

## **MARINE FORECAST INFORMATION FOR COASTAL B.C. WATERS**

Mariners cruising the coastal waters of British Columbia have several sources of forecast information available to them:

1. Continuous recorded weather broadcasts originating in Environment Canada, and transmitted by the Canadian Coast Guard on the FM Marine Radio Weather Channels, updated 4 times daily.
2. Voice broadcasts of Environment Canada forecasts transmitted by certain Canadian Coast Guard SSB stations 4 times per day.
3. Navtex weather forecasts (with a suitable receiver)
4. Text versions of the Environment Canada forecasts available on the Internet.
5. Access to the Canadian Meteorological Centre's computer model data via an official web site (Vizaweb) that presents the data graphically.
6. Interpreted versions of Computer Model Data for certain locations via private web sites (such as "Big Wave Dave").
7. Graphical presentations of Computer Model Data for large areas via private web sites such as ZYGRI, WindyTY, or Wind Finder.
8. GRIB Data via the Sail Mail system (which provides low-bandwidth data communications and document retrieval via SSB, satellite, or cellular connections). A GRIB file viewer is necessary to view the GRIB data, but some computer-based chart plotters (such as Coastal Explorer) integrate this feature.

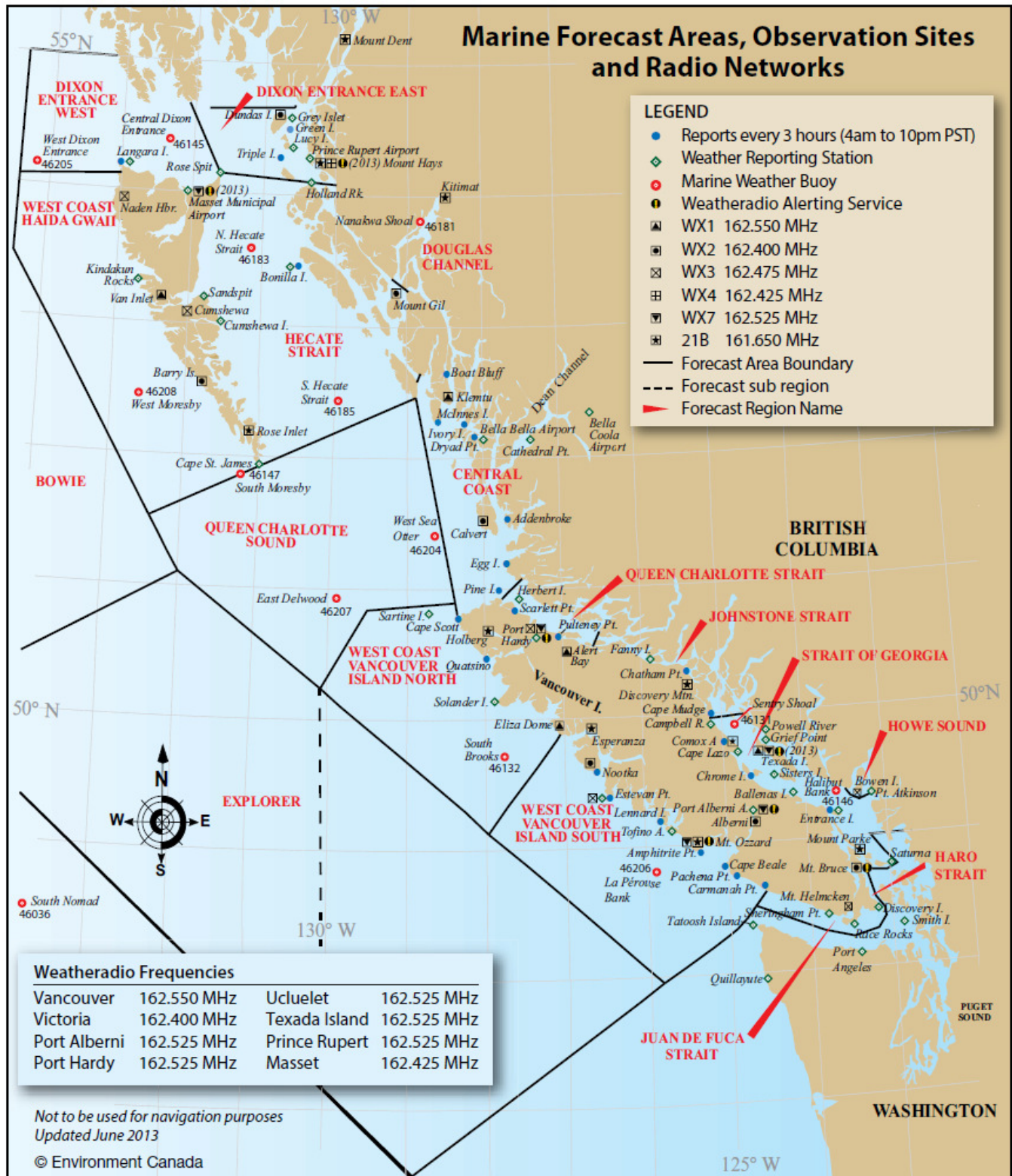
In referring to the list above, sources 4 through 8 require some type of access to the Internet. This is readily available in many marinas offering WiFi infrastructure, or widely available in most areas South of Cape Caution using a "tethered" smartphone. Smartphone access to the Internet is also available within a few miles of Bella Bella, Klemmtu, Hartley Bay, Kitimat, Oona River, Bella Coola, Prince Rupert, Masset, and Queen Charlotte City. North of Cape Caution, WiFi access to the Internet is available at several locations, including Duncanby Landing, Pruth Bay, Ocean Falls, and Shearwater. Elsewhere, it will be necessary to use satellite data service to access the Internet in real time, or SSB (with a Pactor modem) to retrieve stored data files.

Sources 1 and 2 are voice-based, and all that is required is an appropriate radio receiver (and antenna).

### **VHF Marine Radio Weather**

All modern FM marine VHF radios have 10 specific channels (WX1 through WX0) that can be selected to receive continuous recorded voice broadcasts of weather data originating from Environment Canada. The broadcasts are updated at 4:00 am, 10:30 am, 4:00 pm, and 9:30 pm. The coastal waters are divided into a number of different forecast areas. The following two charts are taken from the Environment Canada Marine Weather Guide and illustrate the

different forecast areas, as well as the location of the radio transmitting sites, weather buoys, and reporting lighthouses.





from [https://www.ec.gc.ca/meteo-weather/451553A6-9F80-4D09-A6B9-1B4097AF3D4E/1588\\_MarineWeatherGuide\\_08\\_e.pdf](https://www.ec.gc.ca/meteo-weather/451553A6-9F80-4D09-A6B9-1B4097AF3D4E/1588_MarineWeatherGuide_08_e.pdf)

The above charts indicate the specific marine weather channel used by each transmitting site. Note that a given transmitter will only transmit the forecast for nearby and adjacent forecast areas. Note that local reports are no longer reported from Amphitrite Point in Barkley Sound.

Although convenient, and requiring the minimum of equipment, the VHF Marine Radio Continuous Weather Broadcasts have a number of limitations which should be considered:

1. There are areas on the coast which are used by cruising boats that do not have reception from any of the VHF transmitting sites.
2. Because the transmissions are a continuous "loop" of recorded data, it can often take quite a while for the information of interest to show up in the recording (especially if everything is repeated in French).
3. If you miss the information you were waiting for, you have to wait through another complete cycle of the recording. It might be useful to actually record the received signal for post-analysis.
4. Many of the forecast areas are quite large. Unless otherwise specifically mentioned, the forecast data that is transmitted represents the strongest wind conditions expected anywhere in the forecast area at any time during the forecasted period. This "low resolution" forecast information can often cause cruisers to needlessly remain "holed up"

waiting for a better weather forecast when the actual conditions in the area that they are concerned about could be quite benign. Solutions to this particular issue will be discussed later in this document.

Note that if a local weather channel is inoperative or out of range, weather information and current conditions are often available by calling nearby manned lighthouses on Marine VHF Channel 82A.

### **SSB Marine Radio Weather**

The same Environment Canada marine weather forecast data is also available on SSB frequency 2054 KHz from the Prince Rupert and Tofino Coast Guard transmission sites. There is a single transmission from each location four times per day which includes Notices To Mariners and weather forecast data. The transmission schedule is as follows:

Tofino - 0450, 1050, 1650, 2250 PST (the broadcast is actually relayed from Prince Rupert)  
Prince Rupert - 0515, 1115, 1715, 2315 PST

Using SSB radio to obtain weather forecasts has the advantage of being available over a wide geographic area, but the data is only transmitted once, so if you miss it, you could have up to a 6 hour wait before you can try again! SSB radios require proper antenna installation, and interference from on-board devices (LED lights, inverters, motors, etc.) can sometimes mask transmissions.

Dixon Entrance forecasts (and other nearby U.S. waters) can also be received from Kodiak via SSB on a frequency of 6501 KHz at 0230Z and 1645Z daily.

### **Internet Marine Weather Forecasts**

The actual "script" of the announcer on the marine radio broadcasts is available in text format on the Internet. Because it is primarily "text" as opposed to imbedded with lots of graphics, the file is quick to download, and it is reasonable to use low-bandwidth (and expensive) satellite connections. Here are the links:

Normal forecast (updated 4 times per day):

[http://weather.gc.ca/marine/marine\\_bulletins\\_e.html?Bulletin=fqcn13.cwvr](http://weather.gc.ca/marine/marine_bulletins_e.html?Bulletin=fqcn13.cwvr)

Extended forecast (updated at 4 am and 4 pm):

[http://weather.gc.ca/marine/marine\\_bulletins\\_e.html?Bulletin=fqcn53.cwvr](http://weather.gc.ca/marine/marine_bulletins_e.html?Bulletin=fqcn53.cwvr)

Wave Height Forecast (updated at 4 am and 4 pm):

[http://weather.gc.ca/marine/marine\\_bulletins\\_e.html?Bulletin=fqcn23.cwvr](http://weather.gc.ca/marine/marine_bulletins_e.html?Bulletin=fqcn23.cwvr)

If you are cruising in an area with cell phone coverage, you can use a smartphone to access and display this data directly, or use "tethering" to download onto a web browser running on an attached computer.



Once you get North of Cape Caution, much of the time your only way to access the Internet will be via the Globalstar or Iridium satellite systems. Because of the small file size, downloading these text files can be surprisingly inexpensive.

### **Computer Forecasting Models**

One of the first major post-War applications of digital computers was to model the atmosphere and generate weather forecasts. This is an extremely complex and non-exact process that requires a great deal of computing power. The surface of the earth is broken down into a grid, and each "square" is divided into a series of vertical slices. In each of the cubic cells that are defined by this process, known parameters (temperature, pressure, humidity, velocity, etc.) are input, and then the interactions as a function of time across the boundaries of each cell with its neighbours are modelled using iterative numerical techniques. The initial condition data is gathered from local observation, radiosondes, satellites, and other sources. Other external factors, such as solar radiation, coriolis effect, and the effect of the water or land surface of the earth (temperature, reflectivity, thermal mass, altitude, etc.) are also built in to the model.

The models are run iteratively, and updated with known observed data when it is available. Forecasts out to a week in advance can be made with a fair degree of accuracy, but not much further. The performance of the models depends on the size of the initially-defined grid. Better results are achieved with smaller grid sizes, but the computational requirements increase exponentially as grid size is reduced. Grid sizes of 10 to 100 km on a side are commonly used for models that encompass the entire earth's surface (this is a "GEM", or "Global Earth Model"). If only a portion of the earth's surface is modelled (this is a "LAM" or "Local Area Model"), smaller grid sizes can be handled by today's computers, and increased forecasting accuracy results (note that boundary conditions about the periphery of the Local Area Domain are set to match the GEM).

The actual computers and their models are located at a variety of sites throughout the world. Most developed countries have one or more computing centres associated with their governmental weather forecasting services, and several educational institutions also have facilities. The UN's World Meteorological Organization coordinates the gathering and distribution of current condition information in a standard format to the models around the world.

In Canada, the Canadian Meteorological Centre is the source of most computer-generated weather forecasts. For the West Coast, they have developed a LAM with a grid size of 2.5 km - this is the best source of accurate marine weather forecasting data on our coast. Output from this model (and others) can be obtained through the **Vizaweb** site. Go to:

[http://weather.gc.ca/vizaweb/index\\_e.html](http://weather.gc.ca/vizaweb/index_e.html)

You will need to enter the user name and password carefully, paying attention to capitalization:

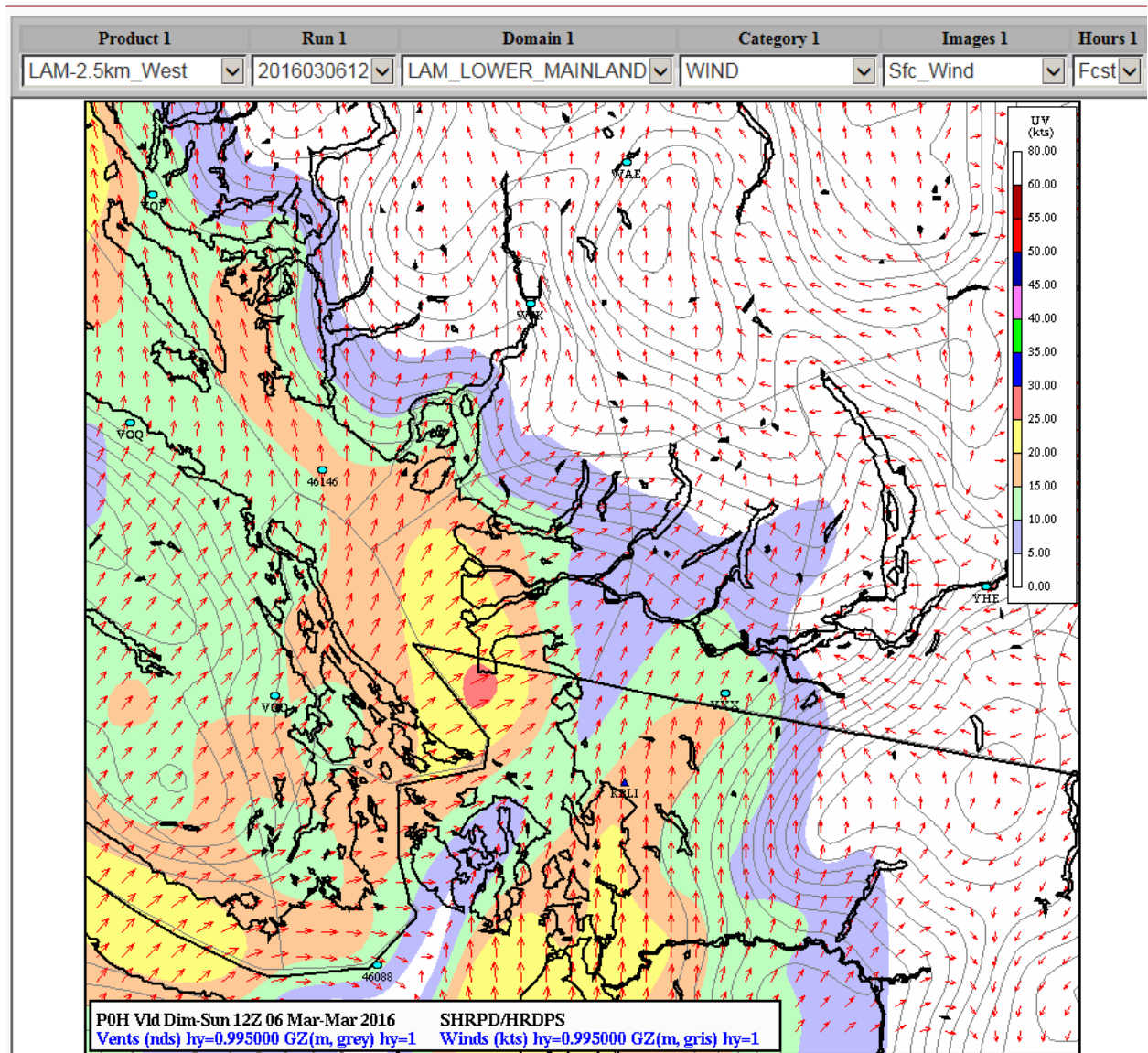
User Name - **vizaweb**

Password - **Bewaziv16!**

Product 1 Run 1 Domain 1 Category 1 Images 1

LAM-2.5km\_West 2016030612 LAM\_WEST WIND Sfc\_Wind Fcs

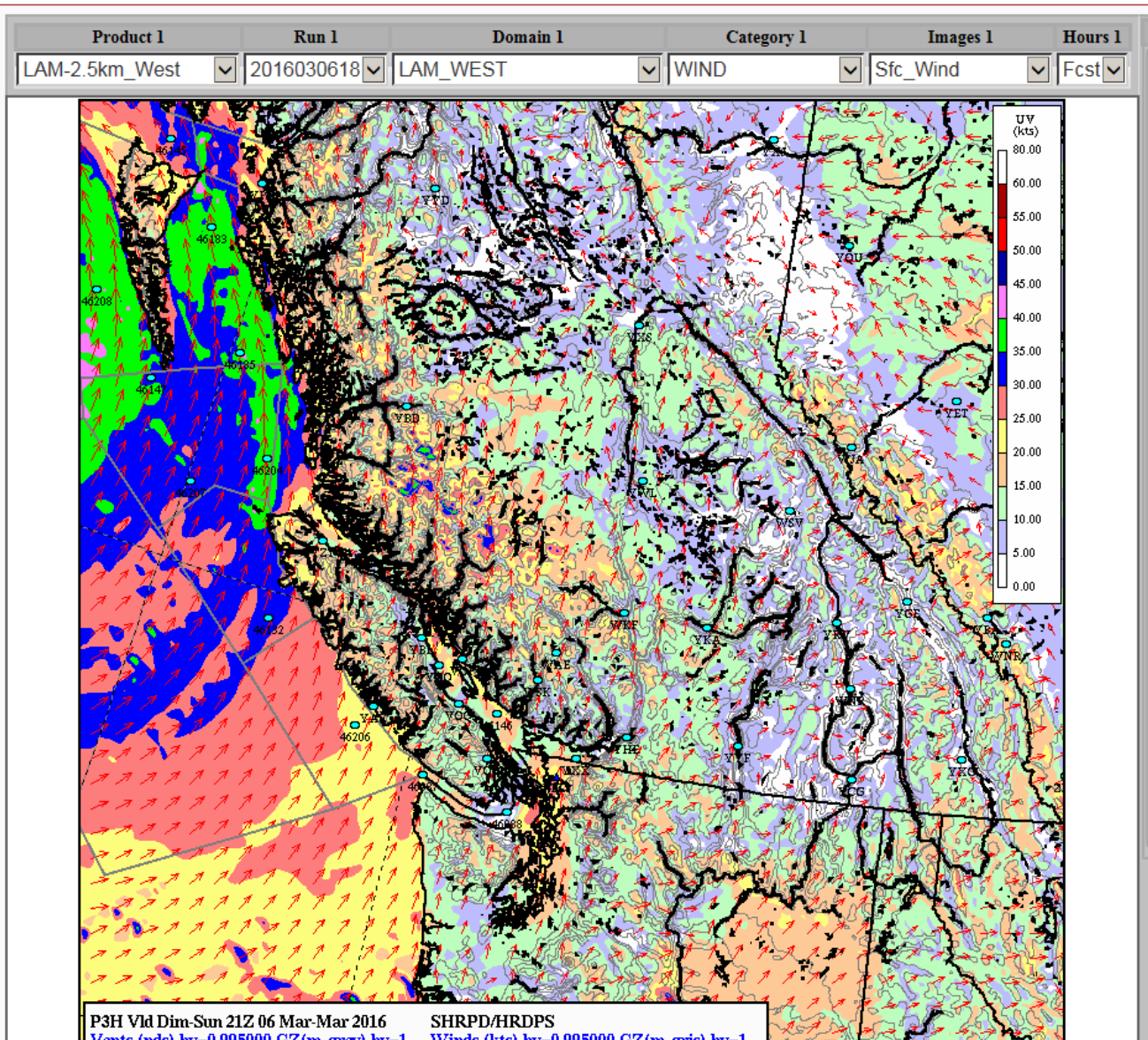
6



Lower Mainland

It looks like the strongest predicted winds at this particular forecast time are SW 25+ knots in an area just South of Point Roberts! Charts such as this can be produced for every hour for the next two days, and there is provision to animate them. Here is a forecast for the entire West Coast, for a time 9 hours in future:





At this time, it looks like Hecate Strait will be experiencing Gales!

Earlier in this document, we identified a problem with the radio-transmitted Marine Weather forecasts: the forecast areas are very large, and the time covered is long (about 6 hours). By using Vizaweb, both of these issues can be overcome! Of course, this all depends on having a reasonably robust connection to the Internet.

**Note** - As of May 2016, the LAM-2.5km\_West model has disappeared from the Vizaweb web site, and it has now been replaced by the 2.5Km HRDPS\_West model.

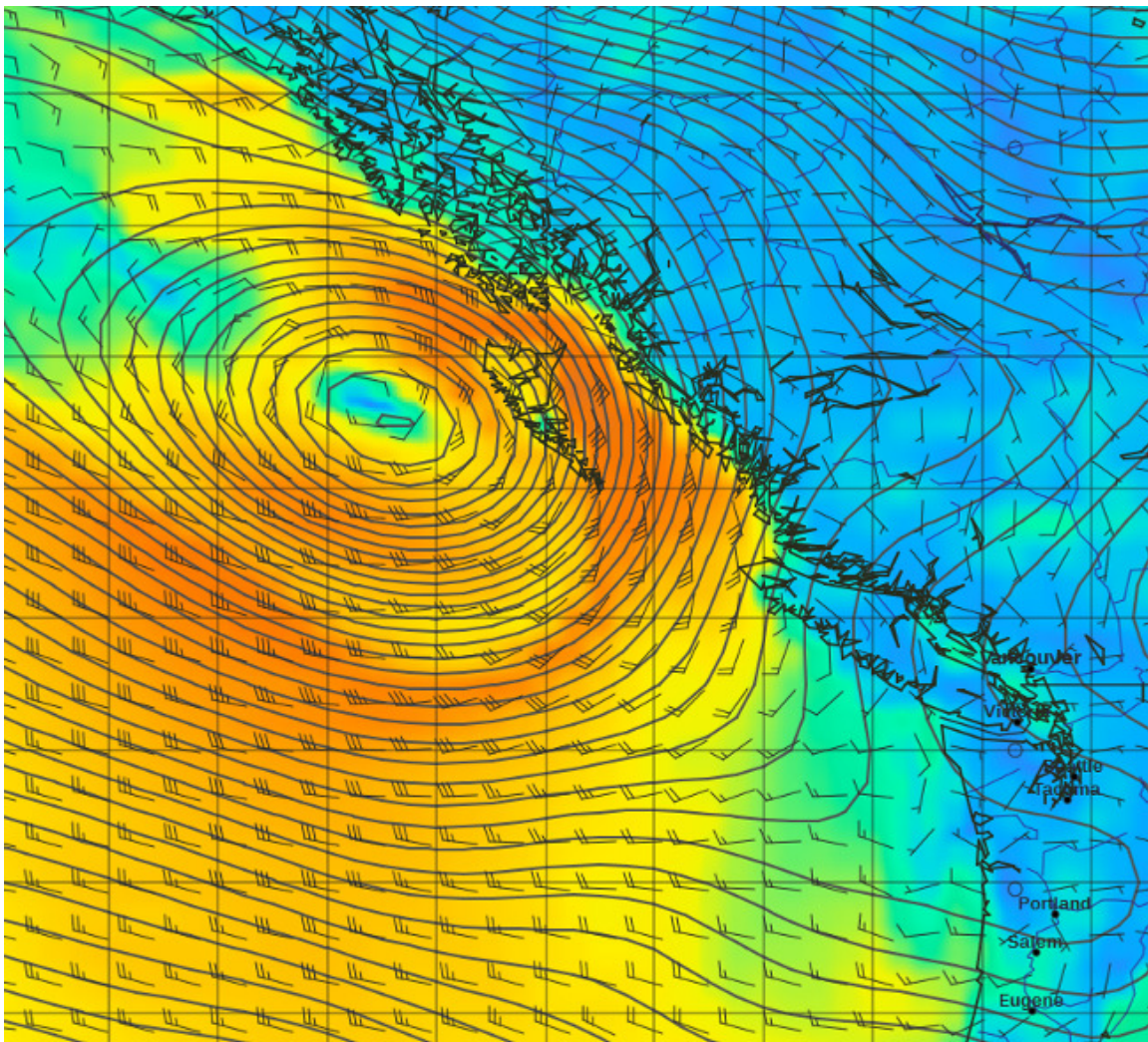
Further information on using Vizaweb is available at:

<http://www.cps-ecp.ca/portmoody/Uploads/-234Vizaweb%20for%20Dummies.pdf>



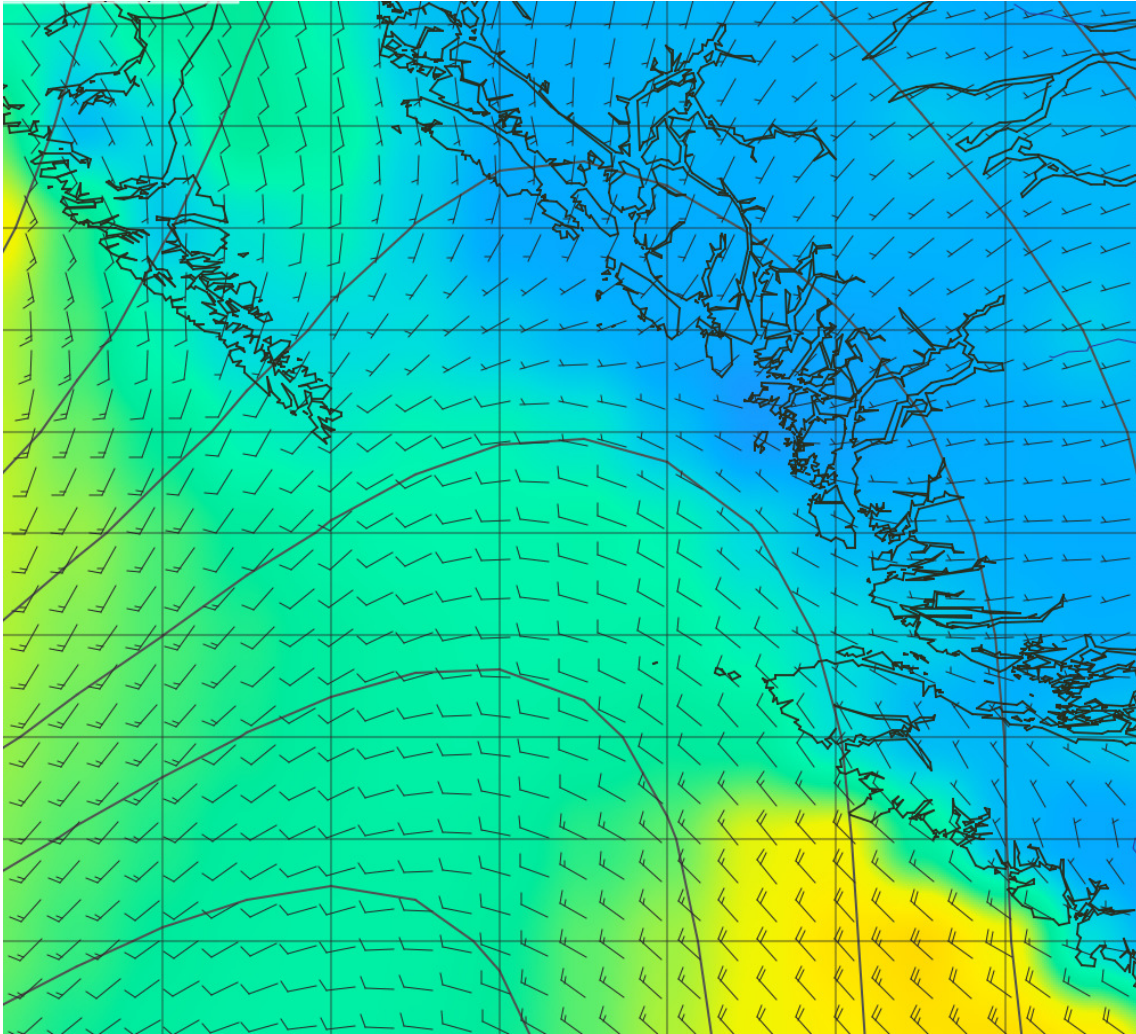
## GRIB Files

A GRIB file is a compact binary file containing historical or forecast weather data organized into grids. It is a data format standard that is often used by offshore passagemakers, and is compact enough that it is reasonable to transmit this via SSB (with an appropriate Pactor modem) or low-speed Internet (such as might be available through a hand-held satellite phone). Resolution is typically not very fine, and this is best suited to offshore waters, but it can be used in B.C. coastal cruising to give an overview of what is happening offshore that might affect coastal waters. Once downloaded, GRIB file data can be displayed directly on some chartplotters (such as Coastal Explorer), or dedicated viewer software can be used. One easy-to-use (and free) PC-based viewer is **ZYGRIB**, which incorporates not only the viewer, but also a utility for downloading data for the area and times of interest. Here is a sample screen shot of the waters off the B.C. coast for the same period as the last Vizaweb image above:



It is easy to see the low pressure area to the West of the Queen Charlotte Islands that is generating a CCW flow that results in Hecate Strait Gales!

The above Zygrib example covers a very large area, and the required data files (pressure and wind, 3 hour resolution, 8 day forecast period) occupies about 600Kb, making it impractical to economically download by a low speed satellite phone. The file size can be reduced by asking for a shorter forecast period, or by reducing the area covered. As an example, the following image is one of 64 in an 80 Kb file with an 8 day forecast period:



The above 80 Kb file can be downloaded on a Globalstar phone in about 2 or 3 minutes, and covers an area that would be of great interest to a boater getting ready to travel between the Central Coast and the Queen Charlottes, or to round Cape Caution or Cape Scott.

Also look at **PocketGRIB**, which is an application that runs on a smartphone.

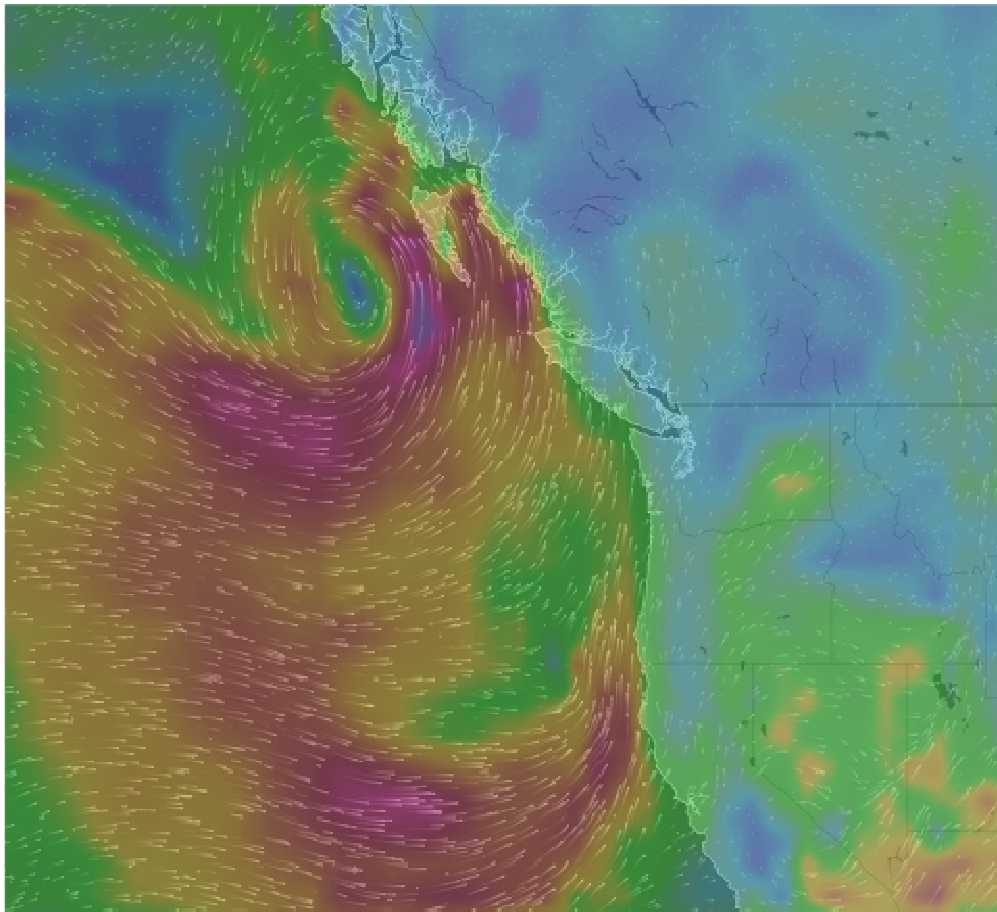


### **Big Wave Dave**

In the South Island area, it seems that everyone has heard of Big Wave Dave's hourly forecasts. This is a web site primarily aimed at Wind Surfers and Kite Surfers - they are looking for big waves to "do their thing", but the rest of the data is ideally suited for boaters, and is presented in a user-friendly format. There are two prediction pages: Prediction 1 uses data from a 12.5 km grid model at the University of Washington, and Prediction 2 uses the Environment Canada 2.5 km grid model (the same one available through Vizaweb). Unfortunately, this web site only presents data for a few areas on the South Island and Oregon that are used by surfers. There is no usable forecast data for areas North of the Gulf Islands. However, for racing or day cruising in the vicinity of Victoria, Prediction 2 is invaluable!

### **Other Forecasting Web Sites**

An interesting web site to investigate is **Windyty**. Although initially developed for aviators, this provides valuable data to mariners in an easy-to-use format. The presentation is actually animated! Here is a screen shot for the same time period as used above:



Other web sites offering marine weather forecasts (either text or graphics) include: SailFlow, Wind Finder, and BuoyWeather.

## **Navtex**

Navtex broadcasts are made on the MF frequency of 518 KHz. There are Navtex transmitting stations at both Tofino and Prince Rupert, and they transmit the same text forecasts (in an abbreviated format) that are used by the on-the-air announcers. This is an older technology originally designed to be picked up by dedicated receivers containing an integral printer. These days, an existing compatible radio and modem can be used to generate a computer-compatible data stream. It is even possible to purchase USB-compatible receivers that plug directly into a computer. Note that the same data is available from the web sites referenced earlier in this document.

The transmission schedule is:

North: 00:30, 04:30, 0830, 12:30, 16:30, 20:30 PST

South: 01:10, 05:10, 09:10, 13:10, 17:10, 21:10 PST