

PASSAGEMAKING IN THE SOUTHERN OCEAN

Once a busy highway for whaling ships and tea clippers, in the last few decades the globe-girdling Southern Ocean has been left to the round-the-world racers and nonstop record-breakers. In their photos, videos and logs, crew struggle to douse sails on wave-swept decks, apartment-block sized icebergs tower above heaving gray seas and massive Southern Ocean graybeards curl over the sterns of madly surfing boats. This wild and windswept world at the bottom of the planet seems no fit place for a cruising boat. Yet somewhere between a half a dozen and a dozen cruising boats quietly complete major passages through the Southern Ocean each year.

In the course of two years cruising the southern high latitudes aboard our 47-foot Van de Stadt Samoa, *Hawk*, we met and talked to over a dozen of these crews. Their boats averaged 40 feet in length ranging from a Westsail 32 to a 50-foot steel ketch; their voyages averaged 4,000 nautical miles and included all the downwind Southern Ocean routes. We relied on their advice and expertise when we prepared *Hawk* for the 9,000 nautical mile eastabout voyage from the Beagle Channel just north of Cape Horn to Perth on the west coast of Australia. They helped us to understand how the reality behind the images beamed back from the racing boats translates to passagemaking, and what the implications were for preparing a well-found cruising boat to venture into the Roaring Forties.

Southern Ocean Realities

Even a cursory look at the *Atlas of Pilot Charts* for the area confirms the Southern Ocean's fearsome reputation. Gale frequencies, wave heights and sea temperatures south of 40°S during the relatively stable summer months of January and February resemble mid-winter conditions in the North Pacific or North Atlantic. Passage lengths of three to six thousand miles mean that most boats will be offshore long enough to run into conditions that test their limits. Of fourteen cruising boats making summertime Southern Ocean passages whose voyages we followed, one was rolled and dismasted, two hit ice with one damaging its rig and the other losing its rudder, seven were knocked down past the horizontal at least once and one was lost with all hands two hundred miles from Cape Horn.

In the southern Atlantic and Indian oceans, average wave heights exceed twelve feet up to 30% of the time between 40 and 45°S, and 50% of the time south of 50°S. Ice limits reach as high as 35°S in the Atlantic. While summertime gale frequencies in the high latitudes of the

northern oceans average between 1 and 3%, south of 40°S summertime gale frequencies of 5-8% are the norm with double-digit percentages south of 50°S in many areas. This translates into an average of one gale per week south of 50°S with the accompanying frontal systems sweeping through the Roaring Forties every few days.

Instead of day after day of heavy air, downwind sleigh rides, these fast-moving weather systems make for highly changeable conditions in terms of both wind speeds and directions. While we experienced downwind conditions (wind aft of 110° apparent) 75% of the time in the tropics during a tradewind circumnavigation, the Pilot Charts show that such consistent downwind conditions are not to be found north of 50°S, if at all. In the summertime, lows track further south than in the winter on average, but the occasional low still manages to get north of the forties. Easterly gales result, stopping progress for most boats. Strong beam winds occur when a stationary high pressure system develops around 40°S and blocks the passage of low pressure systems further south. The result is a significant percentage of wind forward of the beam.

Two logbooks from Southern Ocean passages illustrate the percentages of wind from various wind angles. Evans and I crossed the South Atlantic and South Indian Oceans between 40° and 42°S from January to March of this year. Australian Michael Wignall took *Carmen*, his racy, John Sayer's designed, forty-foot cedar/epoxy sloop, from Sydney, Australia to Cape Horn in February and March of 2002. He spent most of the passage between 47° and 49°S. While purely anecdotal, we both experienced winds forward of 110° apparent more than half the time (Table 1).

Table 1. Percentage of passage at various wind angles

Apparent angle	Hawk	Carmen
Forward of 70°	26%	43%
70-110°	25%	23%
Aft of 110°	49%	34%

Wind speeds also varied far more than we had expected, with light air pockets lasting from six to twenty-four hours in the wake of frontal passages with gale-force winds. As Table 2 shows, we spent more than a quarter of our time on the two-month passage trying to keep *Hawk* moving in ten knots or less of wind, a task made much more difficult by the leftover swells of a meter or more coming from different directions. Despite *Carmen*'s more southerly route, she also encountered a significant percentage of light air, along with a greater percentage of heavy winds.

Table 2. Percentage of passages at various wind speeds

Apparent wind	Knots	Hawk	Carmen
Force 0-3	0-10	26%	17%
Force 4-6	11-26	65%	68%
Force 7+	27+	9%	15%

All of these changes in wind speed and direction make for a great deal of sail handling. For the first forty days of our passage, we rarely went more than one watch between major sail changes. The Rhodes 41 *So Long*, with Tony Curphey and Susanne Huber-Curphey aboard, left the Beagle Channel bound for Cape Town, South Africa ten days ahead of us, spending most of the voyage around 40°S. Susanne said, “During the 4,630 miles in 41 days, twelve cold fronts passed and we made 248 sail changes (if I have counted them all from the logbook).”

As in any offshore sailing, waves, not wind, pose the greatest danger to cruising boats, and Southern Ocean waves average some of the largest on the planet. The wind shifts much more quickly than the waves, making for dangerous periods after the passage of the center of a low when the wind opposes the prevailing wave train and can lead to the development of cross seas or breaking waves. Close-reaching in strong beam winds and large seas can be dangerous aboard a boat that lacks stability, but running in storm conditions can be equally dangerous aboard a boat that does not remain in control when surfing. To avoid knockdowns, crews need to understand how their boats handle large waves from different angles and protect them where they may be vulnerable.

Combine all these factors and they sum to relatively slow average daily runs. Most crews spent several days hove-to or forereaching in easterly gales, and another couple of days making no progress in light winds. With storm force winds over the stern, most crews ran under bare poles or trailed warps to keep the boat under control in the big waves. If sailing where ice could be encountered, prudence dictated the boat be hove-to for the hours of darkness. Short-handed crews tended to keep the boat under-canvassed during weather changes, waiting to put up more sail when the wind dropped but shortening sail the minute the wind seemed to be increasing. When passage planning for the Southern Ocean, therefore, it makes sense to assume an average speed about a third slower than normal rather than planning on fast downwind runs.

Preparing for the Roaring Forties

Given conditions in the Southern Ocean, preparing a cruising boat for a passage in the Roaring Forties is like preparing for any passage, only more so. All of the things we think about in a tropical passage actually need to get done in earnest and be done right before setting off into

the Southern Ocean. All lockers, floorboards and icebox lids must be able to be locked into position and be strong enough so they will not break if the contents of the locker fall on them. The mast and rigging need to be inspected and any weaknesses corrected. Particular attention should be paid to the vang lugs, the gooseneck and the spreaders, areas that will take shock loads in the large swells, particularly in light air.

When Maxwell Fletcher was preparing his Westsail 32, *Christopher Robin*, for a Southern Ocean passage from the North Island of New Zealand to the Falklands via Cape Horn in 1985, he asked Eric Hiscock if he had any advice. Hiscock's reply: "Keep the water out." The average wave heights, wind speeds and wind angles over the course of a long passage in the Roaring Forties all mean that water will be washing over the boat a good percentage of the time. Given the high incidence of knockdowns on these routes, the boat must be capable of being rolled past the horizontal without taking on water. The ideal vessel for this passage would be a submarine, and the closer a cruising boat can get to that, the better.

Before leaving on our passage, we stripped the decks of anything not necessary to sailing the boat. We removed all dorades from the decks and sealed them both above and below. We removed our anchor from the bow and attached the chain to a hawsehole plug that we bedded with silicon. Hatches were sealed with plastic below and duct tape on deck. Portlights were lubricated with Vaseline and then sealed. Companionway boards were secured at all times to prevent them coming adrift in a knockdown. *Hawk's* aluminium construction with all deck hardware welded rather than bolted contributed greatly to keeping her dry below. Her hard dodger also protected the companionway, the most vulnerable part of any cruising boat, and provided shelter during hours spent on deck watching for changes in the weather.

Given the changeability of the weather, the boat needs to be set up for ease of sail handling, with sail combinations that can be handled by one person. For Jeremy Firth, who with his partner Penny St. Leger circumnavigated the Southern Ocean aboard their steel Adams 40 cutter, *Rosinante*, that means relying on a roller furling headsail and an easily reefed main for most conditions. "*Rosinante* was rigged with the Southern Ocean in mind. [As the wind increases,] we go down three substantial slab reefs. The last one has the head of the mainsail below the upper spreaders. We roll up our 130% 9.6oz dacron headsail until it gets too small and starts to pump on the forestay. Then we set a storm jib on an inner forestay. By now it will be blowing around 45-50 knots. Then we take the mainsail off... Once the front has passed and if the wind is still abaft the beam (as it mostly will be), we often delay re-setting the mainsail and

run under a progressively unrolled headsail.” In light air, they dropped all sail and motored slowly just to keep up crew morale.

Aboard *Hawk*, we found that we also relied on the mainsail and the roller furling headsail whenever we thought conditions might change. But, in addition, we used a variety of easily deployed light air sails when we found ourselves stuck in high pressure including an asymmetrical spinnaker in a sock and a Code Zero reacher on a removable furler. These allowed us to make headway in apparent winds between 4 and 7 knots despite the large swell. Michael Wignall on *Carmen* carried a mainsail, trysail and #3 jib (about 100%). He regretted not leaving his 150% jib on the furler for use in light air. “With the #3, I needed a steady 7 knots of apparent wind to get the boat moving in the large swells.”

Every boat will have its own array of storm equipment depending on the boat design and the way it handles waves from astern or over the bow. This equipment – including storm sails, warps, drogues, parachutes and related hardware – needs to be stowed where it can be easily reached and quickly deployed. On *Hawk*, storm sails are stowed on the floor of the head, next to the companionway, and drogues and warps are stowed in secure positions on the cabin sole. The over-sized blocks we use when trailing a drogue are kept on the stern quarters at all times.

While weather forecasting tends to be particularly unreliable in these latitudes, early warning of a deep low pressure system may allow time to position the boat favorably before the bad weather arrives. We used a variety of weather sources on our passage including Inmarsat C, weather faxes and a shoreside weather router who contacted us only when we had severe weather in the offing. By comparing these various weather sources with current conditions including sea state, cloud patterns, barometric pressure and wind direction, we were often able to generate our own synoptic chart and prognosis that were significantly more accurate than any of the weather sources on their own. We sailed conservatively and ended up routing ourselves into high pressure systems on several occasions, but we also avoided several severe depressions that passed only a hundred miles or so south of us.

Pre-trip preparations also include making sure the crew will be well cared for on passage. That means stowing a variety of quick-fix, one pot meals and high energy snack foods as well as proper clothing and bedding for temperatures in the single digits. Like most crews, we did not run a heater while underway, and we found dealing with twenty-four hours a day of near-freezing temperatures to be much more draining than day sailing for a few hours and putting the heater on

for the night. We often wore two to three layers of thermal underwear under our foul weather gear along with two layers of gloves, hats and two layers of heavy socks inside extra thick-soled sea boots. At night, it took three wool blankets and a sleeping bag to keep us warm.

The crew are not the only ones to suffer from the cold. Low temperatures also take their toll on the boat's systems, with batteries, watermakers and electronics being the most vulnerable. Batteries charge less than half as efficiently in near freezing temperatures, and watermakers produce only about half the water. Batteries older than three or four years should be replaced for the trip, and watermakers should not be relied upon to produce the crew's drinking water. Backups need to be carried for critical electronics with LED displays, as these seem prone to failure after a long period in cold temperatures.

Finally, passage preparations need to include route planning. The obvious time to make such a passage is in the more stable summer months (December to March), planning to arrive at the destination in late March to minimize the chances of encountering a cyclone or winter storms. The major routing decision is how far south to sail. The great circle routes typically run down into the deep 50s. This would have been 2,000 miles shorter than our route along 42°S and daylight would have been much longer, but in the Atlantic and Indian oceans the probability of encountering ice at those latitudes is quite high. We used the old Admiralty recommendation for square-rigged ships, tracking mostly between 40° and 42°S, and encountered both lots of light air and about one gale every other week.

We considered dropping down along 45-47°S where the wind was generally steadier from the west and about 5-10 knots stronger on average than along our 42°S track, but at that latitude a storm blows through with 45-50 knots sustained once a week and average wave heights over twelve feet increase to 30-40%. *Hawk* sails very well in light air, so we preferred to deal with the high pressure systems further north rather than risk the possibility of getting knocked down further south. None of the Southern Ocean options are a milk run, but for the Indian and Atlantic oceans, 39°S-42°S seemed a good choice for a boat which sails well in light air and 43-45°S otherwise.

In the Pacific, conditions are generally more moderate, with ice limits and extreme waves confined to the area south of 50°S and relatively light (average Force 3-4 versus 5-6 in the other oceans) and variable winds between 40 and 45°S. Here boats that do well in light air tend to stay between 46-48°S, with heavier, more traditional boats ducking a bit south of 50°S.

While on Passage

Once the preparations are finished and the boat and her crew have committed themselves to the deep, the key to a safe passage lies in sailing the boat conservatively and taking care of the crew, both physically and mentally. On his passage aboard *Christopher Robin*, Maxwell Fletcher said, “We always cooked a nice, hot meal, even in the worst weather. When the weather was fair, we overslept in order to store up energy.” He added, “The only time I was scared was right after the Horn... our self-steering broke and I spent a morning trying to fix it... No luck. By then I was cold, exhausted and a gale was descending on us. What was frightening to me was that I had let myself get so tired that I almost didn’t care what happened.”

The length of most Southern Ocean passages makes it critical to nurse the boat and conserve supplies, whether food, fuel or water. As Jeremy Firth said, “The primary aim of a cruising passage is to get there with the boat and its crew in one piece with the rig in its proper place and without starving. For *Rosinante* this means not getting too foolhardy about great circle routes and being super conservative about the amount of sail set for prevailing conditions because they can change so quickly.” While a good deal more challenging than a summertime passage through the North Atlantic, the Southern Ocean routes can be safely navigated by well-found, properly-prepared cruising boats with prudence and a great deal of respect.