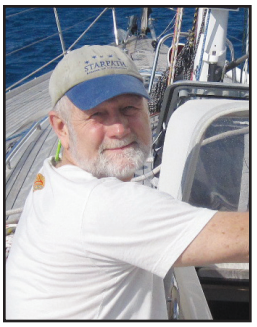
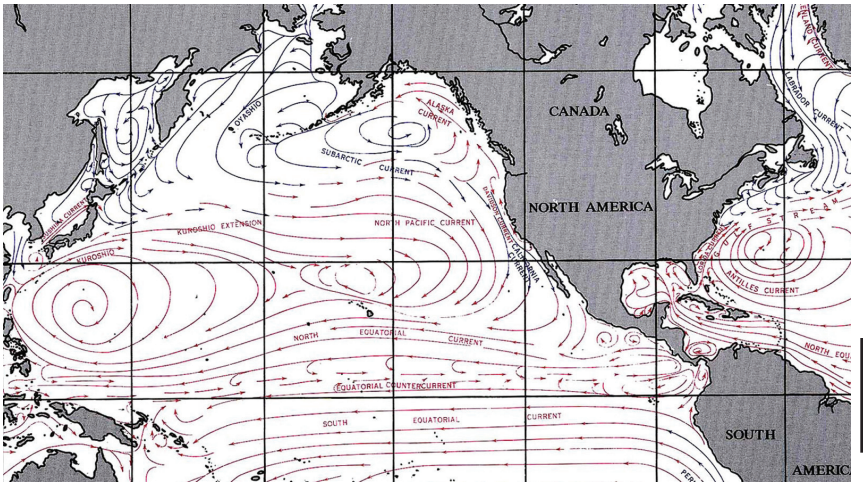


# Staying Current With Currents




## Ocean currents are not what they used to be

**Figure 1.** Section of the *Bowditch* Stream Drift Chart; which remains one of the best overall outlines of ocean currents. See also the RSMAS site in the References

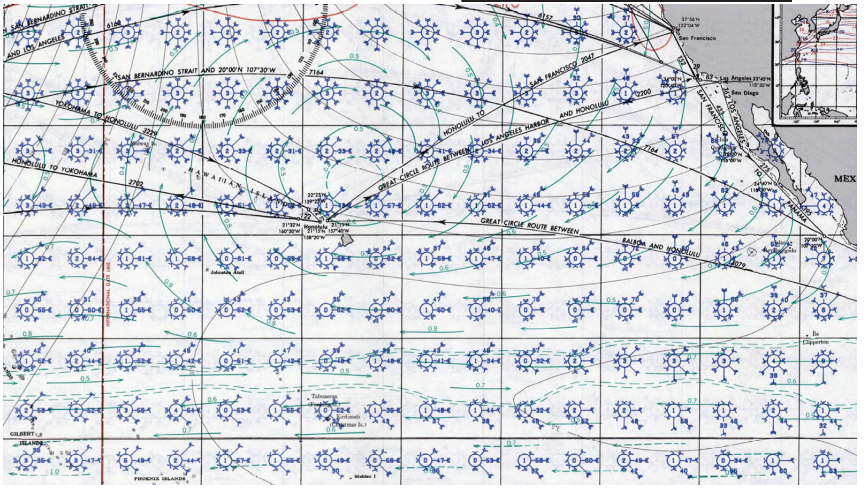
OK…This is not an article about climate change. Ocean currents are indeed what they used to be; it is just that we know now that they are not what we thought they were.

*Bowditch* teaches us in some detail about the various ocean circulation patterns around the world (**Figure 1**). They have names, average speeds, directions and water temperature. We have been taught to take these currents into account when planning ocean and coastal voyages—and they are the right answers to exam questions that come up in licensing and certification. We can learn the seasonal average values for specific locations from Pilot Charts (**Figure 2**). Boundaries of the Gulf Stream are shown on the OPC map of 24-hr wind and waves.

While these ocean current data remain valid and helpful in many circumstances, we know that they are a coarse outline of what the ocean surface flow really looks like at any one moment. We have learned much more about the ocean in the past five years from international satellite measurements and from the development of numerical models of the ocean. **Figure 3** shows a more realistic snapshot of the ocean surface. It is far more dynamic than we might have guessed from descriptions in early navigation and weather books. We have set up links to articles, videos, and other modern resources at www.starpath.com/currents. The latest *Bowditch* (2002) briefly mentions mesoscale eddies, but it predates new ocean research.

We are especially fortunate in most U.S. coastal waters to have ready access to excellent real time coastal currents from RF radar measurements (**Figure 4**). These are in a sense the best current data available. They also serve as a test for ocean model predictions. The Bureau of Meteorology (BOM) in Australia also has coastal current predictions online, but they are small pictures that require a subscription for a more convenient format. Nevertheless, they do show that the common

**Figure 2.** Section of the May Pilot Chart, which remain the best quick source for climatic estimates of current flow. Green lines are currents with speed in kts. The large gyre NE of HI is consistent with *Bowditch* but not always present



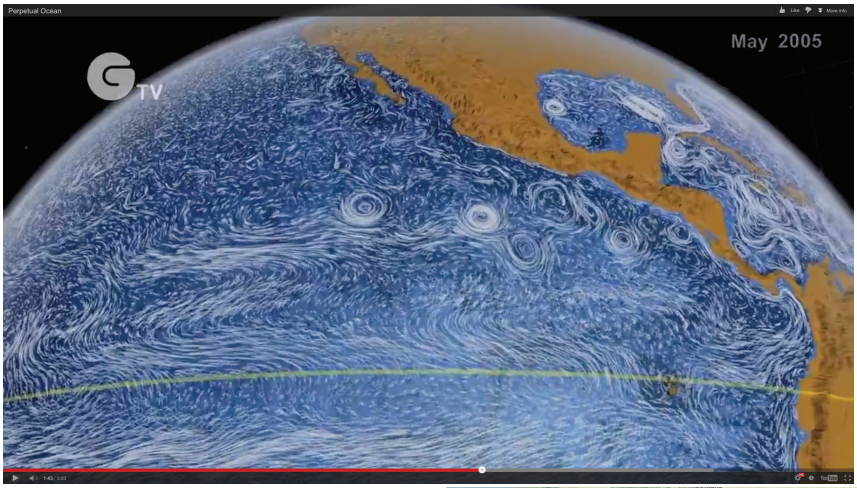


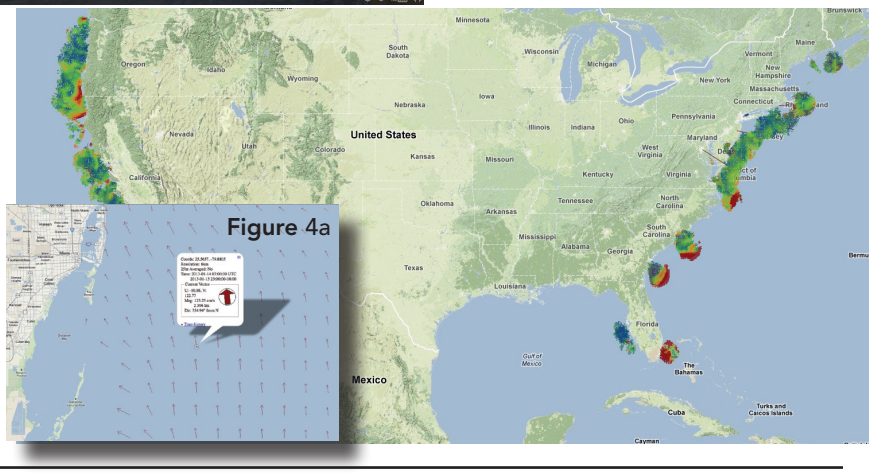

**Figure** 3. A snapshot of May current circulation showing numerous eddies and meandering streams around the globe. These are model data, after assimilation of actual measurements. This is a screen capture from the excellent NASA video called Perpetual Ocean, easily found on YouTube. It shows all oceans and seasons

**Figure** 4. HF Radar stations with live coastal current data. Histories and averages are also available; Figure 4a. Radar current data from Miami station, viewed from an online link

descriptions we used to use for these coastal currents are over simplified.

Unfortunately, once we leave the U.S. coastal waters and travel outside the range of these RF Radar stations, we have more of a challenge in learning what others know about the currents we are sailing in. The model predictions are good, but the public distribution of this data to mariners is lagging far behind.

There are several private companies that provide Gulf Stream predictions,



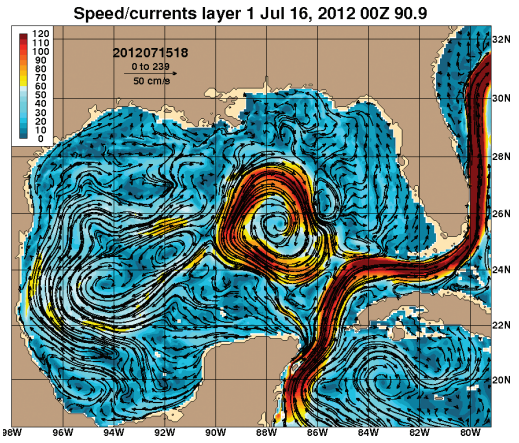



**Figure 5.** US Navy HYCOM data at the time of the oil spill. This eddy in the Gulf shows up more often as just the end of a large loop in the Gulf Stream that penetrates in the Gulf

and we can also track down much of that data online, but away from the Gulf Stream and the Gulf of Mexico, it is more difficult. The Gulf of Mexico is very well studied because the great Loop Current from the Gulf Stream makes the entire U.S. East Coast vulnerable to oil spills in the Gulf. We had a close call with the Deepwater Horizon spill, but luckily the loop had pinched off into an eddy at the time (**Figure 5**). Ocean currents would have been in the news a lot more than they are now had that not been the case.

Recently, the Ocean Prediction Center (OPC) has added links to the Real Time Ocean Forecast System (RTOFS) model data, but these are more schematic pictures than real numerical data we can navigate with. We can at least see that things are very dynamic. The model is based on the Hybrid Coordinate Ocean Model HYCOM (www.hycom.org). Better detail can be seen in the U.S. Navy presentation listed in the References. **Figure 6** compares the Navy HYCOM data with the type of zooming one can do with special tools. The original data that contain the detail are in a special format that requires dedicated readers, all of which come with a learning curve. It is not user friendly. We are trying to develop a systematic way for mariners without special computer skills (like ourselves) to get access to the data. Our prescription to date is outlined at www.starpath.com/currents, along with notes on our immediate application, which is assisting the OAR NW ocean rowboat expedition to get from Dakar, Senegal to Miami, Florida by the most expeditious route. Clearly a low powered craft, row or sail, will be influenced by eddies some 300 miles long and 100 miles wide that can reach speeds of 5 knots in the middle of the ocean. A good place to learn about anomalous mesoscale current eddies is at the Archiving, Validation and Interpretation of Satellite Oceanographic (AVISO) website. It has a wealth of information and training programs.

In the meantime, mariners can find very useful data at the Navy HYCOM site for several locations. The HYCOM data and the RTOFS data are,

however, available globally, not just the few places they list, nor just in the limited resolution they present in these webpages. The models have one-twelfth of a degree resolution, which is one data point every five nautical miles. We just need to convince some third-party providers to make it more readily available to cruising and racing sailors. Ideally someone will make a service like the free service we offer for satellite wind data: send us an email with your latitude and longitude and we will send back the latest ASCAT satellite wind fields. See www.starpath.com/ascat. BWS

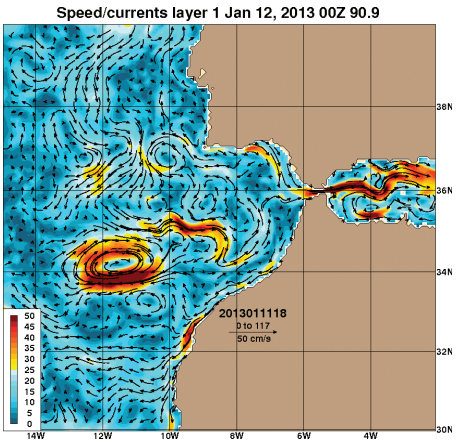



**Figure** 6. US Navy HYCOM data showing a prominent eddy SW of Gibralter that would not have been expected based on any climatic data from the past. This type of picture is readily available online

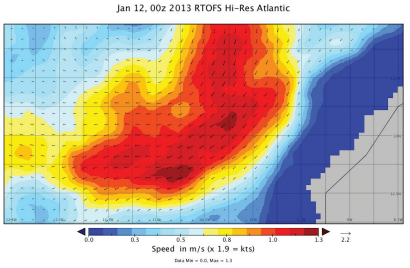



**Figure** 6a. NCEP RTOFS Hi-res Atlantic data for a corner of the Gibralter eddy, showing the detail that is available on a daily basis. This is a patch of 2-to 3-kt current in the middle of nowhere. It would be nice to know this level of detail when sailing in these waters, but for now this presentation is not readily available

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RSMAS Univ. of Miami
http://oceancurrents.rsmas.miami.edu

Ocean Prediction Center
www.opc.ncep.noaa.gov

Pilot Charts, Bowditch, and related links
www.starpath.com/navpubs

HF Radar Currents
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Starpath currents
www.starpath.com/currents