Route Planning, Weather and Marinas for Coastal Cruising

A HOW TO USER’S GUIDE

BY BILL WORSLEY
Route Planning, Weather and Marinas for Coastal Cruising -
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Introduction

For the past 10 years my wife and I have sailed 15,000 miles along the Gulf Coast, East Coast and the Bahamas, anchored out mostly and had the memories of a lifetime on our Catalina 380, Southern Skies. Over this time frame, information and electronic technology has advanced tremendously allowing for much safer passages, enjoyable times spent on the water and the ability to stay in touch with family and friends. While we have not upgraded our principle source of navigation that came with our previously owned Catalina 380 – Raymarine RL70C Plus Chart plotter and Radar along with ST 60 instruments, we have taken advantage of our PC with internet access and smart phones to enhance our sailing enjoyment and safety. Before we had smart phones (2011), we used the PC with an air card for internet access and now we use the hot spot on the i-Phone and a good data plan for both! We also have an inexpensive Alfa AWUS036H wireless adapter that worked very well with Bahamas WiMax when we were in the Exumas (2013).

The devices, apps, websites and products that are discussed and demonstrated in this document are included because they worked for us in our coastal and near off-shore sailing experiences. There are many more vendors, sources and devices for displaying this type of information. If what you are currently using meets your needs for prudent safety and seamanship, you are in good shape. If not, then you may want to consider some of the topics and tools discussed. One of the key objectives of this paper is to make you aware that such information is available regardless of the device or app you use.

By no means am I dismissing the importance of written material such as the many cruising guides and the seven regional editions of the Waterway Guide which is now in its 70th year of publication, but the emphasis of this document is on electronic media. While a chart plotter has become the norm for navigation, that does not dismiss the importance of having back-up paper charts such as provided in chart kits for the regions where you are boating. If you are traveling on the ICW in an area where there are a lot of bridges such as Florida, the appropriate chart kit and Waterway Guide are excellent tools to identify and highlight all the bridges on the chart kit and follow the schedules for opening in the Waterway Guide as you make your way along your route.

Based on our experiences and what we currently use, here is a list of the topics that will be covered. Each topic has a hyperlink to the bookmarked discussion of that topic and there is a “Return to Topic Outline” hyperlink at the end of each topic to facilitate navigating within the document.

September 23, 2017
Whenever we think about taking a cruise, an immediate thought process runs through our mind – how much time do we have and where do we want to go? For many of us before retiring, we probably planned to go too far in too short of a time, did not pay enough attention to the weather because we were driven by a schedule and stayed at whatever marina or anchorage that appeared on the horizon. Hopefully, we and the boat survived a host of potentially bad decisions and now we would like to do it again, or better yet the first time, with the essential planning and knowledge at hand. For me most of the detailed thought process for taking the cruise occurs at home. Thus, from a navigational perspective, I need some sort of charting software on my PC (larger screen than iPad, etc.) to develop the routes for each leg of the trip to get me to my ultimate destination and return or to leave the boat there and return at a later date to continue. Let’s assume, we have a cruising destination in mind. Plotting a route for each leg and then summing up the distance for all the legs will give us an estimate of total distance for the cruise. Based on this distance, the time you want to spend at the end of each leg and a few days thrown in for weather delays, one can determine if the time required can be done safely in the time you have available for the cruise.

Below are
the tools and process I use to plan a cruise. This is also very helpful if you plan to have family and/or friends join you along the way.

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**PC Charting Software – Maptech’s US Boating Charts with Tides and Currents running on Offshore Navigator Lite** [http://www.richardsonscharts.com/]

Maptech is extremely helpful on the phone (888-839-5551) with both product information and technical assistance (chart set up, interface to GPS antenna, etc.) The software is for PC only, not MAC. Be sure to read all the technical requirements for running the software before purchasing.

Once on their website home page, click on Maptech’s Digital Marine Software and then click on US Boating Charts with Tides and Currents. Read the features and benefits. Cost is $99. It uses raster formatted charts with charting tools, marks, routes, etc. If you do not have a source of GPS data for your computer, then also order the Maptech GPS to interface with your computer. This will allow you to display real-time location, SOG, COG and distance to any point from your current location on the chart. The GPS is about 2” in diameter and ½” thick and connects to your PC via a USB port. It works very well below deck.

Below is part of the Maptech chart of Key West to the Mississippi River showing routes along the Gulf coast and across the Gulf to Clearwater and Tampa that we have taken. Routes can be displayed showing waypoint numbers or just as waypoints with no numbers, also can show headings and distance between waypoints. Marks can be easily created such as for tracking actual location during crossing, anchoring locations, marinas, other points of interest, etc. Marks can be visually identified by icon shape and color and with written description as well as time stamped when created. Tides and currents are also shown with both graphical display and times. The tides and currents data must be updated yearly with a separate disk.

Maptech is also the source of the Maptech Chart Kits that many of you use for coastal cruising.
Once a route has been made and saved, it can be given a specific name and other properties can be selected in the Route Properties dialogue box which is displayed by right clicking on any part of the route and selecting “Route Properties”.

Also by right clicking on the route, the “Route Plan” can be selected which shows the waypoints for each leg of the route with Lat/Lon, distance for each leg, cumulative distance and bearing for each leg. You can also select “Reverse View” if returning along the same route and want to display the data in reverse order starting with the last waypoint.

Below is a screen capture of Big Lagoon and entrance to Pensacola Pass with the flood current graph displayed for May 30, 2017. Note previous anchoring locations in Big Lagoon and Ft. Mcree made by right clicking,
selecting “Create Mark” and then selecting its Property box to label, select icon type and color of icon. When the GPS is setup and turned on, the position of your vessel can be displayed by a “ship” or the “red cross-hairs” as shown on the chart below. The solid red line extending “infinitely” to the east of the cross-hairs is an extension of the vessels course while underway.

- **Float Plan** – Now that you have created routes for a cruise, a good thing to do is put together a float plan for yourself and family ashore. A float plan can be as simple as a list of dates and corresponding locations or as detailed as an Excel spreadsheet with formulas. This is really a tentative plan for your cruise, the ship’s log will define the actual cruise. By estimating the run time for each leg (sail days), the amount of time you wish to stay at each location (lay days) and throw some days here and there for weather delays, you will be able to see if you have enough time to safely complete your proposed cruise within your allotted time frame.
- **Ship’s Log** – Again, I use an Excel spreadsheet. In a file such as 2017 Cruise Log, there are “sheets” for the following: Summary Log, Daily Log, Fix-Need, Notes-Equipment, Summary Data and Equipment Purchased in 2017. Screen captures of the summary log and daily log are below.

**Summary Log**

<table>
<thead>
<tr>
<th>Days</th>
<th>Date</th>
<th>Day</th>
<th>Location</th>
<th>Paid</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>3/17</td>
<td>Thu</td>
<td>Slip to Home</td>
<td>2</td>
<td>Prop; 2 x 5.5 gal diesel; outboard gas; 2 x 2.5 gal; 15 h.p. (Hull only)</td>
</tr>
</tbody>
</table>


While this is not a part of the Route Planning Process, it is a very essential tool to safely executing the plan while underway and should be readily available to the helmsman and crew. The product is a very sturdy, laminated 8 ½” x 11” card with a summary of the International Colregs on one side and the International Maritime Buoyage System on the other. Below is a screen capture from the Davis webpage showing the product and description.
Weather

Assuming that we have done an excellent job in the maintenance and preparation of our vessel for a coastal cruise, one of the greatest variables with the most impact on the safety and enjoyment of our cruise is the weather. Thus, we should make every effort to understand as much about weather and resources for weather forecasting as possible to assure a positive outcome in our decision making process when leaving the dock or a safe anchorage.

So, what makes weather? Where does it come from? In particular, as sailors we are most concerned about the formation of wind, its speed, direction and its effect on water - waves. The first few pages of Michael William Carr’s book, “Weather Predicting Simplified” provide an excellent overview of what makes weather and where it comes from. It all starts with the Earth’s land and water absorbing the most heat from the sun at the equator and adjacent tropical regions. This heat is then transferred from the equatorial regions toward the much colder regions at the poles. This transfer of heat from the land is done by means of continuous air movement and the heat from our oceans is transferred by ocean currents. Let’s only focus on the air movement in the Earth’s atmosphere in the formation of wind. As the hot air rises from the equatorial region, it becomes less dense and thus results in a lower pressure. As it continues to rise, it cools, becomes denser and then some descends back toward earth near 30 degrees north and south latitude while the rest of the less dense air moves on toward the poles, descending there in the form of higher pressure. Around 60 degrees north and south latitudes, regions of warm air rise forming low pressure areas. The rising and falling of air in the atmosphere creates three regions of rotating cells, called Hadley Cells. The Earth’s rotation on its axis (Coriolis effect) deflects these “columns” of air at the 30 and 60 degree latitudes forming the trade winds in the northern and southern hemispheres. The formation of weather in our Earth’s atmosphere is dependent on many variables. The most significant of which is this process of heat absorption from the sun and the transfer of this heat by air movement across the Earth’s atmosphere.

Air moves in the form of wind between these areas of low and high pressure at a speed dependent upon the pressure gradient between adjacent isobars (an isobar is a line of constant atmospheric pressure), - the closer the distance between isobars the greater the wind speed. The direction of the wind over water in a low pressure system in the Northern Hemisphere will be at an angle of 15-degrees to the tangent line at every point along the full length of each isobar contour toward the center of the low pressure. For a high pressure system in the Northern Hemisphere, the wind will flow at an angle of 15-degrees to the tangent line outward from the center at every point along the isobar contours. In the Southern Hemisphere, the wind flows in the opposite direction for the high and low pressure systems. The figure below illustrates this. This is also known as the Buys Ballot Law which states that if you turn your back to
the wind, stick out your right arm and rotate your body 15 degrees in the clockwise direction, then your right hand will be pointed directly at the center of the high pressure region. Relative to this position, then low pressure is to your left. The same is true over land with the exception that due to the greater friction of air currents over land than water, one must rotate 30 degrees to the right. Thus, the wind directions on land are about 30 degrees to the isobar contour tangent lines.

With this brief introduction to weather, I will discuss a number of tools that provide us knowledge about historical weather, weather forecasting and real-time weather. The first tool discussed are Pilot Charts which have been around since the 18th century. They provide a pictorial summary of the average reported, historical weather conditions (wind speed and direction, waves, currents, etc.) for each month of the year over five geographical locations.

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- **Pilot Charts:**
  

  **Atlas of Pilot Charts**

  Pilot Charts depict averages in prevailing winds and currents, air and sea temperatures, wave heights, ice limits, visibility, barometric pressure, and weather conditions at different times of the year. The information used to compile these averages was obtained from oceanographic and meteorologic observations over many decades during the late 18th and 19th centuries.

  The Atlas of Pilot Charts set is comprised of five volumes, each covering a specific geographic region. Each volume is an atlas of twelve pilot charts, each depicting the observed conditions for a particular month of any given year.

  The charts are intended to aid the navigator in selecting the fastest and safest routes with regards to the expected weather and ocean conditions. The charts are not intended to be used for navigation.
Once you select Pub 106 – Atlas of Pilot Charts for North Atlantic and Gulf of Mexico, you then must select the month in which you wish to see the historical pattern of wind and waves. I have inserted the months of January and July for the Western Atlantic along the East Coast in which you can see the differences in wind conditions between winter and summer for this area.

**January Pilot Chart Western Atlantic**
(winds predominately NW to W)

**July Pilot Chart Western Atlantic**
(winds predominately SW, S and SE)
For the following discussions about PassageWeather, GRIB Files, PredictWind, NOAA Weather, Real-Time Weather Conditions and ActiveCaptain, it may be helpful if you are not familiar with these topics that have active internet links, to set up your desktop in a “split screen” mode. In this manner, you can view this document in the left pane and set up your internet browser in the right pane. Now, you can read “how to” on the left pane and the actions will be executed in the right pane as you read along. Clicking on the PassageWeather link on the left, the home page appears on the right. This is demonstrated below.

- **PassageWeather**: [http://passageweather.com/](http://passageweather.com/)

This is a terrific, free website that provides the forecast for Wind (speed and direction), Pressure Contours (Isobars) and Waves (height and direction) for a given large body of water that you select at time intervals every 3 hrs. for the first 2 days, then 6 hrs. for the next day and finally every 12 hrs. for the next 4 days. For example, within the North Atlantic Ocean, select the body of water within which you will be making a passage such as the Gulf of Mexico or Newport to Bermuda. Below is a list of the 10 areas of the Western North Atlantic from which to choose based on your route.

The Selector Map on the Home Page provides links to the weather forecasts for all oceans and the Mediterranean Sea. Also included on the Selector Map for is a link to all the World Pilot Charts for downloading.
It provides a pictorial/graphical plot of time (day, date, hr. (UTC), so correct to your time zone – 5 hrs. less for central time) vs the wind speed and direction both in vector arrows and color coded based on wind strength, change in isobar contour locations over time and wave direction and height.

Here are the criteria by which the models for wind, pressure and waves are forecast (taken from the homepage of the PassageWeather website):

“The weather data that we use to produce our weather forecast charts come from the most trusted and reliable sources available. These sources include the US National Weather Service (NWS), the National Oceanic and Atmospheric Administration (NOAA), the National Centers for Environmental Prediction (NCEP), the Marine Meteorology Division of the U.S. Naval Research Laboratory (NRL), Frivind AS and the Cyprus Oceanography Center.

Our worldwide Surface Wind (10m above sea level), Surface Pressure, Visibility, Cloud Cover and Precipitation forecast charts are derived from the 0.25 degree GFS (Global Forecast System) model, one of the operational forecast models run at NCEP. The GFS model is run four times daily, with forecast output to 180 hours (7.5 days).

For North America, we create higher-resolution Surface Wind (10m above sea level) charts using data from the 12km (~0.12 degree) NAM (North American Mesoscale) model. This model, an NCEP implementation of the WRF-NMM model, is run 4 times a day, with forecast output to 84 hours (3.5 days).

We run higher-resolution Surface Wind (10m above sea level) charts for parts of Western Europe and the Mediterranean Sea, using data from the 18km (~0.2 degree) COAMPS (Coupled Ocean / Atmosphere Mesoscale Prediction System) model. Developed by the NRL. This model is run twice a day, with forecast output to 96 hours (4 days).

We also run high-resolution Surface Wind (10m above sea level) charts for Western Europe and the Mediterranean Sea using data from the WRF model. This advanced weather model is run by Frivind AS, a company specialized in maritime forecasting and data modelling. The WRF is a high-resolution model run on a 0.075 degree (~9km) grid. This model is run four times a day, alternating between North Europe and Central Europe, with forecast output to 72 hours (3 days).

Our Wave Height & Direction forecast charts are derived from the WW3 (WaveWatch III) model, the third generation of the wave model developed at NOAA/NCEP. The WW3 model is also run four times daily, with forecast output to 180 hours (7.5 days).

Note: The Great Lakes WW3 wave model only provides forecast output to 84 hours (3.5 days)

The Wave Height & Direction forecast charts for the Mediterranean Sea, Black Sea and Baltic Sea are derived from the WW3 wave model, Developed and run by the NRL. This model is run twice a day, with forecast output to 96 hours (4 days).”

- Below are screen captures from the selection of the Gulf of Mexico from PassageWeather’s “Selector Map” for the Surface Wind, Surface Pressure and Wave Height for May 24, 2017 at 1800 UTC, 0600 UTC and 0600 UTC, respectively.
- **Surface Wind (knots) and direction** vectors for the Gulf of Mexico. Note color coded wind scale at bottom, the buttons to advance the forecast in time segments (Previous, Animate and Next) and the day, date and UTC time.

Using the information displayed in the Surface Wind and the Surface Pressure plots is a good time to reinforce the fundamentals of predicting wind strength and direction. Wind is created by the atmospheric pressure differential between adjacent isobar contours (pressure gradient) – the greater the pressure difference per distance between isobars, the greater the wind speed. Note the stronger winds in the NE Gulf of Mexico just north of Tampa, Florida vs the weaker, essentially variable winds in the SW Gulf of Mexico or Bay of Campeche – just what you would predict based on the Surface Pressure Isobar Contours.
Wave Height (meters) and Direction for Gulf of Mexico. In general, wave height is a function of wind strength (speed), duration (time) and fetch (distance).

Note: Wind speed is in knots, Pressure in mb, and wave height in meters. The surface wind speed and direction, isobar contours, wave height and direction information provided by PassageWeather make this an excellent website for planning a passage over the next three to four days and longer with daily updates.

GRIB Files – http://weather.mailasail.com/Franks-Weather/Grib-Files-Explained

This is an excellent website dedicated to fulfilling the premise that marine weather forecasts are vital to the safety of all sailors. On the left side of the home page is an outline of the topics covered with links to those pages. Some of the topics are: GMDSS services, Weather on the Net, GRIB files, Forecasts, About Weather, Basic Theory (Coriolis effect, How pressure differences are formed, How the atmosphere is heated and cooled, How air moves and Latent heat).

GRidded Information in Binary (GRIB) files are output directly from Numerical Weather Prediction programs. Saildocs was the first GRIB service designed by sailors for sailors with regard for those with limited bandwidth, thus an efficient and inexpensive way to transmit a vast amount of wind, pressure and rain data to aid in making safe passages.

There are two parts required to make use of GRIB files – 1) a source of the GRIB files and 2) a “viewer” or software to display the raw data in the GRIB file in a useful manner of wind vectors and pressure isobars that you can interpret. Initially, I used “ViewFax” as the viewer which was referenced in Franks weather site shown above. I used saildocs.com as a source that “pushes” an e-mail to me every midnight with the most recent set of GRIB files. Both the GRIB files from saildocs and the viewer are free. The GFS model is used to predict wind speed and direction from the isobars. I recently was checking the link to ViewFax and found it no longer worked. Thus, I started to look at other viewers that could be easily downloaded and do a better job of displaying the GRIB file data. Such a tool is PredictWind.
• **PredictWind** - [https://www.predictwind.com/](https://www.predictwind.com/) - Your one stop weather forecasting and routing tool.

The link above is to their homepage. Read all the promotional information about PredictWind on the homepage to get a feel for the vast amount of weather forecasting, observations, route planning and devices by which you can receive and display this information. Then read the information provided on the tabs at the top of the homepage to get a more detailed understanding of its features:

- Take a Tour
- Why Predict Wind
- Who Uses PredictWind
- Apps
- GRIB Files
- Pricing
- News
- Contacts

If you encounter any technical problems or do not understand some aspect of the many facets of this tool after reviewing the information I have provided, contact PredictWind support using the “Contact” tab on the home page of the website. Their technical support is second to none. Their response is immediate, they fully understand all aspects of the tool and all are excellent sailors in their own right.

To get a first-hand experience using this tool on the website, click on the “View Free Forecasts” link provided throughout the homepage. Register to create a User ID and password. Once registered, then Login using the Login link at the top of the homepage. Unless you logout, anytime you go to the website just click the “Login” box and you will have access to the web version of PredictWind without having to login again.
Once logged into the web application for PredictWind for the Free price level, you will see a screen similar to this:

![Image of PredictWind interface]

This is the actual screen capture for my login at the Basic price level. I can select 9 locations (currently displaying the Wind Maps for Pensacola, FL using the PWG model on the left pane and the PWE model on the right) from which to view all the forecasts (Forecast Tables, Forecast Graphs, Wind Maps, Rain Maps, Cloud Maps, Isobar Maps, Air Temp Maps, Sea Temp Maps and GRIB Files). Note that with the Free price level one gets to choose only 2 locations. For both the Free and Basic price levels, to add more locations, just delete one location (click the “X” by the location name) and select “Add New Location” to add another different location. When adding a new location, you will be given a map of the waters around that area. Pick a red dot close to shore and you will get data of greater resolution (1km) but less area. Pick a red dot “offshore” and you will get less resolution (50 and 8km) but of a larger geographic area. In essence PredictWind is controlling the file size of data being sent over the internet to provide a rapid response. The higher resolution of 1km close to shore is particularly good if you are looking at the land effects around islands. Otherwise, the 50km and 8km is sufficient for forecasting coastal and offshore weather. For the screen capture above, note that I am displaying the 8km resolution and the Wind Map is displayed (see the three choices in center of the row showing the different models) using the wind barb arrows and color shading. View the plots of the other eight properties by clicking on the desired map under Forecasts on the left hand side.

Another very nice feature as shown below is the ability to move your cursor over any part of the displayed GRIB file map and in a pop-up window you will see the numerical forecast values for wind
speed, true wind direction (remember, meteorologist report wind direction as “true” and not “magnetic” - so correct to magnetic if you are going to use it relative to your compass heading) and barometric pressure.

PredictWind Offshore Application

Now having digested all of the information on the PredictWind website application, let’s move on to viewing GRIB File data on the PredictWind Offshore application that runs on a PC, Mac, iPhone/iPad and Android. To download the PredictWind Offshore App, close the current window where you are logged into the web application. Now open PredictWind again (https://www.predictwind.com/) and select the “Grib Files” tab. It will direct you to downloading the PredictWind Offshore application. First, view the YouTube video that provides an excellent overview of this application (how to, features, etc.) and then read the “How it Works” section. Finally, download the application for the device (PC, Mac, iOS or Android) on which you will view the GRIB files that you will download. I suggest evaluating it first on your computer for ease of viewing.

Having downloaded the PredictWind Offshore App, double click on the “globe icon” to open the app and you are now ready to begin using the app.
Here are two links to superb PredictWind Help Centers on their website. Both contain written as well as video tutorials that are immensely helpful in providing both an overview and specific details for using this weather forecasting tool. The first link is to the entire Help Center that covers every topic:

https://support.predictwind.com/hc/en-us

The second link is to the Help Center just for the PredictWind Offshore App:


If offshore and you do not have an internet connection, you may obtain help for the Offshore App by selecting PredictWind Offshore Help under the Help tab.

Selecting this will open the PredictWind Help Center document that is stored with the Offshore application on your computer. Below is a list of topics discussed in this help section.

Offshore App

Overview

• Overview

The Essential Help Topics

• How to Change Preferences/Login Details
• How to Download and View GRIB files
• How to Download and View Weather Routing Results
• How to Download Data with the Iridium GO!
• How to Download Data on a Satellite Connection
• How to Download Data via Email with an SSB Radio / Satellite connection

See all 7 articles

Additional Help Topics

• How to View GMDSS Forecasts
• How to Download and View Departure Planning
• How to Download and View a Destination Forecast
• How to View Satellite Imagery

To get started with the Offshore App that you just downloaded, go through this How To help guide starting with the Overview and then the Essential Help Topics as well as Additional Topics. This will
tell you how to log in, download GRIB files for a specific area and use all aspects of the program. Open the program on your computer and you will see a screen much like the one below.

To download the current GRIB file data for the area of interest to you, do the following:
- Move the green and red Lat/Lon location markers to define the area for which you wish to obtain GRIB file data.
- Click on the “GRIB Offshore” box and then click on the green “Download” box
- Make the following selections on the dialogue box that appears and then click Next
- On the next box, make these selections and click Next

![Download Settings Window]

- On the final download dialogue box, select Web at the top and then click on “Download All”.

![Download Dialogue Box]

- When all files have downloaded, then close the box.

Below is the graphic displayed on PredictWind Offshore for the Lat/Lon location markers that were selected.
You may then center or move the data window on your screen by left clicking-hold and drag, then zoom in for greater detail for the wind vectors, color coded wind speed and isobars for a specific area of interest. These GRIB files were downloaded on Wednesday, June 21, 2017 at 1300 hrs. CDT.

It just so happens as I am writing this section, Tropical Storm Cindy, is approaching the Gulf Coast. Note that the PWG model has been selected in the bottom left corner and if I click on the play icon just above it to run the animated 7-day wind and isobar forecast, the program will run showing a smooth transition over time of the weather forecast based on the model selected.
Two days later, on Friday, June 23\textsuperscript{rd} at 1535 hrs. most of the stronger winds dissipated as the storm went ashore and lighter winds filled in from the southeast.

In order to get Ocean Data, Weather Routing, Departure Planning and Destination Forecasting, you must upgrade to the Standard or Professional level pricing package. With those packages, come the ability to download the GRIB files offshore via Iridium Go or SSB with Pactor Modem.

**Comparison of Passage Weather and PredictWind**

Both of these tools provide excellent weather forecasts for the next seven days. They both use GRIB files as the data source for providing wind speed and direction. The PassageWeather website is extremely simple to use, free, the GRIB files for the region you have specified are loaded automatically and the graphs of surface winds, surface pressure and wave height are clearly displayed with options to advance one-time interval at a time (Next) or use the “animate button” to play through the whole weather forecast time frame.

For PredictWind, there are a lot more ways to display the forecast, more choices to make (models, resolution, defining area of interest) and pricing structure vs extent of weather parameters displayed and methods of GRIB file delivery (Web, Iridium GO, Globalstar, and e-mail). As related specifically to forecast resolution and models, PredictWind runs their own global weather model at 50km resolution with 2 sources. In addition, 1km / 8km resolution forecasts are generated for popular regions around the world. The forecasts models (PWG &
PWE) can only be found at PredictWind. The GFS forecast is used by most other weather websites as it is free. The ECMWF forecast model is run globally at 9km resolution. Most scientific papers show the ECMWF model outperforms the GFS model. However, the ECMWF data has a higher acquisition cost, so very few companies provide it as part of their standard package. At the Standard and Professional level of subscription, you can also integrate your route plan starting and finishing locations with the weather to define the best day to start and update the weather and its impact on your route as you make progress toward your destination. With these features, PredictWind clearly borders on the capability that you can obtain from such personalized, professional weather routing services as:

- Commanders Weather [https://www.commandersweather.com/](https://www.commandersweather.com/)
- Marine Weather Center (Chris Parker) [https://mwxc.com/](https://mwxc.com/)

NOAA Weather – There are 3 primary websites that provide different levels and detail of weather:

- **NOAA Weather by Zone** – [http://www.nws.noaa.gov/om/marine/zone/usamz.htm](http://www.nws.noaa.gov/om/marine/zone/usamz.htm)
  To use this, select the area of the color coded map of the US to select the region you want, i.e. Florida, then select the sub region and finally select the specific area which may be coast to 20 nm out or 20 to 40 nm out for example. You will get a Synopsis (tells what is causing the weather for the next 5 days and then a day and night forecast for the next 5 days. This is the new display format for the NOAA weather which started on May 28, 2017.

  ![NOAA Weather Zone Example](image)

  NOAA Weather by Graphical display will be discussed in the next section but while you are on the NOAA Weather by Zone for the specific area you want, there is a link to the corresponding NOAA
weather by graphical display and images by radar and satellite in the lower right of that web page. See below. Click on the National Digital Forecast for a graphical display of the wind or waves in that area – discussion of this follows in the next section.

NATIONAL DIGITAL FORECAST DATABASE

RADAR & SATELLITE IMAGES

[Return to Topic Outline]

- **NOAA Weather by Graphical Display** – [https://graphical.weather.gov/](https://graphical.weather.gov/)

There are a lot of conditions to be selected for this website to display the desired graphical wind data but the results yield a forecast with much greater detail (wind speed and direction) than what you get from NOAA Weather by Zone. They do complement one another based on the verbal description of one and the graphical display in the other. Also, the graphical display typically will cover the region of 4 or 5 zones at one time which is helpful if sailing through more than one zone. The graphical display also advances in shorter time periods to tell you more frequently what is predicted to happen, much like Passage Weather in both time lapse between prediction and display. Still this NOAA method does not cover the entire Gulf of Mexico and does not cover larger bodies of water (oceans) like PassageWeather or PredictWind. To use this tool, follow steps 1, 2 and 3 below:

1. Select area of interest, Florida
2. Click on “Graphical Forecast tab” then “Weekly View”
3. Now find the small “More” under the LOOPS tab and click it. A dropdown list appears (many weather features can be selected), select “Wind Speed and Direction”. Then move your cursor over the “Wind Speed and Direction” column showing time of day and move the cursor down in time, pausing long enough for the graphical chart on the right to display the change in wind conditions as a function of time. In most cases a hot spot internet connection from your phone will be much faster than a marina wifi. See screen capture below which is for May 24, 2017 at 2pm. This is local time, no correction from UTC!

Note the color coded wind speed bar at top of graph

This is the best way to see the wind speed and change in speed and direction over time. The wind vector barbs show the change in direction. There are feathers on the tail of the wind vector to indicate wind speed but the color coding is far better and easier to see.

Wednesday, May 24, 2017 at 2pm EDT (Winds SW at 25 knots in the NE Gulf)
18 hours later on Thursday, May 25, 2017 at 8 am. (Winds W at 15 to 20 in the NE Gulf)

24 hours later on Friday, May 26, 2017 at 8 am. (Winds variable and less than 5 knots in the NE Gulf)

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If you want to see what is really happening at the current time, check out the buoys offshore or fixed stations on land. Select the region of the world you want and then zoom in to get individual buoy data.

Below are the data for the buoy about 20 miles south of Apalachicola at 10 am CDT on May 24, 2017. Winds SW (230°) at 15.0 knots gusting to 15.9 knots

Here is Cedar Key, Florida at the same time:
Winds SW (220°) at 21.0 knots gusting to 31.1 knots
The predicted wind speed and direction using the NOAA Graphical display on page 24 for Wednesday, May 24th at 2 pm are very close to both (20 nm south of Apalachicola and Cedar Key) of these actual wind conditions from real-time buoy data.

Use of Smart Phone Apps and Bookmarks for Weather Information

There are a number of apps for smart phones that are particularly good for use when on the water and within cell phone coverage. In addition to the apps, one can bookmark other websites that make it just as easy to use as with your computer (PassageWeather, NOAA by Zone, Weather Underground, e.g.)

- **“MyRadar” app**

  Most of us have used this real-time weather tool on land and water to warn us of approaching thunderstorms or rain. What you may not have done is gone to the “Layers” setup page to turn on “wind”. Wind is an amazing feature on this app that allows you to “see” the wind. By use of Doppler Radar and in particular NEXRAD (Next Generation Radar), the app will display the direction and relative intensity of the wind by means of wind vectors.

  An excellent discussion of this and Understanding Weather Radar in general may be found at: [https://www.wunderground.com/prepare/understanding-radar?mr=1](https://www.wunderground.com/prepare/understanding-radar?mr=1)
Below are two more examples of how dramatically MyRadar allows one to see the real-time wind conditions showing a low pressure system in the NE Gulf of Mexico and a Nor’easter off New York.

Low Pressure System in NE Gulf

Nor’easter off New York
Comparing Wind Strength and Direction from MyRadar to Isobar Contours from PassageWeather

Note the SW area of the Gulf of Mexico on MyRadar with wind “on” above. The wind vectors barely exists in this area indicating little to no wind. On the right is the Surface Pressure figure from PassageWeather during the same time frame showing the very wide distance between the 1012 and 1013 mb isobars in the same SW area. Compare this to the shorter distance between isobars in the NE Gulf between 1016 to 1019 where there is much higher wind as shown on MyRadar in the NE Gulf. Also note how compressed the contours are below the Yucan Peninsula on the SE side and the corresponding strong ESE wind flow due wind direction being 15-degree to the SE to NW tangent lines of the isobar contours.

MyRadar is also an excellent tool to display an “on-shore breeze” caused by the thermal difference between land and sea temperatures. This typically happens during the summer from mid-day until late afternoon as the land heats up and the water remains pretty much the same temperature all day. As the air over the land heats up, it rises creating a low pressure that pulls in cooler, heavier air from the sea and the cycle continues until the land stops heating and begins to cool relative to the water temperature. It is not unusual to then have a land breeze in the late night/early morning as the warmer sea temperature pulls in the cooler air over land. This phenomenon occurs only when there is an absence of significant pressure differentials between isobar contours or other significant weather systems that might influence local weather.

In the screen capture below, MyRadar with wind “on” shows an area of essentially no wind in the center of the Gulf, but then around the shore line from Apalachicola to Perry to Cross City to Clearwater, FL there is an on-shore breeze that is perpendicular to the shore line. This wind is created by the thermal difference in land and sea temperature. The direction of the wind on shore will always be more or less perpendicular to the shore at that location. The diagram below and to the right describes this phenomenon.
Weather Underground App on i-Phone – radar, fronts (synoptic charts of highs, lows, troughs, cold, warm and stationary fronts) and forecast (% chance of rain, wind speed and direction, fronts (synoptic charts))
While you can obtain Weather Underground on your PC (https://www.wunderground.com/), it is much simpler and quicker to use by downloading the app onto your smart phone. Using the current location arrow, one can select the weather information at your current location or the menu to search any location and create a favorite’s list that you might use while sailing to your distant locations. Below are screen captures using Pensacola, FL as the selected location for June 11, 2017 at 2:10 pm CDT.
Below is the “home page” for Pensacola. Touching the center map section will bring up the radar as shown below. Zooming way out on the previous radar page will ultimately bring you to a synoptic map of North America showing all the highs, lows, fronts and troughs.

Touch “Forecast” which will default to Day to see the 10 day forecast of rain chance, sky, low and high temps, wind direction and speed. Touch “Hour” to display the 10 day forecast with all the same weather parameters as before but shown hourly.
• **Hurricane Tracker App**

My wife is the official hurricane tracker on-board and is set up for “push notifications” from this excellent app. Hopefully, you will not need to use it while at sea, but if so, it provides the latest information from the National Hurricane Center Miami, Florida. In addition to listing the current storms, providing pictorial outlooks, there is a technical discussion tab that further describes the hurricane models, their predicted path and some of the meteorological rationale behind them.

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• **Mike’s Weather Page** [http://spaghettimodels.com/](http://spaghettimodels.com/)

Mike (Mike Boylan) says that weather is a hobby for him on his homepage. Based on the content of his website, I think it is fair to say he is truly a weather aficionado. His primary focus is on tropical weather and especially as it develops into tropical storms and hurricanes. However, with over 80 internet links related to weather on his homepage, this website is a virtual cornucopia of weather information. There is an app, Mike’s Weather Page that is available but it costs $0.99 per month; whereas, the website is free. Below is a partial screen capture of his homepage.
Also on his home page are links to the GFS, EURO, CMC and HRRR models which display some of the best synoptic graphics with isobars for the area from the western U.S. to western Europe.

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What if your computer and smart phone have failed you or you are out of range? One very essential device to have on board is a recording digital barometer. For example:


That along with Davis’ Quick Reference Weather Forecasting and a little practice may help you immensely. The Davis card provides a concise explanation of cold fronts, warm fronts, frontal weather systems, clouds, hurricane information and much more. The product is a very sturdy, laminated 8 ½” x 11” card. Below is a screen capture from Davis’ webpage showing the product and description.
Summary of Weather Forecasting Tools

I have discussed some eight sources of weather forecasting using electronic media. So what is the process by which I use any or all of these while cruising? If I am just going for a day sail and returning to a safe harbor or anchorage, then I would feel comfortable in just checking the NOAA Weather by Zone for the specific area where I will be sailing. This will give me the synopsis of the weather and a five day forecast of which the current day is most accurate and should provide sufficient information for my day sail. This is much like listening to one of the weather channels on your VHF radio for your area. I much prefer reading the weather when I want to, rather than waiting for the right hourly time for the specific coastal forecast on the VHF. However, one should always monitor Channel 16 on the VHF which the National Weather Service will use to broadcast any severe weather warnings that may be occurring near the area in which you are sailing. This warning has been very helpful to us on several occasions. In one case we reduced sails down to a double reefed main prior to the storm hitting in which we experienced 40 knot winds on a broad reach, lightening and heavy rain for 30 minutes and another where we struck all sails and then had 45 to 55 knot winds for 15 minutes. Racing with a sufficient, knowledgeable crew is one thing, but being prudent always rules when cruising shorthanded.

If I am about to depart for a two day or longer cruise, then I want to be aware of more than just the weather in my current location. I want to know what possible weather is coming (typically from west to east or northwest to southeast in the US) and the forecast for where I will be on my trip for the next 5-6 days. I do this in a methodical process drilling down from a large area forecast such as provided by PassageWeather and PredictWind to a more regional area such as found with NOAA Digital Forecast and then finally with NOAA by Zone. If all data seem to be consistent and in agreement, no problem. If there seem to be differences, then I will try to understand why to arrive at a final conclusion of what to expect, when and how to plan my trip. Typically, I start looking at the weather a few days to a week before departing on longer trips. While on any leg of the cruise, I try to update using those same sources 2-3 times a day assuming connectivity is available.

Upon arriving at the end of each leg, be it a marina, mooring or anchorage, I check all the weather forecasts sites even if it is bright and sunny. Knowing what is coming may have an impact on my next departure…either to depart sooner before adverse weather arrives or delay and allow the adverse weather to pass. I remember making a beautiful overnight June sail offshore from Cape May to anchor
inside at Sandy Hook, NJ. We were going to anchor a day or so here and then coordinate our departure
time to arrive at Hell’s Gate on the East River at the right time for minimal current effects. Right after
anchoring, I checked the weather. Much to my surprise, a very strong cold front was coming in from the
NW bringing 20-25 knot winds with us totally exposed in the crook of Sandy Hook as a lee shore. We
moved immediately for protection behind the sea wall at the Atlantic Highlands and were very thankful
for that preparation.

Marina Information – ActiveCaptain - https://activecaptain.com/

If you are making a cruise in familiar waters, you may already know the marina where you wish to stay or a
favorite anchorage area. On the other hand, if you are not very familiar with the cruising area, having a source
for current marina information will be very helpful. ActiveCaptain is such a resource. It is a crowed-sourced
database of essentially real-time information with over 250,000 users. In May of this year it was acquired by
Garmin Ltd.

If you are not a registered member of ActiveCaptain, use the “Register” link in the upper right corner of the
home page to register.

You will use your e-mail address as your User ID and create your own password. After registering, then use the
Login dialog box to login. When complete you will return to the home page and then click on “Live Map” tab.
The default tab on the left vertical side is “Markers” so this will bring up a coastline topographical type map of
the US much like a Google Map.

You can change the type of map you wish to view by clicking on the “map bar” in the upper right corner of the
Live Map display to select Nautical, Map, Hybrid or Satellite.

Zoom out and move the map to your area of interest and zoom in until you see the details of marinas,
anchorages, etc. come into view as shown below on the “Map” view.
To identify the displayed icons, use your cursor to hover over the icon and a bubble will pop-up displaying the name of that location. Click the icon and a brief summary will appear which contains the link, “Show Details”. Selecting this will open all of the information about that location with tabs for General, Navigation, Dockage, Fuel, Services and Reviews. The screen captures below are for all this information on St. Andrews Marina in Panama City, FL.

General Information

Navigation Info
Dockage

- Docks: Floating
- Additional info: Only floating pier marina in this area.
- Size restrictions:
  - LOA max: 120 feet
- Items without data:
  - Beam max
- Slips:
  - Transient: 15
  - Total: 102
  - Transient price: 1.50 USD per foot
  - Date of price: 2017-05-30
  - Additional info: 25% off dockage for ActiveCaptain and BoatUS members.
- Moorings
- AC power:
  - 30 amp, 50 amp, 110/220 volts

Fuel

- Fuel types:
  - Gas: available
  - Diesel: available
- Items without data:
  - Fuel brand
- Fuel price:
  - Gas: 3.38 USD per gallon including all taxes
  - Date of gas price: 2017-05-30
  - Gas price info: 89 octane, ethanol-free with ValTech.
  - Diesel: 2.39 USD per gallon including all taxes
  - Date of diesel price: 2017-05-30
  - Diesel price info: $0.10 per gallon discount if staying overnight, ValTech diesel.
- Propane

Services

- Pump out: Yes
- Ice: Yes
- Trash: Yes - There are dumpsters.
- Showers: Yes - The ladies bathroom/shower is accessible from inside the store during business hours and outside after closing time. It's locked (get a key) and there's lots of hot water along with a bench to put our stuff on, hooks outside the shower stalls for towels, drains in the floor (not slick - you won't slip) the shower curtains are more than adequate, so there are no drafts and no public displays. The shower section is behind a curtained off side room too (rented - so it doesn't get steamy!) from the toilet and sinks. There is a small mirror up high on a decorative shelf so you can see your hair - regular mirror outside the shower area by the sinks.
- Heads: Yes - The ladies bathroom has two stalls -- one large handicapped with plenty of room for a wheelchair and an aide, along with a single regular toilet.

Reviews

- wonderful stay:
  - Date: 2017-03-25
  - Captain: Worsley, Baton Rouge, LA (82)
  - We came over to stay because of predicted high south & east winds. We had been at Panama City Marina and they are very exposed to the east. St Andrews is really great! Pleasant staff, clean bathrooms, BoatUS discount and then there is the town - Hunt's Oyster Bar and their singing oyster shuckers ... many other great restaurants. Very enjoyable stay!

- Enjoyed three night stay:
  - Date: 2017-02-16
  - Captain: Larry D. Smith, Lake Tahoe, CA (230)
  - As everyone has said, this is a good place to stay. Facilities are nice, docks are great and you cannot beat the prices. Fri/Sat nights were a little noisy up to about 11pm, the bars played music and there were lots of car/motorcycle noise as they appeared to be cruising the area, and the boat is not that big. Still a very enjoyable stay. Hunts is not to be missed for good food and the best oysters.
ActiveCaptain is an incredibly valuable tool providing essential information to help you make decisions on marinas and anchorages. You can use the other tabs (Location Search, My Card, Route Search and Help Card) on the left vertical side of the Live Map page for information related to those topics.

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About the Author

Bill Worsley has been sailing for 50 years. Soon after retiring in 2004, he and his wife, Rene, obtained their current boat, Southern Skies, a 2001 Catalina 380. Over the past ten years they have done extensive cruising on the Gulf Coast, East Coast and the Bahamas. Bill also crewed three times in the Caribbean 1500 and the 2015 ARC Europe. He may be contacted at worsleyw@bellsouth.net

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September 23, 2017