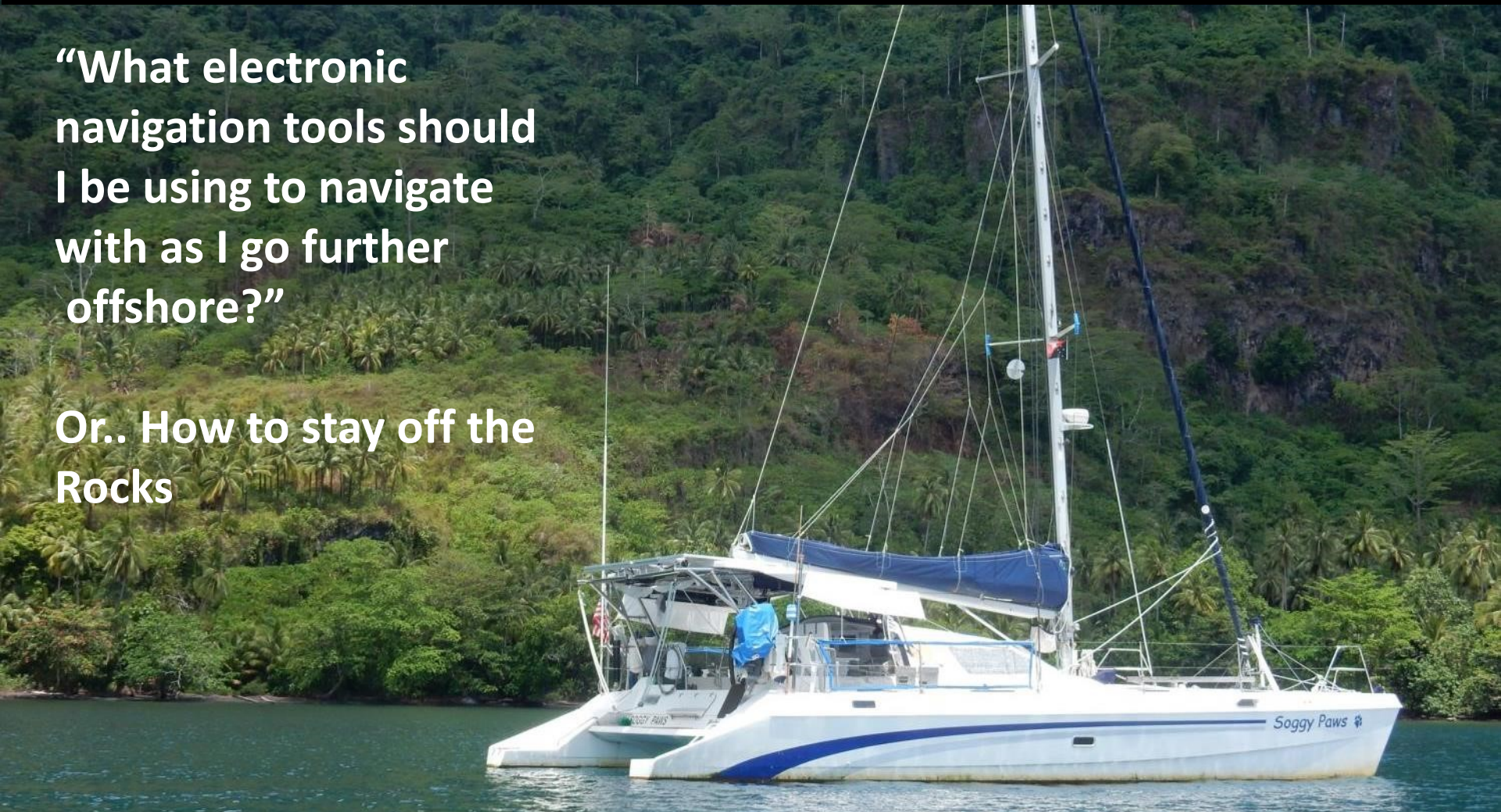


Using Satellite Imagery with OpenCPN

“What electronic navigation tools should I be using to navigate with as I go further offshore?”

Or.. How to stay off the Rocks



Sherry & Dave McCampbell
www.SVSoggyPaws.com



s/v Soggy Paws

Florida to the Philippines 2007–2015



Sherry & Dave McCampbell
s/v Soggy Paws 2023



6 years cruising in SE Asia from the Philippines



Avanti, Beveridge Reef, Aug 2017



“I had no idea the reef was there. I knew we’d hit something and were taking on water. We were ready to abandon ship.”

Robbie Cooper, s/v Avanti, Beveridge Reef, September 2017

Vestas Wind
Cargado Shoals,
Indian Ocean
2014



“Team Vestas Wind’s grounding on the Cargados Carajos Shoals comes down to a basic failure in overall passage planning, and an over-reliance on electronic navigation.”

Tanda Malaika
Huahine
2017



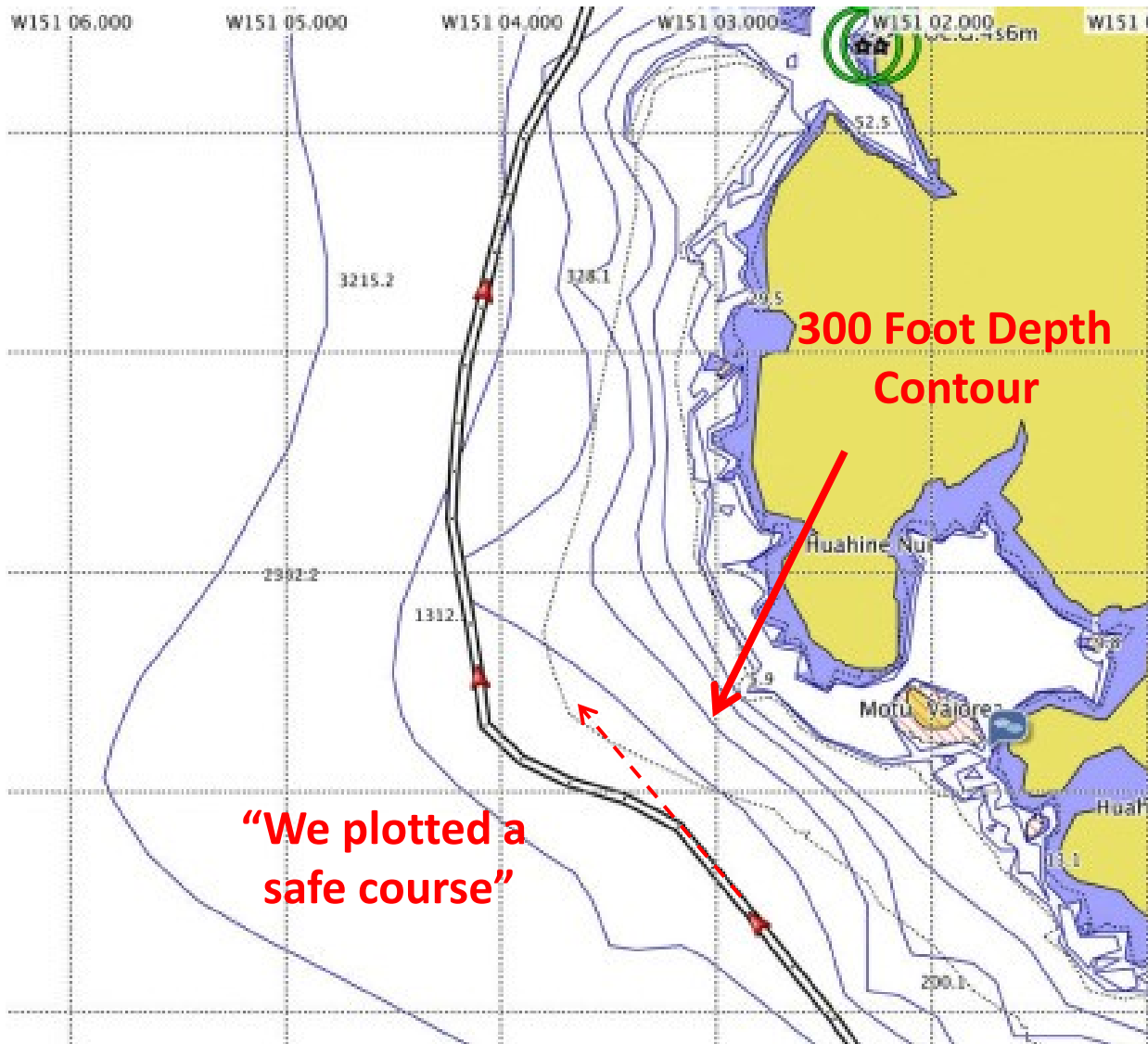
*“When they asked us what happened and we told them that our **chart did not show reef, they asked us if we had been using Navionics charts, and I said yes.** He then shook his head and said that at least five boats end up on those reefs a year who were using Navionics charts.”*



On the rocks, NW Australia, June 2016

Moonshadow's Close Call

What the Chart Showed



“We had plotted a route that kept us outside the 300-foot depth contours”

Moonshadow's Close Call

What was REALLY There



“We looked up, and to our horror found that we were only about 900 feet from the surf!

Had it been nighttime, we almost certainly would have ended up in that surf”

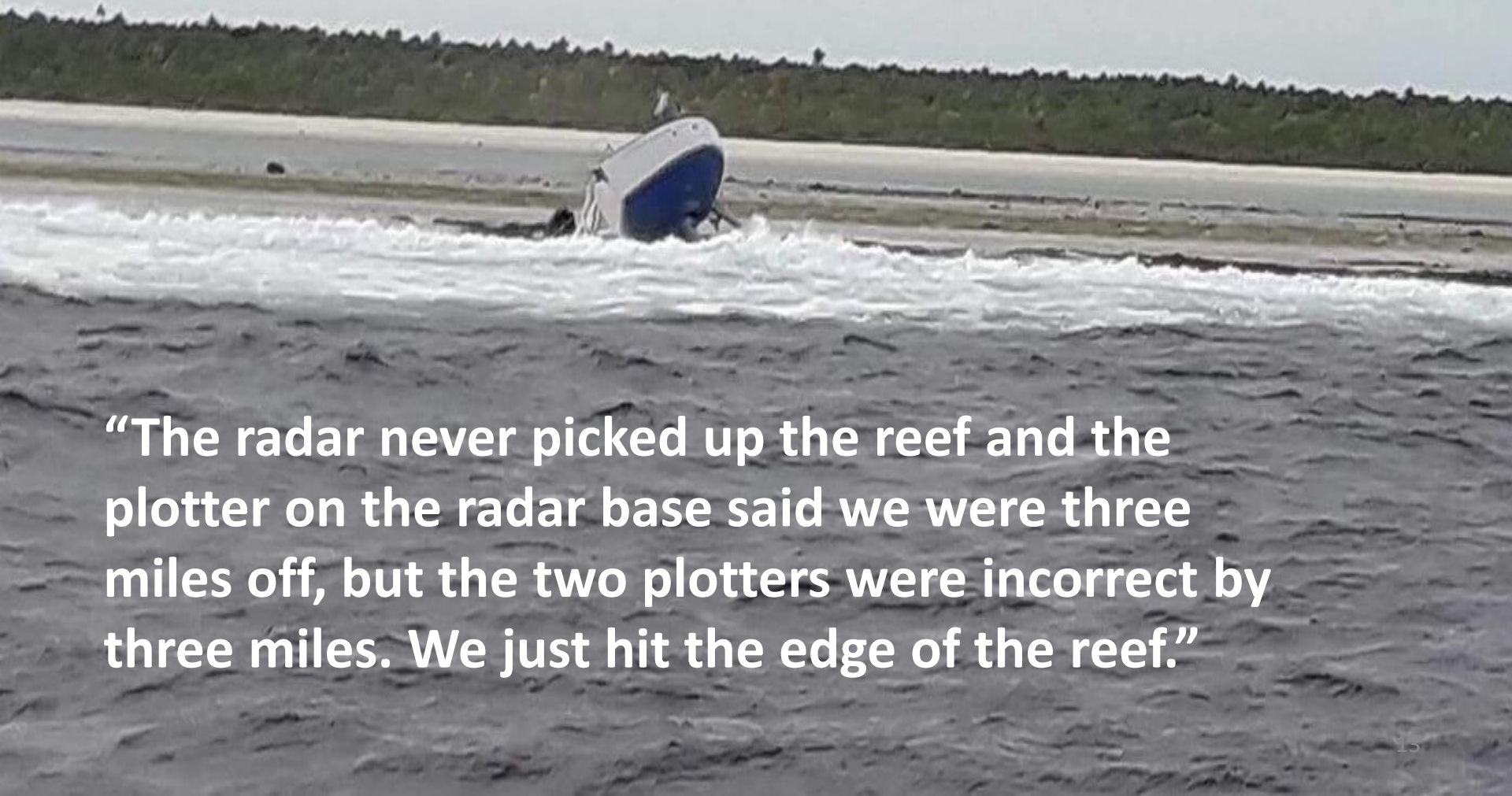
USS Guardian MSO
Tubataha Reef, Philippines
2010



A charting error **mis-located the Tubbataha Reef by 7.8 nautical miles** from its actual location. (Was correctly plotted on a more detailed chart)

Southern Fiji, June 2017

60 ft Oyster with Crew of 4, at night



“The radar never picked up the reef and the plotter on the radar base said we were three miles off, but the two plotters were incorrect by three miles. We just hit the edge of the reef.”

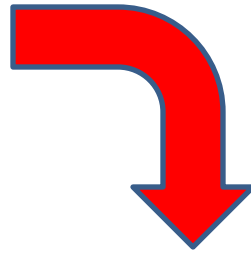
Discussion Points

- Pitfalls of conventional electronic charts
- Why not to use your iPad / Android tablet as your only navigation tool
- Why not to use your chartplotter as your only navigation tool
- Paper vs Raster vs Vector vs Satellite Charts
- Validating the accuracy for the next stop
- Navigating at night
- Introducing the power of OpenCPN

Note: All tools and resources referenced in this presentation are linked on the reference pages at the end.

Old School vs New School

- Old School: Must have paper charts to be safe
- New School: I love Navionics on my iPad
- The Best Approach



**Use EVERY tool
you can get your hands on**

Paper Charts

- Satisfyingly “there” feel
- Only as good as the survey they are based on
- A pain in the neck to keep updated
- Bulky, expensive, hard to acquire
- Hard to store large quantities
- They can blow away, they can get wet
- But islands don't disappear!

Electronic Raster Charts

- **Essentially a scanned paper chart**
- All paper chart info is retained
- Easiest to adjust to using (if you are familiar with paper charts)
- Take up **MUCH more electronic storage space** (vs Vector charts)
 - 24 CD's to cover the world, partially
- Everything zooms at the same rate
- Difficult to update
- Being phased out in the U.S.

Raster vs Vector



Electronic Vector Charts

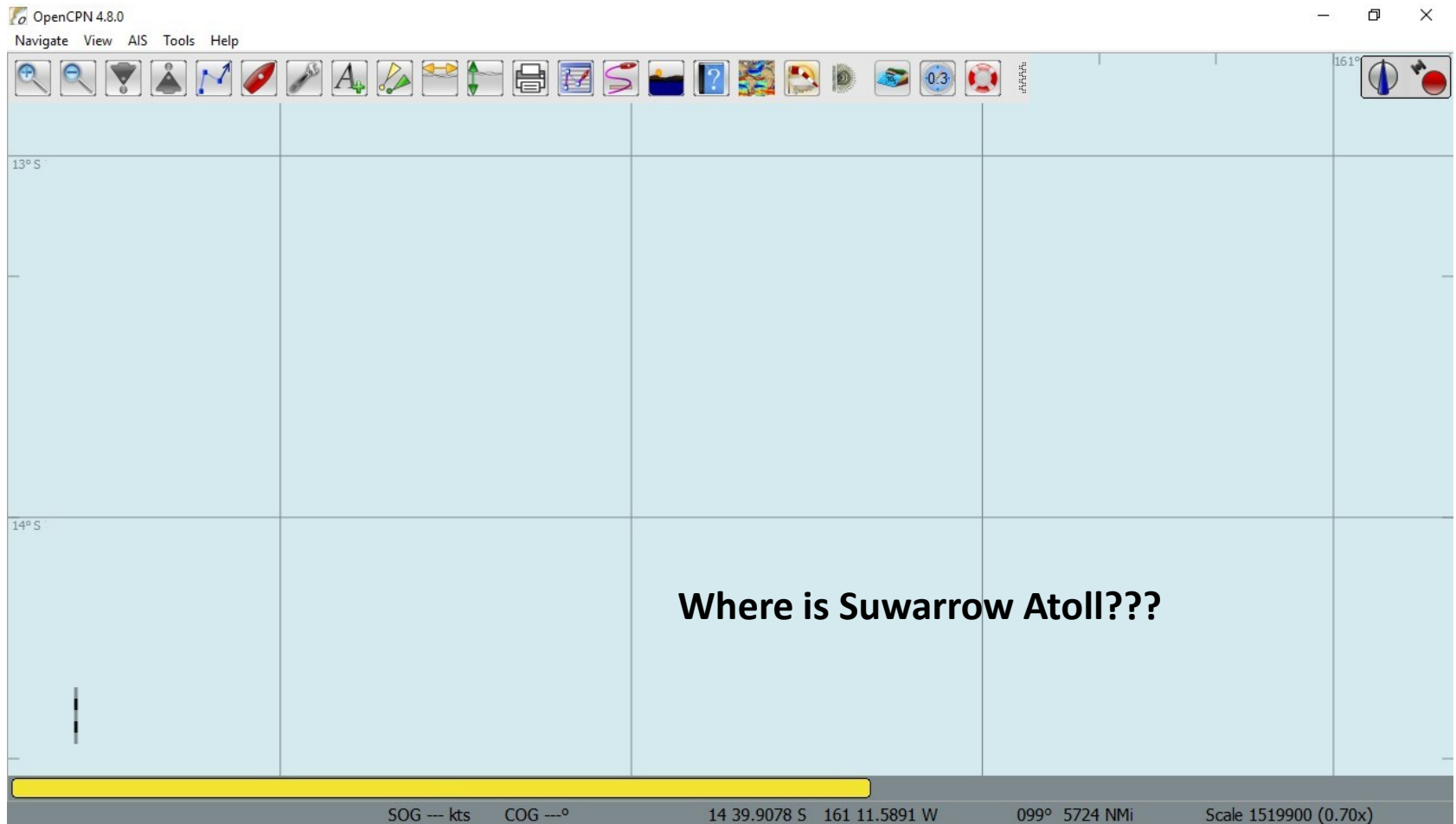
- Vector charts have been drawn from paper charts by *someone* (or something)
- Are only as accurate as the underlying chart they were made from
- Take up SIGNIFICANTLY less space on electronic storage
 - The Whole World in one folder
- Contain lines, “objects”, “data”, “layers”
- Simpler to keep updated

Electronic Vector Charts

- Most chart plotters are using vector charts
- Most tablet/phone apps are using vector charts
- Vector charts take a significantly smarter program to display and use
- Very powerful if used correctly
- Sometimes confusing to use and/or set up (flexibility = complexity)

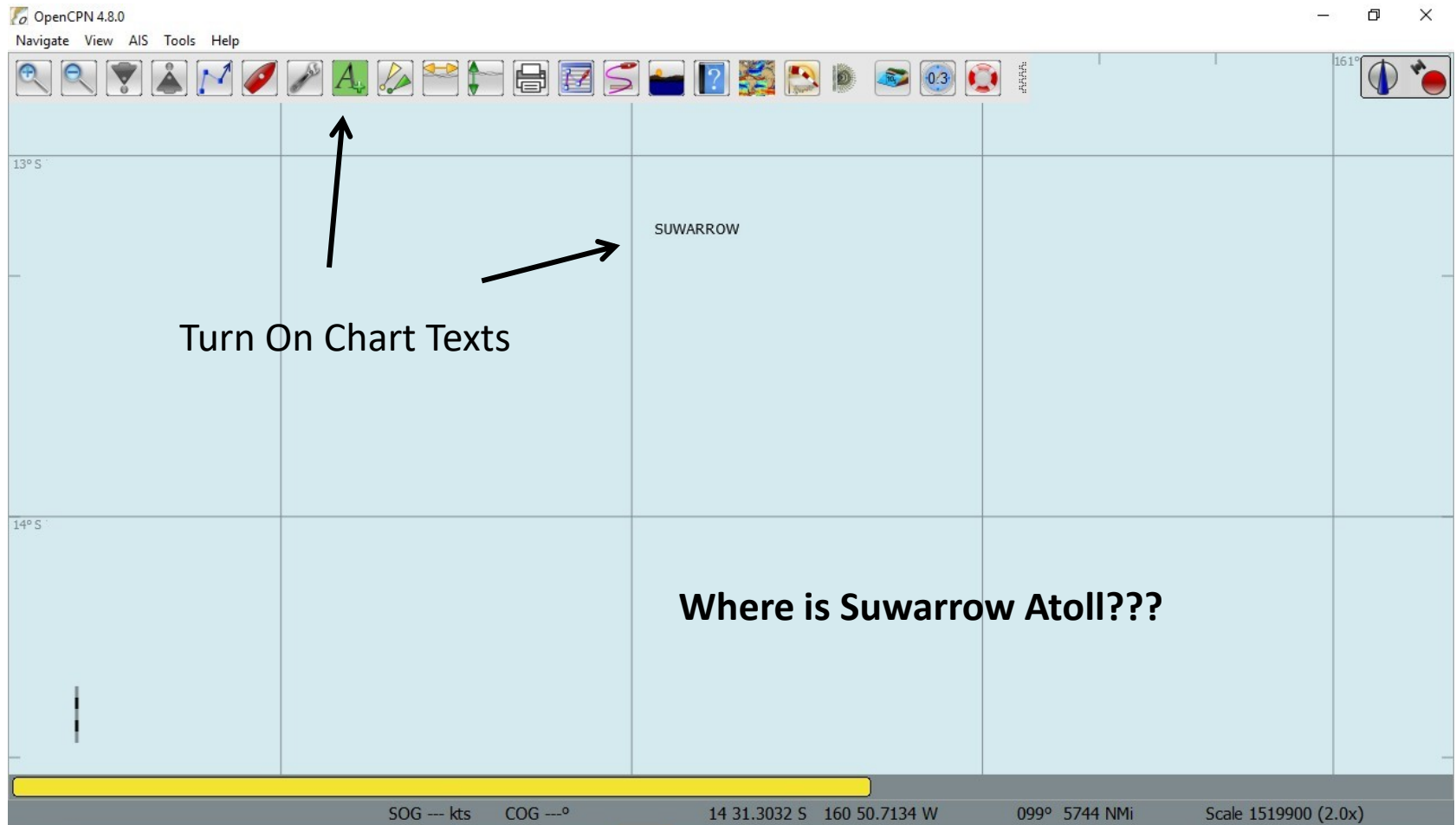
Problems with Vector Charts

The Disappearing Island – Chart Zooms



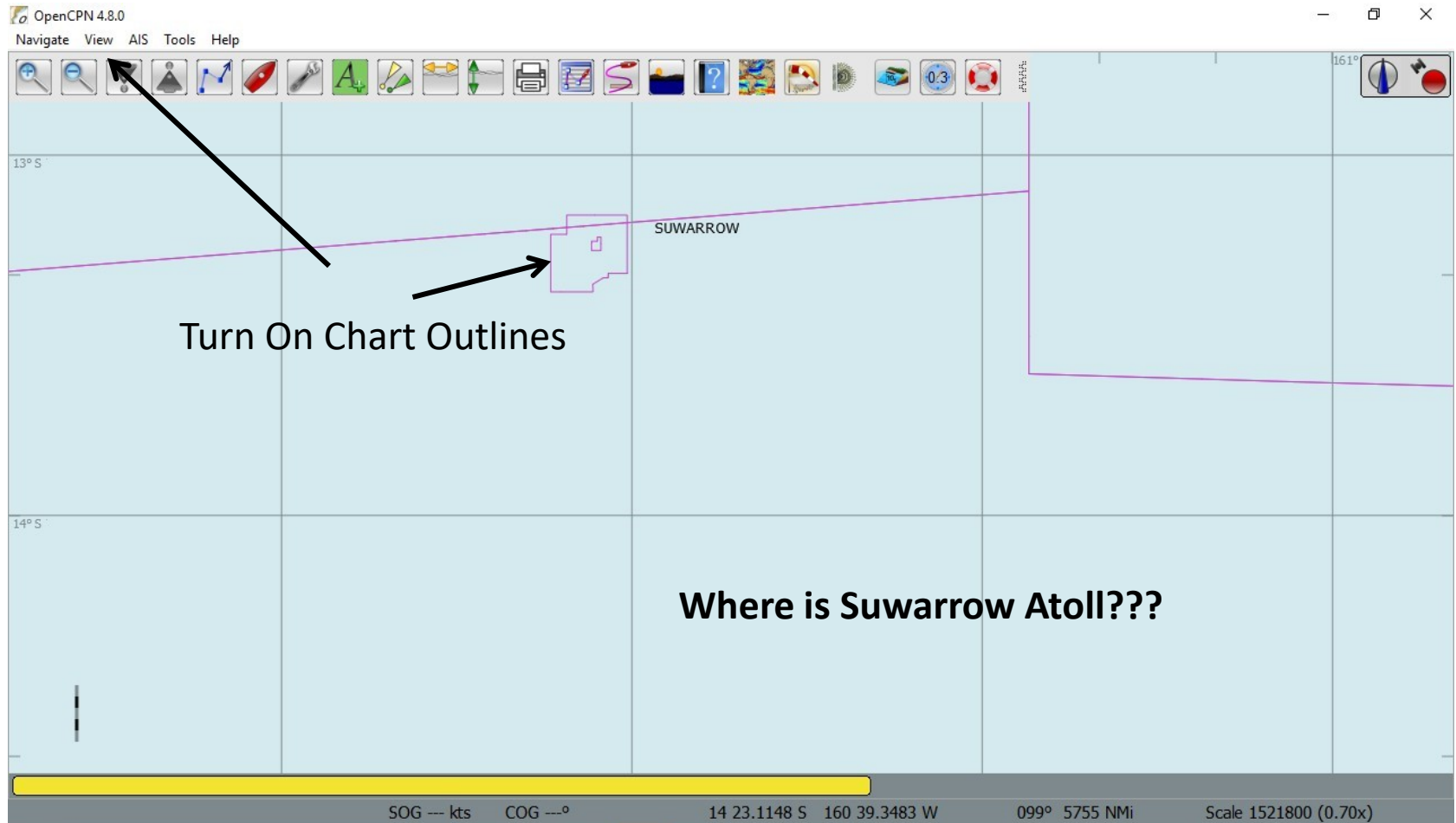
Problems with Vector Charts

The Disappearing Island – Chart Zooms



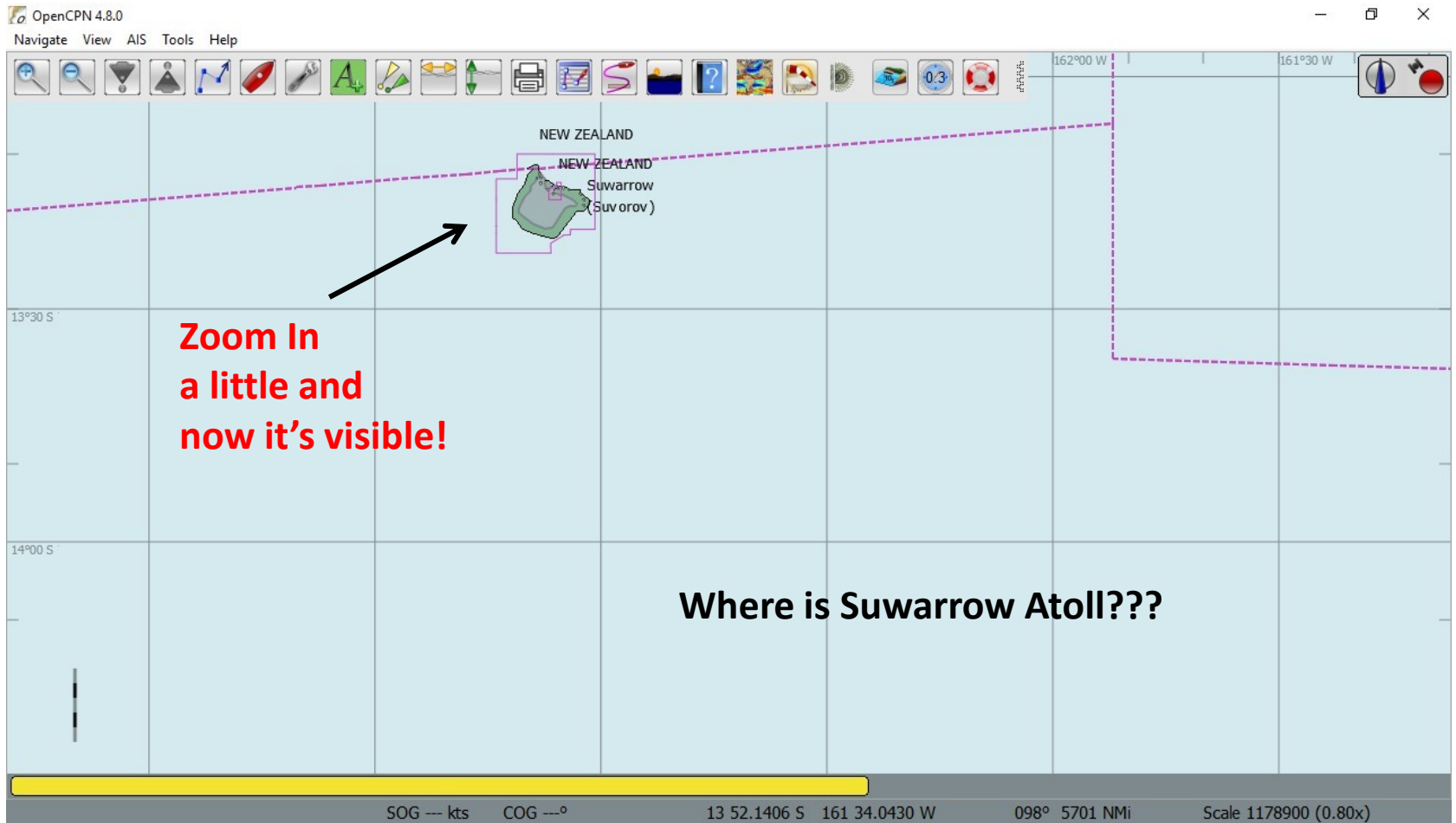
Problems with Vector Charts

The Disappearing Island – Chart Zooms

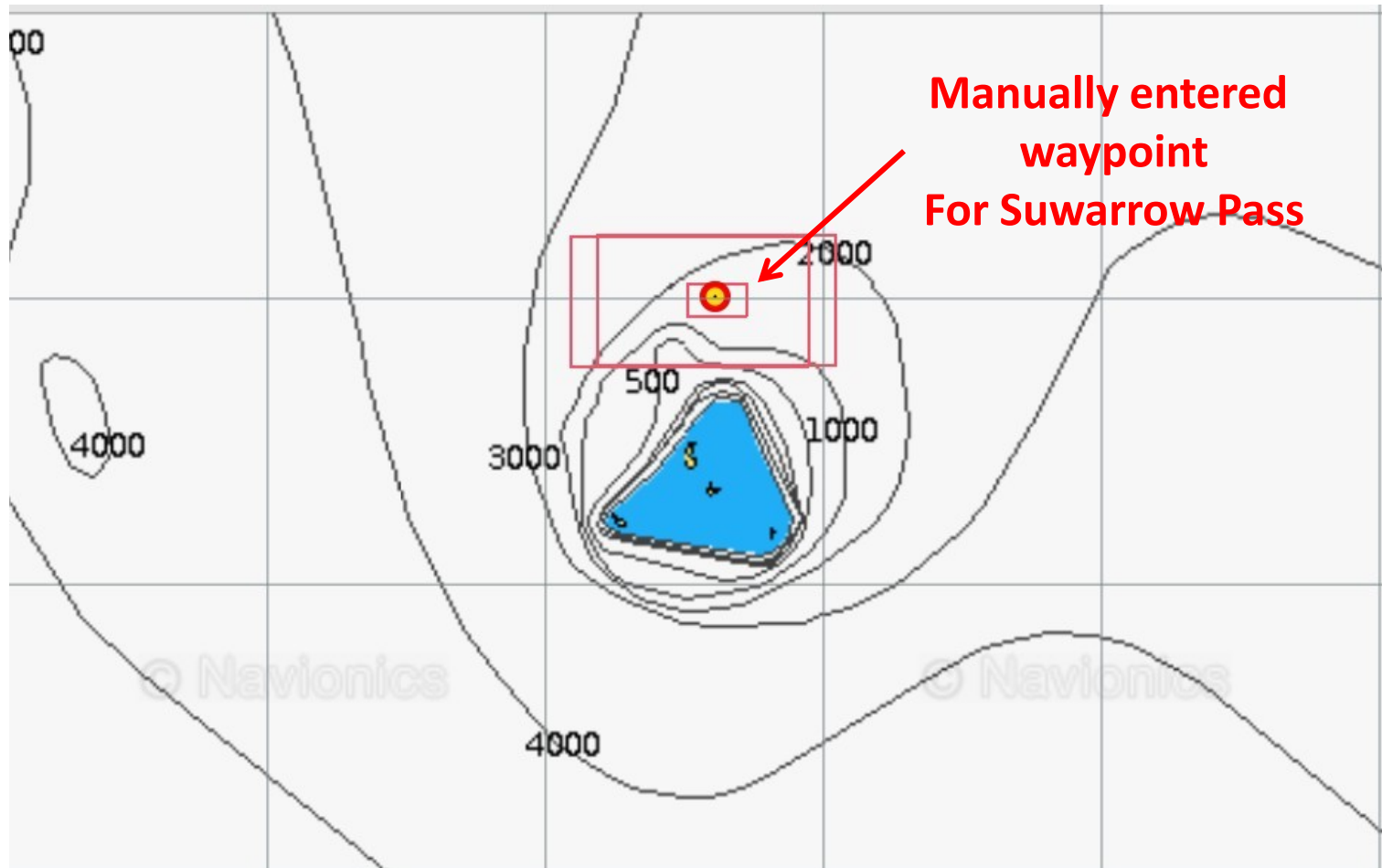


Problems with Vector Charts

The Disappearing Island – Chart Zooms



Suwarrow Atoll- The disappearing island is also misplaced (Navionics).



Note: Current Navionics Charts have Suwarrow in the correct location

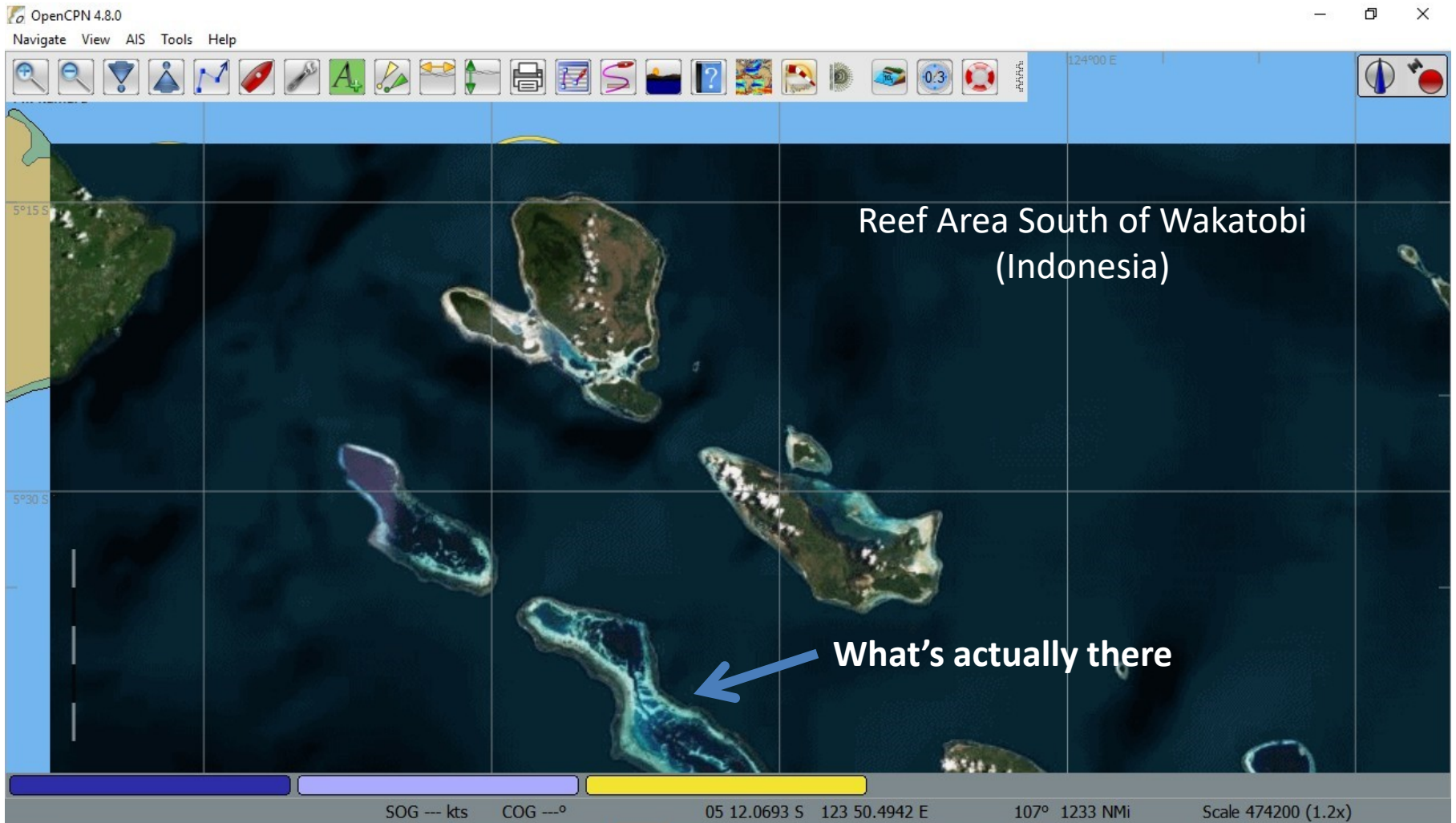
The Disappearing Island-

is it really misplaced?



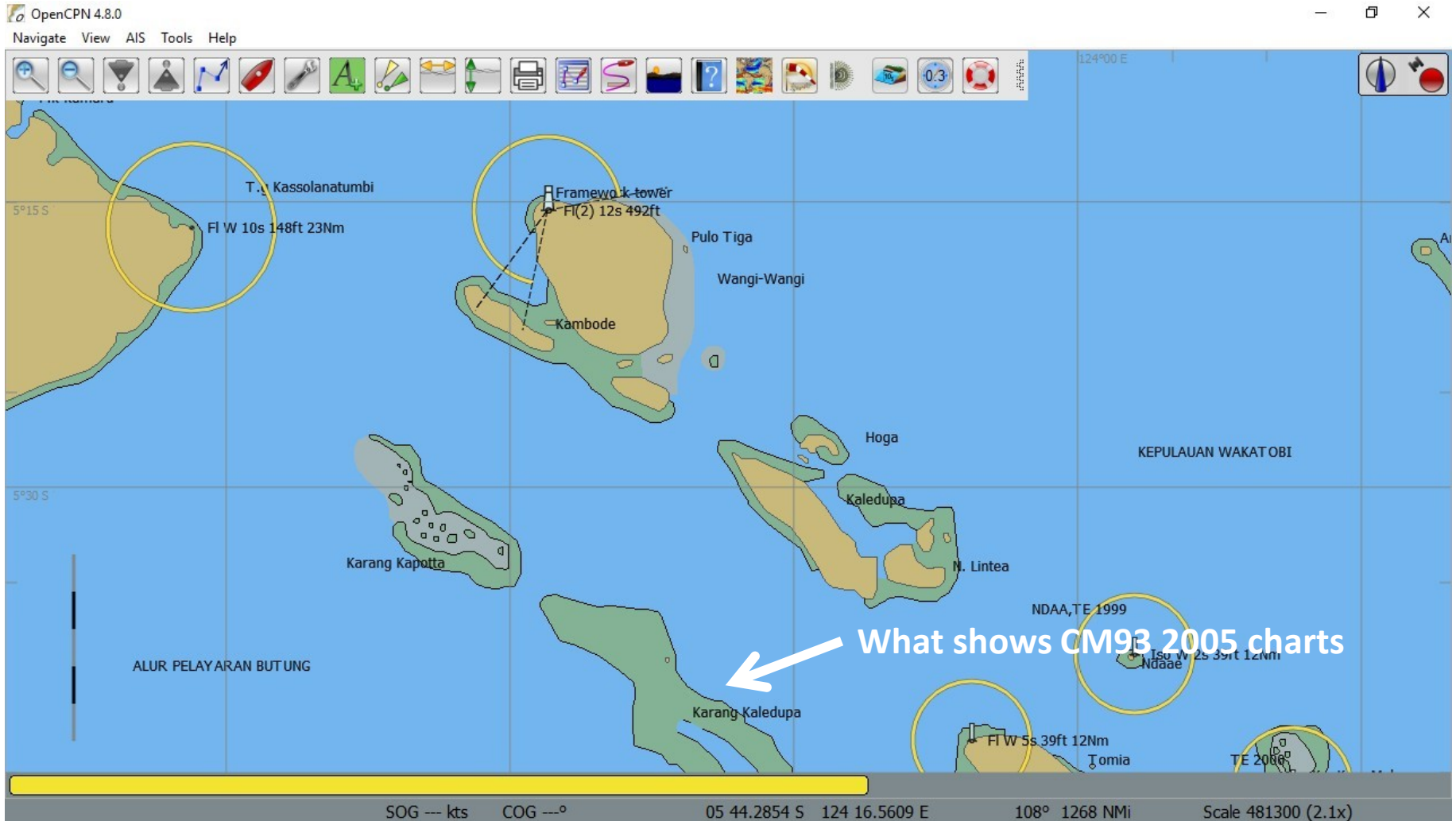
The Disappearing Reef

Cmap Chart Version



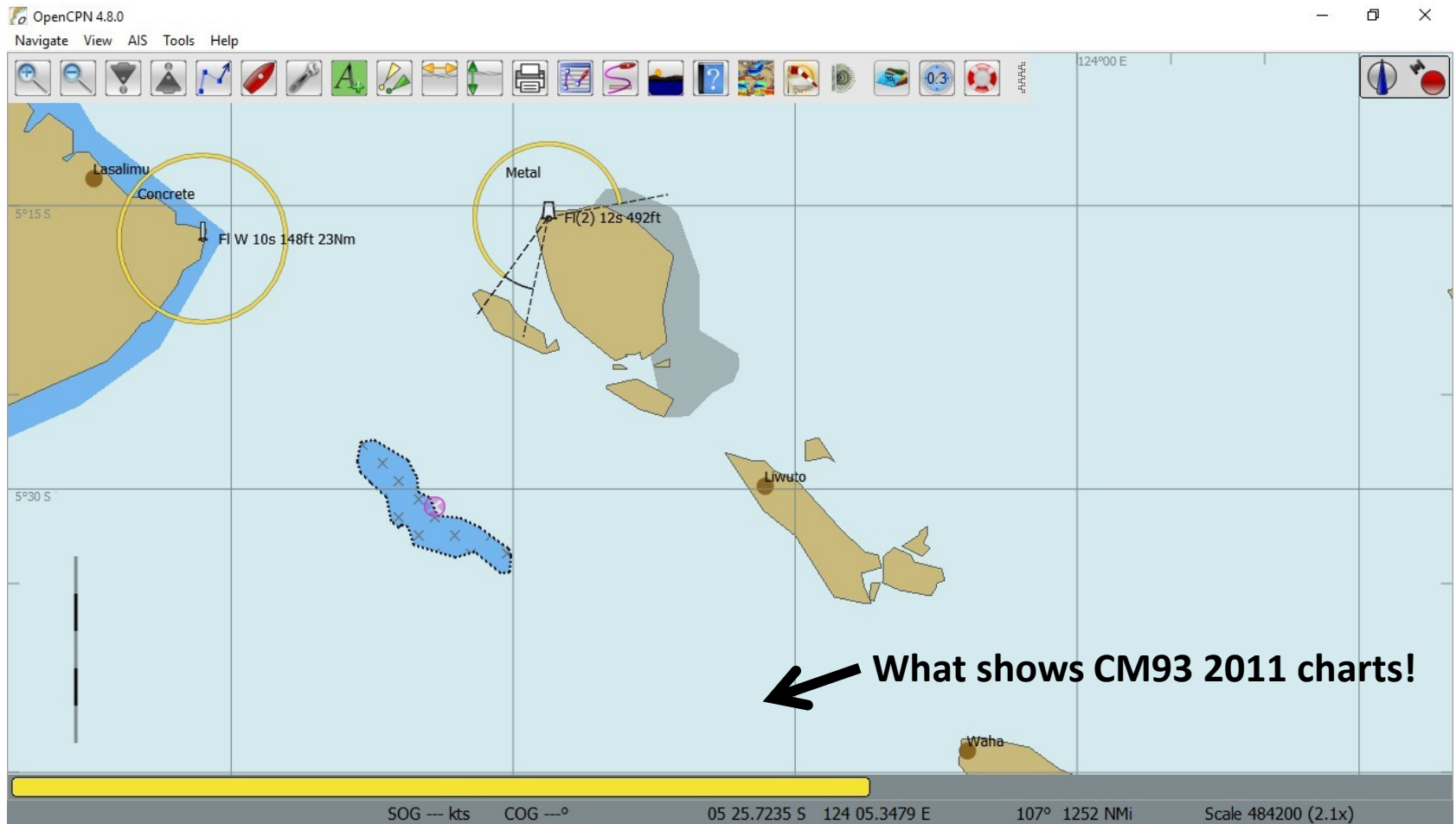
The Disappearing Reef

Chart Versions



The Disappearing Reef

Chart Versions

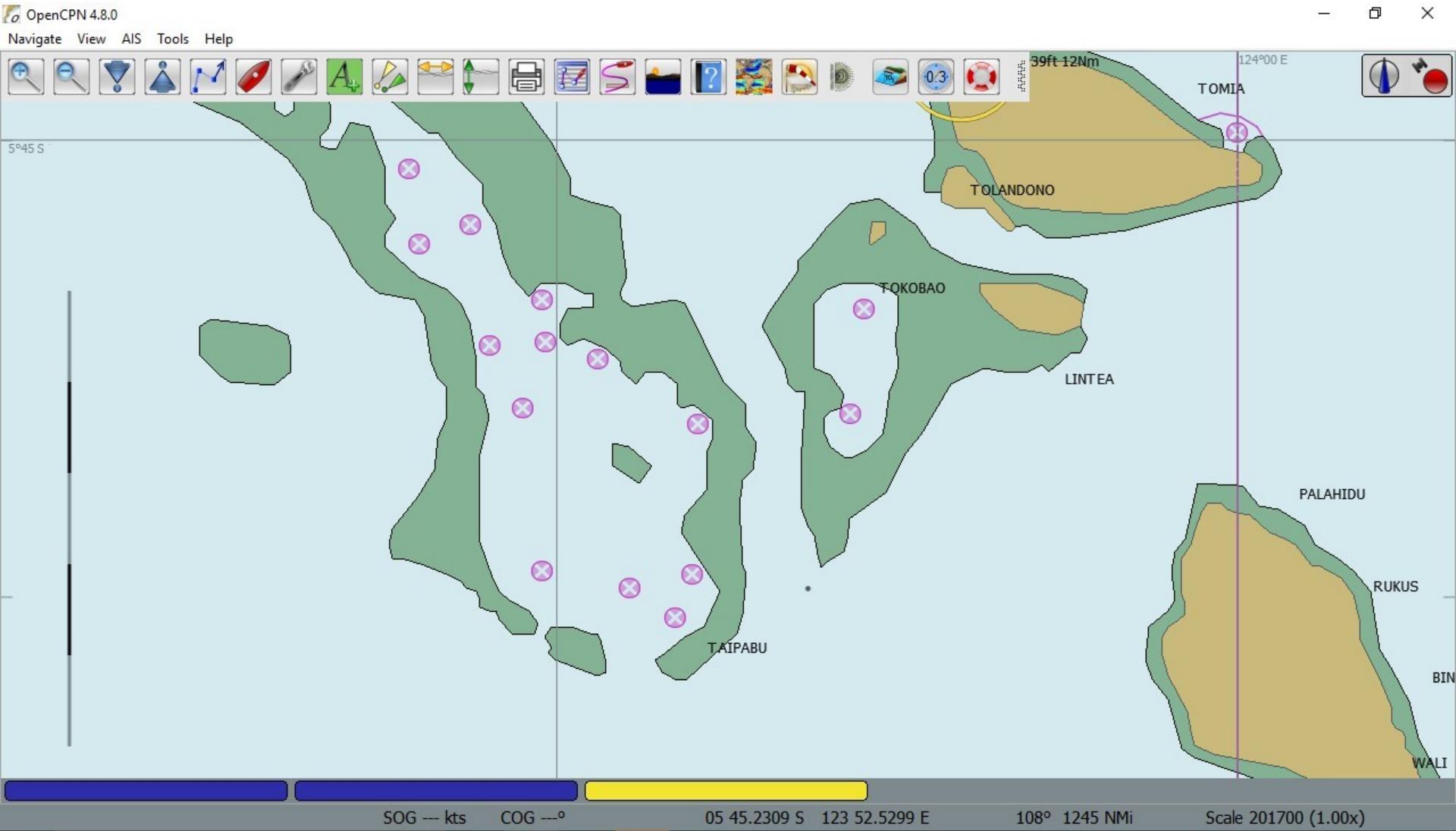


Another Benefit of Satellite Imagery

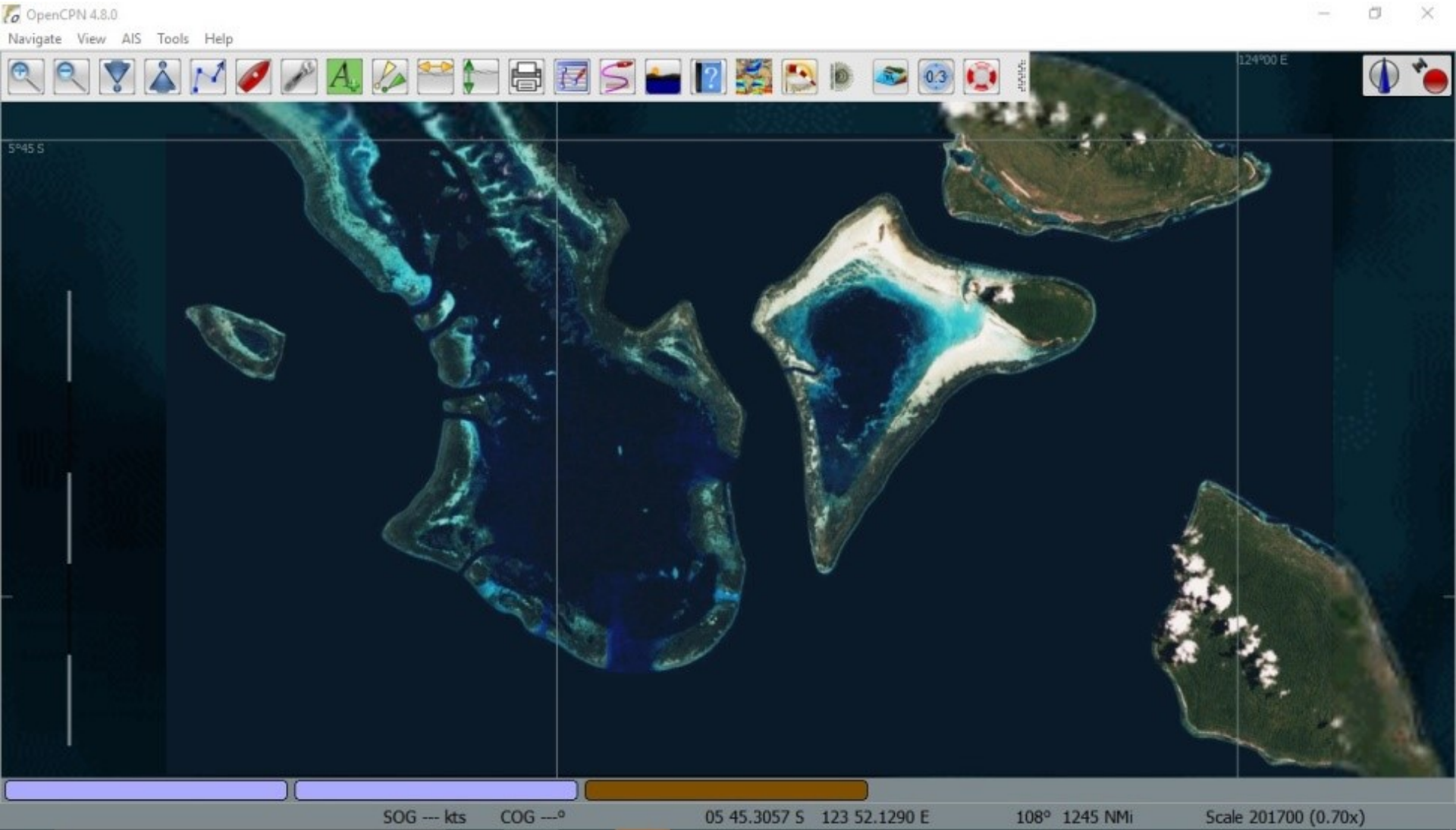
- More Detail -

- Instead of a shaded area on the chart indicating “shallow water”
- Details that will let you find a small channel to go inside a reefy area.
- Shaded colors that show you where the nice sand spot is for anchoring
- Where “amenities” are

Which Would You Choose?

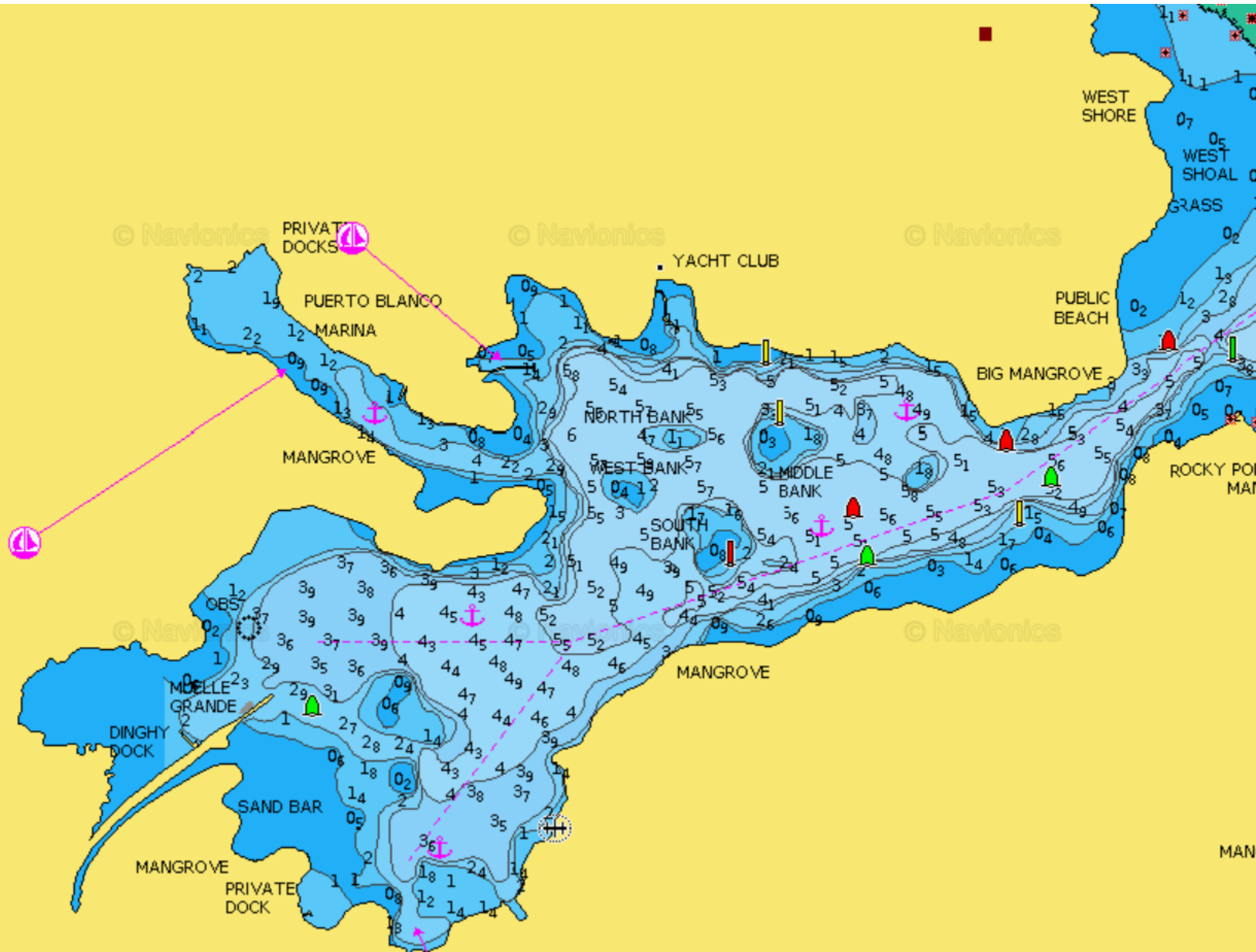


Which Would You Choose?



Luperon, Dominican Republic

Navionics View

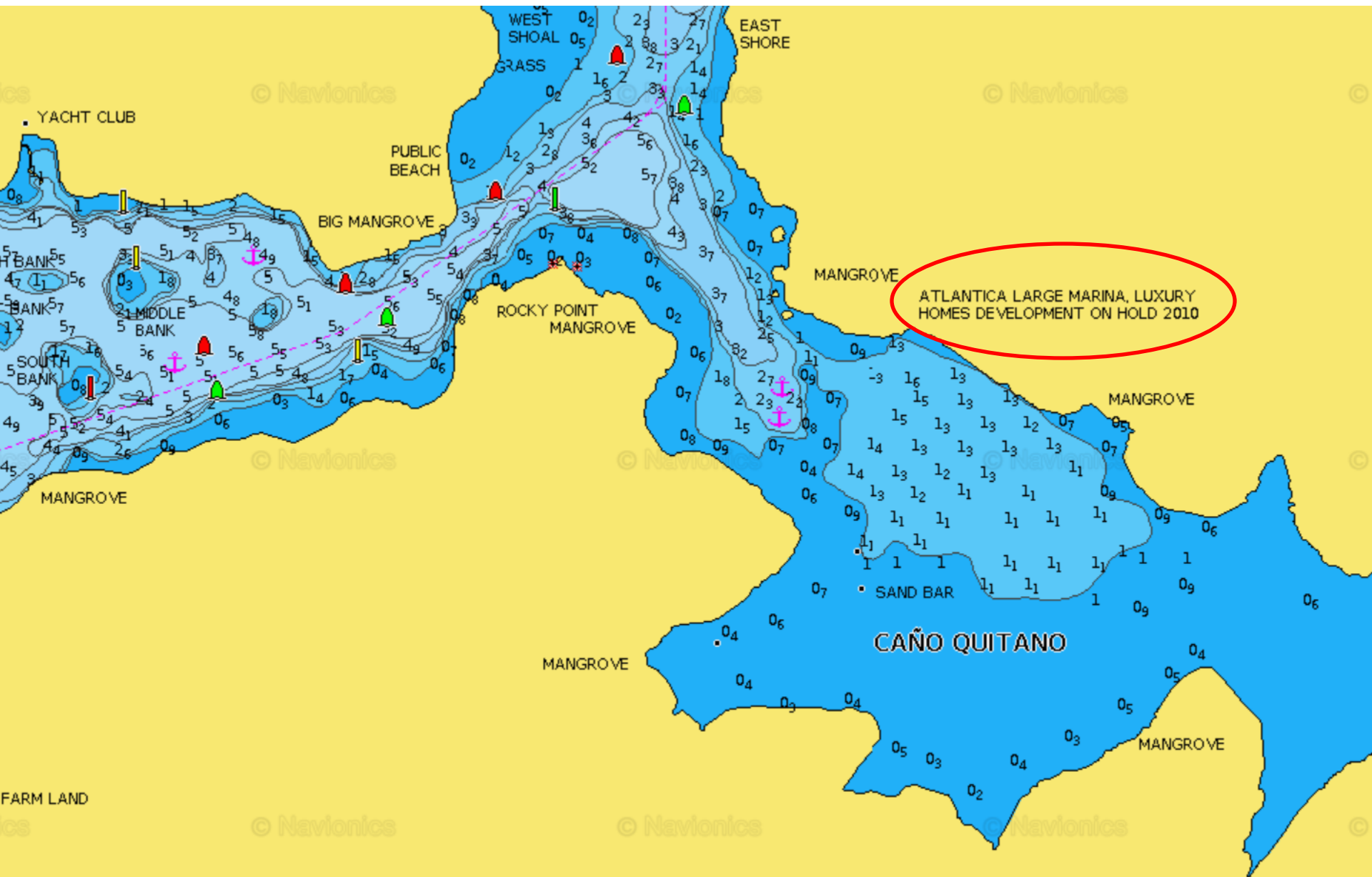


Luperon, Dominican Republic

Satellite View





Luperon's New Marina?



Luperon's New Marina?



What Can Display Satellite Imagery

- GoogleEarth (Windows, Android only)
- SAS Planet (Windows only)
- Guru Maps (iPads, iPhones, Android) 
- All In One Offline Maps (Android) 
- Some chartplotter chart sets now include satellite charts
 - Garmin G2 Vision (but poor resolution)
- OpenCPN & Sat2Chart Charts (Windows, Linux, Apple Mac, Android (tablet & phone),
 - Sorry, not iPad or iPhone

Using Satellite Image Programs Directly

- GoogleEarth
 - You are not in control of the chart-saving
 - Automatic updates change capabilities
 - Careful with Perspective slider (tilts the map)
- SASPlanet
 - Can control what is saved
 - Possible to populate from other's saved data
 - Not as user friendly
- Same issues with satellite imagery programs on tablets
- These are not really navigation programs

What is OpenCPN?

Open Chartplotter Navigator

- An “open source” (**FREE**/ donationware) navigation and charting program
- Now runs on Windows 7-11, Mac, Linux, Raspberry Pi, and Android
- Regularly being updated with new features by cruisers, for cruisers
- Download **FREE** from <http://opencpn.org>
 - Android Version on Google Play (\$9.99 for supported version with updates)
Make sure you choose the Dave Register version



OpenCPN Chart Table Overview

The screenshot displays the OpenCPN 5.6.2 interface. On the left is a vertical toolbar with icons for various functions. Below the toolbar is a menu with options: Show/Hide Toolbar, Settings, Create a Route, Route & Mark Manager, and Enable Tracking. A tooltip for the 'Enable Tracking' icon reads: "Hover over each icon to see a tool tip for what the icon does." Below the menu is a "Chart Information pop-up" window with the following text: "ChartFile: C:/Users/sherr/Document/Charts/Indonesia SP/HalmaheraMorotai/BacanSW.Z16-Z16.mbtiles", "Name: BacanSW.Z16-Z16 20220211135723", "Scale: 1:15000", "ID:", "Depth Units:", "Soundings:", "Datum: WGS84", "Projection: Web Mercator (EPSG:3857)", "Source Edition:", "Updated: 2000-01-01". At the bottom of the window are three tabs: "mbtiles Chart", "KAP Chart", and "CM93 'Background' Chart". The main map area shows the Bacan Islands with various chart overlays: a pink "mbtiles Chart", a blue "KAP Chart", and a yellow "CM93 'Background' Chart". Annotations include "Chart Outlines" pointing to red dashed lines, "Other cruiser's tracks" pointing to blue lines, and "Chart Bubble/Bars" pointing to red dashed lines. A large "Feet" text is on the right with the note: "IMPORTANT! The background chart is in feet. Numbers on mbtiles/KAP charts may be in feet or meters no matter what this says!". The bottom status bar shows coordinates: "01° 02.2815' S 126° 16.8644' E 095° 3196 NMi" and speed indicators: "SOG --- kts COG ---°".

Click here to display satellite chart

Zoom in and out... + and - keys, or mouse scroll wheel

Explore the Toolbar & Find the Manual



Collapse Tool bar

Options/Settings

Draw a route

Open Route & Mark Manager

Enable/Disable “snail trail”

Change to night mode

Print chart

HELP! / About box

Climatology (Historical weather)

Radar window

Weather Routings

Grib File viewer

MAN OVERBOARD Marker

Hover your mouse over each icon, and you will see a “tool tip”



Offline manual is here

Benefits of OpenCPN

- **Free, free, free**
- Runs on almost everything (exc iPad ☹️)
- Supports many chart formats
- Great for sharing tracks and waypoints (gpx)
- Permits adjustment to CM93 v2 Charts
- Good website and extensive help
- Many, many Plug-ins to add functionality

OpenCPN Tutorials

- Sherry (Soggy Paws)
<https://svsoggypaws.com/presentations.htm#navigation>
- Terry (Valhalla)
- Youtube

Sat2Chart Tutorials

- Embedded in Sat2Chart
- Jon (Ocelot)
- Bruce (Migration?)

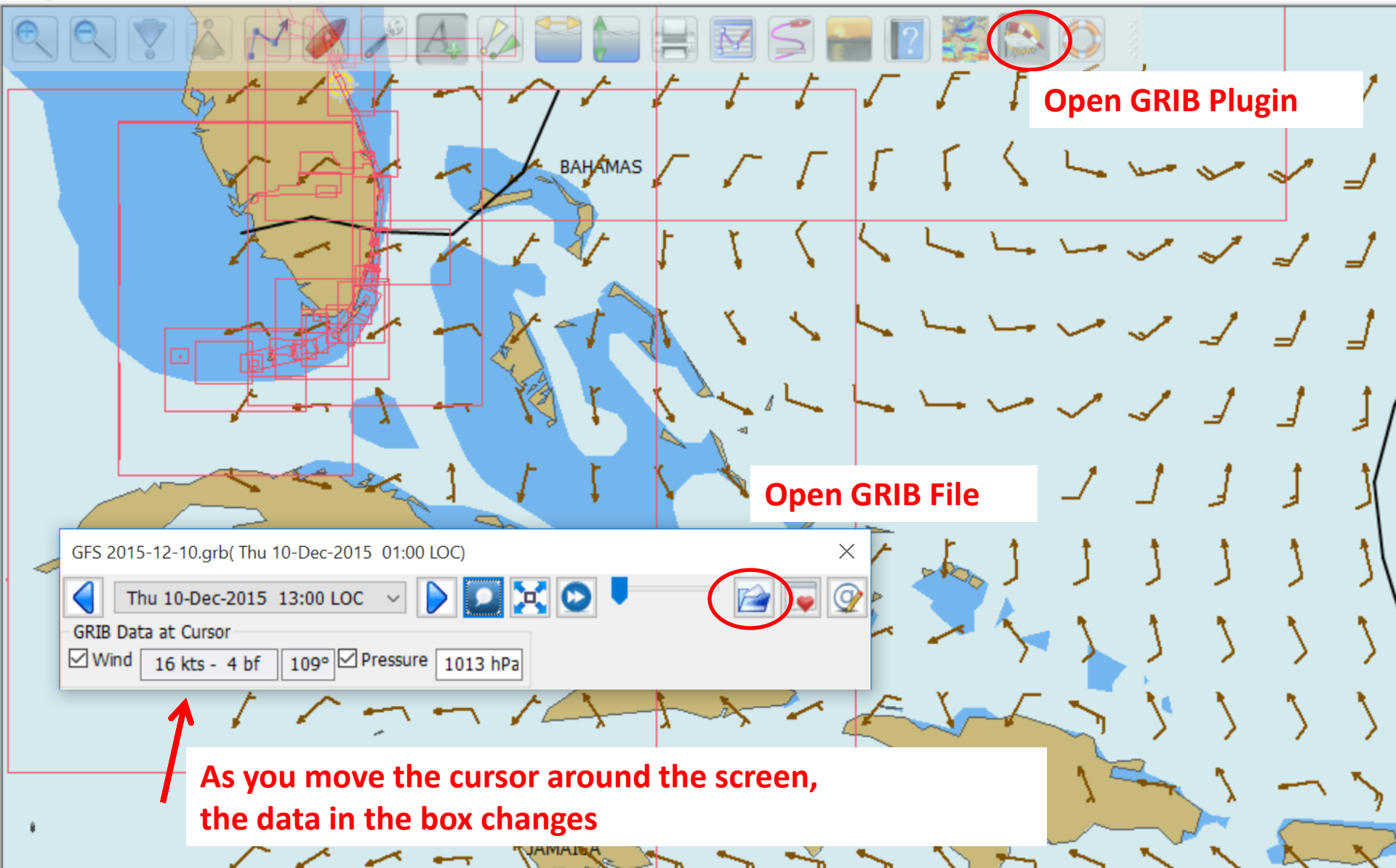
Sources of Free Satellite Charts

Location	Coverage
Migration's ChartLocker	Mexico, all the Pacific Islands, the Dominican Republic, Panama, Australia mbtiles 2021/2023 https://chartlocker.brucebalan.com
Ocelot's mbtiles Charts	SE Asia, Western Pacific, and Indian Ocean 2021/2022
Zen Again's Charts	Pacific Ocean, SE Asia, Crossing to S Africa, S Atlantic, Brazil
Valhalla's Charts	SE Asia, Indian Ocean, and Western Pacific And CM93 v2 Download for OpenCPN. Downloadable anchorage waypoints in GPX format. Mbtiles
Jacaranda's Charts	French Polynesia
Soggy Paws' Charts	Red Sea (Complete), Philippines (Partial), Papua New Guinea, Solomon Islands, Micronesia, Marshall Islands, Fiji, French Polynesia

Links to all these sources can be found on
<https://svsoggyaws.com/SatCharts/>

Also check the OpenCPN.org Chart Sources Page:
<https://opencpn.org/OpenCPN/info/chartsource.html>

GRIB Plugin



Open GRIB Plugin

Open GRIB File

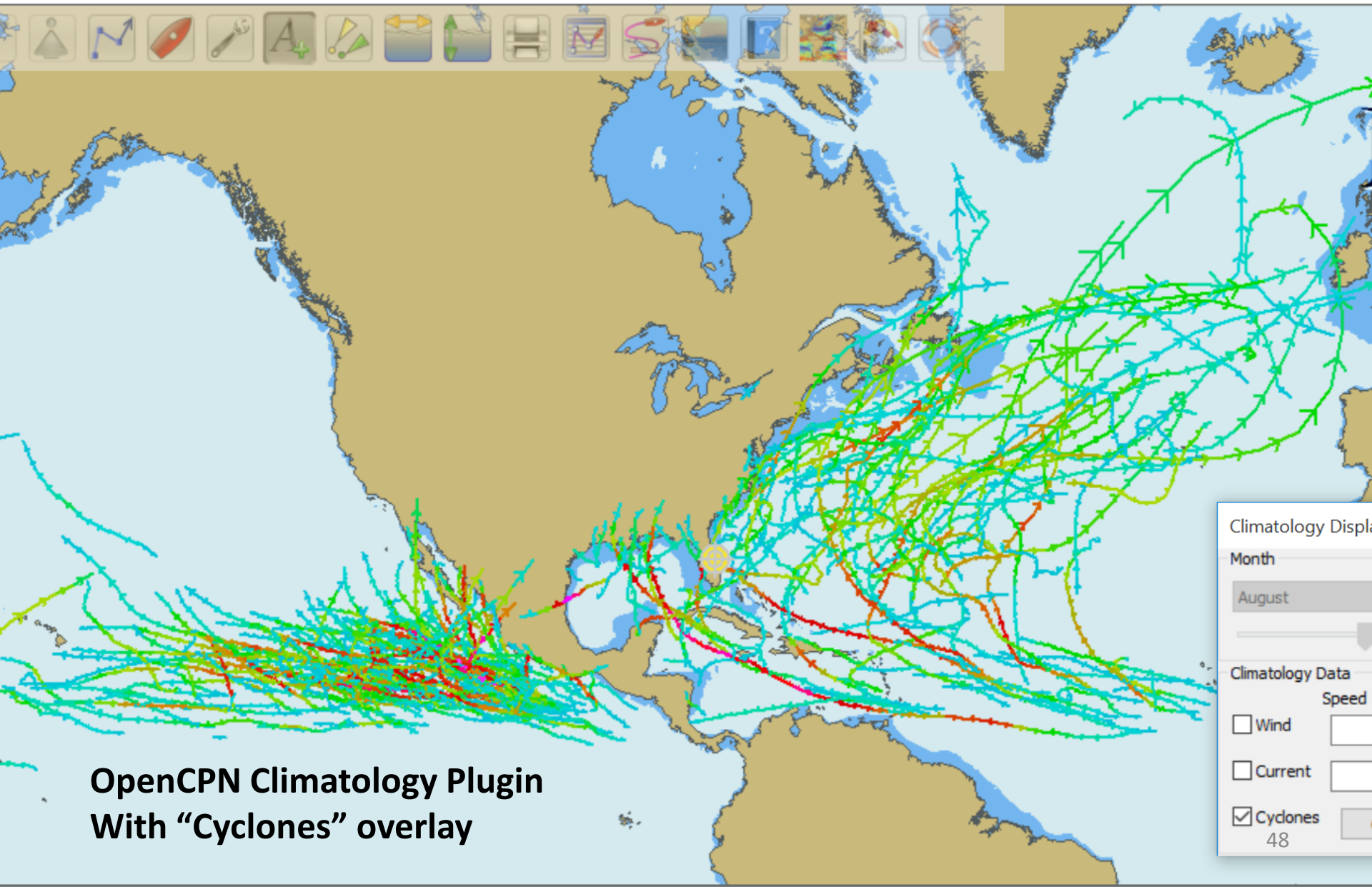
As you move the cursor around the screen, the data in the box changes

Climatology Plugin

- Pilot charts overlaid on your chart
- Updated with fairly recent data
- Wind, currents, and tropical storm tracks
- Traditional wind rose display, or wind barbs

Climatology data was downloaded from NOAA and averaged the 1980's depending on data type and sources available (for example, Wind data is averaged 6 hr data since 1987)

Where is a Safe Place to Be In August?



**OpenCPN Climatology Plugin
With "Cyclones" overlay**

More OpenCPN Plugins

- Radar overlay (Garmin, Navico, B&G)
- Weather Routing
- Voyage Data Recorder
- Stowage Manager
- Logbook Function
- NMEA Instrument Display

Accuracy of GPS

- Understand the limitation of your GPS
- Time to acquire fix varies widely
 - How many receivers it has (8,12,48 channels)
 - How long since last use
 - How far away from last use
 - Signals blocked (cabin, trees, buildings)
 - Newer devices can perform significantly better

Entering a new Area?

What Charts to Use?

- ASK “what are the best charts for...”
- Make sure you validate
 - Chartplotter, tablet, or computer
 - What “generation” of chart
- Ask people who “go places”
- Harbor charts for busy ports are almost always accurate everywhere
- The further off the beaten path, the more likely the charts will be inaccurate

Entering a new Area?

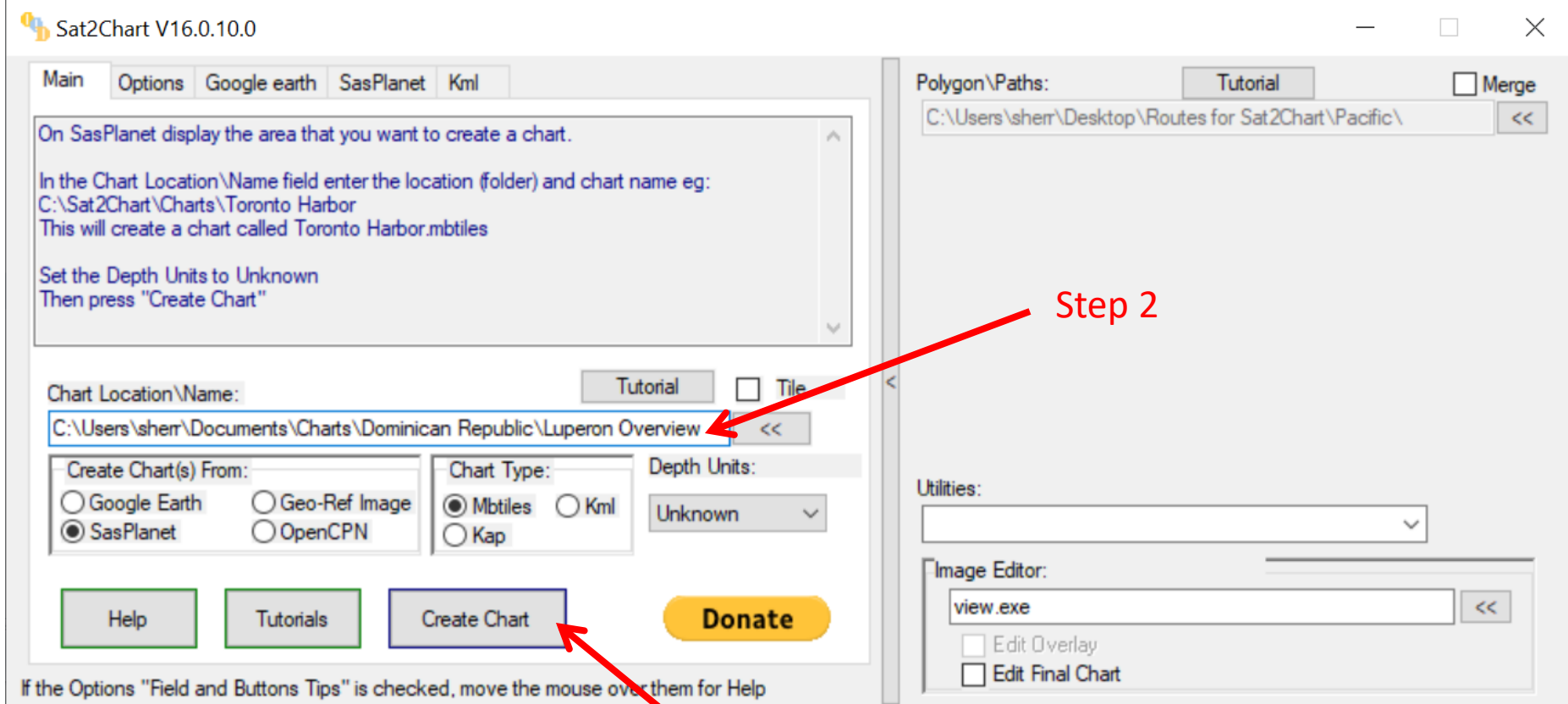
How to Check Your Chart

- Accuracy
 - Plot a known set of waypoints
 - GPX / Friend you trust / Satellite / Guidebook
- Detail
 - Check vs other sources
- Plot route and check at low level
- If you change your route, check your NEW route at low level

Making Your Own Satellite Charts

- SAS.Planet for the imagery (better than GoogleEarth)
- Sat2Chart to capture the image
- <https://www.gdayii.ca/Downloads/>
 - Download and unzip Sas.Planet to C:\
 - Download and install Sat2Chart
- Very very simple to make one chart
- Sat2Chart can also make “area” charts
 - Draw the area in OpenCPN as a closed route
 - Export the route
 - Use Sat2Chart in the Polygon/Paths mode

Sat2Chart Basic Screen



Step 3

- Get the view you want to capture up in SasPlanet
- Set the directory and chart name in Sat2Chart
- Make sure settings are on SasPlanet and Mbtiles
- Click "Create Chart" Button

The Bottom Line

- Know the true accuracy of your GPS device
- Plot a detailed route and examine for anomalies
- If your route changes, examine it again
- Don't sail around reefs at night
- Use all the tools available
 - Paper charts
 - Electronic charts from several sources
 - GoogleEarth, SasPlanet & other satellite charts
 - Other cruiser's tracks and waypoints
 - Cruising guides

Recognition/Thanks

- **OpenCPN development team**
- **Paul Higgins-** Sat2Chart chart maker program
- **Terry Sargent-** SV Valhalla
- **Bruce Balan-** SV Migration
- **Jon Hacking-** SV Ocelot
- And its all still FREE!

This presentation and an OpenCPN tutorial is on our website [Presentations](#) page

- See 'Using Satellite Charts with OpenCPN'

Useful Links

- <https://svsoggypaws.com/SatCharts/>
 - Download existing Sat Charts
- <https://svsoggypaws.com/presentations.htm>
 - Learn more about OpenCPN
- <https://opencpn.org/>
 - Download OpenCPN
- <https://www.gdayii.ca/Downloads.php>
 - Download Sat2Chart
- <https://www.gdayii.ca/Downloads/>
 - Download SasPlanet
- http://svocelot.com/Cruise_Info/Equipment/mbTiles.htm
 - Extensive “How To’s” on Advanced Sat Chart Making



The End
www.SVSoggyPaws.com



The End

<http://svsoggypaws.com>