

Pacific Cup Weather Routing, By Stan Honey

Stan Honey has navigated in twenty-two transpacific races, winning class or line honors ten times. As navigator, Stan has set the single-handed, double-handed, and fully-crewed passage records for monohulls to Hawaii. In 1996, Stan and Sally (Lindsay Honey) won the Pacific Cup overall, sailing their Cal 40 Illusion doublehanded. Stan was the navigator on ABN AMRO ONE, when it won the 2005-2006 Volvo Ocean Race around the world. Stan recently navigated Groupama 3, when it set the Jules Verne record for the unlimited circumnavigation of the world under sail in 2010 (superseded).

Overall race structure and necessary decisions

The primary feature that determines the tactics in a transpacific race is the Pacific High. Typically there is no wind in the center of the high, and increasing wind as you get farther south, up to a limit. The central question concerning course selection is: how close to sail to the high, or how many extra miles to sail to get farther from the high? In years when the Pacific High is weak (or weakening) and positioned well south, there can be strikingly more wind to the south. There have been transpacific races where yachts that are 10 miles to the south of competitors can experience one knot more wind. An ultra-light-displacement-maxi (sled), in one knot more wind will sail 1/2 knot faster, and therefore would gain 12 miles per day on the northern competitor. Smaller uldb's will similarly gain from the additional wind. Although the gain is less for heavier boats, it can still be a significant factor. This condition can persist for the entire middle third of the race. Note that all yachts in this middle third of the race are nearly fetching the finish on starboard pole, so the boats caught too far north cannot jibe out of their predicament without sailing a dramatically unfavored angle, and passing far astern of the competitors to the south.

Occasionally, however, the Pacific High will be strong (or strengthening), and located to the north. In these conditions, it is easy to be too far south. The boats sailing closer to the high will not only get more wind, but will sail a shorter distance. Typically in these sorts of years, the wind stays "reacky" throughout the middle third of the race, so the boats that paid extra distance to get south cannot even "cash in" the southing and reach up in front of the northern boats, because everyone is reaching fast. The boats to the North and ahead get the shift first and gybe to port, crossing ahead of the boats to the South.

So the critical characteristic of the correct "lane" as you approach the High, is to get sufficient veer on which to gybe from starboard to port before the wind gets too light. If you are too far North, you have to gybe before you get enough veer, and end up gybing on a rotten angle. If you are too far South, the boats to the North get the veer first and gybe and cross your bow.

The five sections of the Pacific Cup:

1. Race to the synoptic wind before nightfall on the first day.
2. The windy reach to the ridge (first third)
3. "Slot cars" through the middle (middle third)
4. The run (final third)
5. Approaching the finish

One: The start and exit from the Bay

Get a comfortable start. It is senseless to risk a foul or collision at the start of a 2000 mile race, so consider starting 15 seconds late. The start is generally scheduled for an ebb tide, so this discussion will make that assumption. Tack shortly after the start, and take long tacks across the center of the bay in order to stay in the favorable current. Pass under the bridge at mid-span.

As you leave the Bay, be sure to know where the inside edge of the synoptic wind is, and race to that wind. If you don't get to the synoptic wind by nightfall of the first day of your race, you will spend the first night slatting. Typically the synoptic wind runs from Pt Reyes through the Farallones but be sure that you know where it is. Coamps from Saildocs or other mesoscale models from SailFlow or PredictWind are good for working this out before the start.

Note that the great circle course to Hawaii passes nearly over the Farallones, so as you leave the Bay if the closest point of the synoptic wind is over the Farallones, then race to the Farallones. Tack close to Pt. Bonita to be inside the right hand shift that you get just beyond Pt. Bonita.

After clearing Pt. Bonita the wind velocity will reduce and the wind will begin to veer. You will know when you get to the synoptic wind. The temperature will drop, the humidity will increase, and it will smell like the ocean. The wind will begin to build. Now you need to work out your overall race tactics; the course that you select for the first night and the next day, and where you cross the ridge, will determine your tactics for the rest of the race, and your result.

Two: The Windy Reach (first third)

The Pacific High nearly always has a ridge extending from its southeast corner. On the weather map this is visible as a "U" shape in the isobars on the southeast corner of the high. After leaving coastal waters, you will have a windy reach for a couple of days, depending on your yacht's speed, but when you get to the ridge, the wind will lighten and veer very quickly. Within 6 hours after you initially set the spinnaker, the wind will lift and you will be running on your downwind polars in much lighter air. You will have crossed the ridge.

The most critical decision of the Pacific Cup is where to cross the ridge. The reason this is critical is, once you get to the ridge and the wind comes back, you cannot get farther south cheaply. It never pays to sail lower than your polars, and you can not jibe (onto the dramatically unfavored port pole) without huge penalty. That is why the middle third of the race is called "slot cars."

Three: Slot cars (middle third)

As you left the coast you made your decision where you wanted to cross the ridge, you sailed there, and now you have to live with it for four or five days. If you are too far to the north, you will be slowly destroyed by the yachts to the south of you, and there is nothing that you can do about it; you cannot jibe (without huge penalty), and you should not sail lower than your polars. If you are substantially too far north, you will experience torture. As the wind gets lighter, your polars force you to sail higher and higher, until you "spin out" up into the high. If you have to jibe to avoid total calm, your angle on port pole will have you heading south, far behind your competitor's transoms. The "slot cars" leg ends when the wind eventually veers far enough so that both jibes are symmetrical around the course to the finish, allowing you to sail either jibe. If you are too far South in the middle third you can sail somewhat hotter and faster angles, but the boats to your

North will sail fewer miles, get to the veer first, and gybe and cross ahead of you.

To win the Pacific Cup you need to pick the correct place to cross the ridge, enabling you to sail in the optimum slot for your boat. If you are going to make a mistake, however, being slightly too far South will be a bit more popular with the crew than being too far North; but to win you need to get it right.

Watch for cutoff lows (aka subtropical lows) on the first half of the race. If there is a cutoff, remember that there is light wind South of a cutoff and good wind to its North. So if you have to sail past a cutoff low, either pass well South of it or pass North of it. Cutoff's make a big difference to the race so watch for them carefully.

Four: The Run (final third)

The final third of the race is "the run." This is why we sail Pacific Cups. The wind picks up as you approach the Islands, and you get to practice your helmsmanship surfing tradewind swells. Generally the right hand side of the course is favored in the final third of the race, because the wind slowly veers as you sail west.

In the final third of the race the wind speed is generally even across the course. Oddly, the boats that get too far north in the middle of the race, and stew about it for 3-4 days, often jibe onto port as soon as they can, sailing to the south when there is no longer a wind speed advantage. These boats then miss the right shift in the last third of the race and lose even more.

Instead, favor starboard pole until you can nearly lay the Islands, and then approach Oahu on port pole. Be sure to account for the fact that the wind will continue to veer, and do not overstand Kaneohe. One simple rule-of-thumb to help you avoid overstanding is to plot a waypoint that is 60-100 miles directly upwind of the finish and jibe onto port pole when you can lay that waypoint. The wind will continue to shift to the right, so that when you actually cross the line that is upwind of the finish you may find that you are substantially closer to Kaneohe than your initial waypoint.

Keep an eye out for tropical depressions, or "inverted troughs", that move along the trades from East to West. There is more wind to the NW of a tropical depression and a backed wind direction whereas there is less wind to the NE of a tropical depression with a veered wind direction. So if there is a significant inverted trough (tropical depression) that will be behind you as you approach the Islands, it can sometimes pay to sail down closer to the trough to take advantage of the increased wind velocity and the backed direction. If a tropical depression will beat you to Hawaii, the right corner will be favored even more strongly than usual.

Five: Approaching the Finish

Arrange your final jibe or two so that you pass 10 miles due upwind of the finish. Then sail half the remaining distance on starboard pole, and then make your final 5 mile approach on port pole. As you approach the finish, plot your track on the chart, and take GPS fixes as well as periodic bearings with your hand bearing compass. The finish buoy is hard to see. The best technique is to plot your position and navigate to the finish, rather than expect to see the buoy. It's not even worth looking for the buoy until you navigate to within about one half mile of it.

In the daytime, take bearings on:

1. Mokapu (the turtle's head)
2. The giant ping pong balls near Pyramid Rock (labeled "radomes" on chart)

3. Makapuu (the left edge of Oahu)
4. Pyramid Rock (white house with diagonal stripes on conical rock)

At night, take bearings on:

1. Molokai light, range 28 miles, loom visible 60 miles (flashing 10s)
2. Makapuu light (occluding 10s)
3. Marine AeroBeacon, sometimes obscured (alt green/white or red/white)
4. Pyramid Light (occluding 4s. Don't know what "occluding" means? Then refresh your coastal piloting skills)

Remember that the reef is only 0.8 miles beyond the finish line, so douse your spinnaker promptly. If for some reason you have trouble dousing your spinnaker, jibe onto starboard and sheet your mainsail hard. If you can maintain a beam reach, even with the kite flogging in the rigging, you will stay clear of the reef.

Squalls

Typically, you will get tradewind squalls for the last three or four nights of the race, especially if the ocean is warm in an El Niño year. Squalls only occur at night, starting about midnight and continuing and strengthening until dawn. If there is a moon, the squalls are visible for miles because of their height. If there is no moon, you can often detect squalls behind you by watching for the absence of stars. If you have radar, squalls are easily detectable. Each squall on a given night will behave almost exactly like its predecessor, except it will be a little stronger. So "go to school" on each squall in order to sort out how to best take advantage of the next one. If one squall provided more fun than you really wanted, douse the kite and wing out a jib for the next one. If a squall is approaching, and you get rain before the wind, prepare for lots of wind and a long-lasting squall. If you get wind before the rain, the squall will likely be moderate and short-lived. At dawn the squalls vanish, but leave calm zones around and particularly behind them. These calm zones at dawn are worth taking great care to avoid.

The comments below assume normal right shifting squalls. Occasionally there will be a night of squalls with no wind shifts in them, or even with left shifts. The following characterizations are very typical, but the best prediction of what you will experience in a squall is the experience you had in the previous squall the same night.

In contrast to popular perception, long-lasting squalls do not generally work the way "cat's-paws" do. Cat's-paws and short-lived squalls have diverging wind in front of them. Surprisingly, long-lived tradewind squalls often have converging winds at their leading edge. The wind converges because there is an updraft in front of the squall. In addition, the average wind in the squall is generally veered about 15 degrees or so to the right of the prevailing surface wind, and the squall itself moves about 15 degrees to the right of the path of the surface wind. Behind squalls the wind is light, particularly near dawn.

If you want to race aggressively, watch for squalls and jibe to get in front of them. As they overtake you, jibe to port pole. Stay on port pole during the squall, sailing as deep as you dare, and then jibe back to starboard only when the squall has passed completely over you and your wind speed and angle have returned to the prevailing conditions. If you jibe back to starboard pole too early, you run the risk of crossing behind, or sailing along behind the squall and staying in the light air

in the wake of the squall. If you have the good fortune to be sailing on a sled, you can sail fast enough to stay in the accelerated wind in front of the squall for hours. This requires jibing back and forth in front of the squall, jibing about every 15 minutes. Each jibe “back” towards the squall will be at a horrible angle, because of the way that the wind “toes in” in front of the squall, but jibe back anyway. The additional wind velocity in front of the squall will make up for the horrible angle. If you are racing aggressively, you will jibe over 50 times in a Pacific Cup, with most jibes taking place at night in squalls.

Port pole is more effective to avoid the calm behind a squall because the squall itself is moving to the right of the path of the surface wind, so port pole allows you to diverge rapidly from the light air area behind the squall. It is perilous to exit a squall on starboard pole because of the risk of getting becalmed behind the squall, particularly near dawn.

Weather Information

The best source of information about the future position and strength of the high comes from the 500 mb forecasts via weather fax or grib files. Interpreting upper level charts is beyond the scope of this article, but various colleges have Meteorology courses and Lee Chesneau has published a terrific book and will be giving a weather seminar specifically for the PacCup this spring. Surface analysis and surface progs are available via weather fax and grib files. Satellite imagery via NOAA APT satellites is fun but not very useful during a Pacific Cup. APT imagery is most useful in middle and high latitudes where there are lows and cold fronts to observe. Definitely use a mesoscale model to make sure you know where the inside edge of the synoptic wind is before the start.

Disclaimers and Final Comments:

All of the above comments are relevant to typical Pacific Cups. There are unusual races in which you have to break the above rules to win.

Pay attention to your boat’s polars. If you are racing a light displacement boat, it is worth sailing extra miles to get extra wind, because no matter how hard it blows, a light boat will sail still faster if you get more wind. On the other hand, if you are racing a heavy displacement boat, do not sail any extra miles in order to get more wind than necessary to reach hull speed. If you sail farther to get more wind, you will have more fun, but your average speed will not increase enough to pay for the extra distance.

Watch for tropical depressions. The inverted troughs that extend north of a tropical depression can cause the tradewind direction to shift from normal. This can make a huge difference as you are picking your approach to the Islands.

Watch for cutoff lows. Passing just South of one can take a very long time.

Finally,

Pick your strategy and stick to it. Then whatever happens, make up your story for the Kaneohe bar and stick to it.