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You don't need a weatherman to know which way the wind blows.

- Bob Dylan

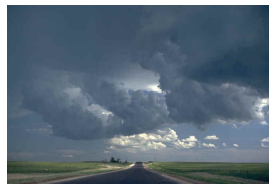
Wind & Weather

Weather affects us all, but none more than the sailor. Every time he ventures onto the sea, he knows it is out there waiting for him. The best he can do is try to understand his foe and prepare himself for the worst.

Basic Cloud Formations



Cirrus



Cumulonimbus



Cumulus



Stratus

Clouds are defined by their general appearance and level in the atmosphere.

A prefix is frequently given to the cloud name to indicate the level of the atmosphere in which it resides.

Cirro is the prefix given to high clouds, those with bases above 20,000 feet.

Alto is the prefix given to mid-level clouds, those between 6,000 and 20,000 feet.

Nimbo added to the beginning or nimbus added to the end of a cloud name means the cloud is producing precipitation.

The system is by no means uniform. There is no term for low clouds, and there are some odd joinings, such as stratocumulus, which is a cloud with two different shapes.

So here's how some cloud types stack up:

Cloud Type	Appearance	Altitude
Cumulonimbus	Thunderheads	Near ground to above 50,000 feet
Cirrostratus	Thin, wispy, above thunderheads	Above 18,000 feet
Cirrus	Thin, often with "mare's tail"	Above 18,000 feet
Cirrocumulus	Small puffy clouds	Above 18,000 feet
Altostratus	Thin, uniform, sometimes with "wide wale corduroy" appearance	6,000 - 20,000 feet

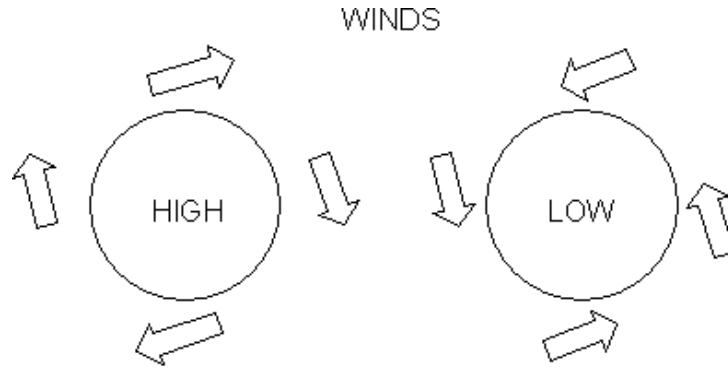
Altostratus	Medium-sized puffy clouds	6,000 - 20,000 feet
Stratocumulus	Broad and flat on the bottom, puffy on top	Below 6,000 feet
Cumulus	Puffy clouds	Below 6,000 feet
Stratus	Uniform, thick to thin layered clouds	Below 6,000 feet

Highs & Lows

Winds blow clockwise around a high pressure area in the northern hemisphere and veer outward. (Winds rotate counterclockwise in the southern hemisphere.)

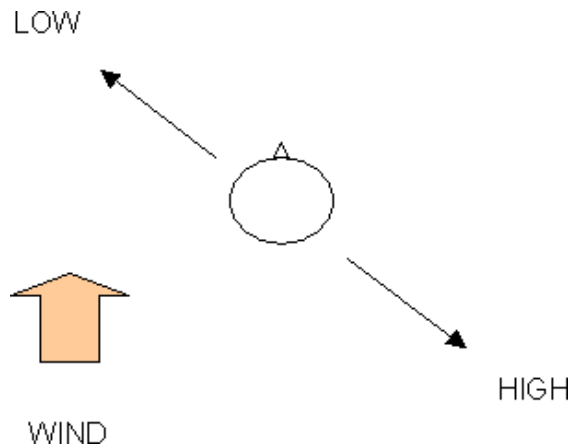
Winds blow counterclockwise around a low pressure area in the northern hemisphere and veer inward. (Winds rotate clockwise in the southern hemisphere.)

The closer a high is to a low, the closer the isobars and more wind is generated.



Standing with your back to the wind, extend your arms to 10 o'clock and 4 o'clock. Your left arm will point to the low pressure area and your right arm will point to the high pressure area in the northern hemisphere. (In the southern hemisphere, the high is to your left and the low is to your right.)

In days past, sailors would use this simple technique to help guide them away from lows and toward highs where they had a better chance of encountering more pleasant weather conditions. It also aided them in running away from hurricanes.



Cold Fronts & Warm Fronts

Both cold front and warm fronts bring with them rain, but the events leading up to the rain differ slightly. The onset of each front is announced by different cloud formations.

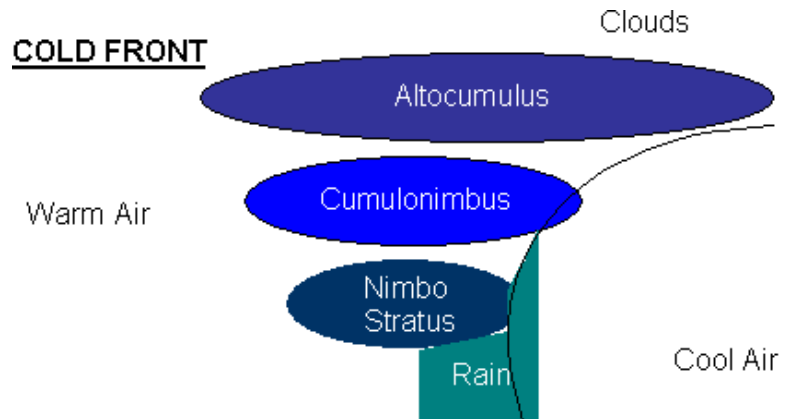
Northern Hemisphere: Wind shifts toward right (clockwise or veering) when either a warm or cold front passes.

Southern Hemisphere: Wind shifts left (counterclockwise or backing) when either a warm or cold front passes.

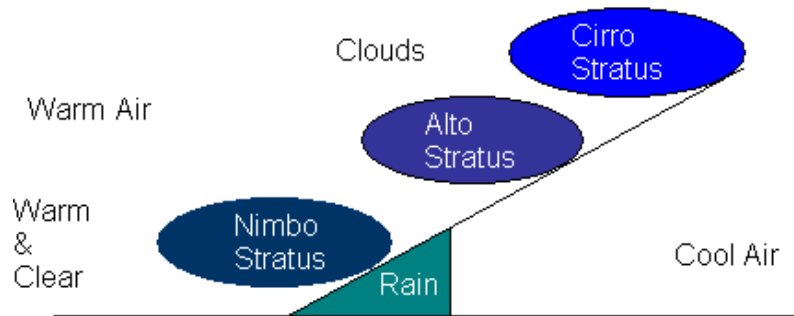
Cold Front	Warm Front	Stationary Front
<p>Cold air replaces warm air</p> <p>Moves rapidly, often signaled by towering cumulus clouds.</p> <p>Rain, strong winds, and thunderstorms.</p> <p>Wind veers clockwise as the front passes.</p>	<p>Warm air replaces cold air.</p> <p>Moves slowly (1/2 speed of cold front).</p> <p>Lots of showery precipitation.</p> <p>If air is unstable, thunderstorms and strong winds are possible.</p>	<p>Air masses of equal pressure opposing each other.</p> <p>Doesn't move.</p> <p>Weather similar to warm front but less intense.</p> <p>Winds parallel the front.</p>

*A backing wind means storms are nigh;
Veering wind will clear the skies.*

*Mackerel skies and mares' tails,
Mean high winds and full sails.*



WARM FRONT



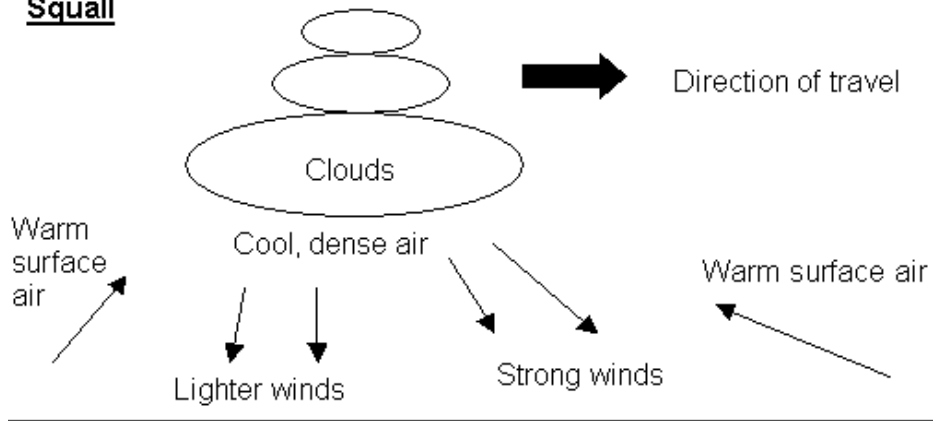
Squalls

Squalls have their own inherent characteristics, two of which are heavy rain and strong winds.

They are fast moving and usually short in duration.

When encountering a squall, it is often best to shorten sail in advance of its approach and to batten down the hatches.

Squall



Clouds & Wind

Worsening weather - Wind backs counterclockwise in the northern hemisphere (clockwise in the southern hemisphere), and pressure drops .

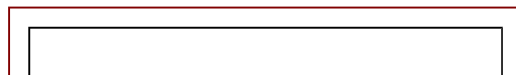
Improving weather - Wind veers clockwise in the northern hemisphere (counterclockwise in the southern hemisphere), and pressure rises and stabilizes .

High and low clouds move in different directions:

Stand with your back to the movement of the lower clouds.

A change for the worse if the high clouds move left to right in the northern hemisphere.

A change for the better if the high clouds move right to left in the northern hemisphere.



Sound traveling far and wide

A stormy day will betide.

Barometric Pressure Changes

A stationary barometer indicates that current weather conditions are likely to continue.

A high and steady or rising barometer indicates settled weather.

Lower than normal and steady or a falling barometer indicates unsettled weather.

A rapid rise or fall indicates that a strong wind is likely to blow and the weather is likely to change.

The speed of a storm's approach and its intensity will be indicated by the rate of barometric fall and its amount.

If the barometer falls without a change in weather, it's likely there is a violent storm a long way off.

First rise after a low,

Foretells a stronger blow.

Rate of Barometric Fall

A fall of .01 inch per hour is considered a low rate.

A fall of .03 inch per hour is considered a high rate.

A fall of .10 inch is possible; .20 inch has been recorded.

Barometer changes forecast 8-12 hours in the future.

Barometric Reading in the Middle Latitudes

29.60 inches is very low.

30.00 inches is average.

30.50 inches is high.

Hurricane Season in the Caribbean, Gulf of Mexico, and U.S. East Coast

June: too soon

July: stand by

August: come it must

September: remember

October: all over

--Old weather saying

Rainbows

A rainbow is created by the refraction of sunlight in drops of rain in the air.

The center of the bow is opposite the sun.

A rainbow in the morning is to the west of the observer, and it is likely the rain that created it will pass overhead.

A rainbow in the afternoon is to the east, and the rain is likely to be moving away.

Rainbow to windward, foul fall the day;

Rainbow to leeward, damp runs away.

-- Old weather saying

Dew on the Deck

Dew in the morning indicates fine weather ahead.

Heavy dew and hot weather indicate continuing fine weather.

If there is no dew in the morning and the previous day was hot, rain is likely.

When halo rings the moon or sun,

Rain's approaching on the run.

-- Old weather saying

Wind Speed

Less than 1 knot – smoke rises vertically

1-3 knots – smoke drifts

4-6 knots – wind felt on face

7-10 knots – light flag extends from pole

11-16 knots – wind raises dust, cinders, loose paper, etc.

17-21 knots – flag waves and snaps briskly

22-27 knots – wind whistles in the rigging

Beaufort Wind Scale

Force Number	Speed in knots	Description
0	0-0.9	Calm
1	1-3	Light air
2	4-6	Light breeze
3	7-10	Gentle breeze
4	11-16	Moderate breeze
5	17-21	Fresh breeze

28-33 knots – walking against wind is difficult	6	22-27	Strong breeze
34-40 knots – wind impedes progress	7	28-33	Near gale
When water is very cold and air is warm (e.g. spring mornings), wind speed at the mast head won't match wind speed at the water.	8	34-40	Gale
White caps will form with the wind speed reached 12 knots.	9	41-47	Strong gale
	10	48-55	Storm
	11	56-63	Violent storm
	12	64+	Hurricane

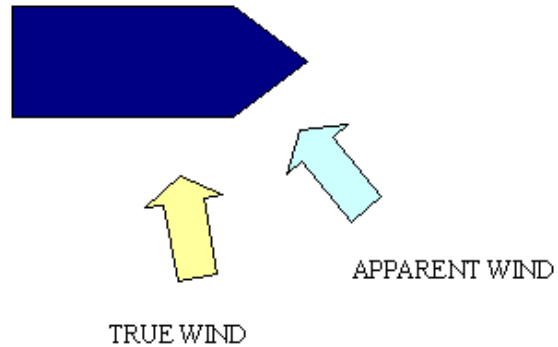
True Wind vs. Apparent Wind

The wind as it naturally blows is called the "true wind."

The wind you feel while sailing is referred to as the "apparent wind."

The apparent wind is not from the exact same direction as the true wind because of the wind generated by the forward motion of the boat.

The apparent wind is always slightly forward of the true wind when underway.



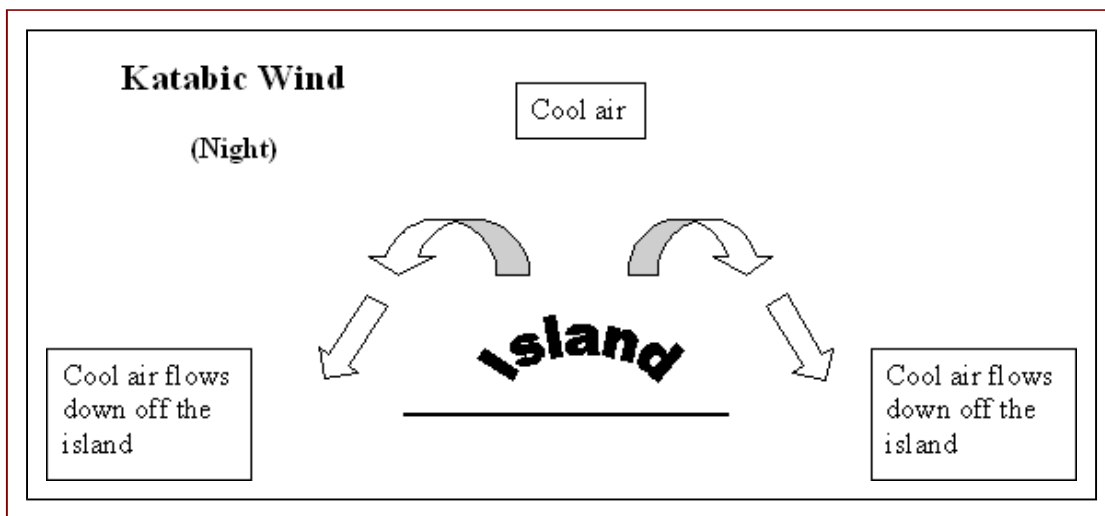
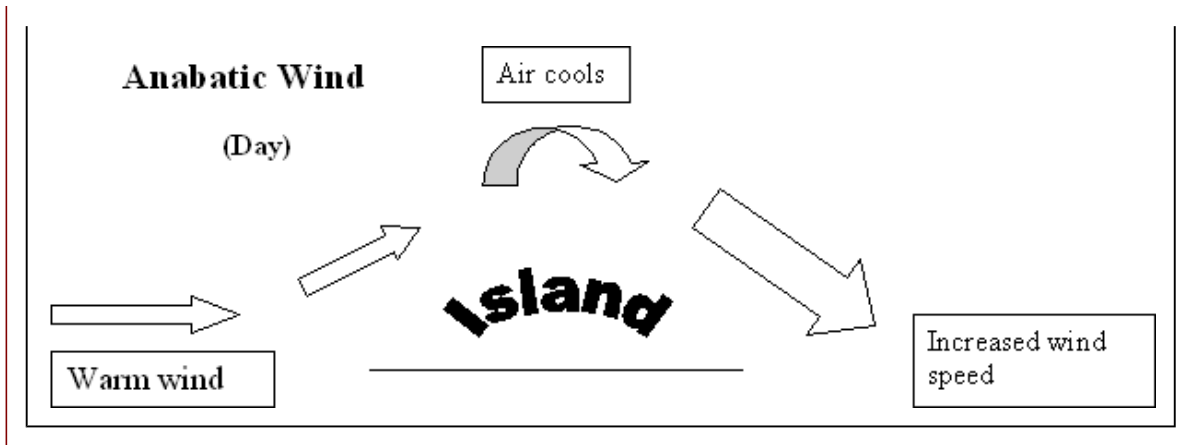
Land Breeze

A land breeze is a movement of air off the land onto the water that occurs after sunset as the air cools over the land, sinks, and flows off the land onto the warmer sea.

Sea Breeze

A sea breeze is a movement of air off the sea onto the land after sunrise as the air heats and rises over the land, pulling the air onto the land off of the cooler sea.





Fog

Usually results in visibility less than 1100 yards (i.e. approximately 1/2 mile or 1000 meters)

Radiation Fog

Over land at night.

Caused by the ground cooling the air below the dew point.

Usually not present when there are high winds.

Usually burns off with the morning sun.

Advection Fog

Caused when warm, moist air moves over cool land.

Can occur with heavy winds and in any season.

Usually persistent and prolonged.

Sunsets

Bright yellow - wind

Pale yellow - rain

Pink - Fair weather

*If the sun goes pale to bed,
'Twill rain tomorrow, so 'tis said.*

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