GUST FACTORS

Gusts are caused by vertical instability in the atmosphere. This brings stronger winds from aloft down to the surface.

It is helpful to know what kinds of gusts can be expected so you can decide whether to set up your rig for the mean wind speed (and then feather through the gusts) or reef down in anticipation of the gusts and be undercanvassed (or motorsail) in the lulls.

Most wind forecasts (voice and fax) are based on the expected *steady state* winds, usually the average speed anticipated over a ten minute period, at a height of about 35 feet (10 meters) above the surface.

Gusts are caused by vertical instability in the atmosphere. This can be due to the sun's heating the nearby land, or areas of warm water triggering updrafts, or the passage of a cold front. Eventually, this leads to mixing with the higher wind speed aloft.

When downdrafts occur they bring with them some of the upper air wind speed, causing the gusts.

Whenever you have squalls about, or have a cold front moving in, conditions tend to be more gusty than with warm fronts or stable air.

Wind speed range	Gust factor—maximum wind speed	Gust factor— mean wind speed
Day		
7—16 knots	2.0	1.6
17—27 knots	1.8	1.5
28—40 knots	1.6	1.5
Night		
7—17 knots	1.9	1.5
17—21 knots	1.8	1.5
28—40 knots	1.7	1.5

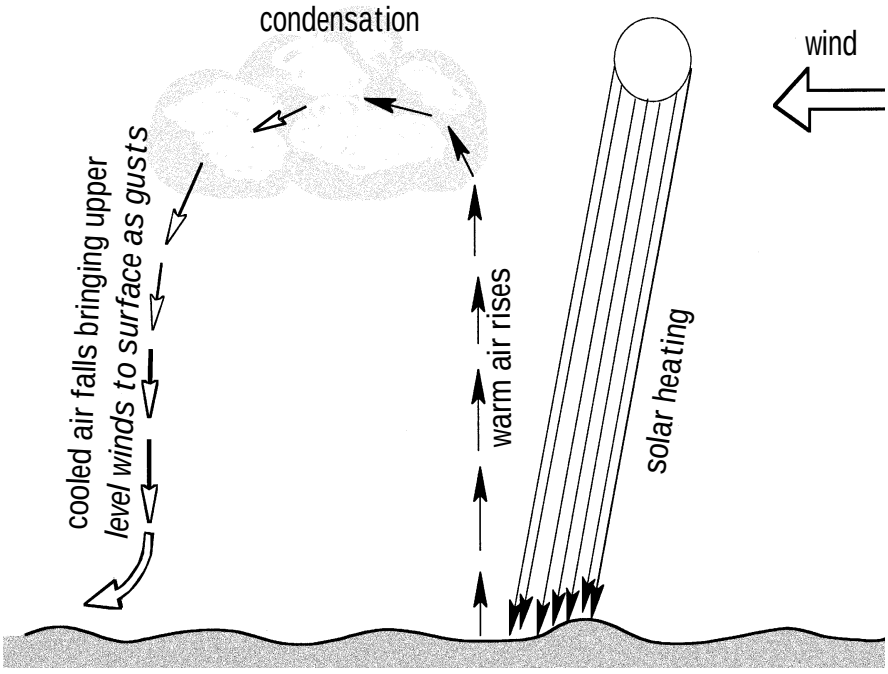
Gusts vary with the weather systems, and between day and night. Here is a rough approximation based on different wind forces. Gust factors are higher in the day due to thermal action and tend to reduce with wind speed. Multiply the average wind speed you have by these factors to get an idea how hard the wind may blow.

Gusts also tend to be stronger during the daytime when solar heating promotes the updraft/downdraft cycle (an exception to this will be when there are squalls, which sometimes are more vigorous in the evening—see more on this subject in the chapter on squalls beginning with page 256).

Gusts generally will increase the wind velocity anywhere from 30% to 70% above mean wind speed. When you consider that the force in the wind goes up with the *square* of the wind speed—so that a 30-knot wind has more than twice the force of a 20 knot wind—you can see why gust factors are worth paying attention to.

Expect stronger gusts:

- ❑ During the daytime.
- ❑ If there are squalls about.
- ❑ With the passage of a cold front.
- ❑ When you see virga hanging from clouds.



Wind gusts are the result of vertical instability resulting in the mixing of upper level winds—which are stronger—with surface winds.

This instability can be the result of thermal activity from the sun's radiation, or the mixing of the upper and lower atmosphere as a result of frontal passages.

DATA FROM OTHER YACHTS

It is the norm now on most passages to be sharing your part of the ocean with a number of other yachts.

Often these yachts will check in to a "net" on either ham or SSB frequencies, giving their position, barometer reading, cloud cover, wind strength and direction.

Things to look for when listening to weather reports from other vessels:

- ❑ Experience of the reporting crew.
- ❑ Trends in their wind speed, direction, sea state, and barometric pressure.
- ❑ Cloud types and trends.
- ❑ Has their barometer been calibrated recently?

If you log this data, you can then begin to construct a highly accurate picture in your mind of what the weather is doing.

Some years ago Linda and I were in Fiji, ready to head for New Zealand. *Beowulf* was new at the time, and we were taking her to Auckland for her interior.

This was the last leg of our trip and we wanted a really good blow as one final test.

We sat in Malololailai for two weeks watching fax charts from New Zealand, Australia, Honolulu, and Rarotonga. All of these fax charts were derived from the same raw satellite data using different computer models—and they all differed substantially from each other.

At the same time, several dozen yachts were en route to Bay of Islands, New Zealand from Tonga and Fiji, all checking in with Keri-Keri radio.

By plotting their locations and reported conditions, it was easy to see what the real picture was—a high pressure was moving in from the Tasman, winds were light and, unfortunately, we expected them to stay that way.

Sometimes there's just one other vessel out there. If it happens to be between you and a brewing weather system, they can serve as an early warning service for you.

One thing for which you do need to make allowances is the accuracy of the other boat's barometer. It may be off several millibars if it hasn't been cali-

brated making the absolute reading of small value.

However, the *relative reading* — how much the barometer is rising or falling, and over what time period — is still significant.

WHAT THE WAVES TELL YOU

The pattern and size of wind waves and swell are good indicators not only of the weather in your own neighborhood, but also of weather far away.

In the case of weather predictions, the wind waves are not what we are interested in (local wind waves usually have a period—i.e., time between the passing of crests— of five to seven seconds).

What is of interest are the swells. The swells with the longest period are also the fastest moving. They typically move well ahead of an approaching storm. A normal period for swells might be six seconds (ten swells per minute). As these begin to slow