

Preface

Since the first public appearance of barometers some three hundred years ago, the barometer has traveled through history along two separate, parallel paths.

There has been the lineage of instrument makers and engineering scientists who focus on how barometers work, how to make and repair them, how to calibrate them, and how to tell a good one from not so good; and along the other path is the lineage of barometer users whose focus is on the meaning of atmospheric pressure and how to use that information to analyze and forecast the weather.

More often than not, neither group has had a compelling interest in the activities of the other group. Those who know about the instruments care most about the instruments. They have confidence their instruments will be used well and properly if they make a good one, without a particular interest in what that use will be.

Barometer users, on the other hand, do not often care about the ingenuity or craftsmanship that might distinguish one instrument from another. They have confidence that the makers will provide quality instruments so they can do their job of weather analysis. Often they do not question the accuracy of the instrument, or even realize that this is a question that might be asked.

That is not to imply anything is wrong—at least so far. We have today phenomenally accurate barometers in science labs and weather stations on the one path, and on the other path our knowledge of the global atmosphere—which is ultimately dependent upon individual barometer measurements around the world—has also improved phenomenally, considering the immense complexity of the science.

Science labs and professional meteorology are well in tune barometrically, but the broader field of barometer users have not kept up as well. And there are changes on the near horizon that will be best met if we know as much as possible about the more com-

mon types of barometers now in use. In short, there is some virtue now in bringing these two paths closer together, which is one of the main goals of this book.

To give an important example, you will hear it said that the reason the typical mariner is not using a barometer so much these days is because they have so many wonderful new weather resources at their finger tips. With a satellite phone and a PC you can be in any ocean in the world and with the push of a button have all the winds and pressures immediately plotted out in front of you. Push another button and you see what they will look like tomorrow, and the next day, and so on.

This very convenient type of data, presented in what is called the GRIB format, are direct outputs from the super computers of the weather services. It is part of the data mentioned above that is getting better all the time. But it is not fully dependable yet. These are *not* the official forecasts. In fact, this type of computerized forecast has not been vetted at all by a professional meteorologist. Nevertheless, the use of this data grows very rapidly every year.

The idea that having that type of data means you do not need to use your barometer is as wrong as possible. It is one of the strongest reasons to use your barometer. With an accurate barometer, you have a way to test the weather map. Once you have tested the maps, then indeed these are wonderful new ways to do weather work at sea, or on land.

A key point in this comparison is having an accurate barometer. This is another new concept to mariners and others as well. Throughout maritime history, mariners relied almost exclusively on pressure trends: up or down, fast or slow. They did not concern themselves with the actual value of the pressure. This has been the teaching since the earliest days. Now we have a new reason to know accurate pressures, and to that end this book covers the process of barometer calibration using natural pressures, which we have access to through online resources. This Internet proce-

dure itself was not possible five years ago, so there is much new to modern barometer usage. There are of course other ways to calibrate without the use of the Internet.

Once we know accurate pressure from our barometer, there are other applications, one of which is the forecasting of tropical storms using deviations from the known mean pressures. To facilitate that procedure and for other applications, we reproduce in Chapter 10 the monthly mean sea level pressures and their standard deviations worldwide. The more you use your barometer, the more interesting this data becomes, as does its applications.

Besides all of that, the crucial role of a barometer in weather forecasting has not diminished, but it is slipping out of the textbooks way before its time, and we hope, here, to belay that trend as best we can.

Finally, an important new development in the past ten years or so is the advent of inexpensive electronic barometers. These can be very accurate and easy to use, but like all others, they must be tested. It is another goal of this book to introduce these new devices to those who have not used them before, and to present ways to evaluate them.

As the book proceeds, we inevitably end up addressing the two most common issues that barometer repair departments ever receive: (1) My barometer does not read the same as the weather reports, and (2) My barometer does not change.

The typical short answers are: (1) Weather reports are for sea level, but your barometer is at a higher elevation, and (2) Watch more carefully, the changes are small and slow. But these answers do not really convey much information. If we want more productive use of our barometers, we need more in-depth answers to these questions—from each of the two paths mentioned earlier.