

1.1 Overview

We admit immediately that *Modern Marine Weather* is a brave title. Of all the technologies influencing marine navigation these days, how we do the weather preparation before a trip and the analysis underway once we leave are subjects that are changing as fast as any—partly because the products and services are evolving rapidly, but also because the related technologies of wireless communications are changing so fast as well. Literally monthly we have new sources and improved technologies related to marine weather. We can get marine weather by “podcast” these days, while most of the world (let alone mariners) is still not aware of what a podcast is. Wonderful new services and products from the National Weather Service seem to appear monthly.

Most younger mariners know about text messaging by cell phone (called SMS for short message service) but it is still just a few that know they can actually call a messaging service to get instantaneous values of the wind speed, wind direction, and barometer at a buoy or lighthouse along their route, whenever they might want it. We can also now use our cell phones to get a live radar view showing precise locations of squalls in our waters, updated every 6 seconds!

And by the time this book is distributed it will likely be well known that mariners can use an “air card” for broadband connection to the Internet in essentially all inland waters and most near coastal waters. This will shortly have a revolutionary influence on practical marine weather, yet as these words go down on the paper (a figure of speech in this case!) this service is just barely known to a few mariners, and just six months ago it was essentially unheard of for this application.

There is also new research into fundamentals that are literally windfalls to our trade. The demand for new energy sources has spurred much research into wind power generation, including where to locate the generators and how they interact with each other and

with the local terrain. This has led to in-depth study of wind flow over and around barricades, and so on—directly applicable to predicting how close we can sail to an islet 20 feet high versus one 80 feet high, and still maintain our wind. A valuable resource for knowledge on sailing near land.

If we are to keep this title meaningful we must stay on our toes. We must make every effort to keep the teaching materials and presentations up to date. Traditional book publishing procedures have a challenge here. If a book takes a year in production, it is destined to be out of date when it arrives. We need new means of publication and teaching to keep up with the topic. The solution is pretty obvious. The Internet is the main source of revolution in marine weather content and services, and it also provides the way to keep materials and information up to date. Of all topics in modern marine navigation, it is fair to say that weather is affected the most by the Internet. Updates on the content of this book can be found at www.starpath.com/weatherbook.

There are also good reasons to start getting involved with the modern sources of marine weather. In October of 2006, the USCG (Department of Homeland Security) finally gave up their most recent attempt to do away with all high seas HF voice and radiofax weather broadcasts—the two most used and depended upon sources for all ocean-going mariners, recreational and professional, in use for decades. The argument was the equipment is old and needs to be replaced, which would cost a lot. Probably in no more than five years or so, they will try again, and probably succeed. And maybe rightfully so by then. It is obviously completely inappropriate now, but by then the new sources we cover in this book will be better known and tested and it might be a reasonable decision. The message to prudent mariners is clear: now is the time to start using the new options so we are prepared.

Needless to say, however, there are elements of this study that do not change with time. What is changing are the types of data and how we receive them. What we do with the data in planning and navigation has not changed—what we watch in the sky and on the water, and how we choose our routes underway has not changed much since the great sailing days of the 1800's—though we do go to weather a lot better. There is much to learn from knowledge gained in those days. From the works of pioneers such as Admiral Robert FitzRoy (1805-1865), the father of modern meteorology (and captain of Darwin's *Beagle*), and we actually still use data gathered by Capt. Matthew Fontaine Maury (1806-1873) who compiled data from ship's logs into the forerunners of modern Coast Pilots and Pilot charts. We rely daily when underway on the Beaufort wind force scale of Admiral Francis Beaufort (1774-1857). Its value has not diminished. We also touch on the work of George Hadley (1685-1768) who started off the understanding of what causes the trade wind flow, the doldrums, and the great mid-ocean Highs.

We still need these basics of weather observations and respect for the sea, long-tested in maritime tradition. Modern tools are blessings that must be used thoughtfully. GPS, for example, has had a mixed influence on the practice of marine navigation. Certainly it is now a most valuable aid to navigation—to the point that it is essentially negligent to navigate without it. But with the advent of its (usual) great accuracy and extreme convenience has come a tendency to not study the basics of navigation. Whenever our GPS fails or is unavailable, or we make a cockpit error in using it, or when we are in some poorly charted area where having a digital position doesn't help at all, we must fall back on the basics. If the basics are not there, we might regret it.

Likewise in modern marine weather, there are new and wonderful resources available now that are analogous to our first getting GPS. We can push buttons now and end up with a full weather map laid out on the electronic chart we are navigating with. The overlays even include wind arrows plotted on the chart showing wind speed and direction everywhere around us. Push another button and the predicted wave heights and directions are plotted as well. Push

another button and we see how all of these change in the next hour, or the next day, or the next 5 days. We can obtain this data in a local bay or in the middle of the ocean. It is easy to ask then, just as when GPS was new, "Why do we need study more?"

A main goal of this book is to answer that question. To explain just what we are actually getting with such a push-button system and how to use it safely. And of course the goal is to provide those basics we can fall back upon as needed. And also in analogy with GPS, which can tell us very nicely where we are, but does not tell us the best way to get to where we want to go, we also cover how to use the weather data we have, and how to interpret what we see around us in the water and sky to help evaluate and modify as needed what we are told is going on with the weather in order to choose the optimum course.

As for philosophy, a famous scientist once said that our goal in teaching practical science should be to make things as simple as possible—but not simpler. So a guiding principle has been to cover the "theory" part of weather only insofar as it actually helps us make decisions in planning and navigation. There are many excellent books on meteorology that cover background in more depth. Selections are listed in the References. But there are some nuts and bolts we cannot skip if we want to best apply what we learn. Our goal is to make the text a practical guide to the acquisition, interpretation, and application of marine weather data. Not just to tell you about it, but to tell you how to do it.

Which brings up a thought that occurs more than once in the book. "There will always be a forecast"... and they are not labeled good or not-so-good. At home we get 40% chance of rain, but at sea we do not get 40% chance of gale. So one of our ongoing goals underway and in our immediate planning of voyages is to develop those skills and resources that help us evaluate the forecasts we are given. We are not trying to outguess the professionals who gave us the forecast—that is not realistic. If they say the wind on the coast is going to be 20 kts, north of 38° 30' N, at midday tomorrow, then barring any immediate contrary evidence, our best bet is to assume the wind is going to be 20 kts, north of 38° 30' N, at midday tomorrow. They have more knowledge on the subject and they

have far more data than what we can see around us or download from our wireless sources.

But we can evaluate the timing of what they forecast when we are located in the forecast region—or when we have access to measurements from the forecast region. Weather systems are in motion, and their route and speed may change. We only hear from the professionals every 6 hours or so. It could be that things have changed since their last report. With trained observational skills, we may be able to detect changes in the timing of the event before the next forecast. We may be able to conclude that this system is early, and we should look for that wind much earlier.

More to the point, however, we can with learned techniques and observations assign some level of confidence to the forecast they give us. If our study indicates that all signs point to this being a good forecast, then we carry on with more confidence. But if our signs indicate this may not be such a good forecast, and if it is wrong, our present plan is not a good one, then we are better off doing just half of what we want to do, and wait for the next forecast to learn more.

In short, to do the best job with weather planning, we do not want to simply look at a map or read a text report, or listen to a voice broadcast, and say we are done—ready to make our decisions. Instead, we want to evaluate what we are told as carefully as possible. That evaluation process is another large part of the goal of this book.

Finally it might be valuable to point out early on that contrary to some images of marine weather study, it is not all about bad weather. In fact, if we do our planning properly and use our resources properly, we will avoid bad weather most of the time. As sailors, we will use the knowledge we gain far more often to find more wind than to avoid too much wind. Find a route with 14 kts instead of 10 kts and you will get there faster. Find one with 5 kts instead of 3 kts, and it is even more true.

Practical knowledge of wind and waves is obviously not just the domain of sailors. The content of this book is equally valuable to all mariners. Just like the Rules of the Road, it applies to “every description of water craft used as a means of transportation on water.”

1.2 Role of Marine Weather

When putting out to sea for an extended passage, the first and foremost concern is a sound and well prepared boat; next comes the basic health, fitness, and seamanship of the crew. With these basics in place, next priorities are fundamental navigation skills and knowledge of marine weather. There are those who sail around the world with only the most rudimentary knowledge of weather at sea, but there is a great deal of luck involved in these cases, and probably more anxiety than necessary. More important to the conscientious voyager, there is usually more risk and inefficiency than need be.

Bad weather is always a test of boat and crew, but it more often affects the progress of a trip without necessarily threatening the safety of a well prepared boat. Although bad weather is always recalled more vividly than fair weather, gales and worse are not common occurrence in most cruising. Knowing where and when bad weather is expected is fundamental weather knowledge every sailor should have. Avoiding it whenever possible is simply good seamanship. Weather statistics are available in Coast Pilots and Sailing Directions, presented on Pilot Charts, and discussed in standard references such as Bowditch’s *American Practical Navigator* (nicknamed *Bowditch*). More detailed information can be found in various issues of the Mariner’s Weather Log, a valuable quarterly publication of NOAA available online, and of course in several wonderful new resources we cover later on.

Weather and navigation cannot be separated at sea. To begin with, it is usually the same person tending to both matters, but more important, it is the weather that ultimately determines how fast and in what direction you proceed. In a sailboat, the sails are your engine and the wind your fuel. A car in the middle of a desert with no food or gas is in a bind. An auxiliary sailboat in the middle of the vast calm of the Pacific High can be in a similar bind (remember the Ancient Mariner!). Knowing about fair weather can be as important as knowing about bad weather. If it’s too “fair” for too long, you won’t get there.

The sensible elements of marine weather are temperature, precipitation, visibility, and wind. Of these,