

Weather Notes with Poole Sailing

It is a requirement of the SOLAS rules that we have a passage plan whenever we take a boat to sea, and an essential part of that plan is an understanding of the weather situation and how it will effect your passage. There are so many sources of weather information available to us that we never need go to sea without a forecast.



SOURCES OF WEATHER FORECAST

- Met Office 5-day Synoptic Charts.
- Passage Weather 7-day Planning Charts.
- Met Office 'Shipping' and 'Inshore' Forecasts, online, on VHF radio plus FM and LW radio stations.
- Navtex.
- XC Weather, Wind Guru, Grib Files and other on-line services.
- Don't forget the Marina notice board.

Limitations of Weather Forecasts

- Weather forecasts are just that, forecasts and not a statement of fact. To fully understand the implications of the forecast we must understand the limitations imposed on the forecaster by time and presentation etc. For instance the man given a ten second slot to fully describe a 24 hour forecast for the central part of the English Channel cannot describe the conditions that he knows will occur in the Western Solent during that period.
- We must also understand the value of the information that we are given particularly with regard to sea state and wind strength. Just where is that forecast 'moderate' sea state going to occur? Does the forecast 'light and variable' wind allow for the onset of a sea breeze?
- When seeking confirmation of a forecast by comparing different sources be careful not to choose sources that are simply different presentations of the same computer generated forecast based on information from a single weather model
- Then remember that it is the 'Sea State', the size and shape of waves that damage our boats and crew and make life at sea unpleasant and dangerous. While big waves are usually driven by strong winds, their shape will be governed by many other factors most of which cannot be discussed in a weather forecast.
- You must be prepared to re-interpret the given forecast and work out the effects of that information on your boat and crew, in your geographic position, during your passage.

UK Sea Areas

- The layout of the 'Shipping Forecast' sea areas limits the forecaster to a 'general' statement based only on the gradient wind, without 'coast' effects.
- Whereas the 'Inshore Forecast' discusses the condition on one coastline and maybe considered more appropriate or 'accurate'.



Geostrophic Wind Strength

- Many forecasts, particularly 'Grib Files' and forecasts derived from them, will give us the 'geostrophic wind strength'.
- That is a very specific 'average' value based on the Gradient Wind, blowing over open water at a given height above sea level.
- We must be prepared for embedded gusts with a strength, 40% more than the given geostrophic wind strength value.

Sea State and Wave Heights

The forecasters most difficult prediction is the wave height. They will look at the effect of the forecast wind strength and 'fetch' over still water and then predict a peculiar 'average' value known as the 'Significant Wave Height'.

- 'Significant Wave Height' is defined as the average combined sea and swell height, from trough to crest, of the highest 33% of waves.
- So the highest 10% of waves will be 1.67 times the significant wave height.
- The highest waves experienced, <1%, will be 2 times the significant wave height.
- We must bear this in mind when we hear a statement of 'sea state' in a forecast.

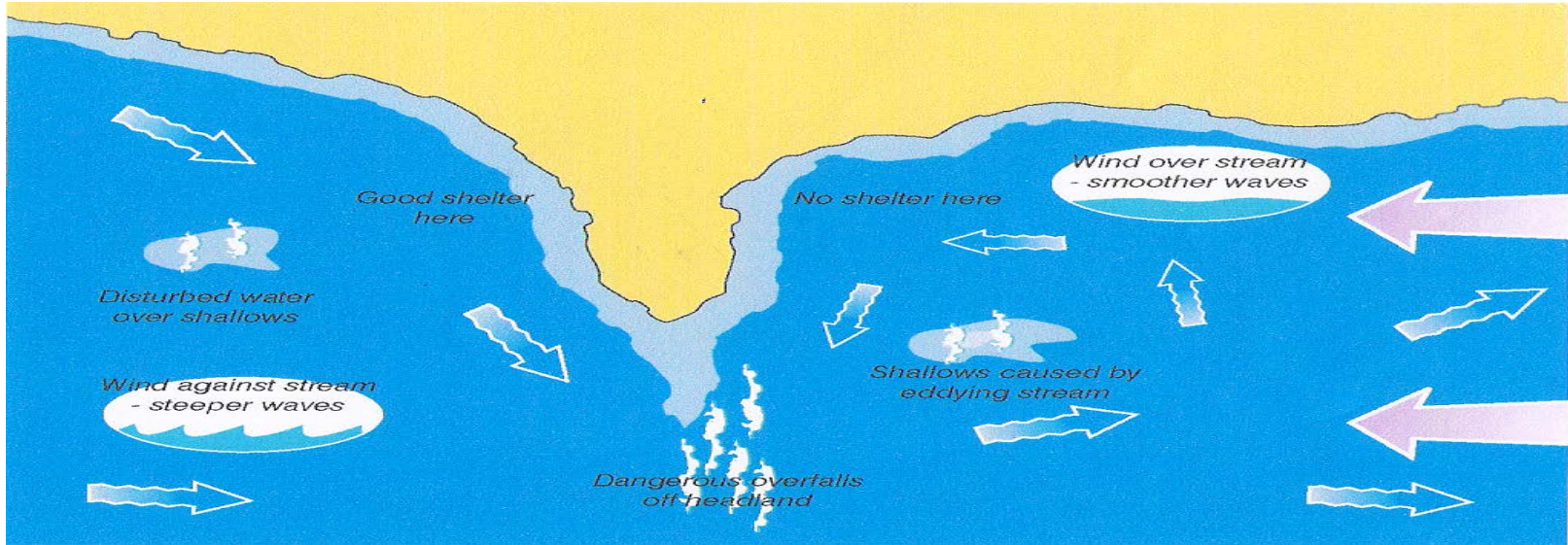


Sea State and Forecasts

- So a forecast of 'sea state' will be based on the fetch, duration and strength of a wind and its effect on the sea surface in 'open water'.
- That sea state will be modified significantly by local effects such as shallow water, but those effects cannot be included in a 'general' forecast.
- We must check our passage plan with respect to shallow water and known 'overfalls' so that we can anticipate where the waves are likely to be breaking.



Sea State and Forecasts



- Sea State is modified most significantly by the tide stream which of course changes direction every six hours or so.
- We must be prepare to re-interpret the stated 'sea state' based on our own knowledge of the tide stream, the timing of tide changes and our geographic position.

Weather Terminology

Many general sounding words have a very specific meaning when used in weather forecasts, here is a selection

- **Gale**- Wind expected to be F8 or more.
- **Strong** Wind- expected to be F6 or F7.
- **Fair** - No Precipitation.
- **Imminent** - within 6 hours of time of issue.
- **Soon** - 6 to 12 hours from time of issue.
- **Later** - more than 12 hours from time of issue.
- **Good** visibility - 5 miles or more.
- **Moderate** visibility - 2 to 5 miles.
- **Poor** visibility - 1000m to 2 miles.
- **Fog** - visibility less than 1000m.
- **Backing** - wind changing in anticlockwise direction.
- **Veering** - wind changing in clockwise direction.

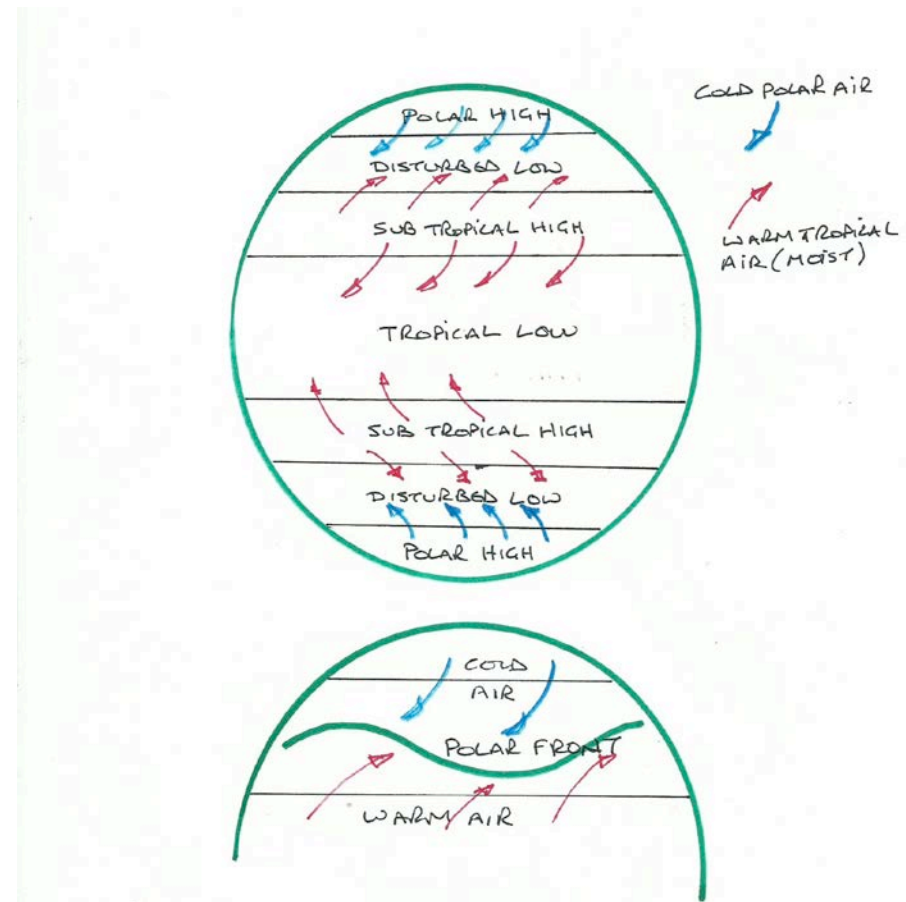
The 'Beaufort Scale' is probably the most well known weather related code.

It relates wind force, to visible changes in the appearance of the sea.

WIND FORCE	WIND SPEED IN KNOTS	WMO CLASSIFICATION	DESCRIPTION OF SEA STATE APPEARANCE OF WIND EFFECTS ON THE WATER
0	0 - 1	CALM	SEA SMOOTH AND MIRROR-LIKE
1	1 - 3	LIGHT AIR	SCALEY RIPPLES
2	4 - 6	LIGHT BREEZE	SMALL WAVELETS, NO BREAKING
3	7 - 10	GENTLE BREEZE	LARGE WAVELETS, SCATTERED WHITE CAPS
4	11 - 16	MODERATE BREEZE	SMALL WAVES, < 1.2M, NUMEROUS WHITE CAPS
5	17 - 21	FRESH BREEZE	MODERATE WAVES 1.2 - 2.4M, MANY WHITE CAPS, SOME SPRAY
6	22 - 27	STRONG BREEZE	LARGER WAVES , 2.4 - 4M, WHITE CAPS COMMON, MORE SPRAY
7	28 - 33	NEAR GALE	SEA HEAPS UP, WAVES 4 - 6M, WHITE FOAM STREAKS OFF BREAKERS.
8	34 - 40	GALE	MODERATELY HIGH WAVES 6 - 8M, EDGES OF CRESTS BREAK INTO SPINDRIFT, FOAM BLOWN IN STREAKS
9	41 - 47	SEVERE GALE	HIGH WAVES 8 - 10M, SEA BEGINS TO ROLL, DENSE STREAK OF FOAM, SPRAY REDUCES VISIBILITY
10	48 - 55	STORM	VERY HIGH WAVES 9 - 12M, WITH OVERHANGING CRESTS, SEA WHITE WITH DENSELY BLOWN FOAM, HEAVY ROLLING, LOWERED VISIBILITY.
11	56 - 63	VIOLENT STORM	EXCEPTIONALLY HIGH WAVES, 11 - 16M,FOAM PATCHES COVER SEA, VISIBILITY REDUCED MORE.
12	64 +	HURRICANE	AIR FILLED WITH FOAM, WAVES OVER 14M, SEA COMPLETELY WHITE WITH DRIVING SPRAY, VISIBILITY GREATLY REDUCED.

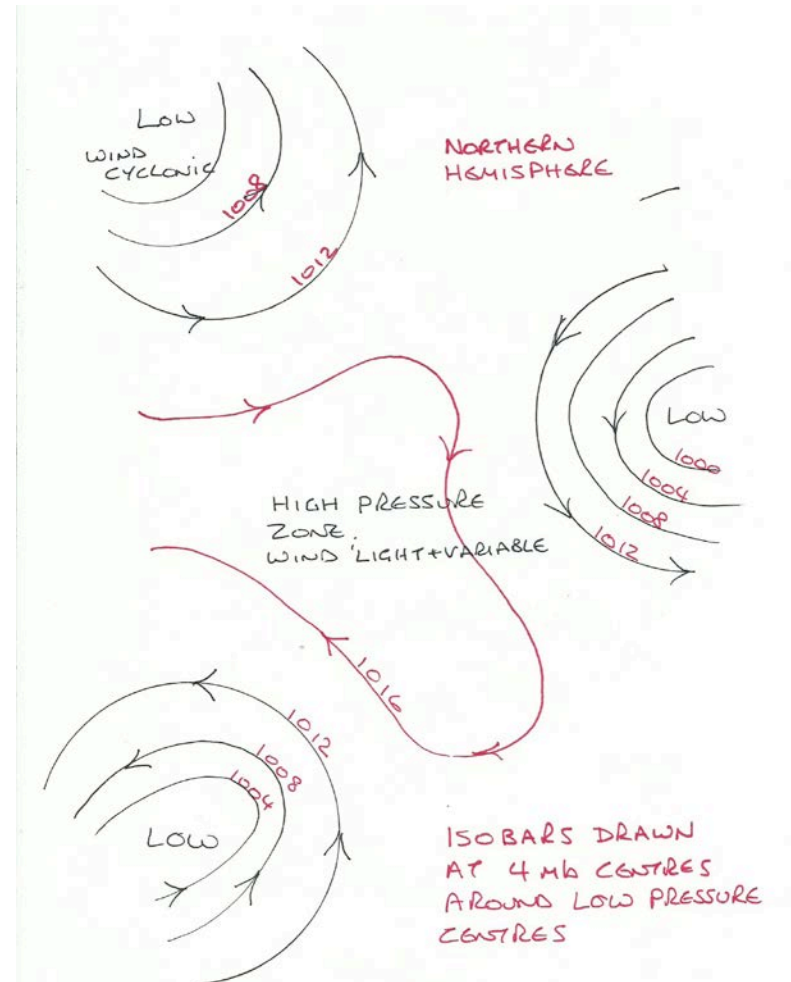
Global Wind Patterns

- At around 60 degrees north we live firmly in the area of 'Disturbed Low Pressure'.
- In this zone cold, dry, north easterly winds collide with warm, moist, south west winds at the Polar Front.
- At the interface the warm air will rise up over the cold air forming a 'Warm Front'. The cold air that descends to fill the low pressure at sea level forms the 'Cold Front'.
- As a result of the Coriolis effect the two fronts will spin anticlockwise (cyclonic) in a roughly north easterly direction. When the cold front catches the warm front they form an 'occluded front'.
- The warm sector that lies between the warm and cold fronts is the real generator of weather in our latitude. Without the constant procession of these Cyclones or Low pressure Depressions, we would enjoy constant high pressure, blue skies and little wind.



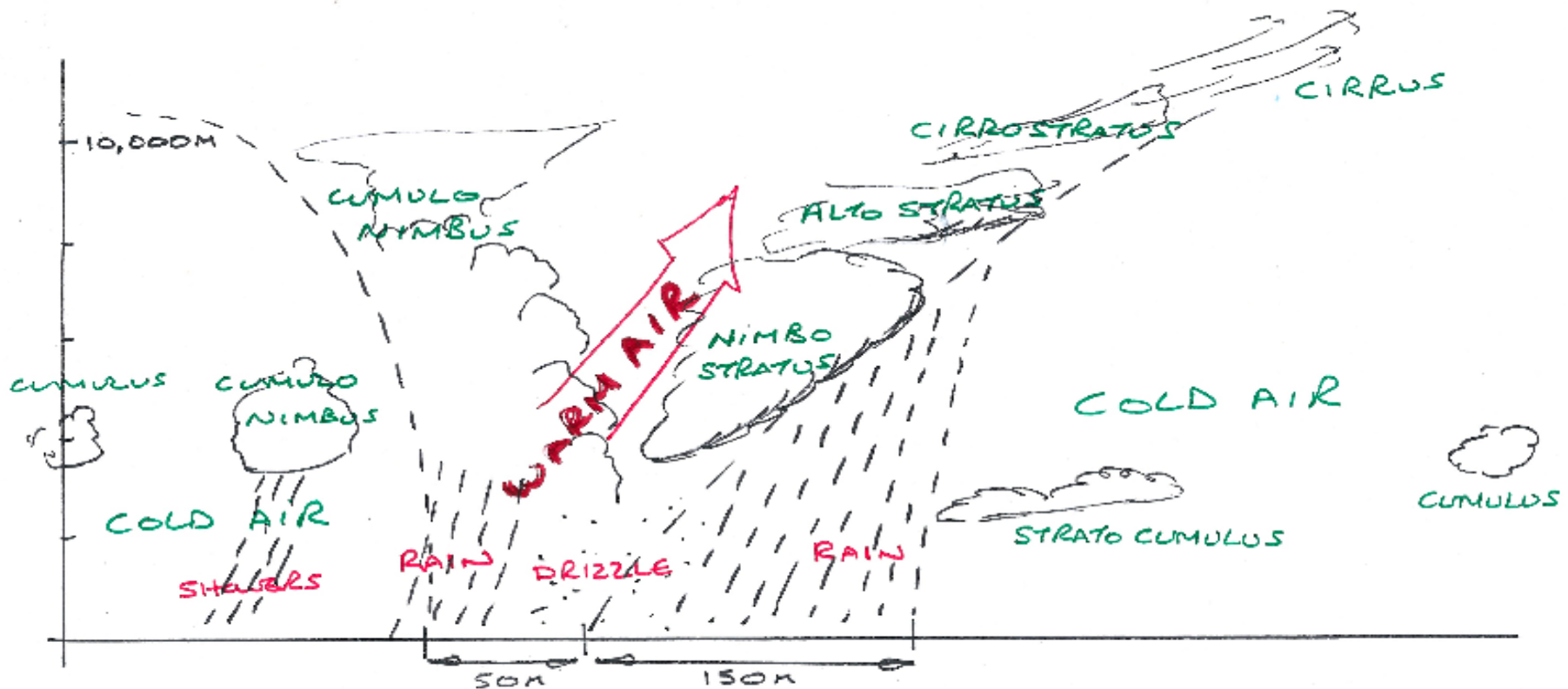
Gradient Wind Circulation

- Gradient wind is the flow produced by the movement of air from high to low pressure.
- Lines of equal pressure, Isobars, can be established around a depression or Low pressure centre.
- In the northern hemisphere wind will circulate in an anti-clockwise or cyclonic direction.
- Winds are strongest where the isobars are close, that is, where there is a steep pressure gradient.
- The anti-clockwise circulations around adjacent low pressure centres will produce an 'apparent' clockwise flow around the high pressure zone between.



Typical Depression

Warm moist air rising off of the sea surface condenses at the interface with cold polar air forming different cloud types at increased altitude. The cloud types follow a constant pattern with the passage of a low pressure system.



CLOUD TYPES

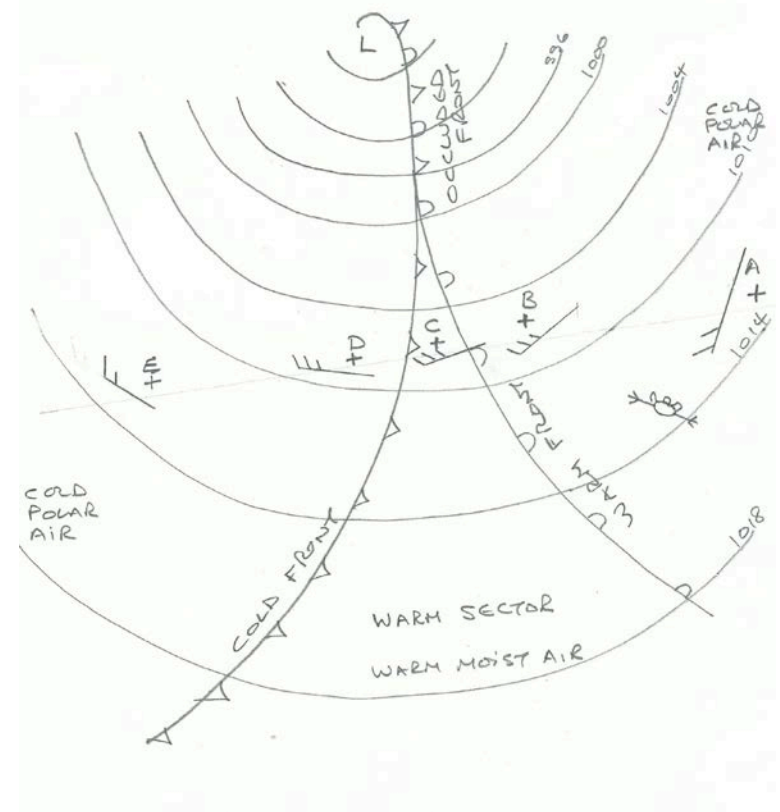
Here are some; Cirrus, Stratus, Nimbo-stratus and Cumulo-nimbus.



Passage of a Depression

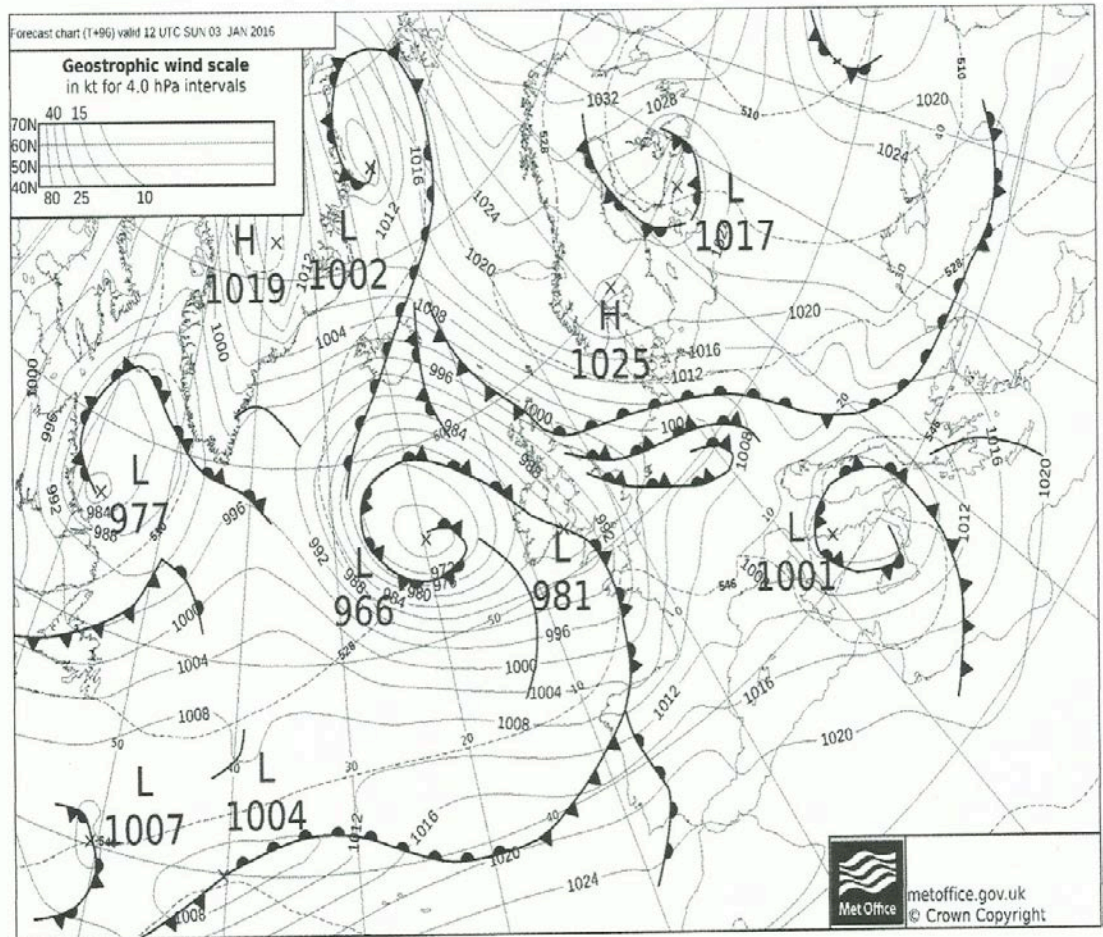
When a low pressure centre passes to the north of us, changes in pressure gradient, wind direction, wind strength and visibility, will all follow a constant pattern. We can anticipate the trends if we observe the matching changes in the cloud types. Look at the changes at the observer positions A through E. In the northern hemisphere, if we stand with our back to the wind, low pressure will approach from over our left shoulder.

- A - Wind backs and strengthens, pressure drops slowly. Visibility good.
- B - Wind veers and strengthens, pressure dropping quickly, Rain. Visibility moderate.
- C - Wind strong and veering, pressure low and steady, Drizzle. Visibility Poor.
- D - Cloud breaks, wind squally, pressure slowly rising, showers. Vis good.
- E - Wind veered and reducing, pressure rising.



Met Office Synoptic Charts

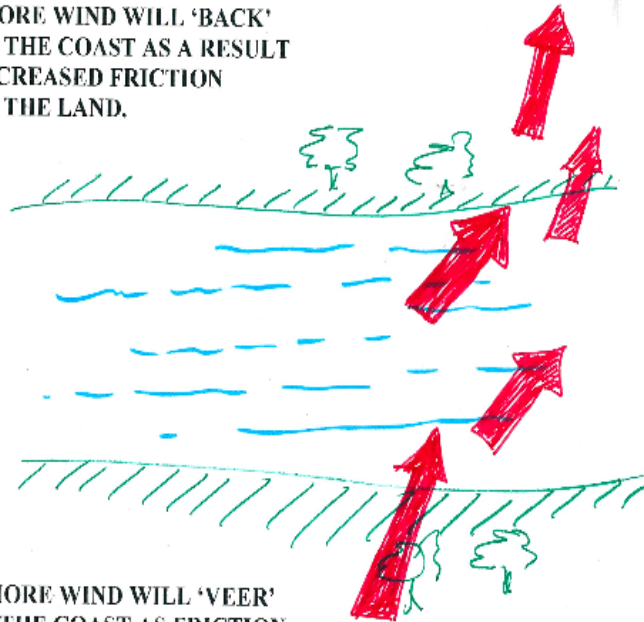
- There is a lot of information to be gleaned from a synoptic chart.
- The wind direction at any location can be deduced by following the anti-clockwise circulation of isobars around the low pressure centres and then applying a ten degree 'tilt' towards the low.
- Wind strength can be found by measuring the spacing between two isobars and comparing the spacing with the Geostrophic Wind Scale in the top left hand corner.
- The likely incidence of rain can be deduced from the expected passage of the fronts.



Coast Effects

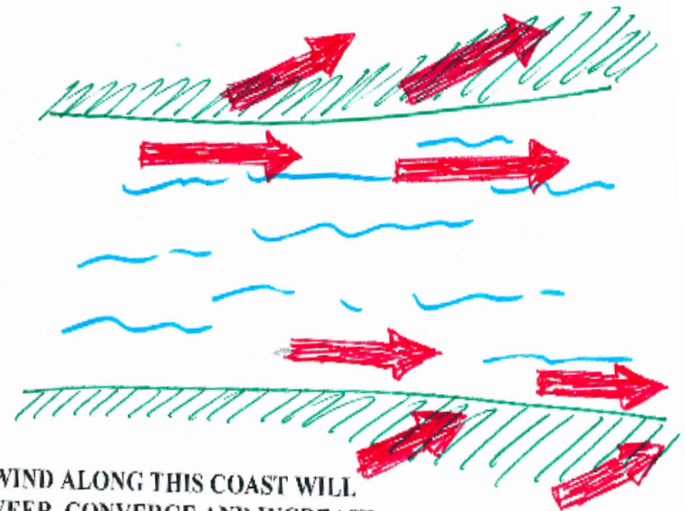
In the northern hemisphere gradient wind is always part of a huge anti-clockwise circulation of air. Land has a greater friction value than water, so wind will veer over water and back over land. So we can predict how a wind will react as it passes over or along a coast line

ONSHORE WIND WILL 'BACK' OVER THE COAST AS A RESULT OF INCREASED FRICTION OVER THE LAND.



OFFSHORE WIND WILL 'VEER' OVER THE COAST AS FRICTION REDUCES OVER WATER.

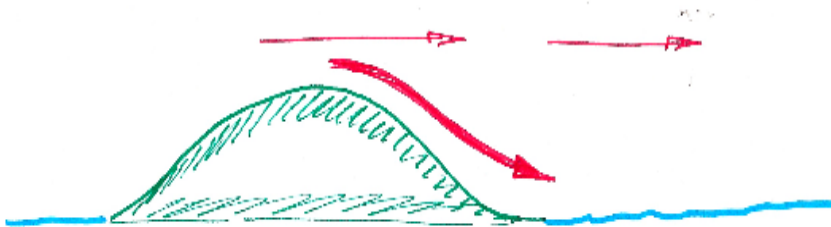
WIND ALONG THIS COAST WILL BACK, DIVERGE AND REDUCE IN STRENGTH.



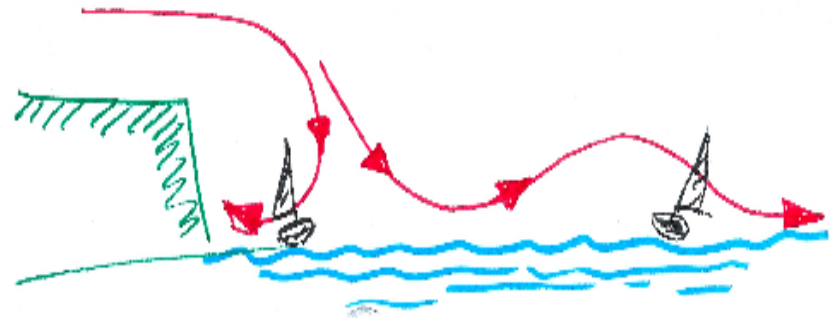
WIND ALONG THIS COAST WILL VEER, CONVERGE AND INCREASE IN STRENGTH.

Coast Effects

You may experience an increase in the wind strength on the leeward side of a hill. Some Islands have well known 'acceleration zones' on their apparently 'sheltered' sides.



An offshore wind may tumble and bounce off of a high cliff. If you are in the wrong zone the air flow will be 'gusty' and unstable. You may be better off moving a little further away from the cliff to find easier sailing

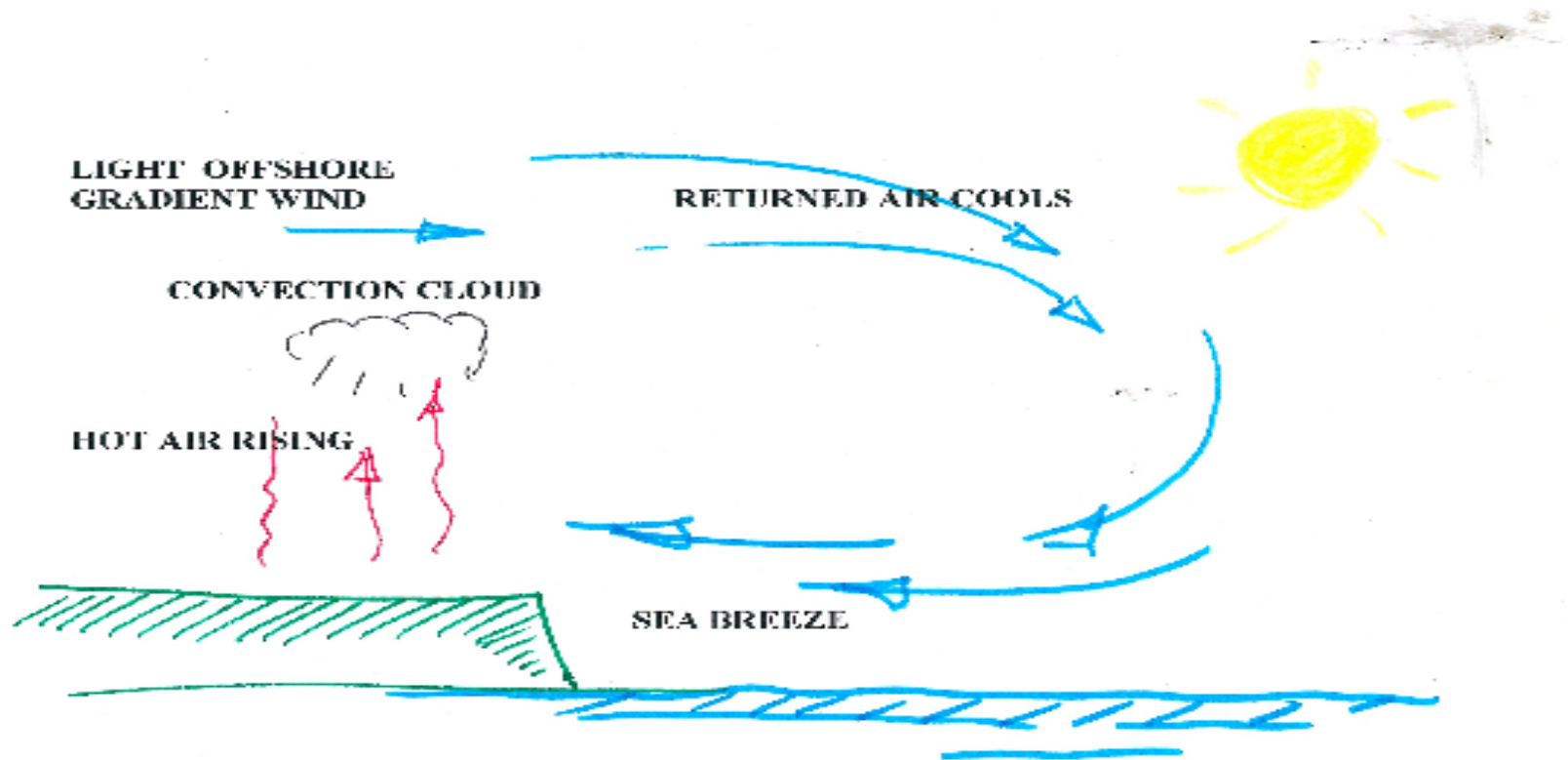


Thermal Winds, Sea Breeze

In high pressure conditions, with a light offshore gradient wind, the onset of a fresh, sea breeze is likely. As the sun rises the land will warm quickly while the temperature of the sea remains constant. Eventually warm air will rise over the land and condense as a convection cloud in the mid-atmosphere.

Cold air from off of the sea will flow towards land to replace the rising warm air starting a vertical circulation that will, over time, reach some fifteen miles or so offshore.

Direction of the sea breeze will follow the movement of the sun and stop when the sun sinks to thirty degrees or so above the horizon.

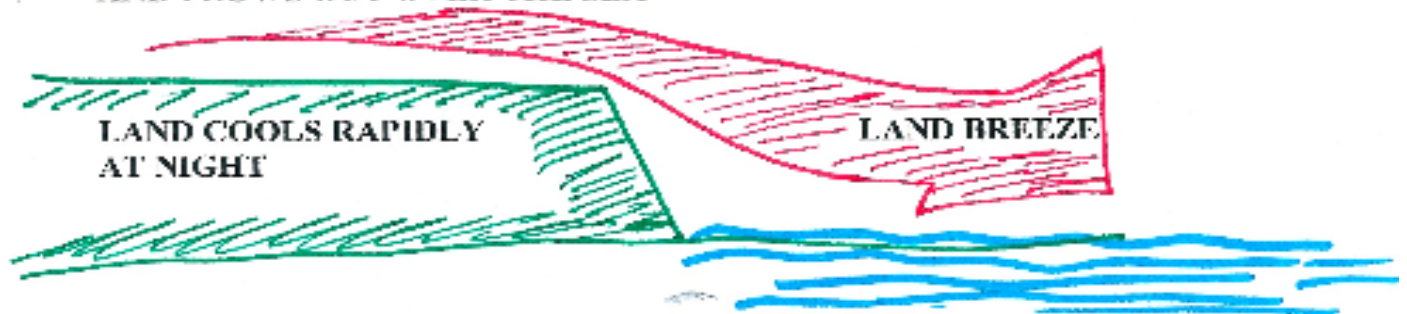


Thermal Wind, Land Breeze

In high pressure conditions with light gradient wind a 'land breeze' may be generated overnight and into the early hours of the morning. It is a weak effect stretching only a mile or two off of the shore.

**HIGH PRESSURE
CLEAR SKY**

**AIR OVER LAND COOLS,
INCREASES IN DENSITY
AND FLOWS OUT OVER THE SEA**



Fog

- **Marine Fog**

- Caused when warm moist air condenses over a cold sea surface.
- Usually a feature of late winter and early spring.
- Will occur in patches in later summer where cold water is forced to the surface.
- Will be dispersed by a change in wind direction or an increase in wind strength.

- **Land Fog**

- Caused when the land surface cools rapidly at night, condensing the warm air immediately above.
- Feature of spring and early autumn.
- Spills over a coast and fills estuaries, but doesn't spread out to sea.
- Dispersed by sunshine.

Patchy Marine Fog is common in the Channel in early summer.
Its caused when cold water from deep down is forced to the surface by tidal action, where it interacts with warm moist air.

