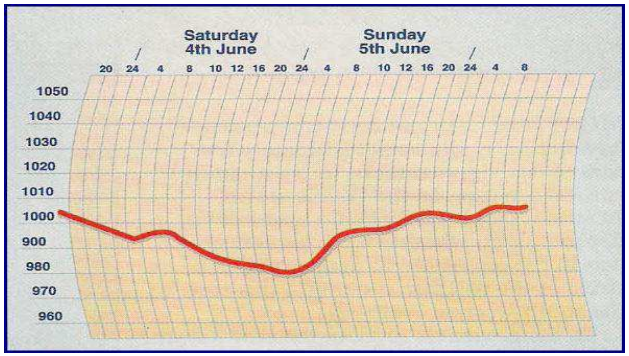
Force 4	seen as limit of safety for many sailing boats and motor boats
Force 6	known as the ‘yachtsman’s gale’
Force 8	usually when the wind starts to become a hazard for commercial shipping

BEAUFORT FORCE 4
WIND SPEED: 11-16 KNOTS

SEA: WAVE HEIGHT 1-1.5M (3.5-5FT), SMALL WAVES BECOMING LONGER, FAIRLY FREQUENT WHITE HORSES

Changes in barometric pressure

Fall or rise



8mb in 3 hours	almost certainly a Force 8 will follow
5mb in 3 hours	almost certainly a Force 6 will follow if Force 3 or less when you see this – you have about 4 to 8 hours notice

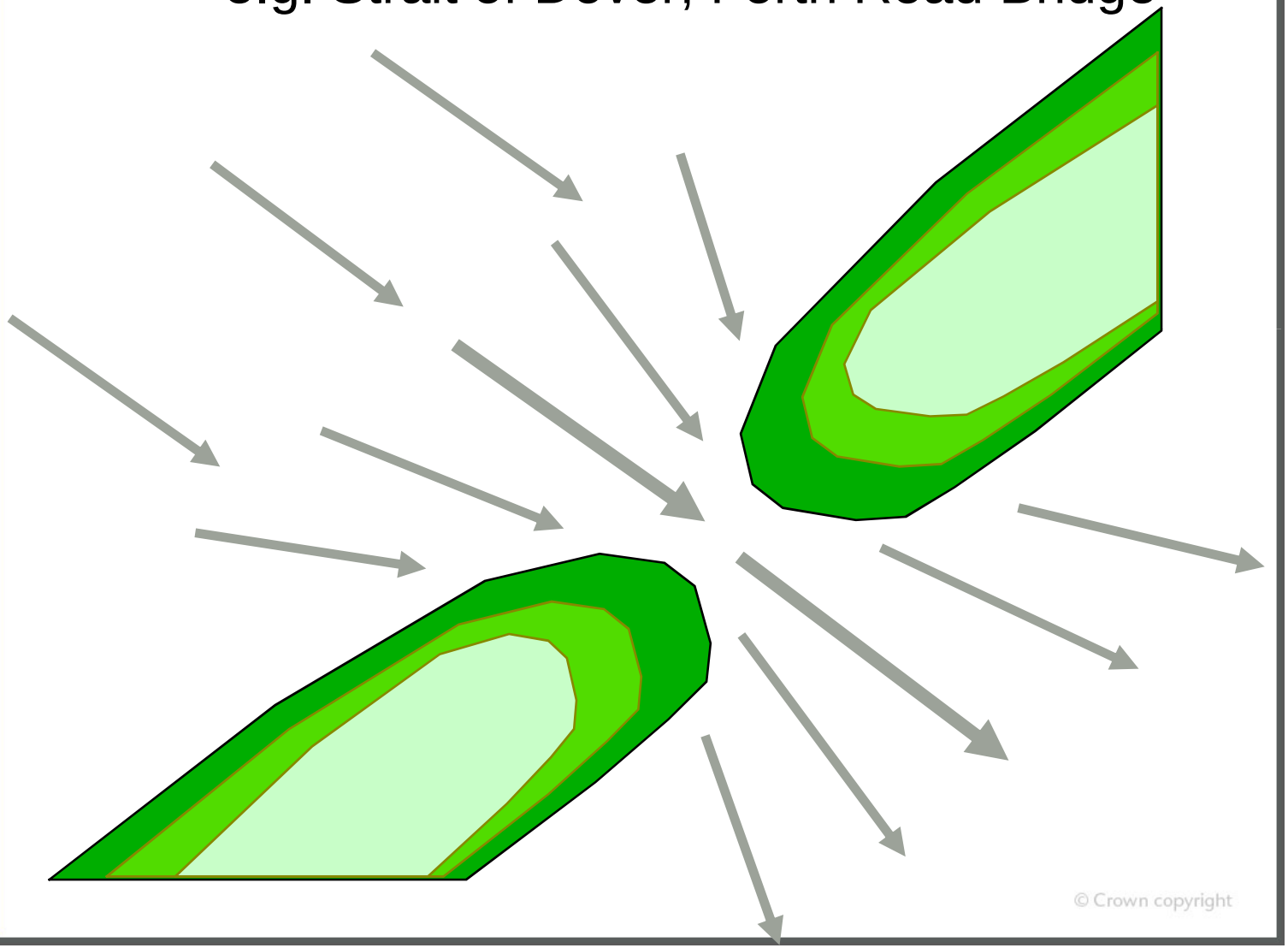
Not the time to be caught on a ‘lee’ shore – e.g. a southerly on the south coast!

1 or few mb erratic	indicative of squall lines, sudden change strong gusts or lulls with dark thunderclouds

Coastal winds

Wind - Channelling

Gaps in barrier strengthen wind flow
e.g. Strait of Dover, Forth Road Bridge



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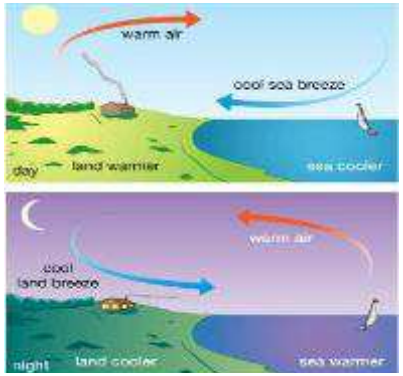
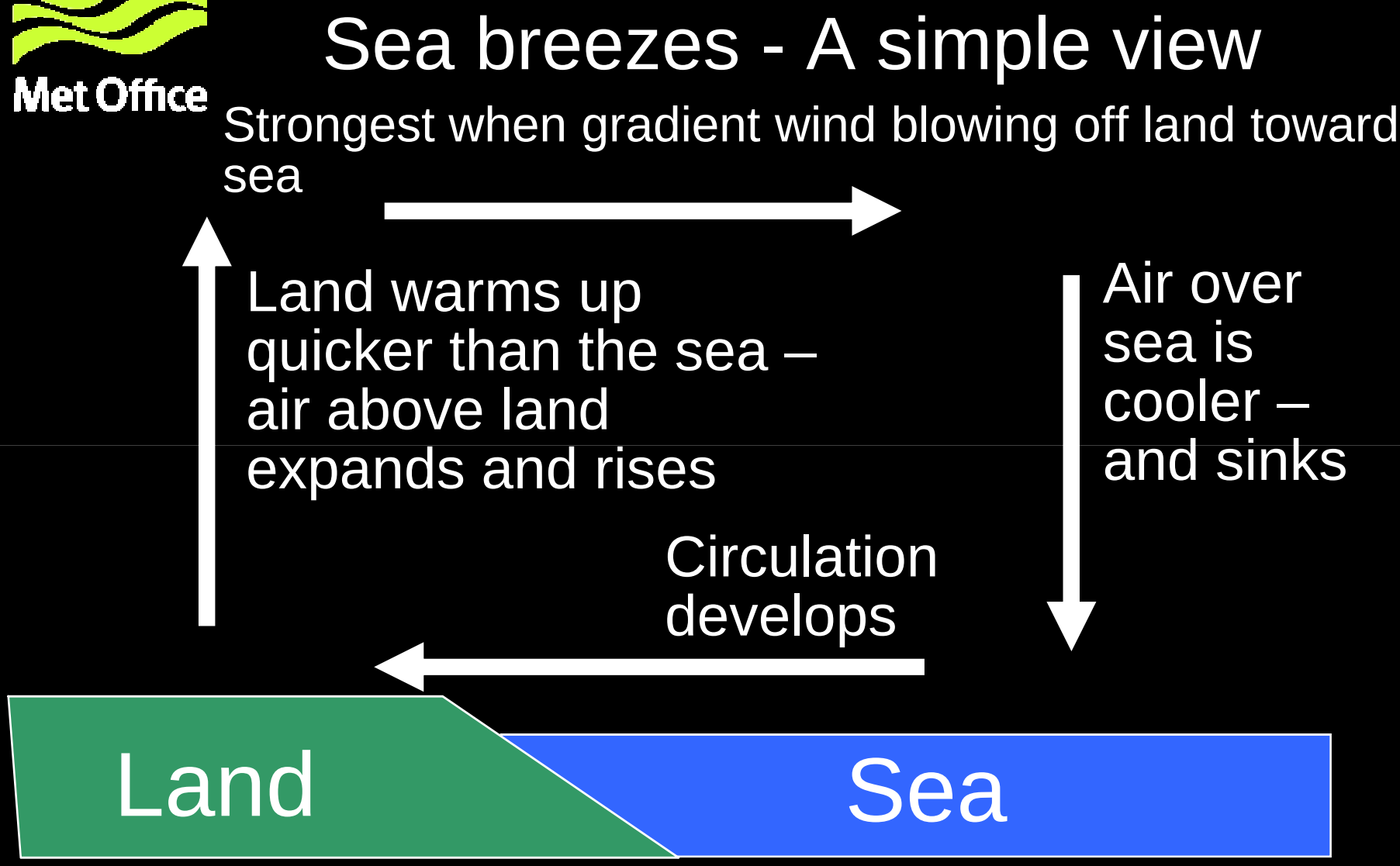
Coastal winds – Sea and land breezes

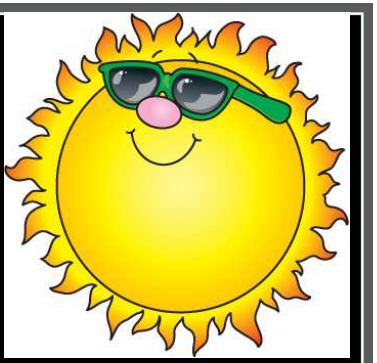
- Usually late spring, summer or early autumn
- Usually under high(ish) pressure
- Usually need bright/sunny spells to warm up land
- Land temperature at least 3 or 4 degrees Celsius higher than coastal sea temperature
- Stronger sea breeze when wind blowing off land in first place
- Land breeze at night



Sea breezes - A simple view

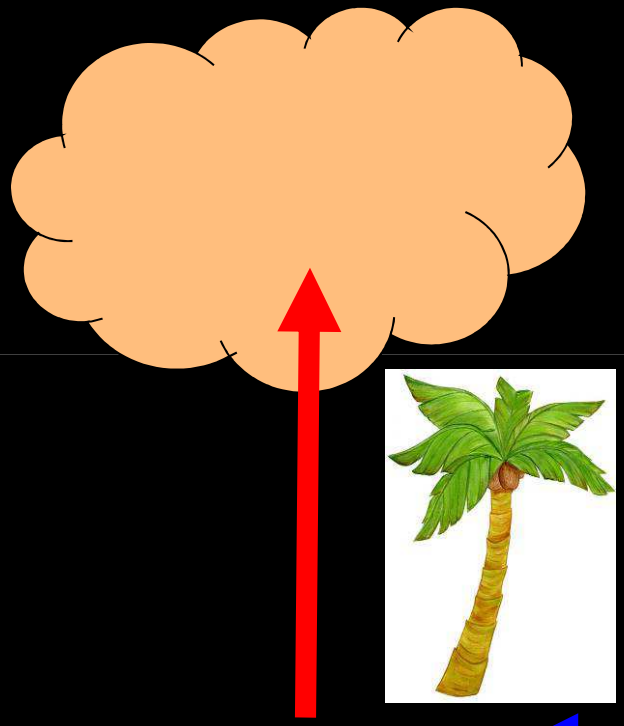


Sea breeze effects



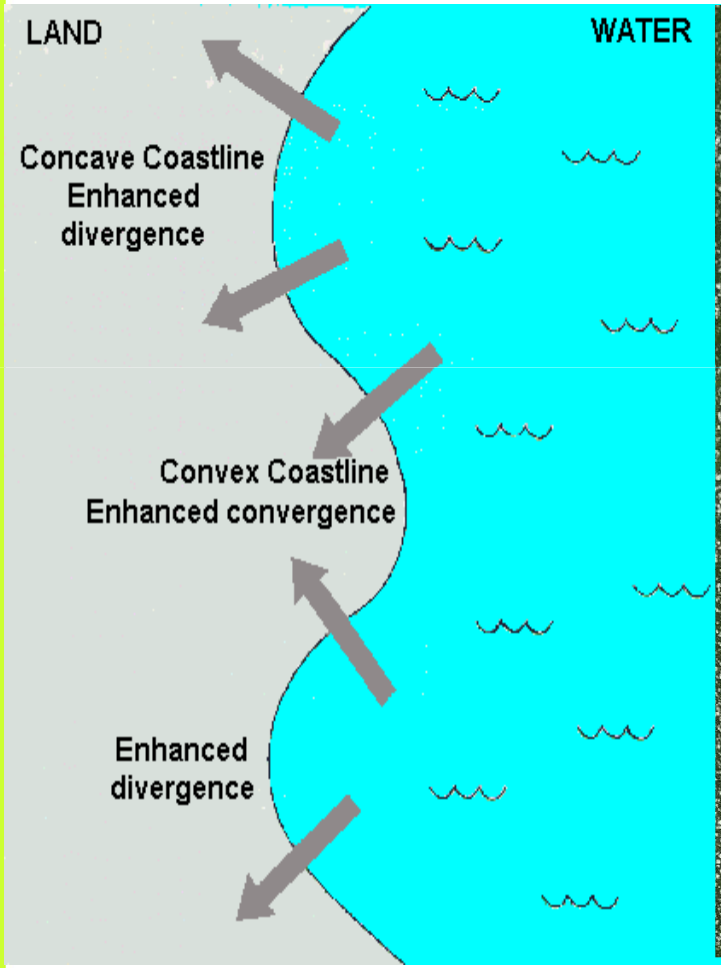
Coasts are usually sunnier than inland!

The Sea Breeze



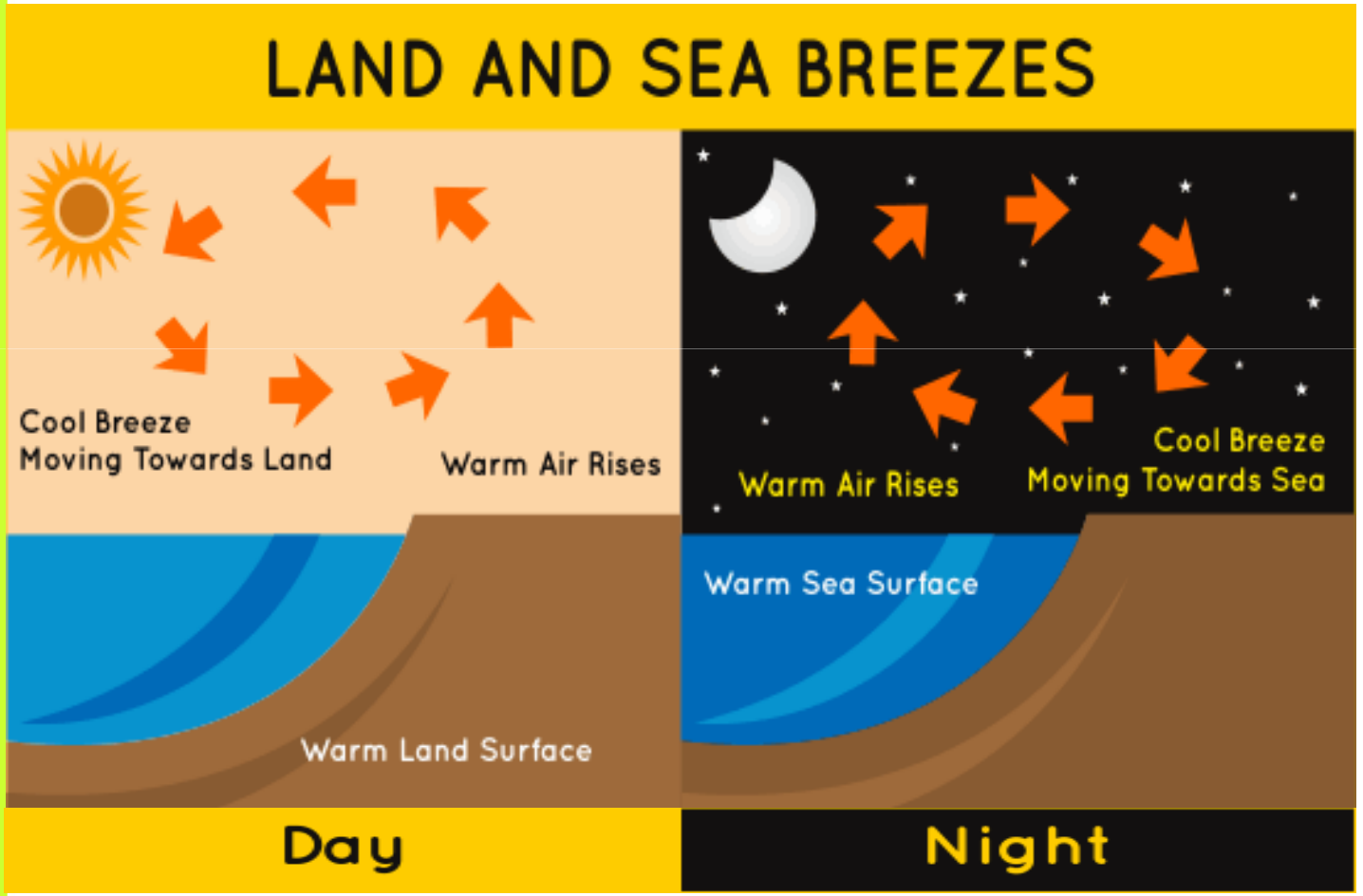
Coasts - Sea breezes

Coastline affects sea breeze



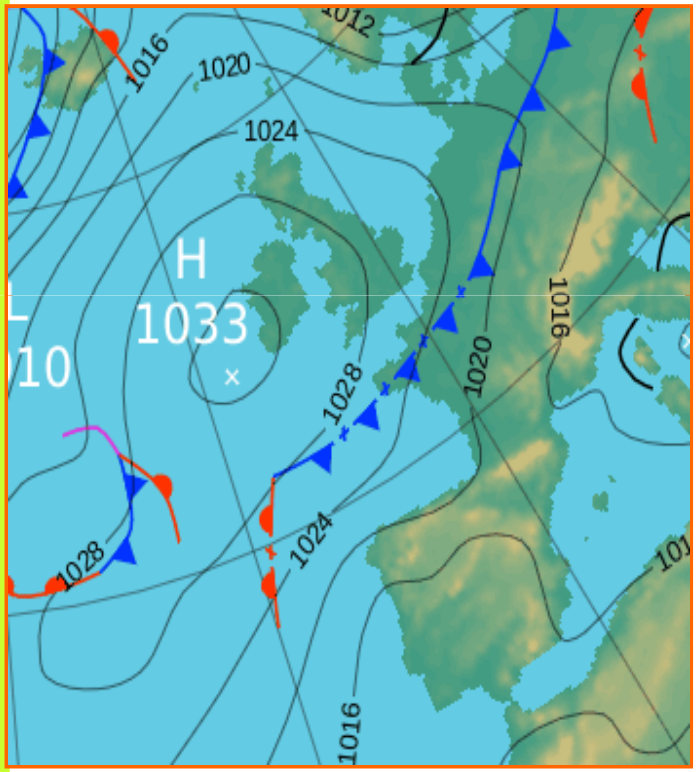
Coasts - Land breezes

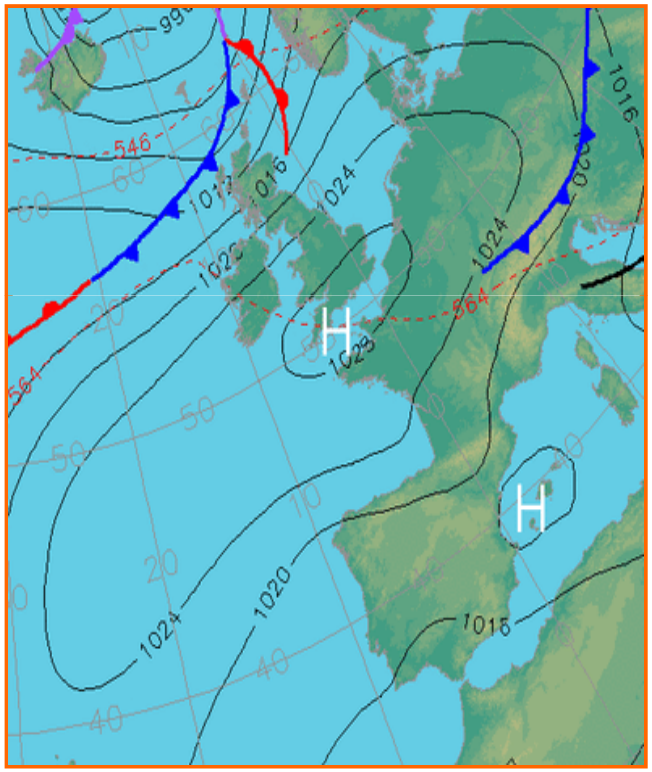
Usually not as strong as sea breezes



Paralympics Sea breeze EXPECTED Synoptic Situation 5/6 September 2012

Analysis Wednesday 05/1300 Forecast Thursday 06/1300





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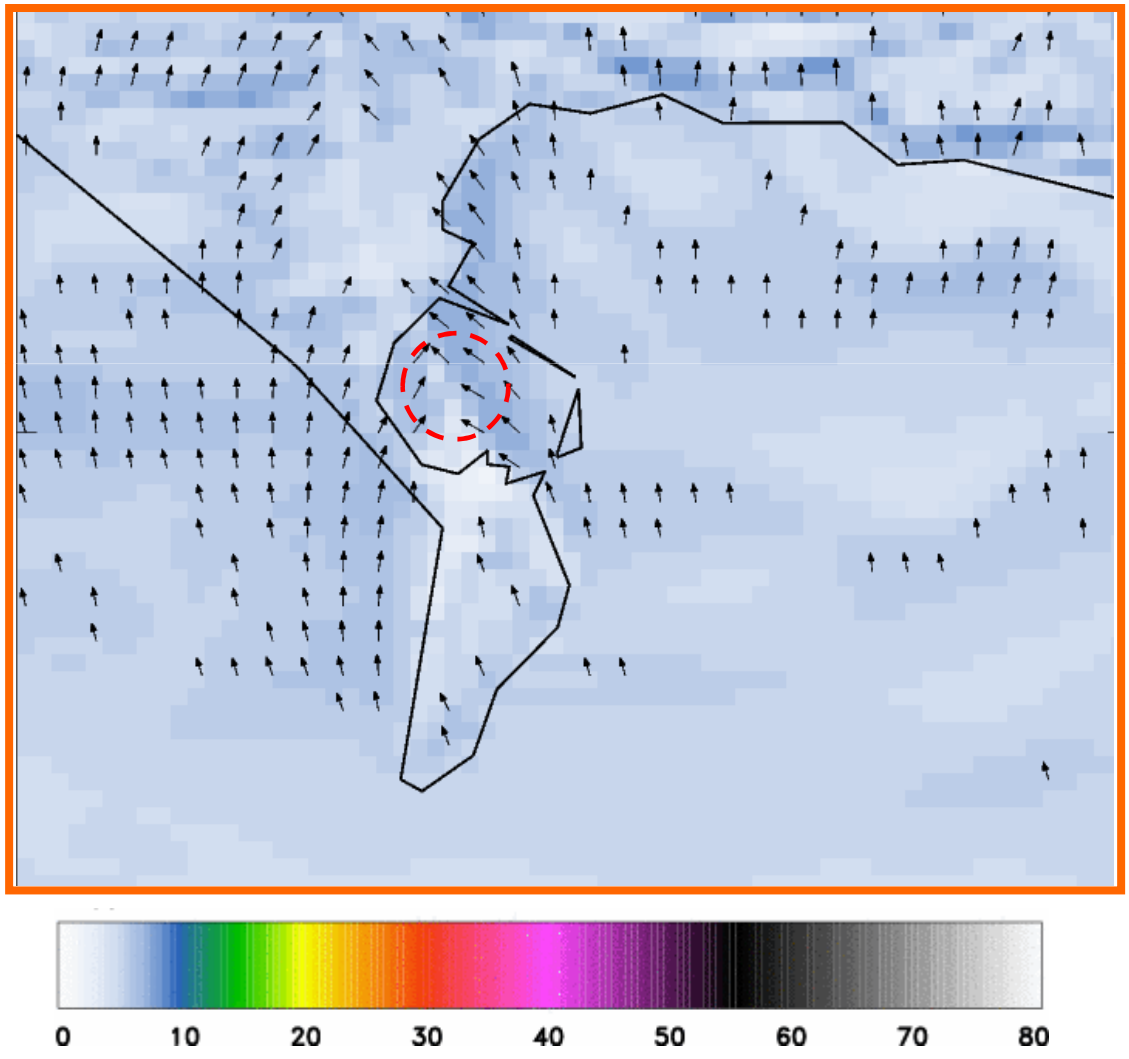
Model products
Winds forecast loop (knots)

1300 Thursday



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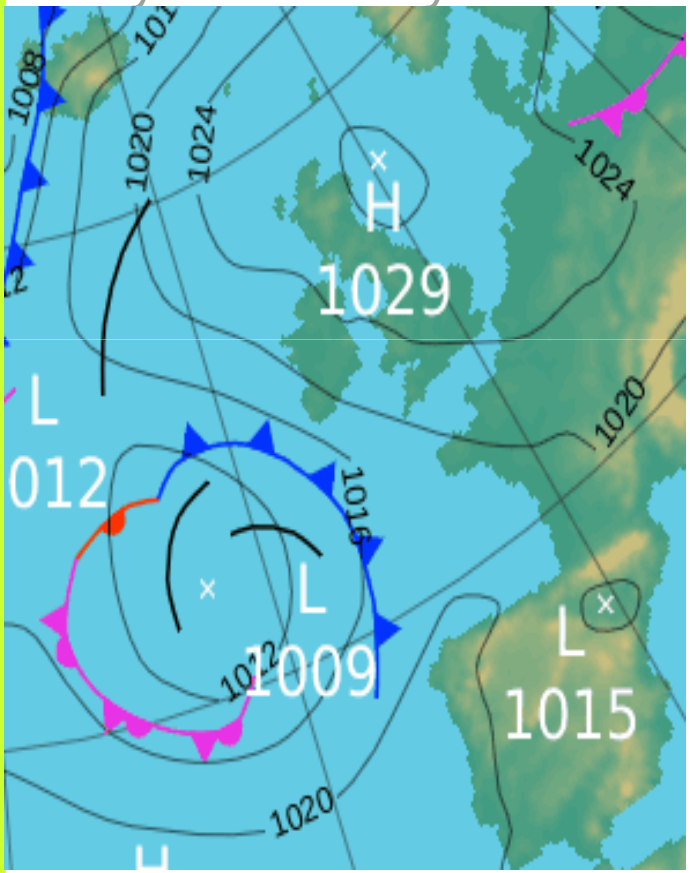
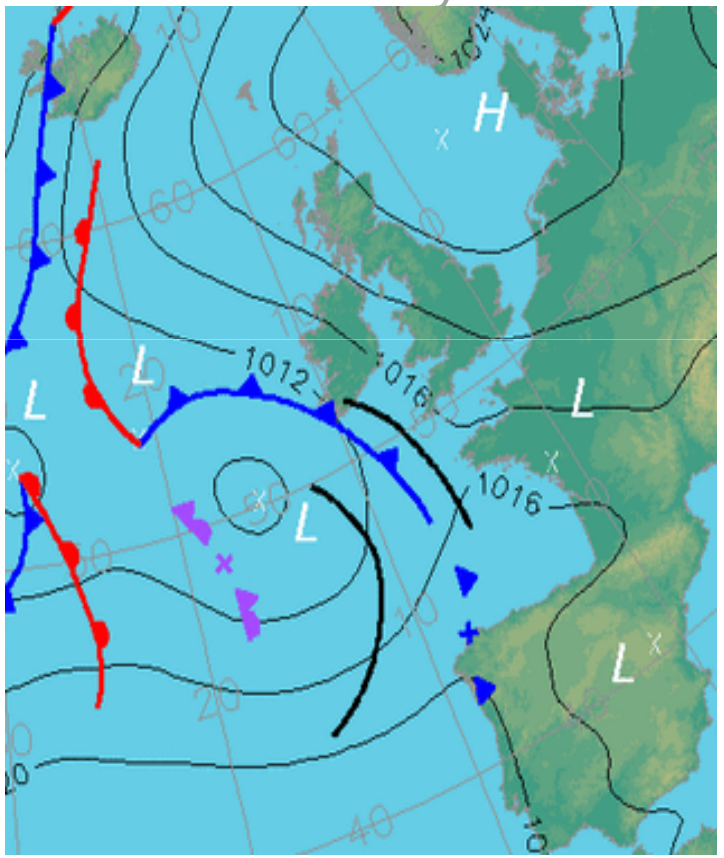
Olympics 11 August 2012
Sea Breeze UNLIKELY

Analysis Saturday 0100



Forecast Saturday 1300



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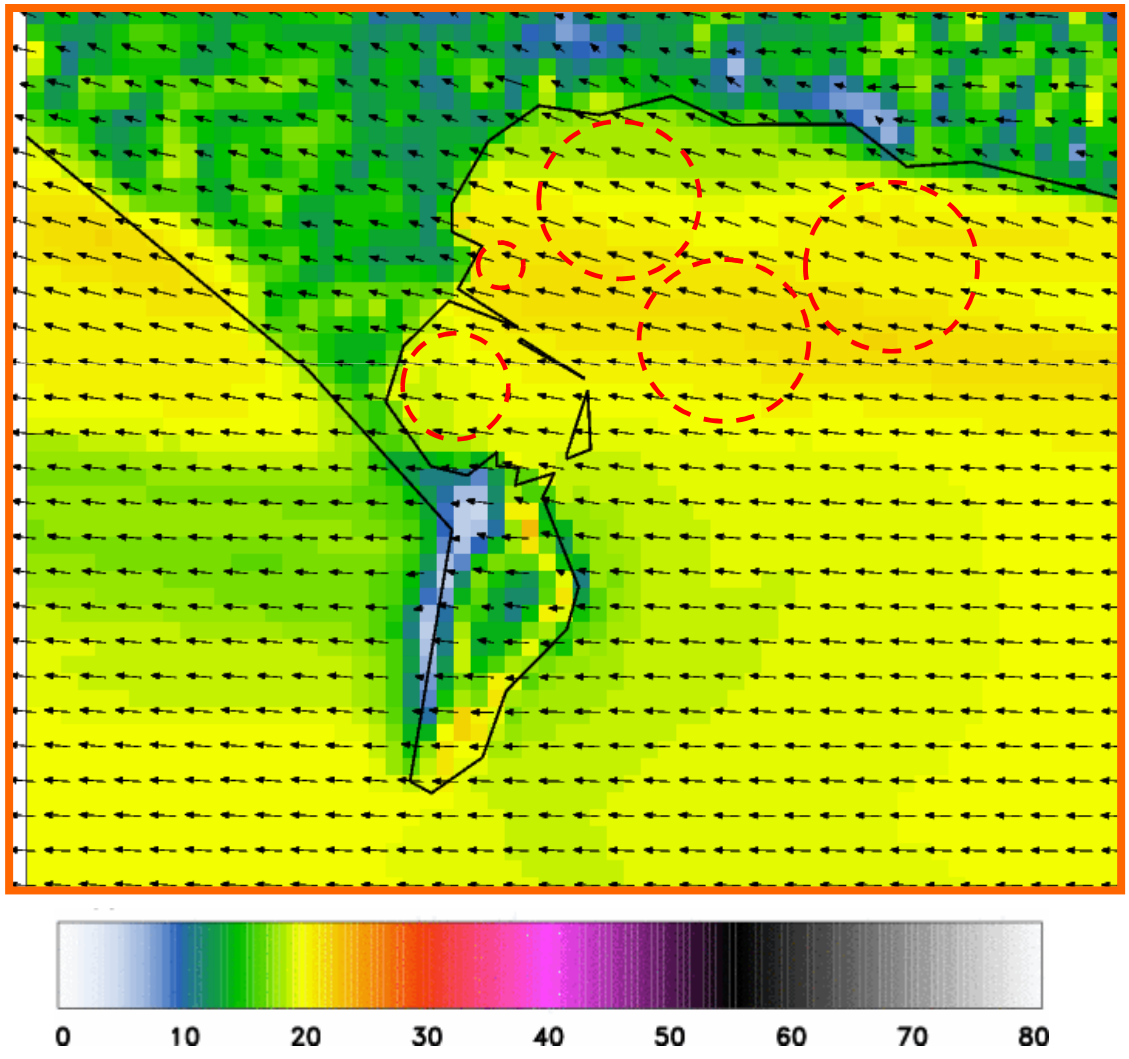
Model products
Winds forecast loop (knots)

1400 Saturday



Local winds

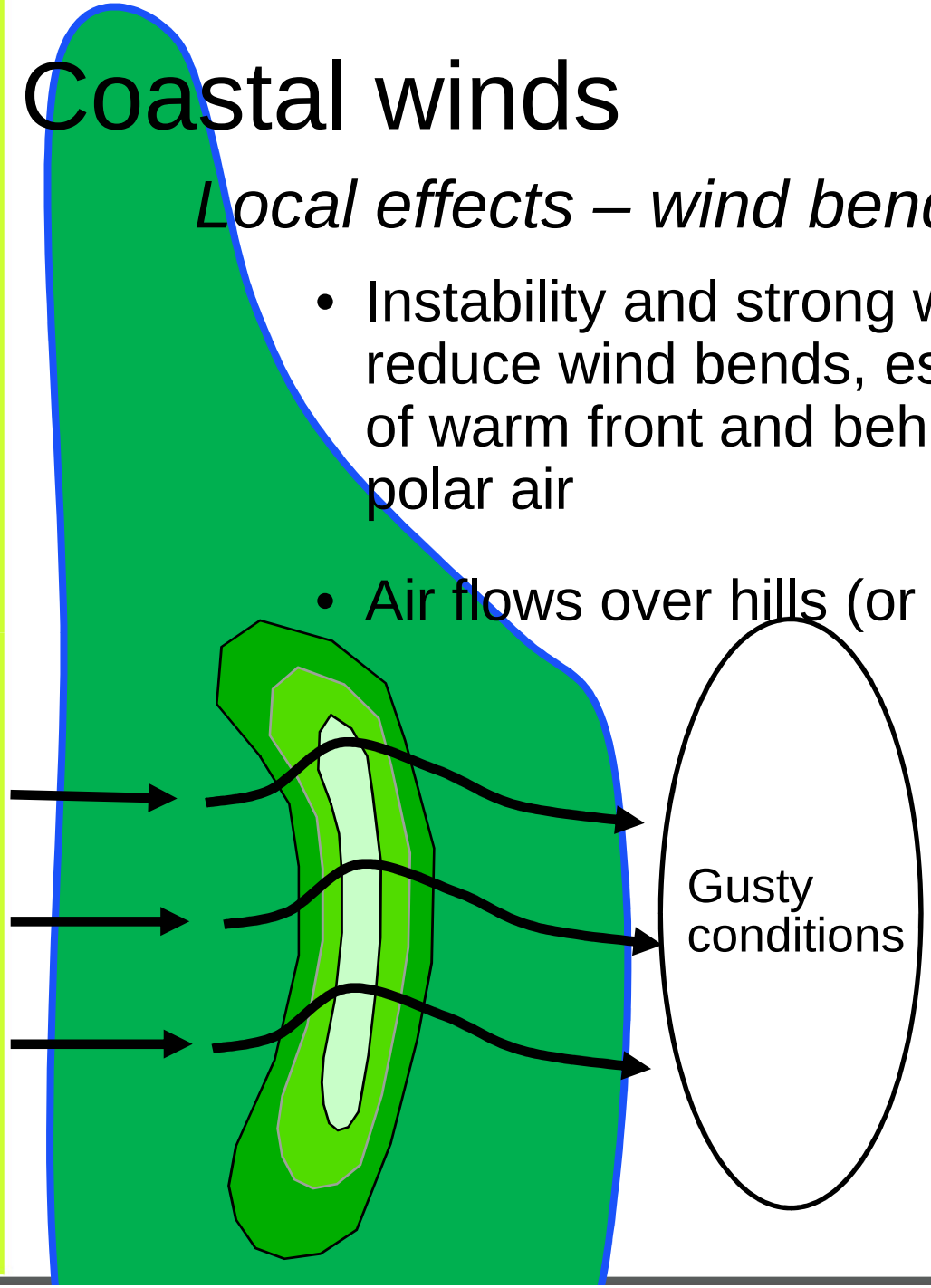
Effects of hills, cliffs, islands and channels

- Wind bends/shadows
- Focusing of breeze
- Certain set ups can promote/reduce wind bends

Coastal winds

Local effects – wind bends

- Instability and strong winds will reduce wind bends, especially ahead of warm front and behind cold front in polar air
- Air flows over hills (or buildings)



Met Office

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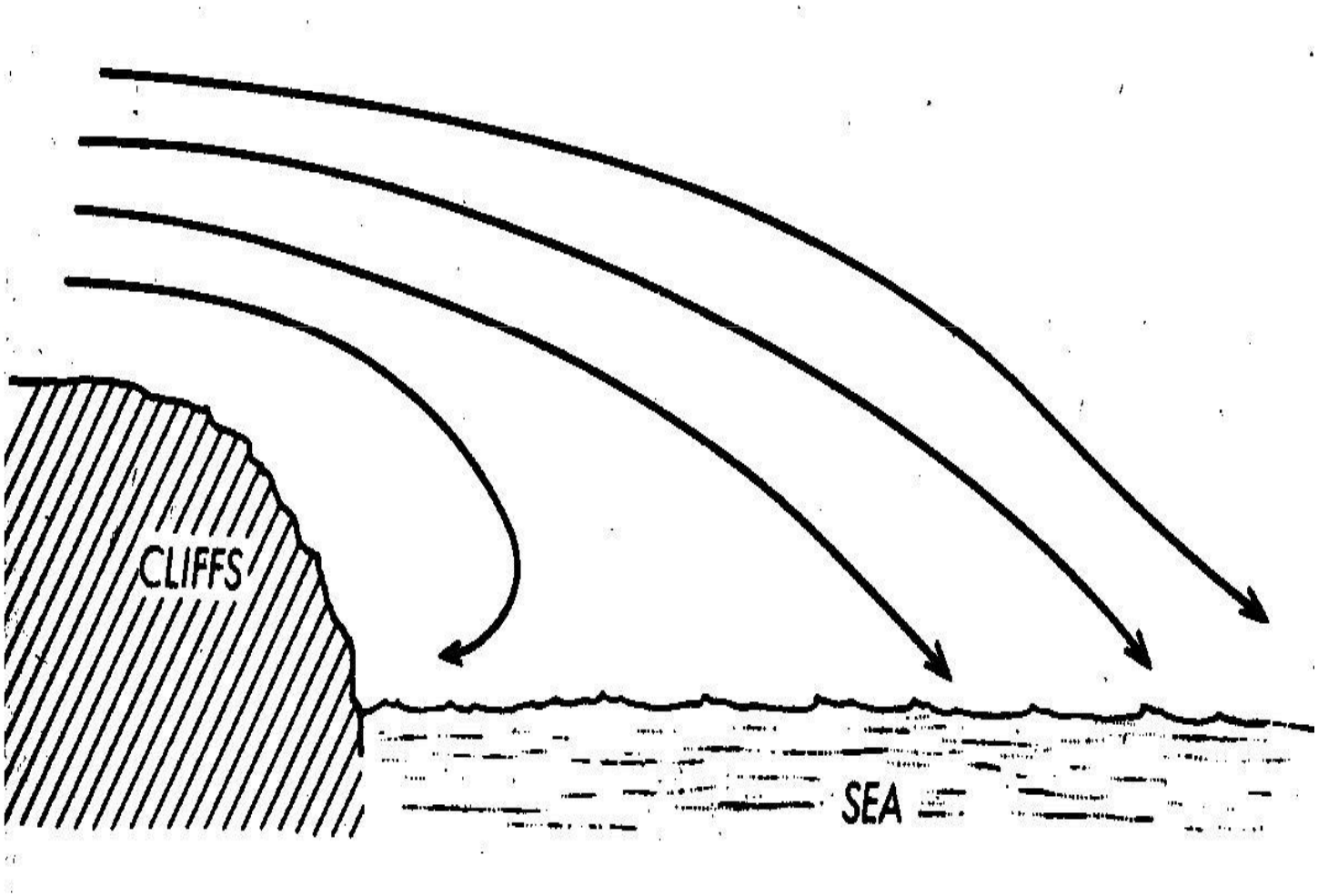
Coastal winds

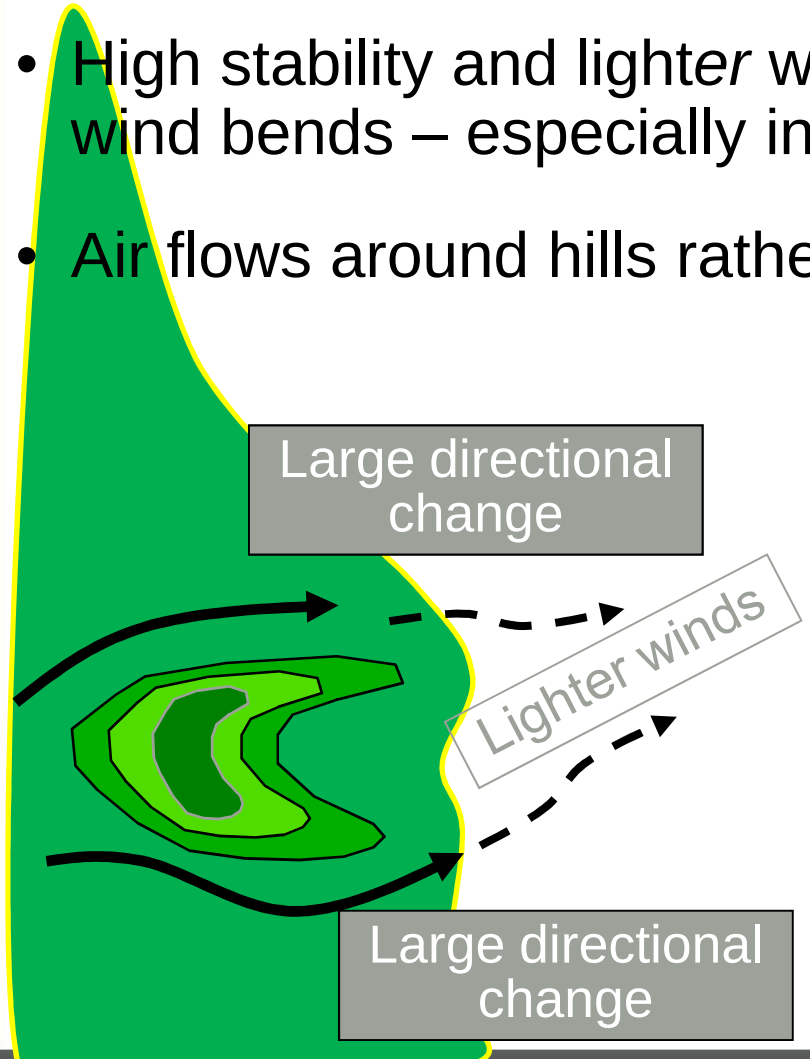
Local effects



Coastal winds

Local effects – wind bends

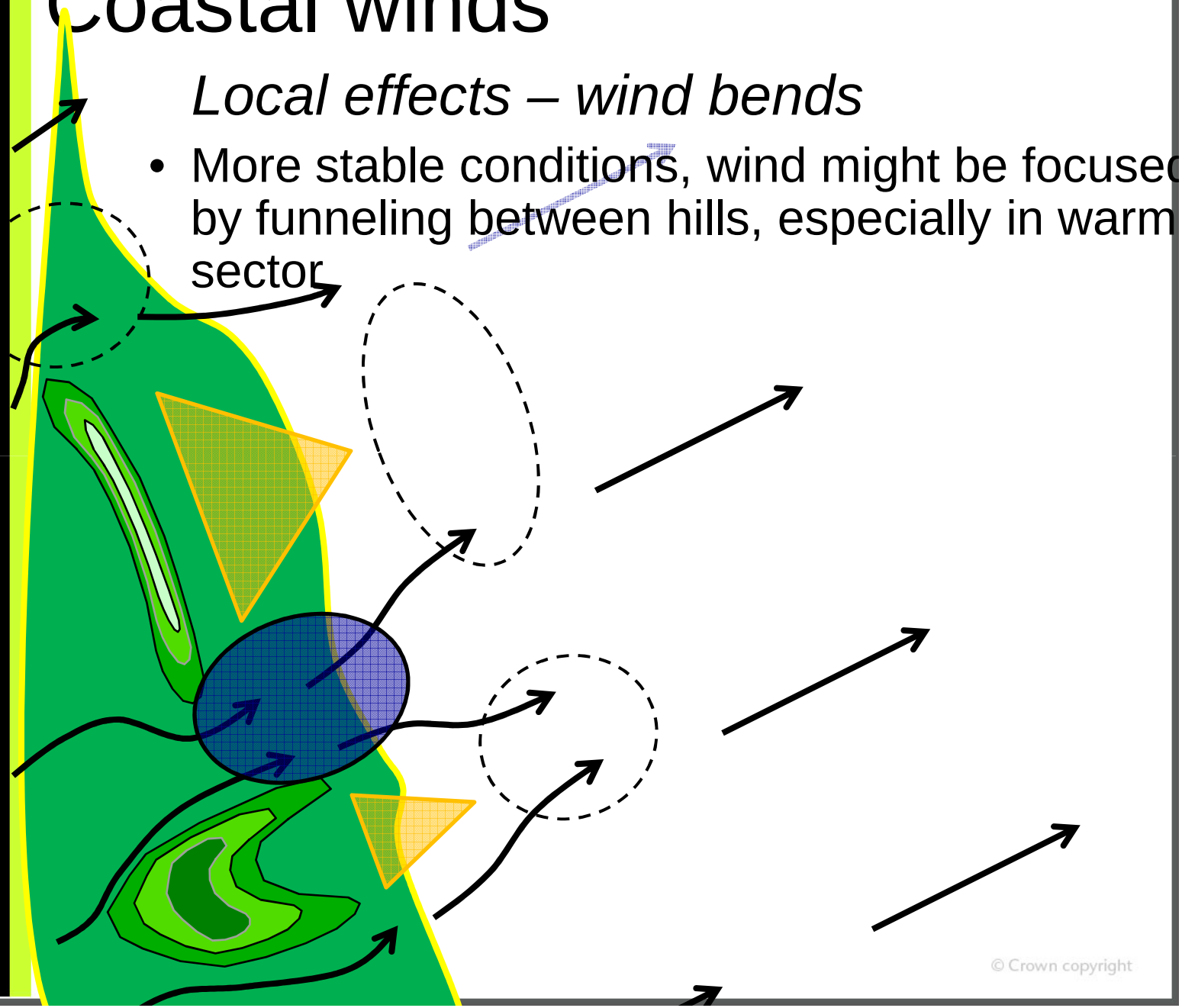
- High stability and lighter winds will promote wind bends – especially in warm sectors
- Air flows around hills rather than over



Coastal winds

Local effects – wind bends

- More stable conditions, wind might be focused by funneling between hills, especially in warm sector



Met Office

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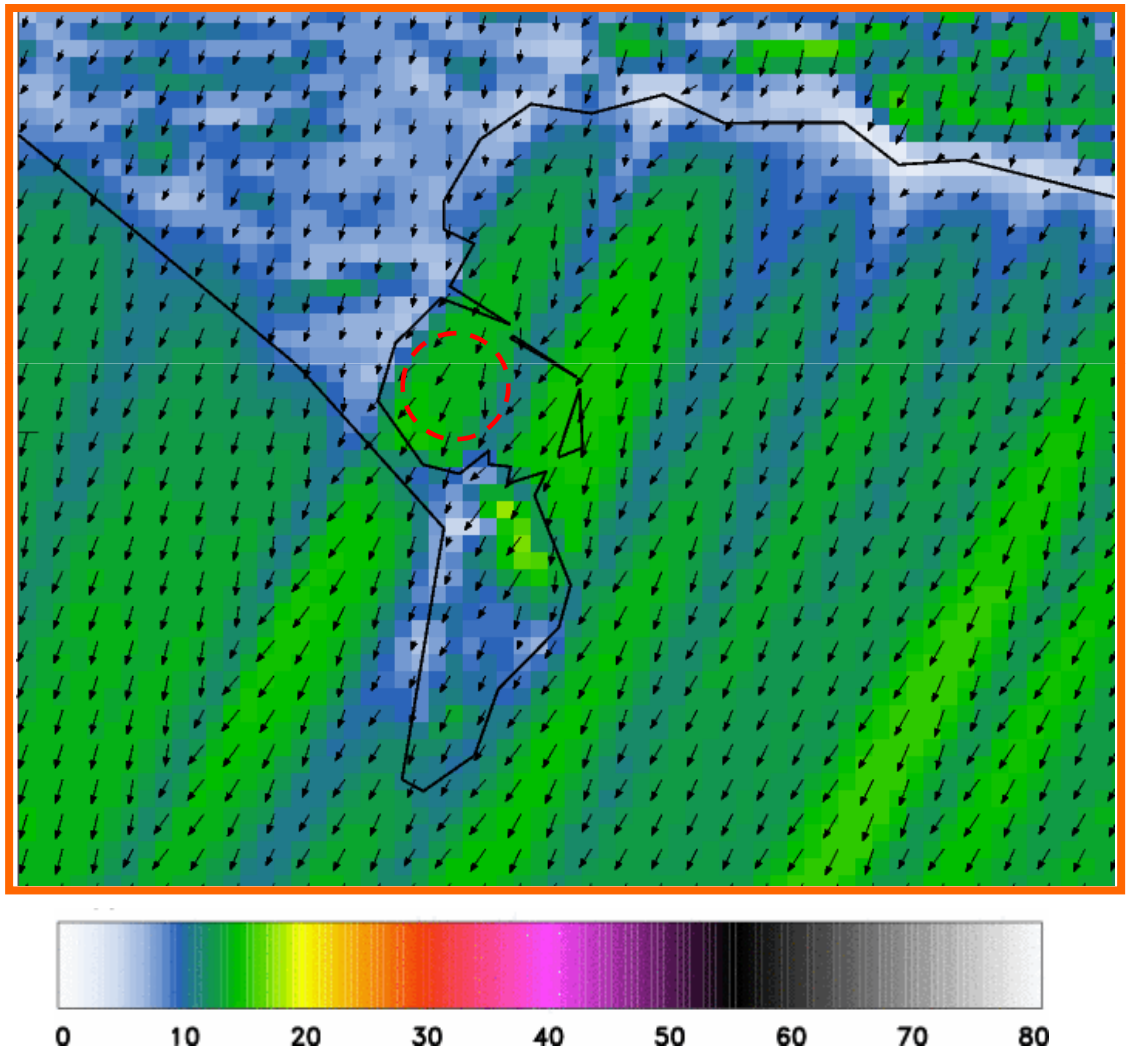
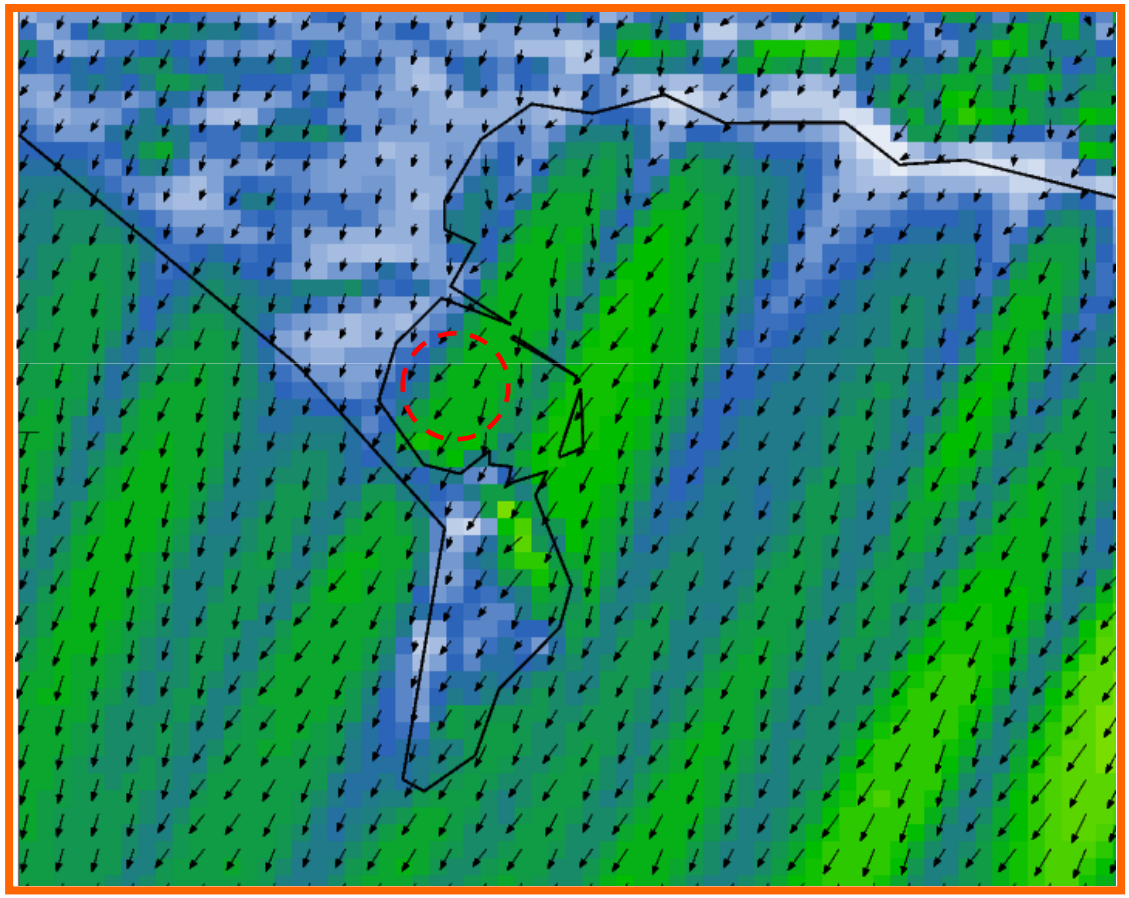
Model products
Winds forecast loop (knots)

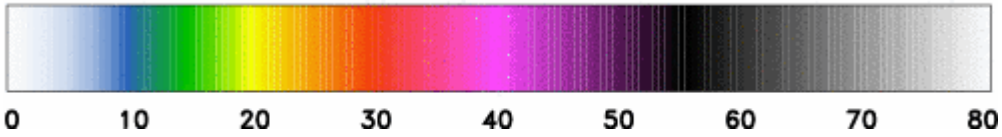
1100 Wednesday



Model products
Winds forecast loop (knots)

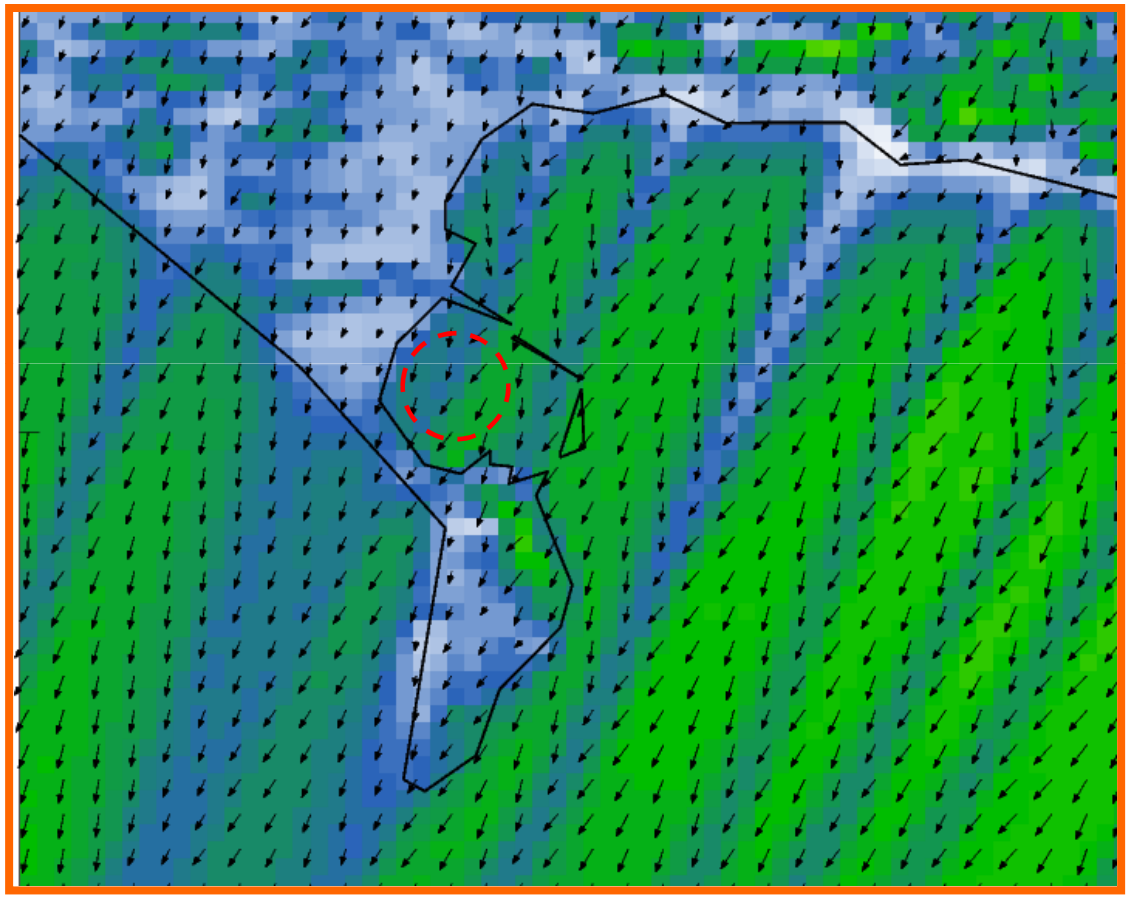
1130 Wednesday

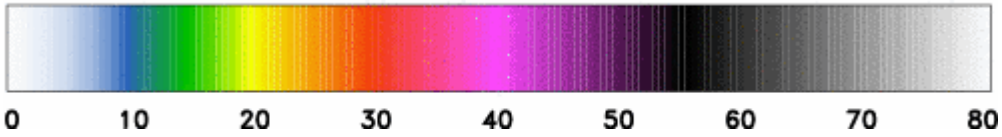




Model products
Winds forecast loop (knots)

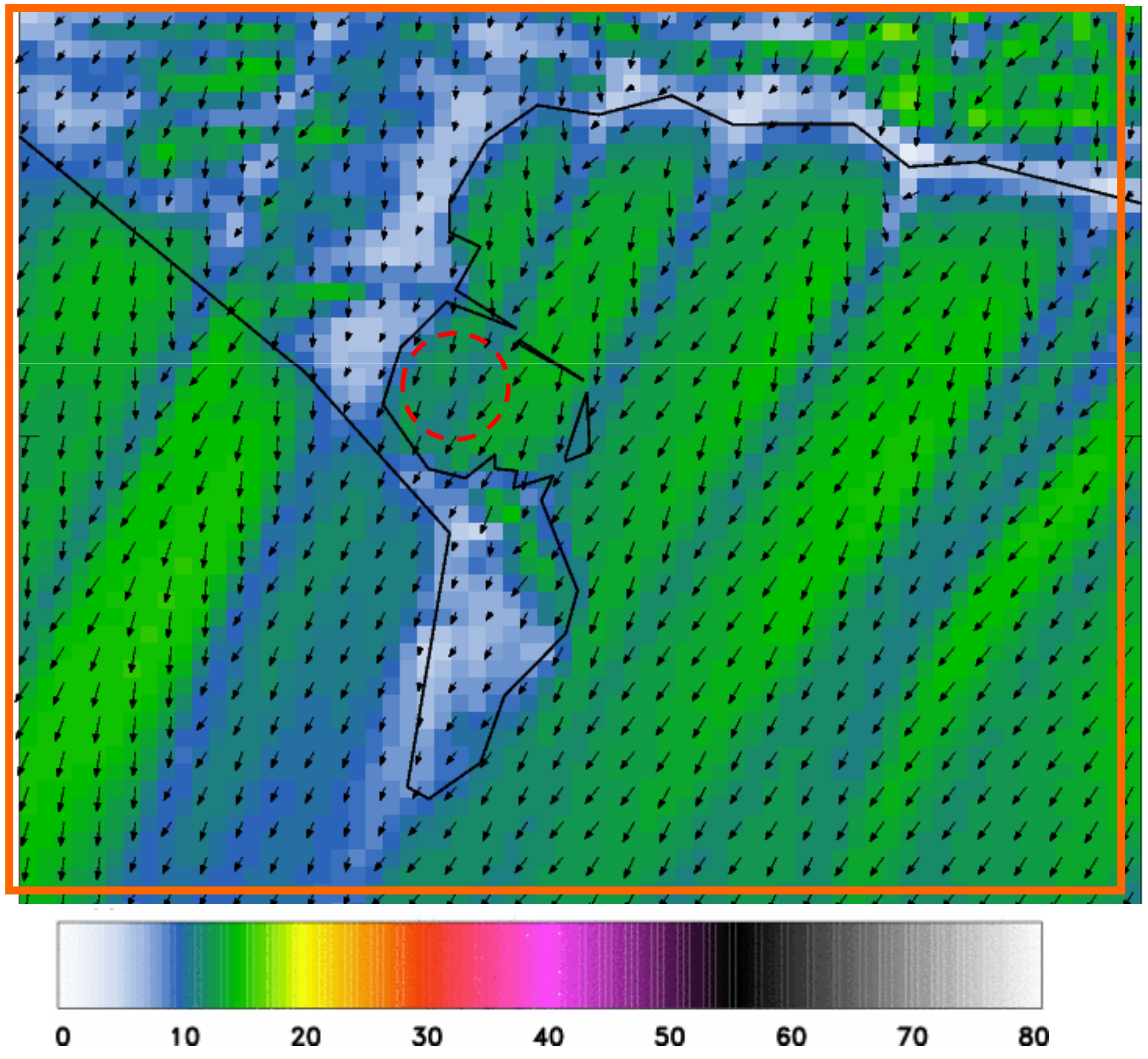
1200 Wednesday





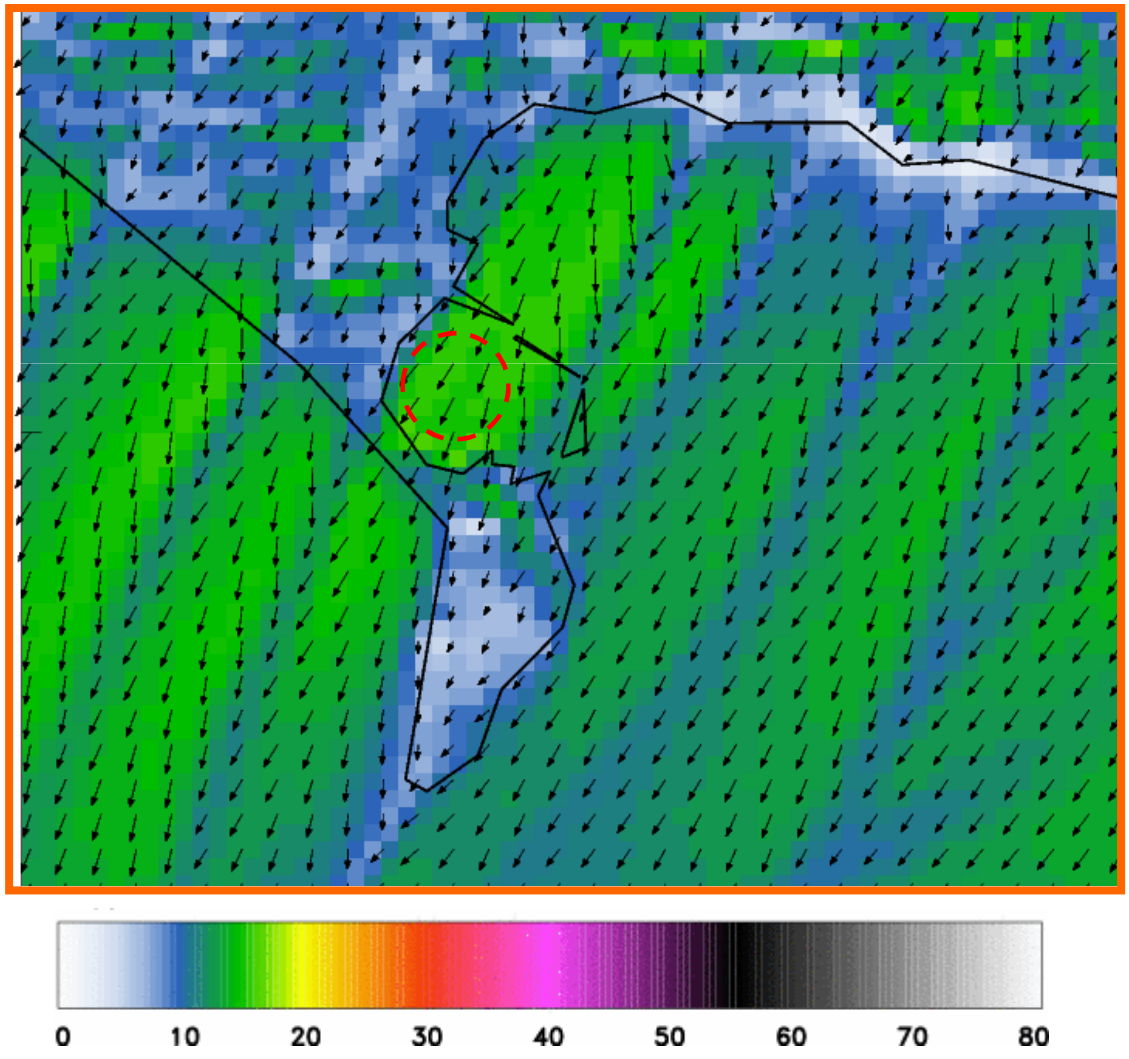
Model products
Winds forecast loop (knots)

1230 Wednesday



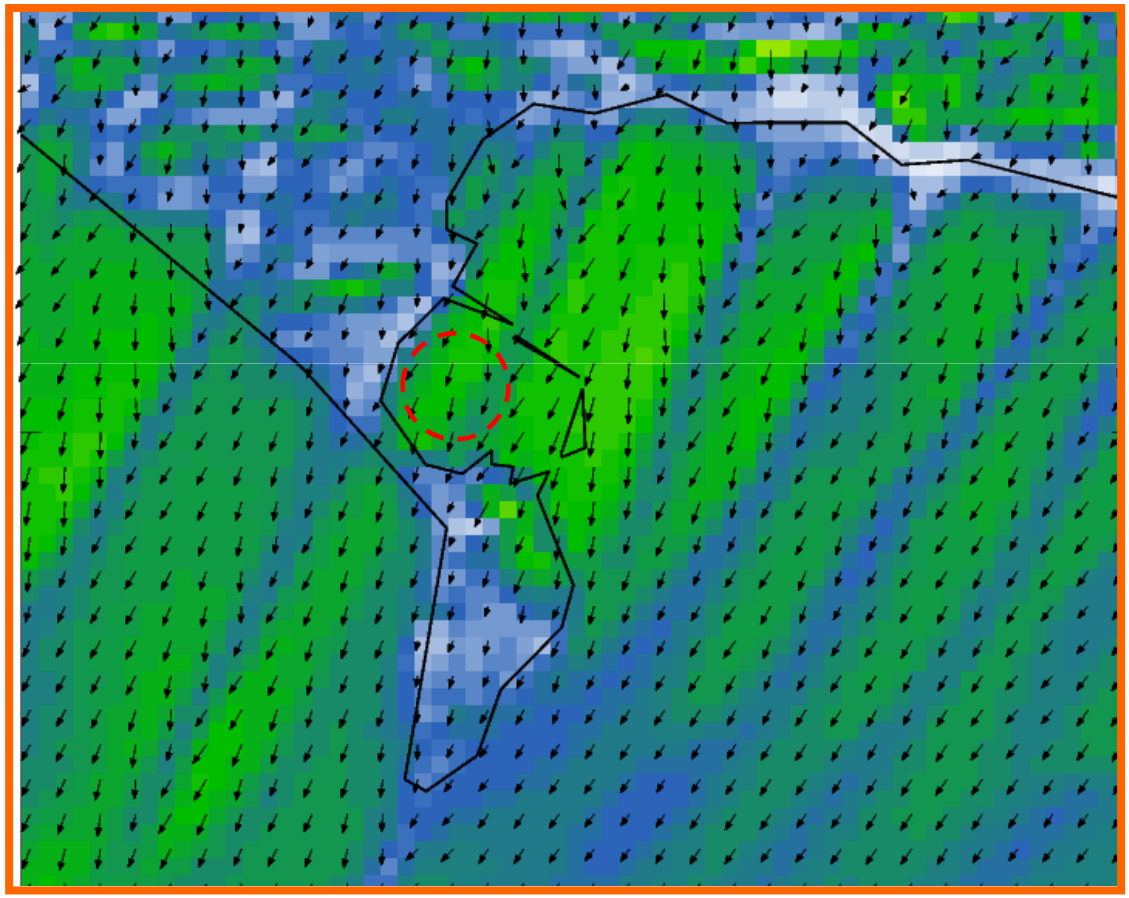
Model products
Winds forecast loop (knots)

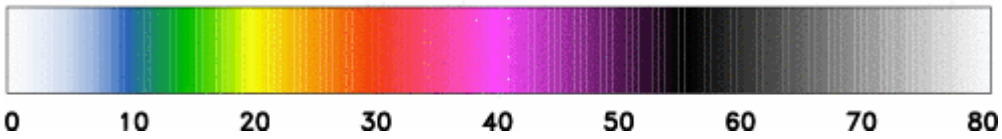
1300 Wednesday



Model products
Winds forecast loop (knots)

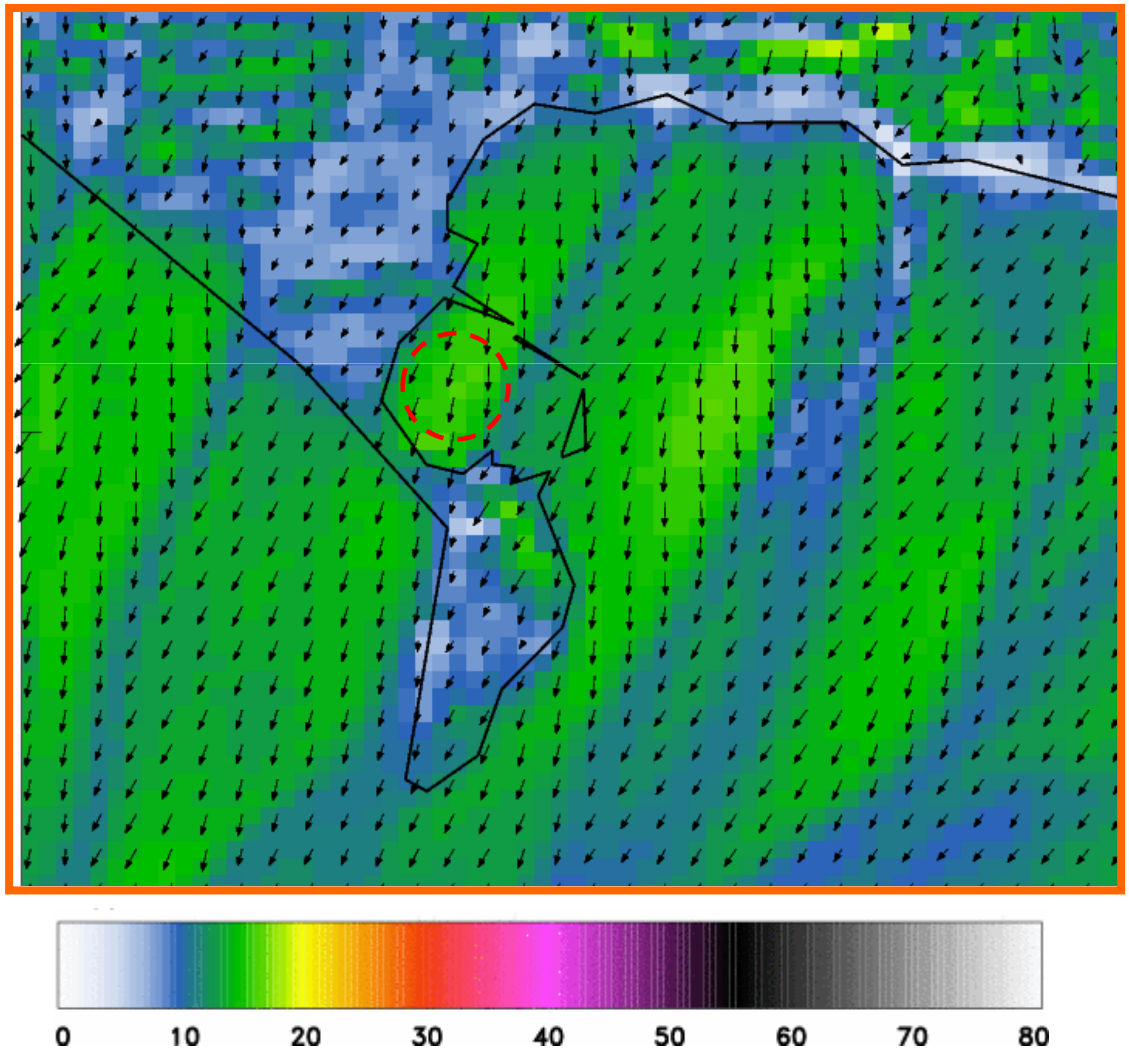
1330 Wednesday





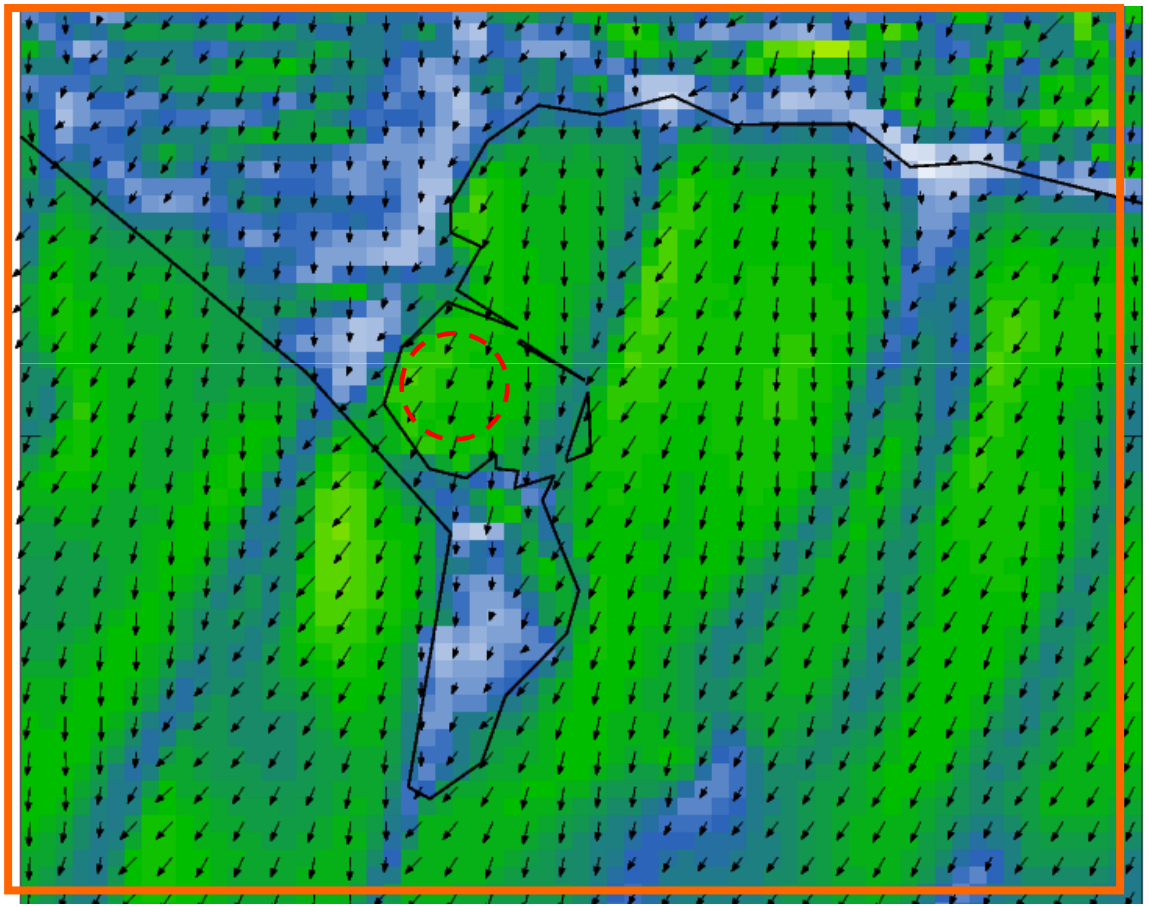
Model products
Winds forecast loop (knots)

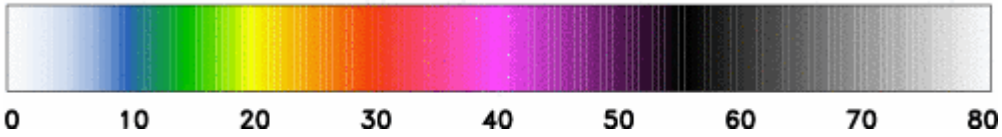
1400 Wednesday



Model products
Winds forecast loop (knots)

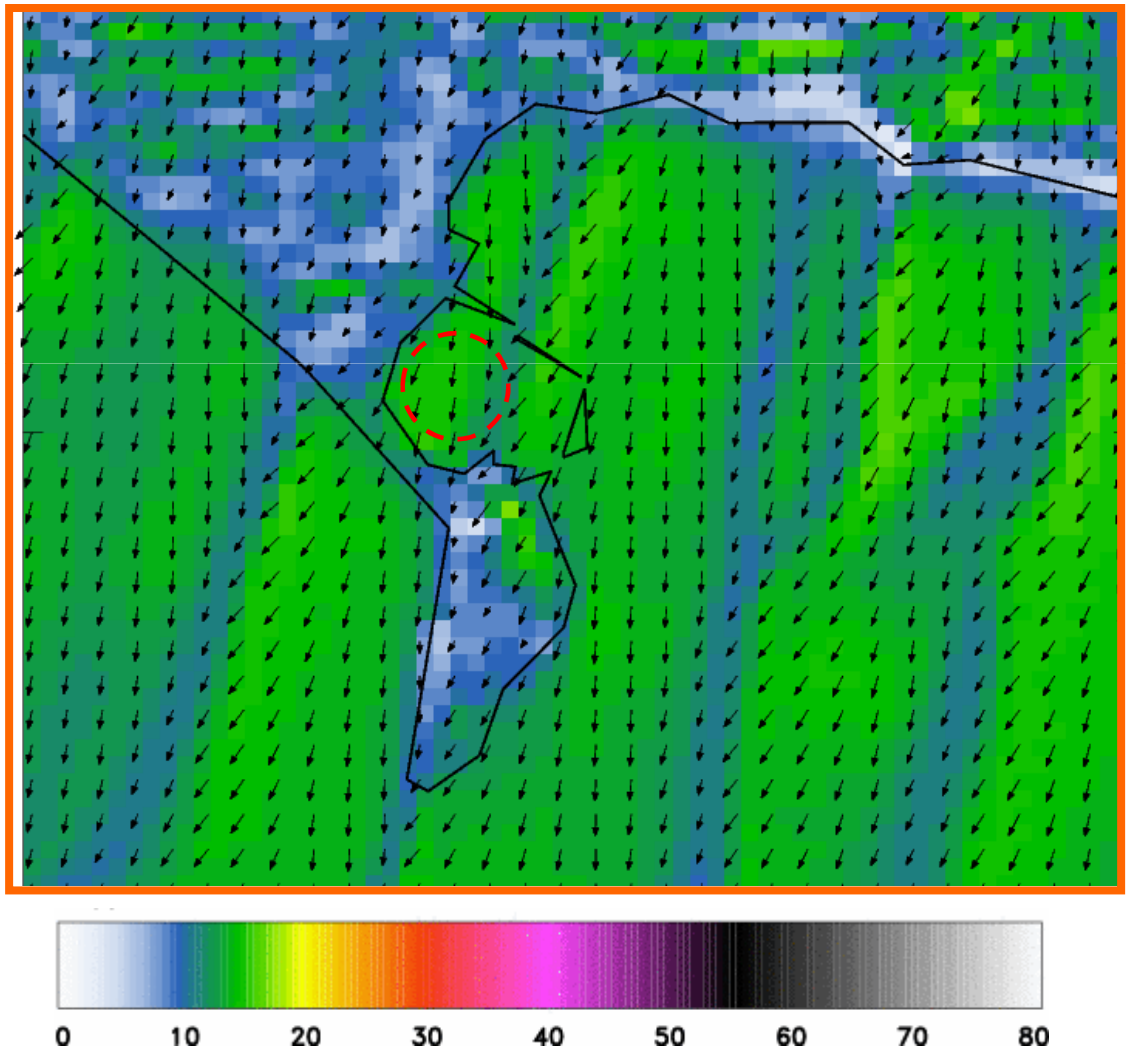
1430 Wednesday





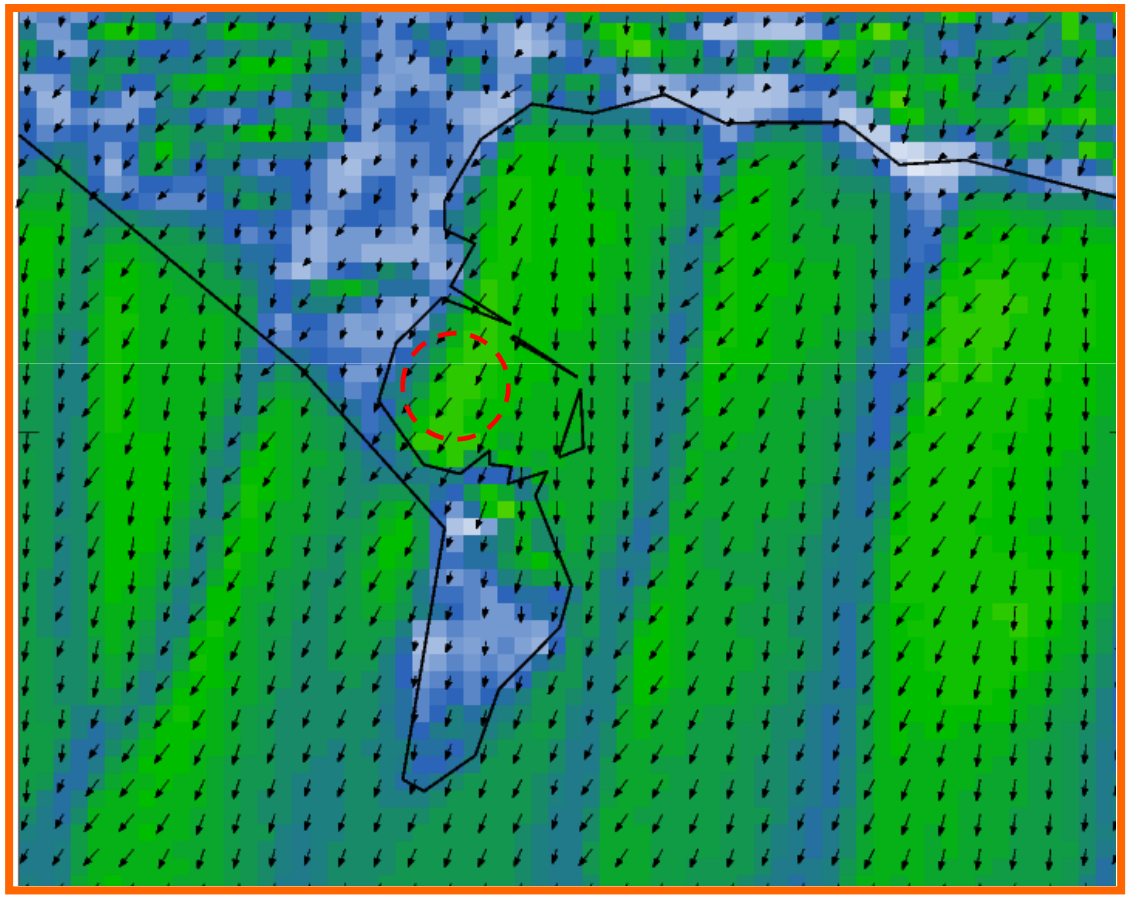
Model products
Winds forecast loop (knots)

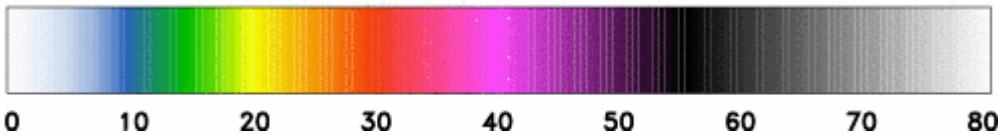
1500 Wednesday



Model products
Winds forecast loop (knots)

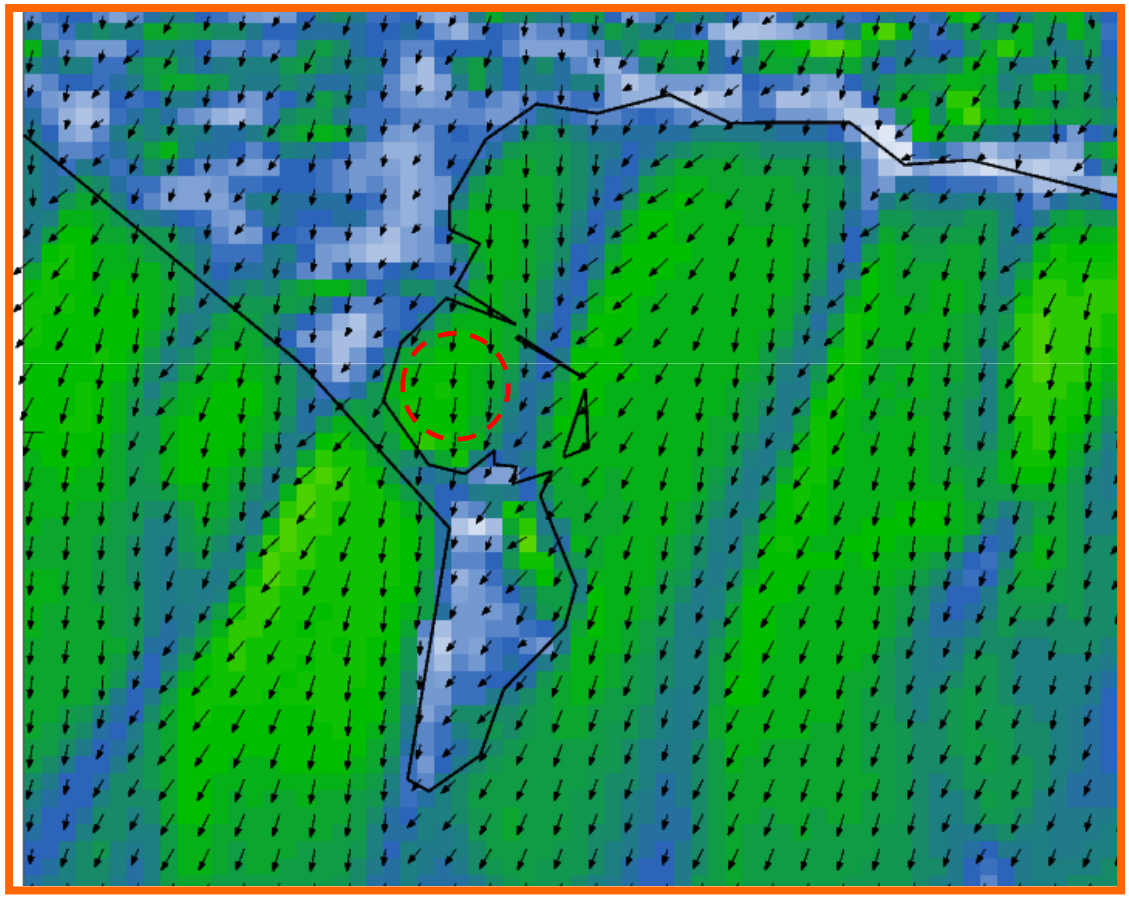
1530 Wednesday

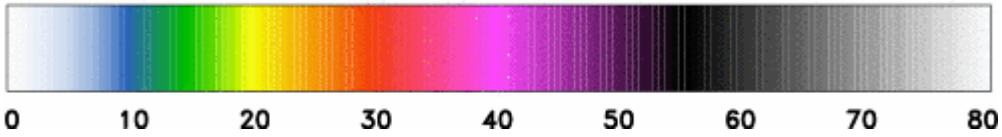




Model products
Winds forecast loop (knots)

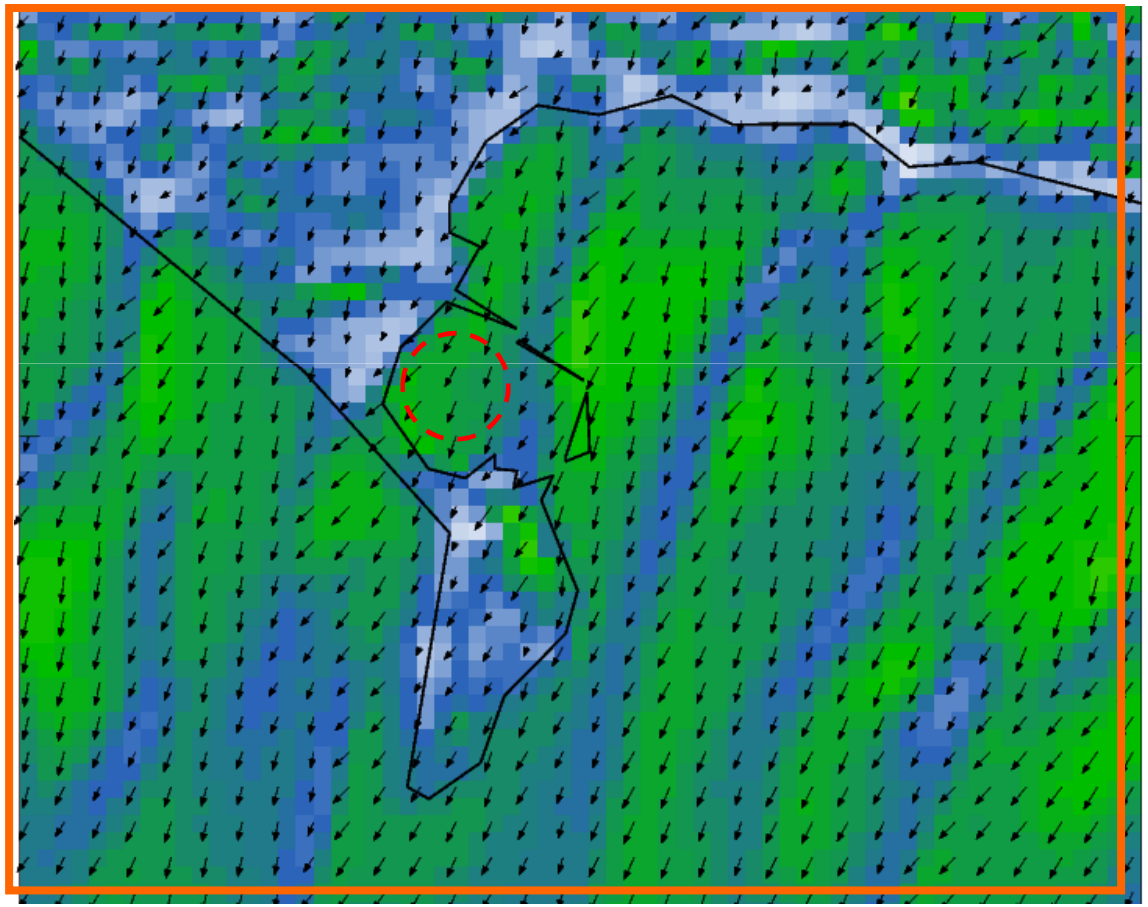
1600 Wednesday

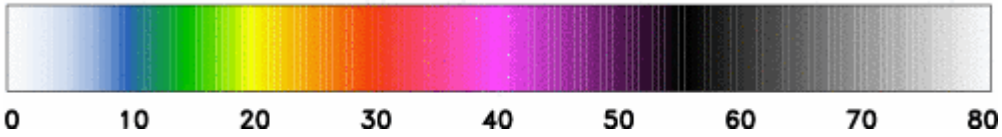




Model products
Winds forecast loop (knots)

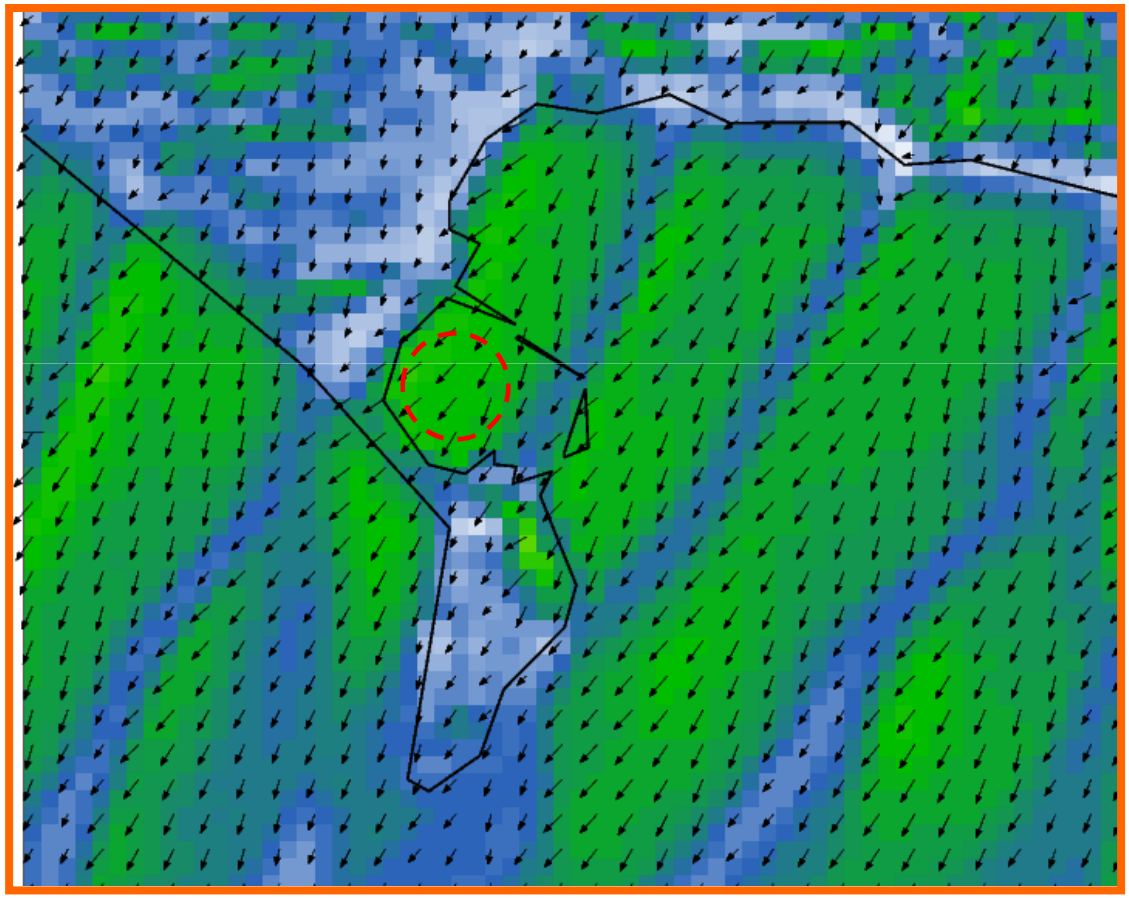
1630 Wednesday

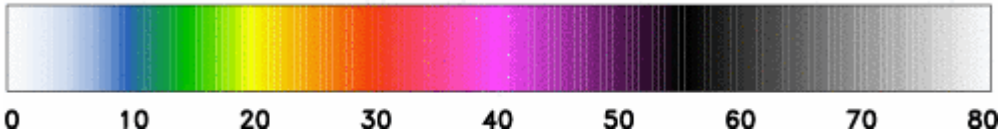




Model products
Winds forecast loop (knots)

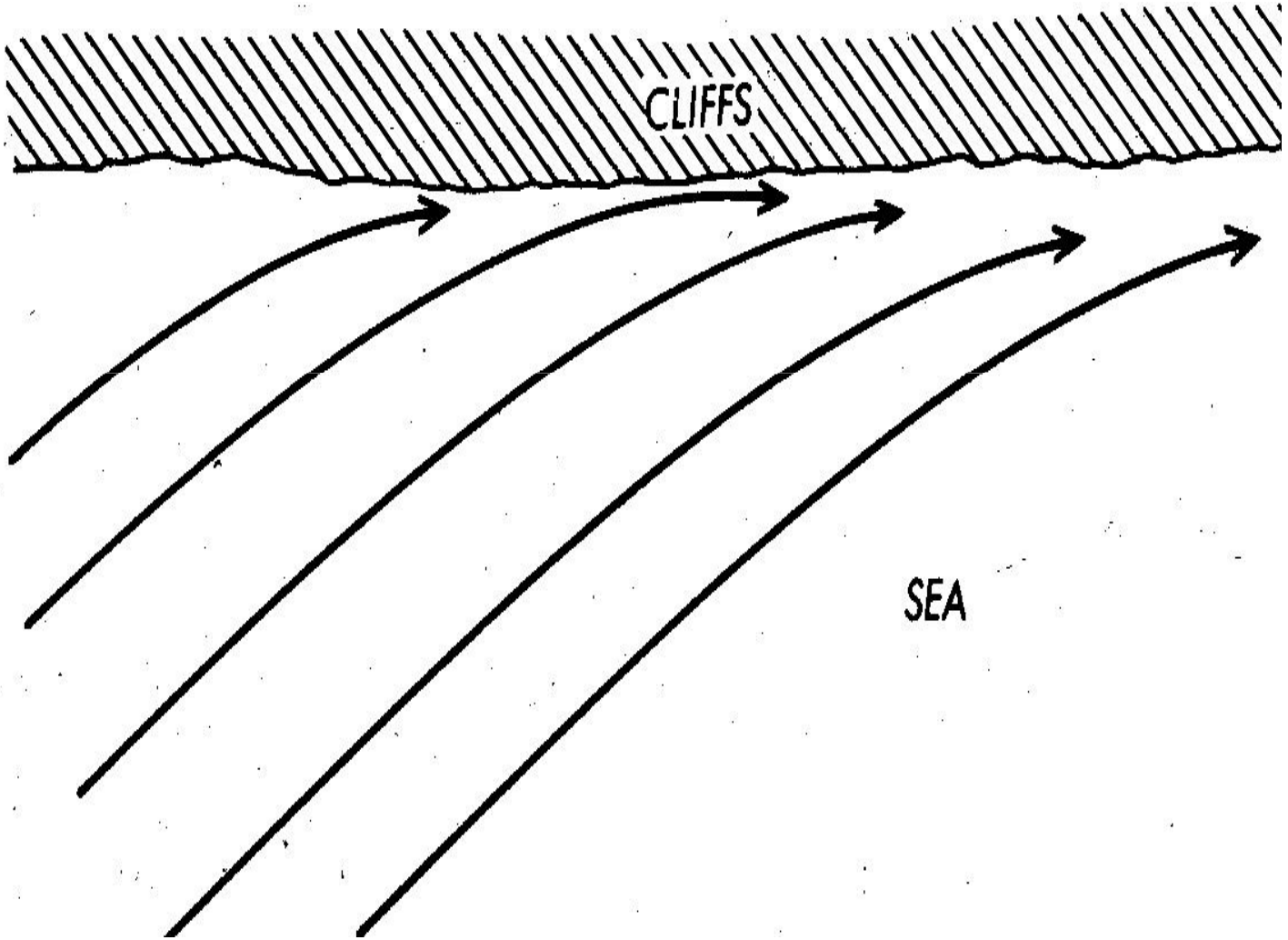
1700 Wednesday





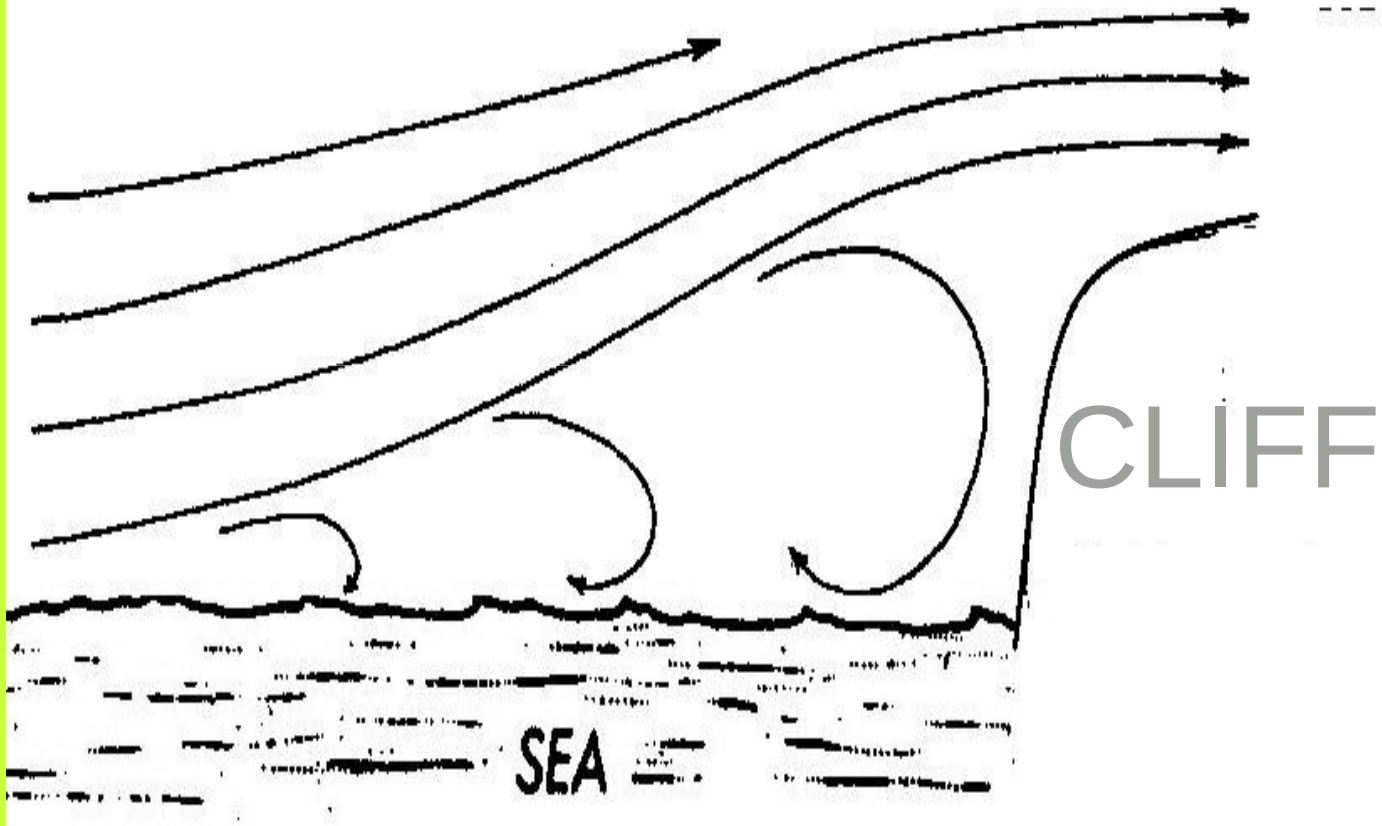
Coastal winds

Other considerations



Coastal winds

Other considerations



Coastal winds

Divergence at coasts

Winds back over land

Land wind

Divergence/lighter winds

Sea wind

Met Office

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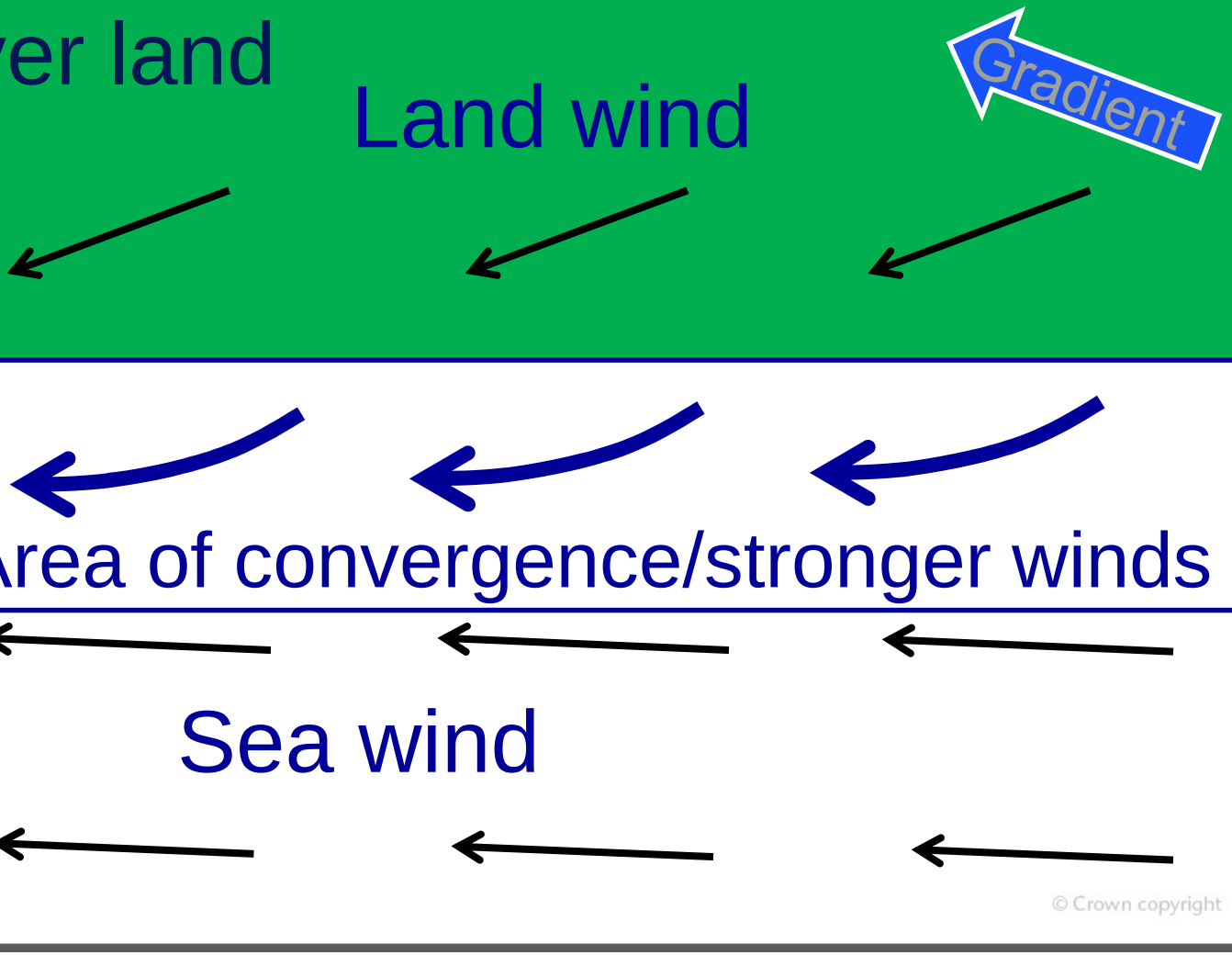
Coastal winds

Convergence at coasts



Met Office

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Coastal winds

Other considerations

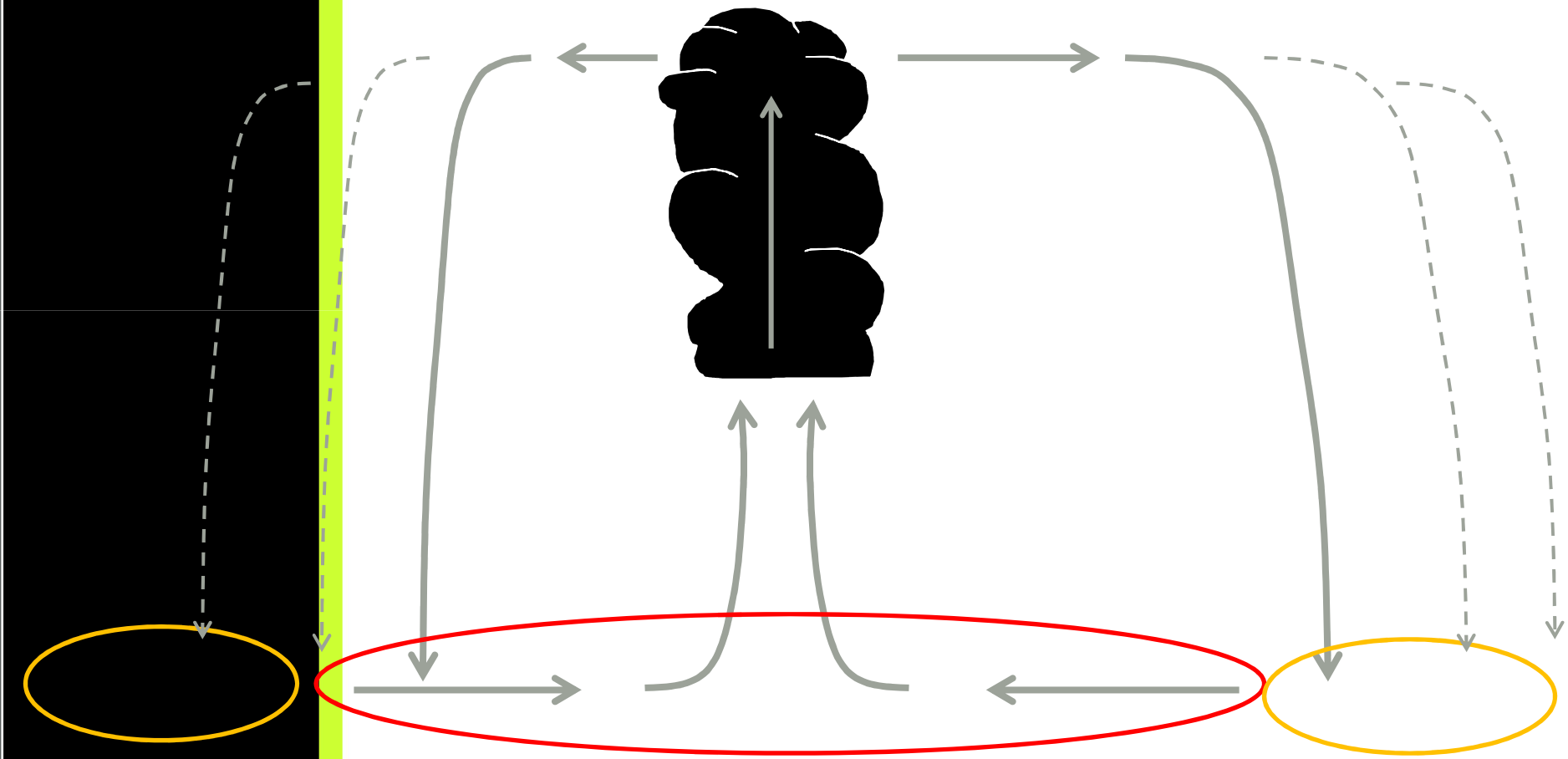
- Tides
- Effects of other boats
- Local effects around south coast

Winds around clouds

- Considering convective clouds only
- Natural variability in wind direction and speed around clouds
- Can be exploited for lifts/headers and change of wind speed

Winds around clouds

Non-showering Clouds



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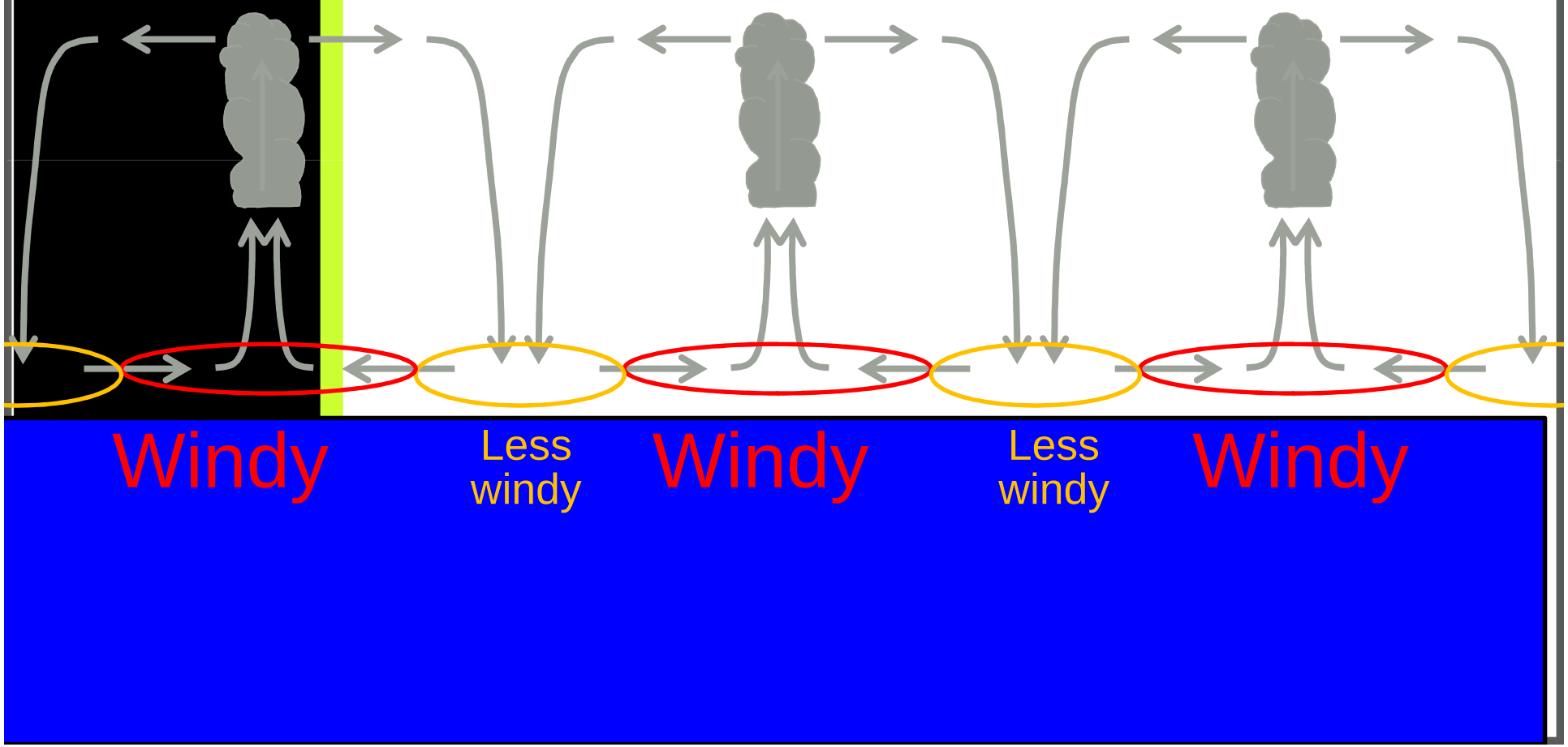
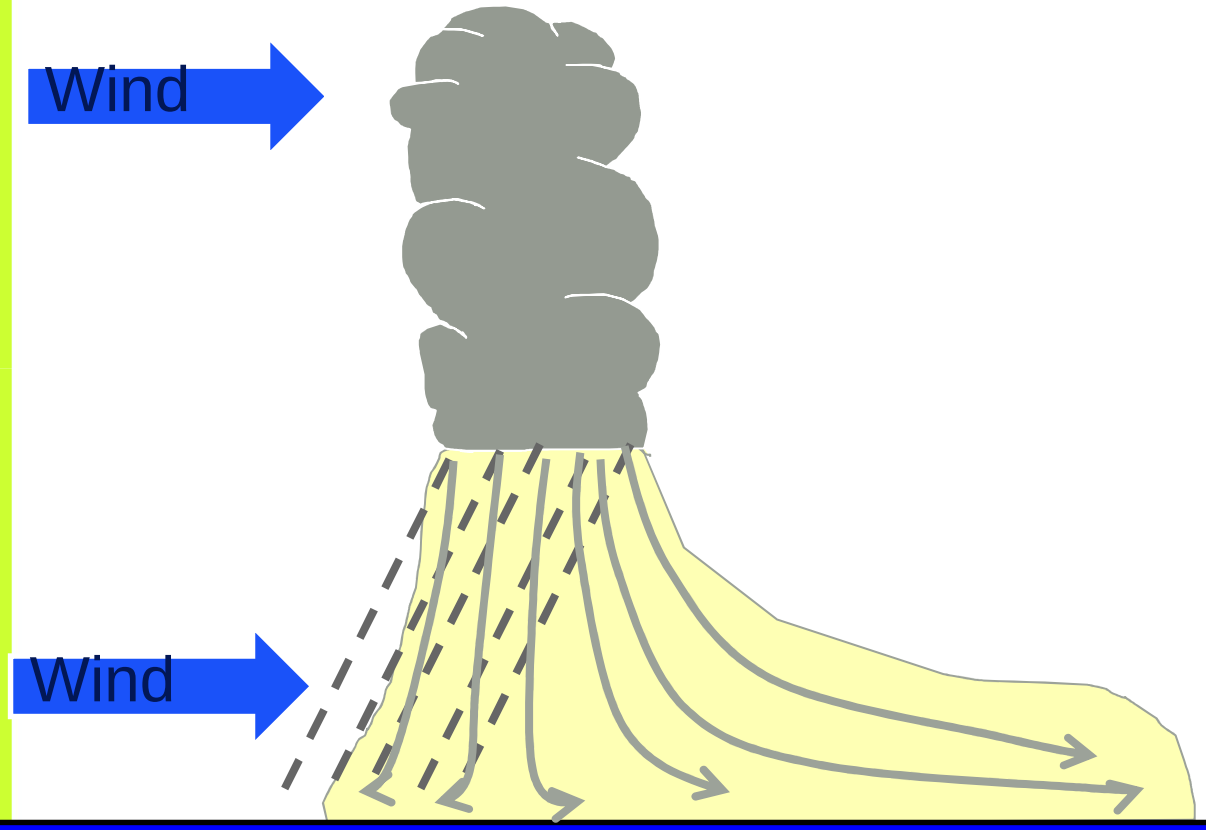
Winds around clouds

Non-showering Clouds



Winds around clouds

Showering Clouds



Met Office

Thank you

Any questions?