Electronic Charting 2025

"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

"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

Chart Zooms / Avanti Wreck

From sv Golden Glow on Noonsite

"Beveridge Reef appears on our Furuno Chart, but only when it's zoomed in to a map size of 35 nm across the screen (at 40 nm size it's NOT visible).

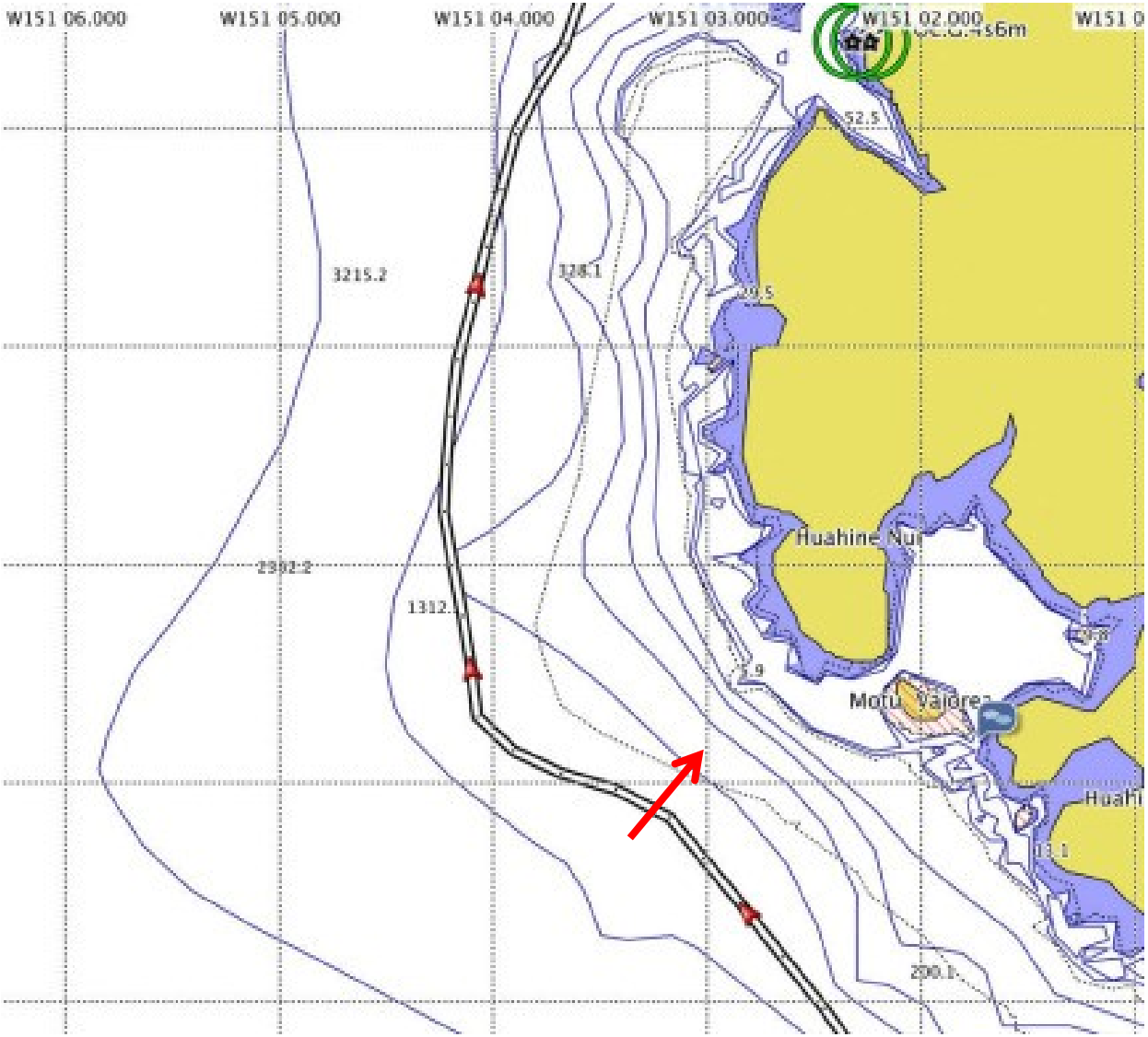
Navionics and iNavx apps DO show Beveridge Reef, but our Earthmate (Garmin) app, the map for our Delorme explorer device, does NOT show the reef."

"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."

Arriving late in the day, racing sunset, they cut the corner on a reef entering Huahine in French Polynesia. Charts were slightly off.

On the rocks, NW Australia, June 2016

Moonshadow's Close Call



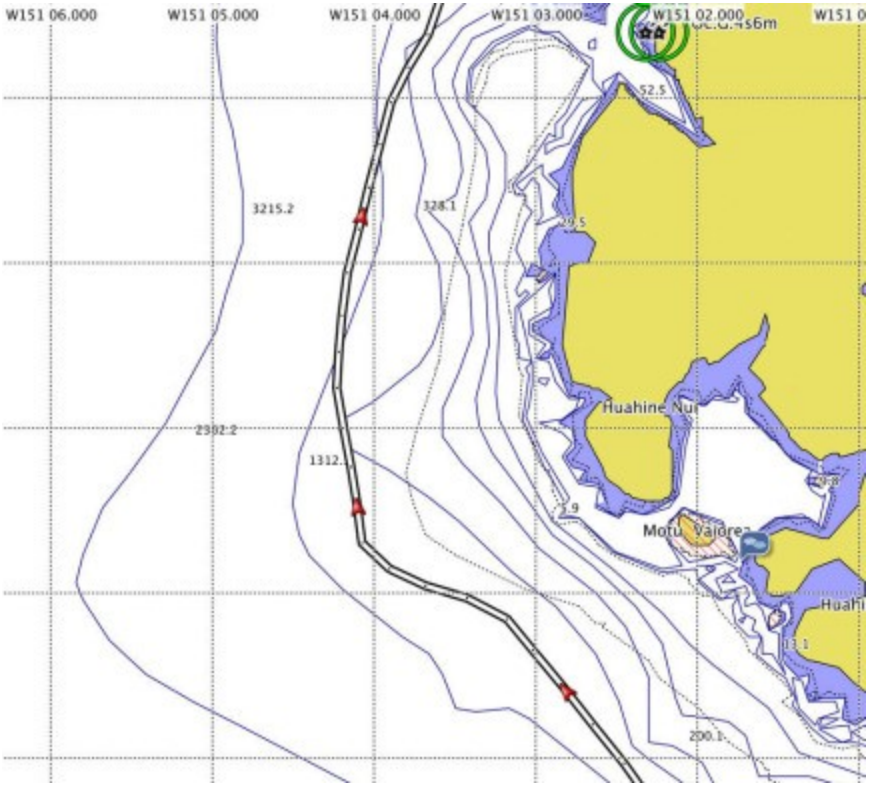
"We had plotted a route that kept us outside the 300-foot depth contours"

Moonshadow's Close Call

"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"

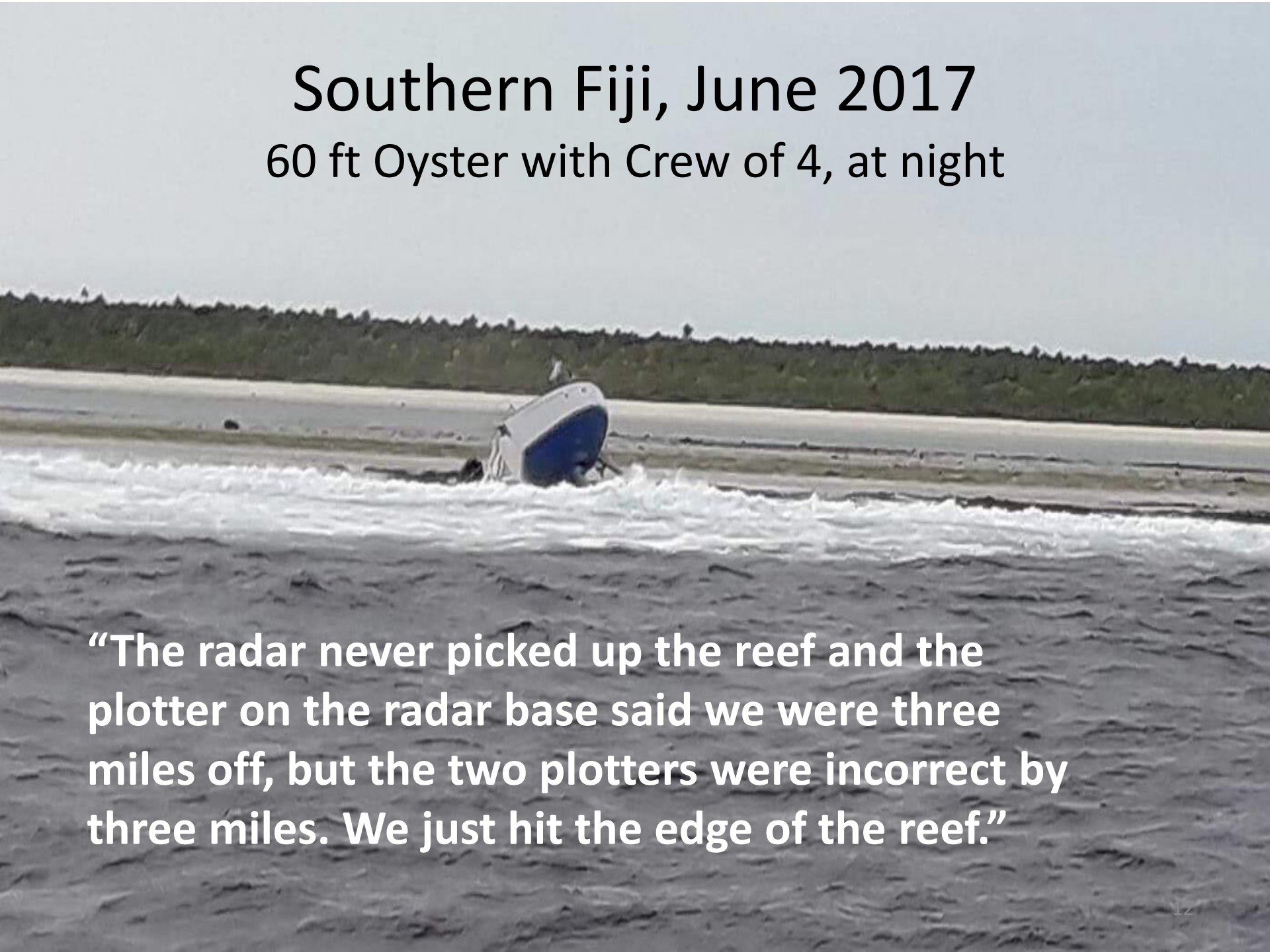
Side-by-Side Comparison



The coastal scale electronic chart supplied to USS *Guardian* was flawed due to human error on the part of the NGA. This error **mis-located the Tubbataha Reef by 7.8 nautical miles** from its actual location. NGA was aware of this error in 2011 and updated a smaller scale electronic chart, but failed to publish a correction for the larger scale chart that the USS *Guardian* was using when she ran aground.

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.”

Things to Think About

- Be suspicious of your charts
- Don’t use your iPad / Android tablet as your only navigation tool
- Don’t 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 Sat2Chart
- Introducing the power of OpenCPN

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

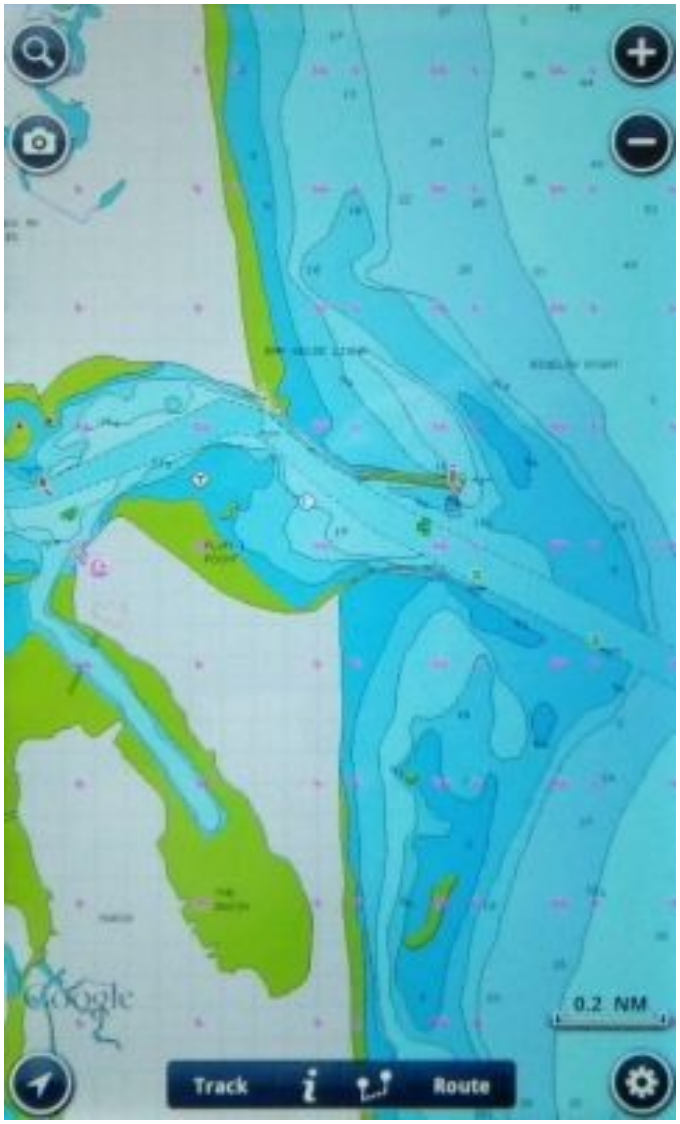
Paper Charts

- Satisfyingly “there” feel
- Only as good as the survey they are based on
- A pain in the ass 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 keep updated

Raster vs Vector



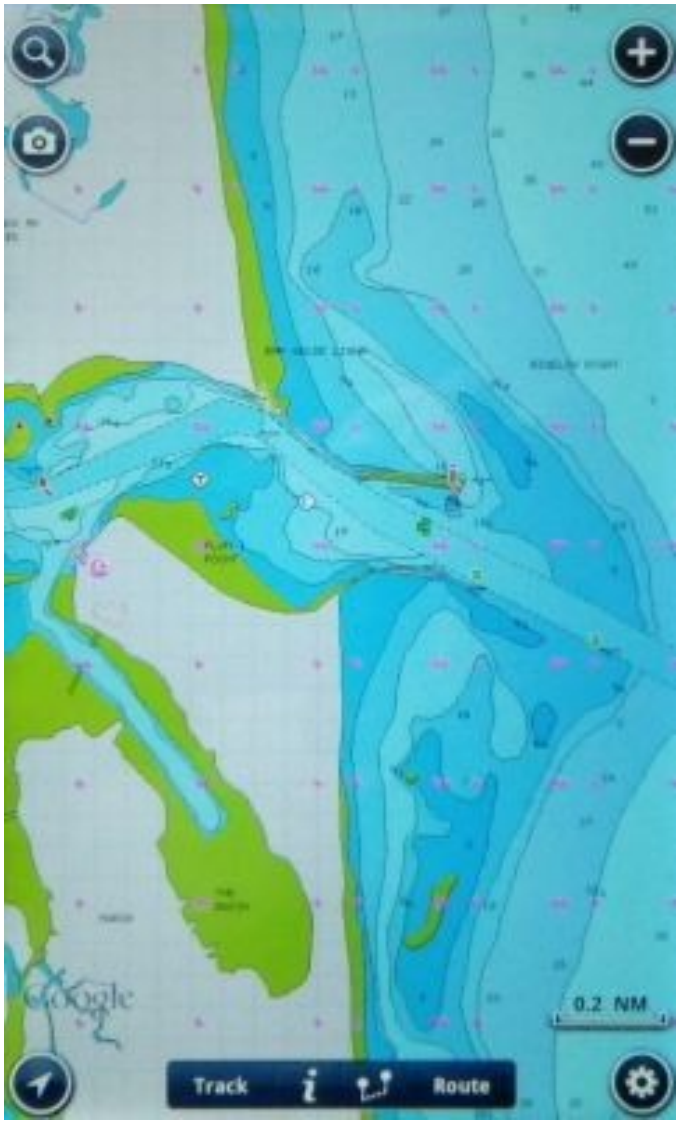
Electronic Vector Charts

- Vector charts have been drawn from paper charts by *someone*
- 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”, and “data”
- Much easier to update electronically

Electronic Vector Charts

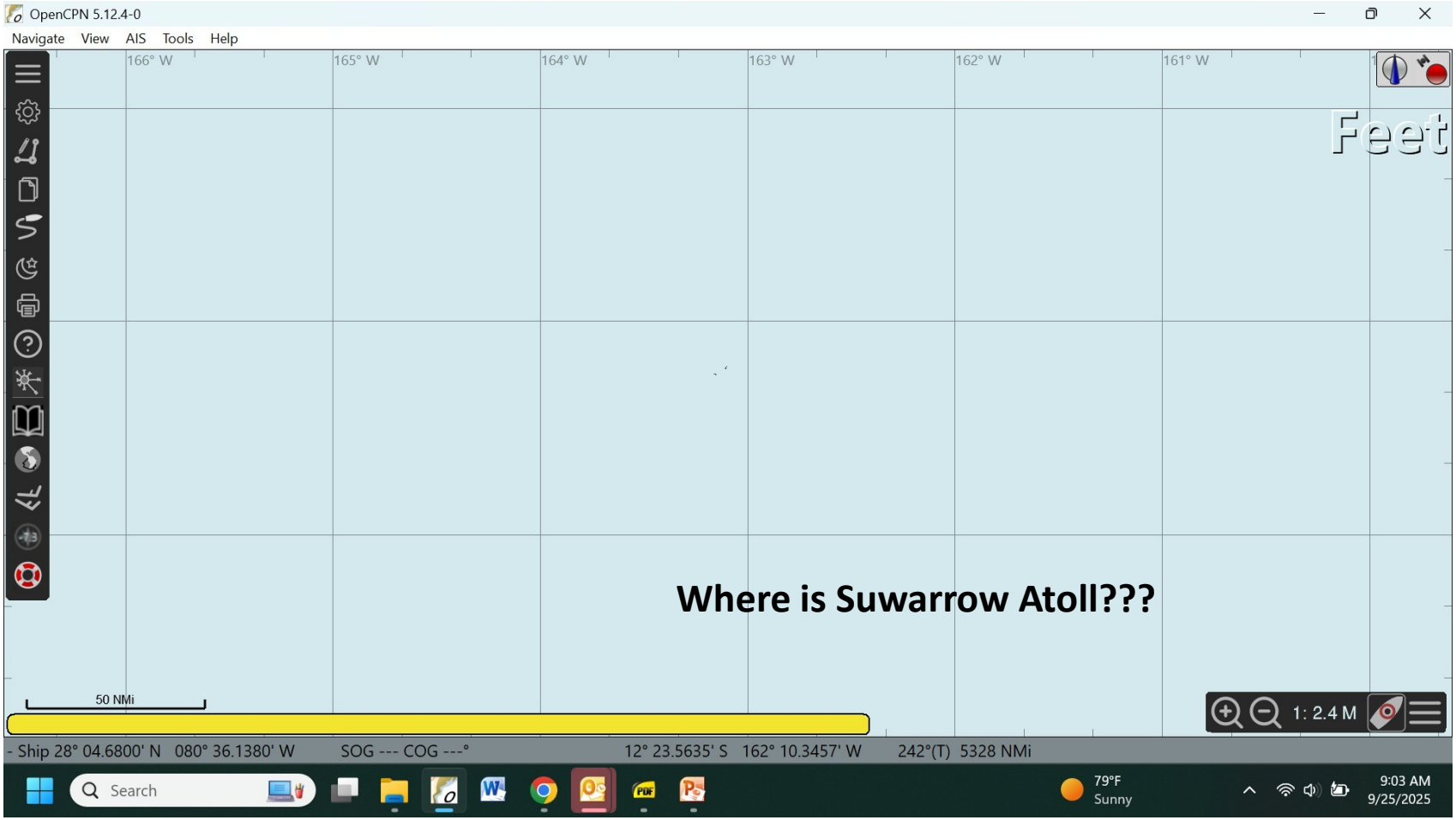
- Most chart plotters are using vector charts
- Most tablet/phone apps are using vector charts
- Take a significantly smarter program to display and use
- Very powerful if used correctly
- Sometimes confusing to use and/or set up (flexibility = complexity)

Raster vs Vector



Problems with Vector Charts

The Disappearing Island – Chart Zooms



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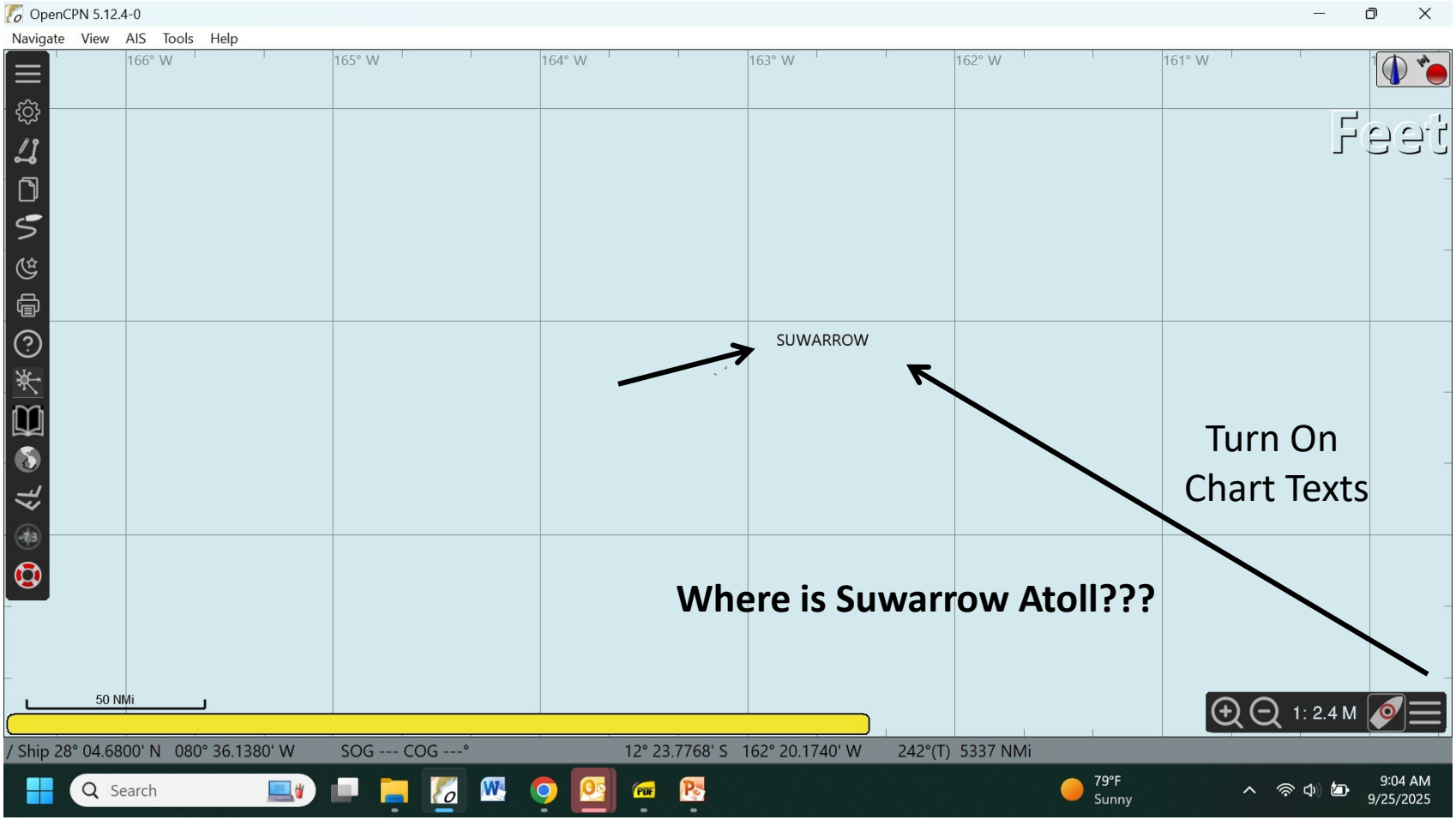
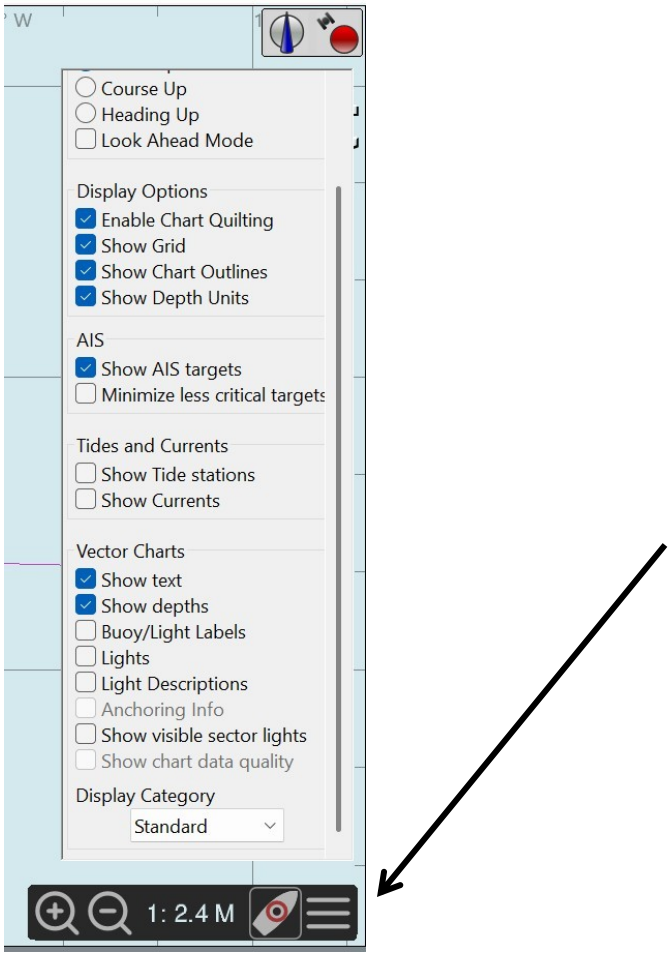


Chart Texts Hotkey = “t”

Side Note: Chart View Menu



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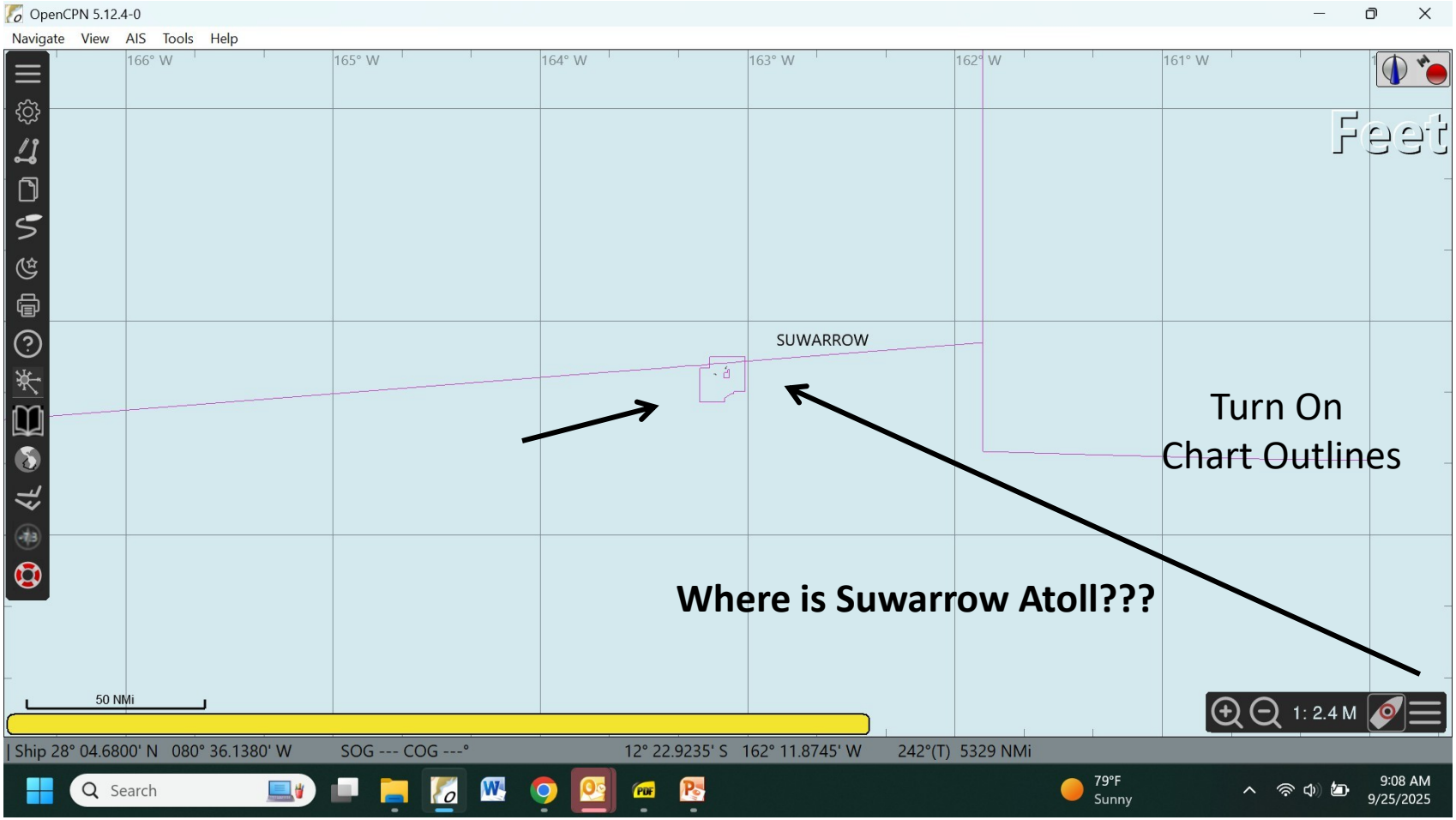
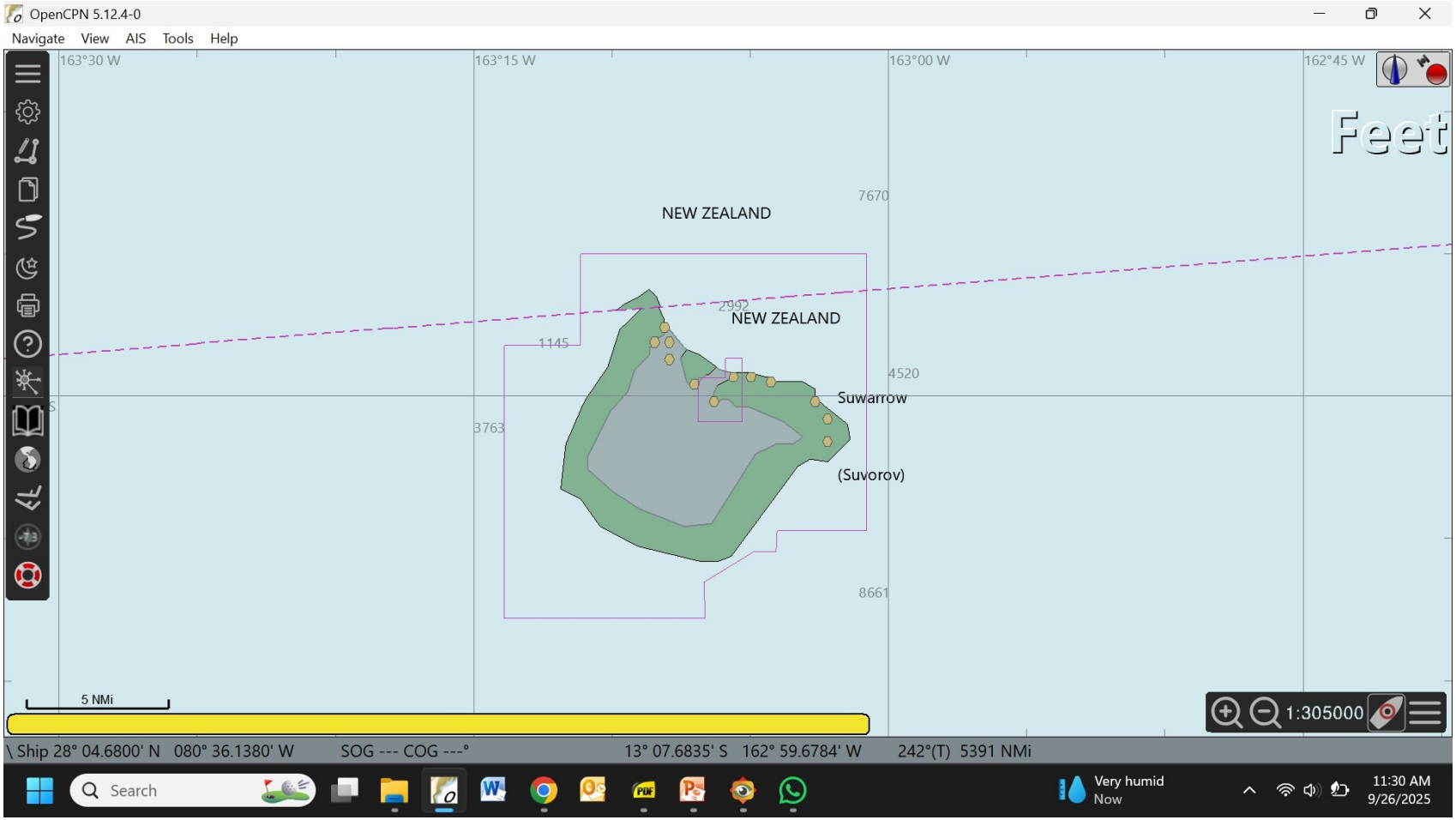


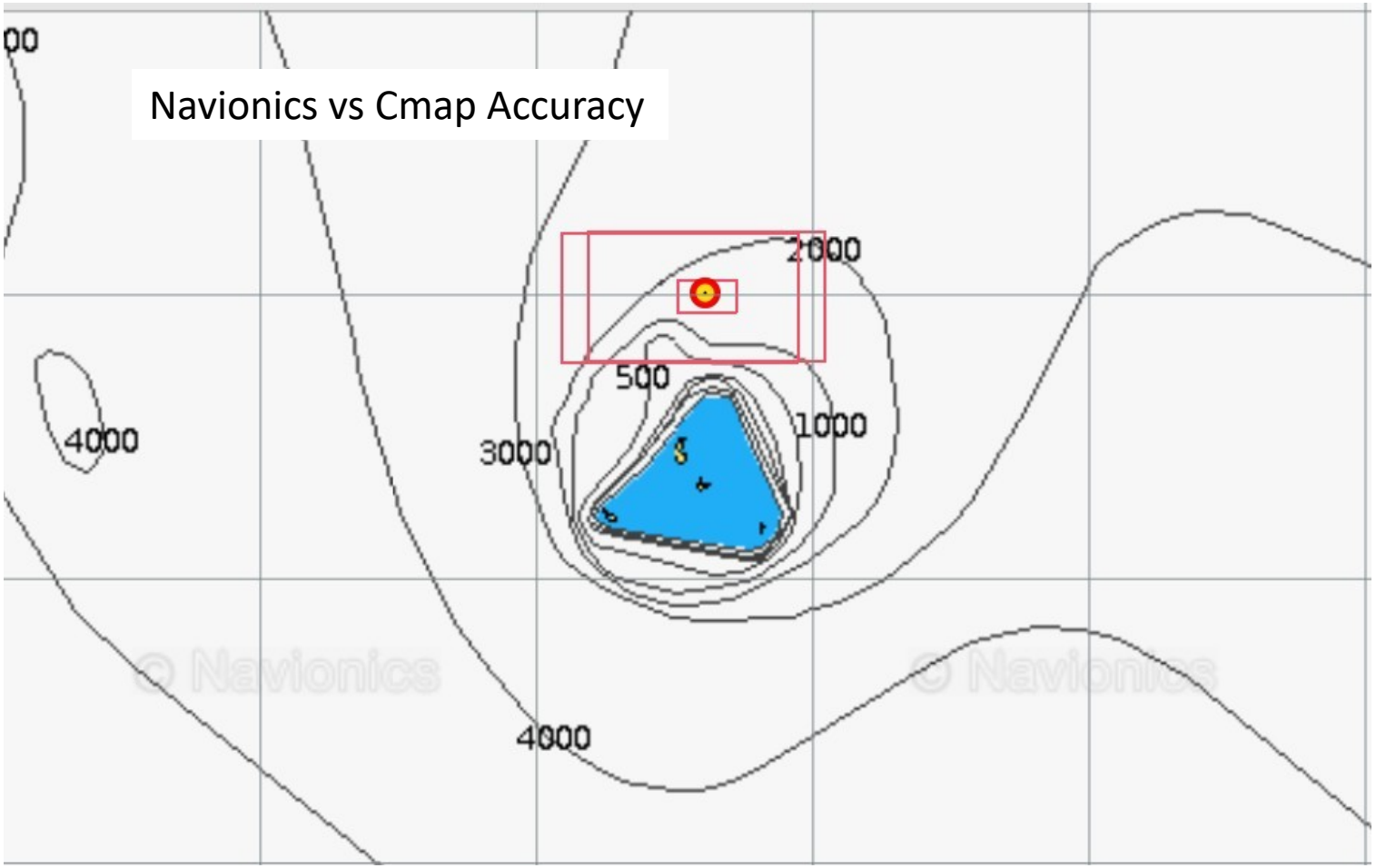
Chart Outlines Hotkey = “o”

Problems with Vector Charts

The Disappearing Island – Chart Zooms



Suwarrow Atoll- The disappearing island is also misplaced.



The Disappearing Island-

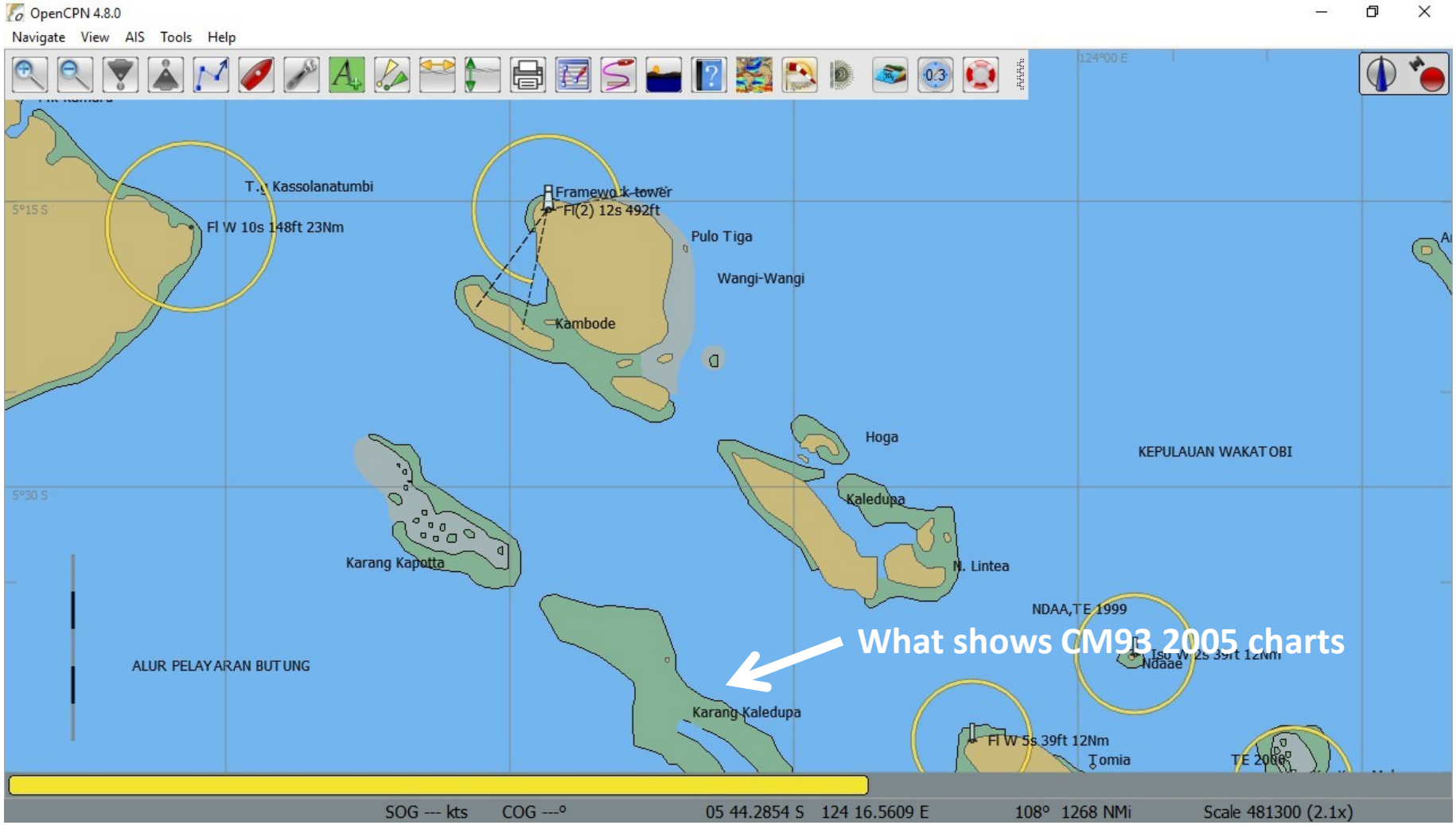
is it really misplaced?

The Disappearing Reef

Sat Chart Version

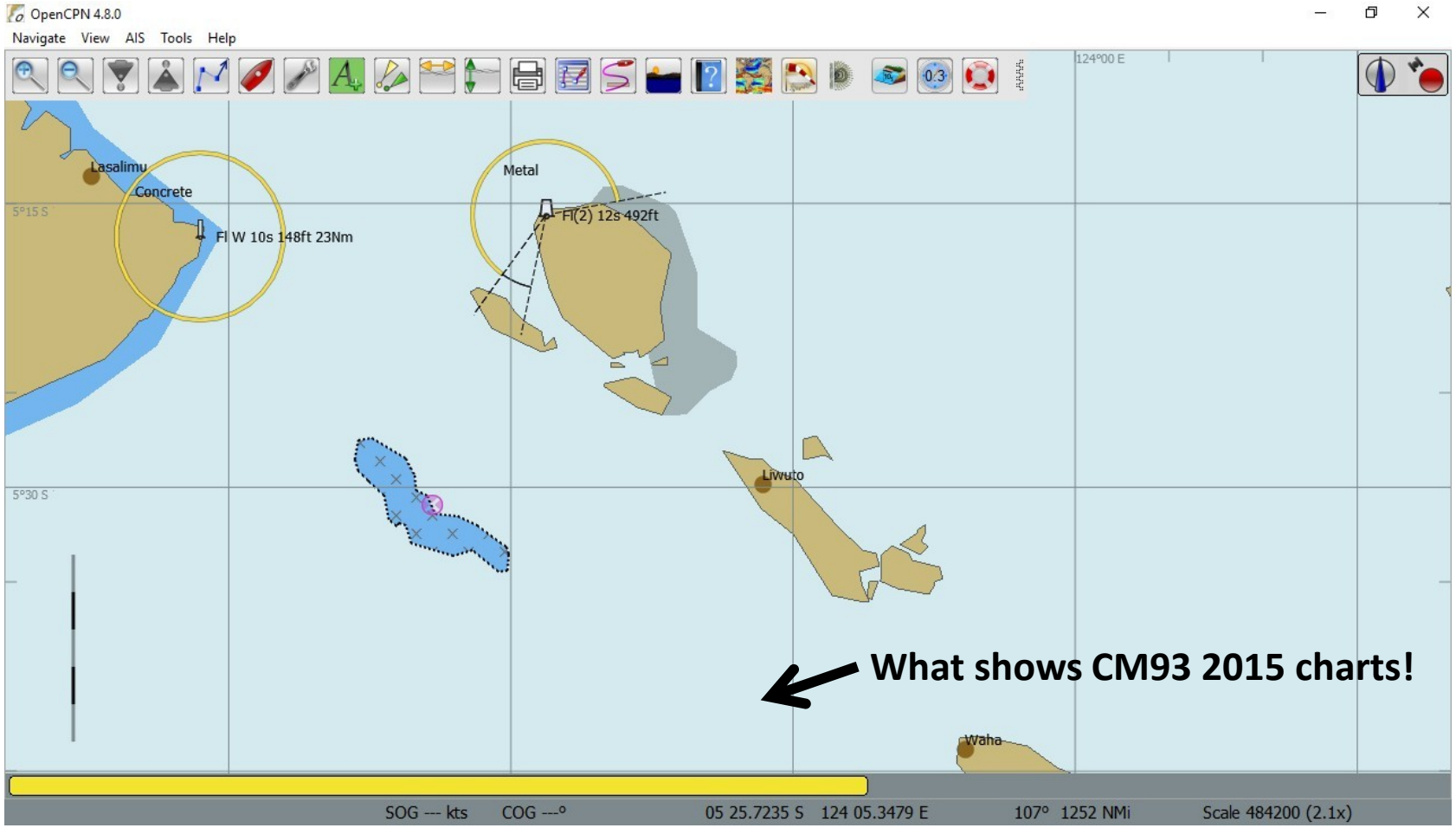
The Disappearing Reef

Chart Versions



The Disappearing Reef

Chart Versions



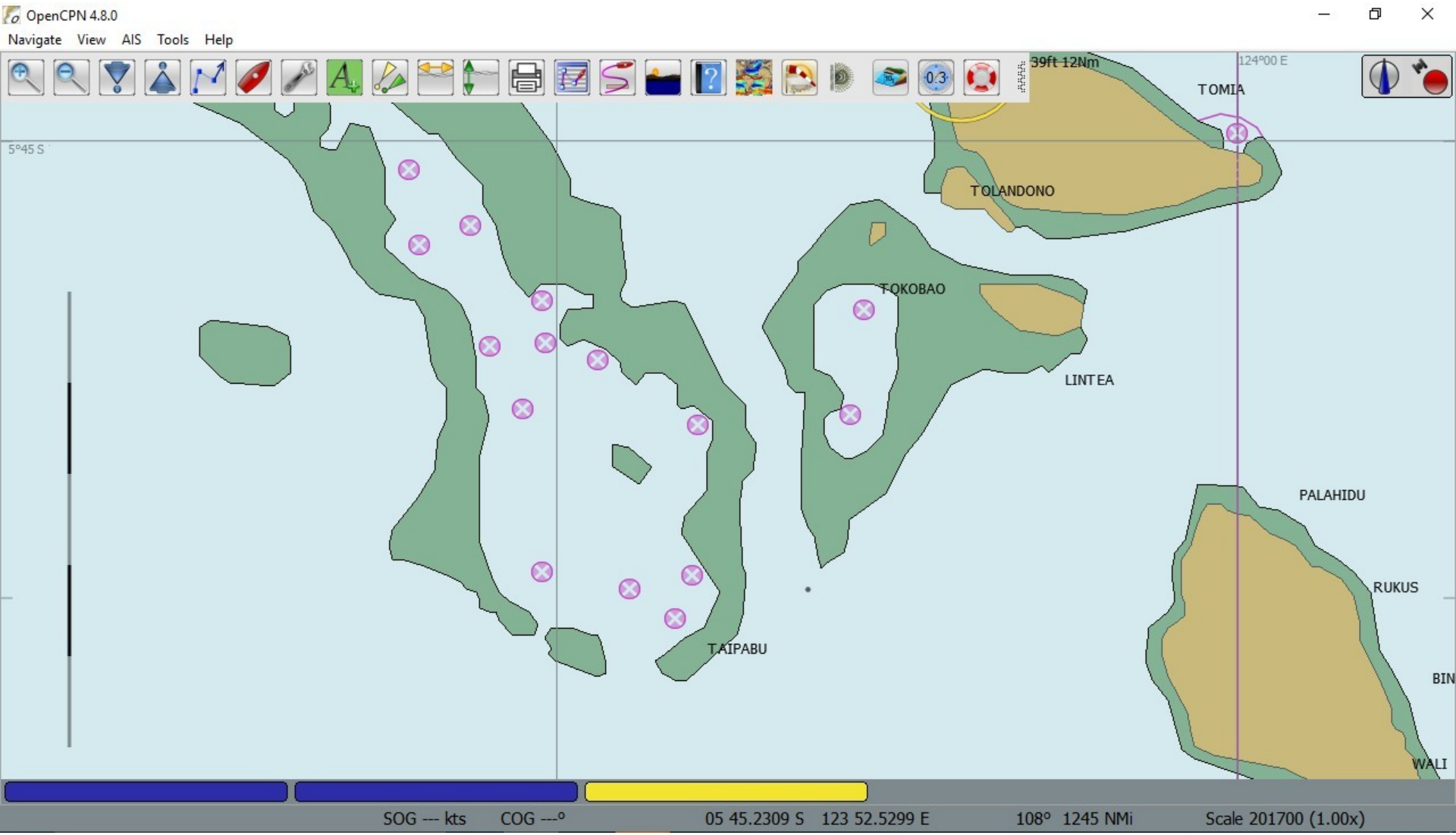
Some Sources of Vector Charts

- Your local country's chart purveyor
  - Sometimes free, sometimes not
- CM93 v2 (stopped updating in 2010/2015)
- CM93 v3 Cmap / Time Zero (Furuno)
- Garmin ($250-$350 per region)
- Navionics
- Raymarine
- Other Cruisers
- The Apple Store!

What Can Run Satellite Charts

- GoogleEarth (Windows only)
- SAS Planet (Windows only)
- Ovital Maps (Tablet only)
- OpenCPN & Sat2Chart Charts (Windows, Linux, Apple Mac, Android (tablet & phone),
  - **Sorry, not iPad or iPhone**
- Some chartplotter chart sets
  - Garmin G2 Vision (but poor resolution)

Which Would You Choose?



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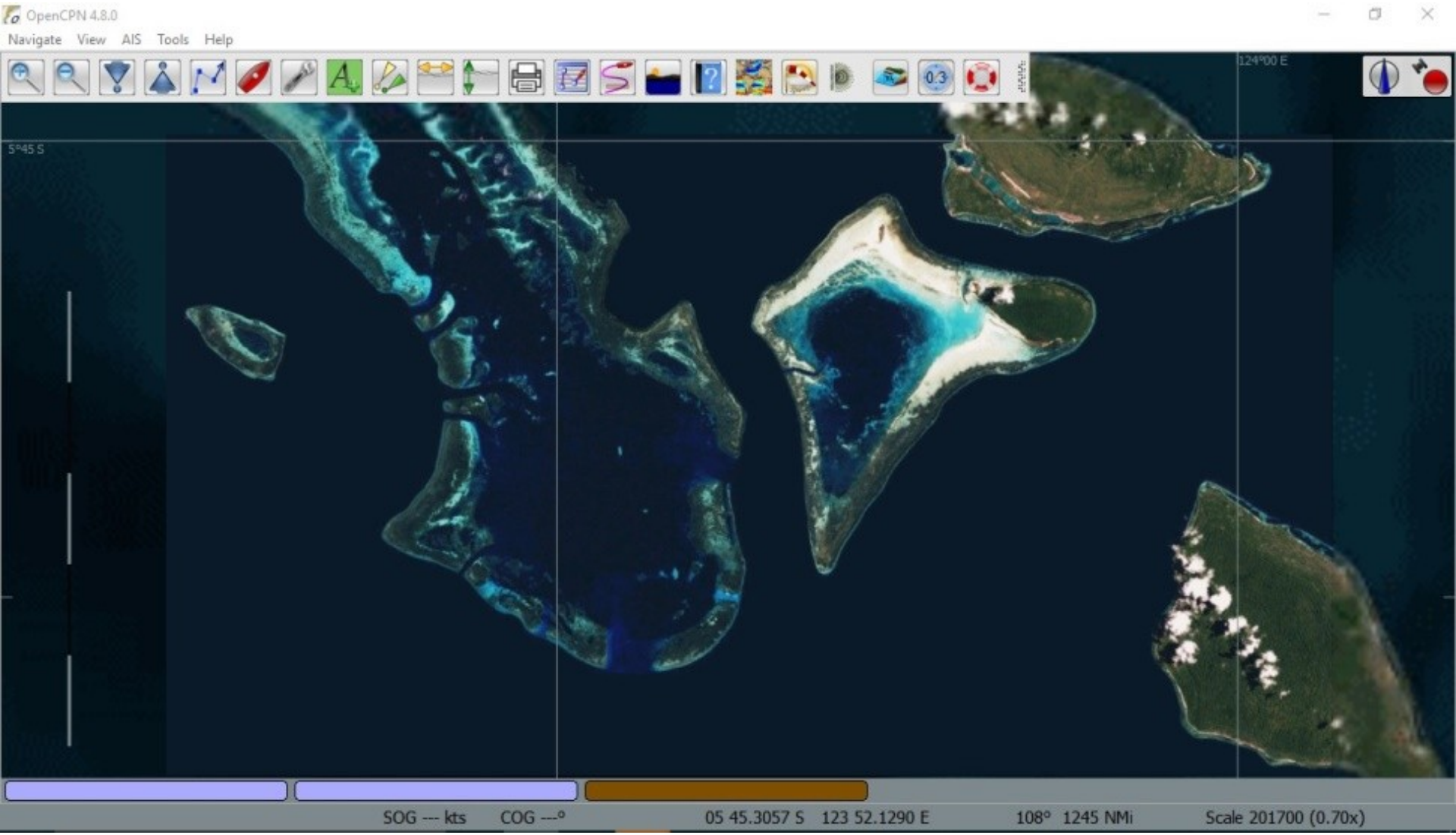

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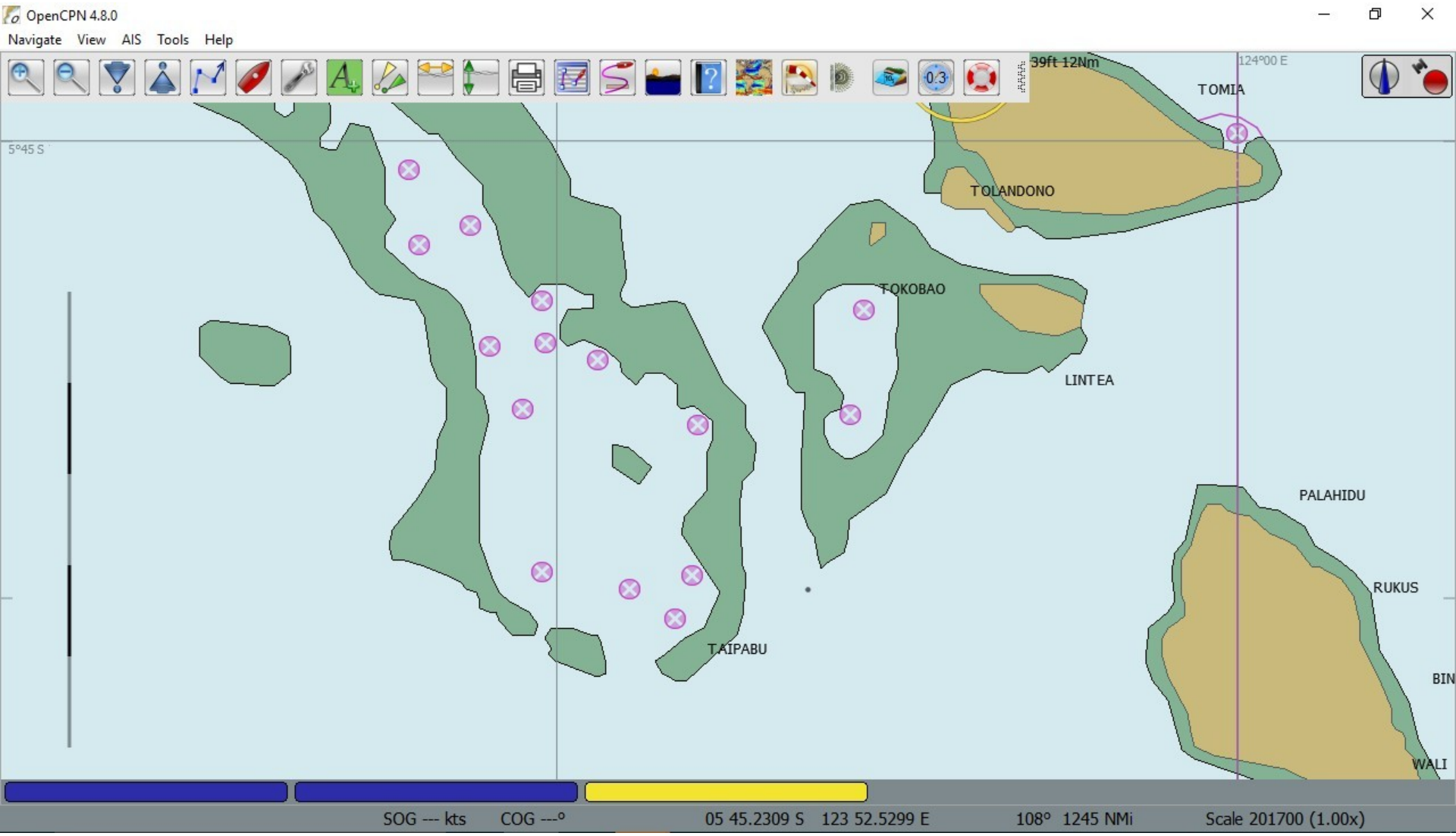


Using Satellite Image **Programs** Directly

- GoogleEarth
  - You are not in control of the chart-saving
  - Not made for navigation
  - Integrating other navigation information
  - You MUST download
- SASPlanet
  - Can control what is saved
  - Possible to populate from other's saved data
  - Not as user friendly
- Is chart there or not???

Benefits of Making Satellite Charts Before Getting Underway

- You know absolutely what you have charted
- You can share your charts with others
- You know who made it and how well it is done

GoogleEarth vs SAS Planet

- GoogleEarth
  - Easier to use but less flexibility
  - Updates may cause problems
  - Limited to JUST Google imagery
  - Infinite / specific altitude settings
  - Many layers and overlay capabilities
- SAS Planet
  - High flexibility
  - Multiple imagery sources
  - User interface is quirky
- For best imagery check both when making charts

Sat2Chart & OpenCPN Tutorials

- Sat2Chart Youtube Channel
- Terry (Valhalla)
- Sherry (Soggy Paws)
- Jon (Ocelot)
- Bruce (Migration)

- Also embedded in Sat2Chart and on OpenCPN

Sources of Pre-Made GoogleEarth Charts

- Mike on Zen Again (world?)
- Terry on Valhalla (SE Asia, W Pac, IO)
- Sherry on Soggy Paws (Fr Poly to SE Asia, Red Sea)
- Jon on Ocelot (SE Asia, Indian Ocean, Africa)
- Bruce on Migration (Carib & Pacific)
- Peter on Grace (W Coast N America, Med)
- Rally Groups (Puddle Jumpers, etc)
- Other Cruisers' hard drive swap
- Best to download big collections in person via hard drive

Sources of Free Satellite Charts

Location	Coverage
Migration's ChartLocker	Mexico, all the Pacific Islands, the Dominican Republic, Panama, Australia mbtiles 2021/2025
Ocelot's mbtiles Charts	SE Asia, Western Pacific, Indian Ocean, South Africa 2021/2025
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
Grace's Charts	West Coast N America, parts of the Med
Jacaranda's Charts	French Polynesia
Soggy Paws' Charts	Red Sea (Complete), Philippines (Partial), Papua New Guinea, Solomon Islands, Micronesia, Marshall Islands, Fiji, French Polynesia, Med (soon)

Complete list of known sources can be found on https://svsoggypaws.com/SatCharts/

Choosing a Charting Program

- Are you held captive??
- Chartplotters = captive, expensive, ruggedized
- Time Zero (ex Nobeltec) = captive, expensive
- Most tablet apps = captive, cheap
- OpenCPN = OPEN!, free!

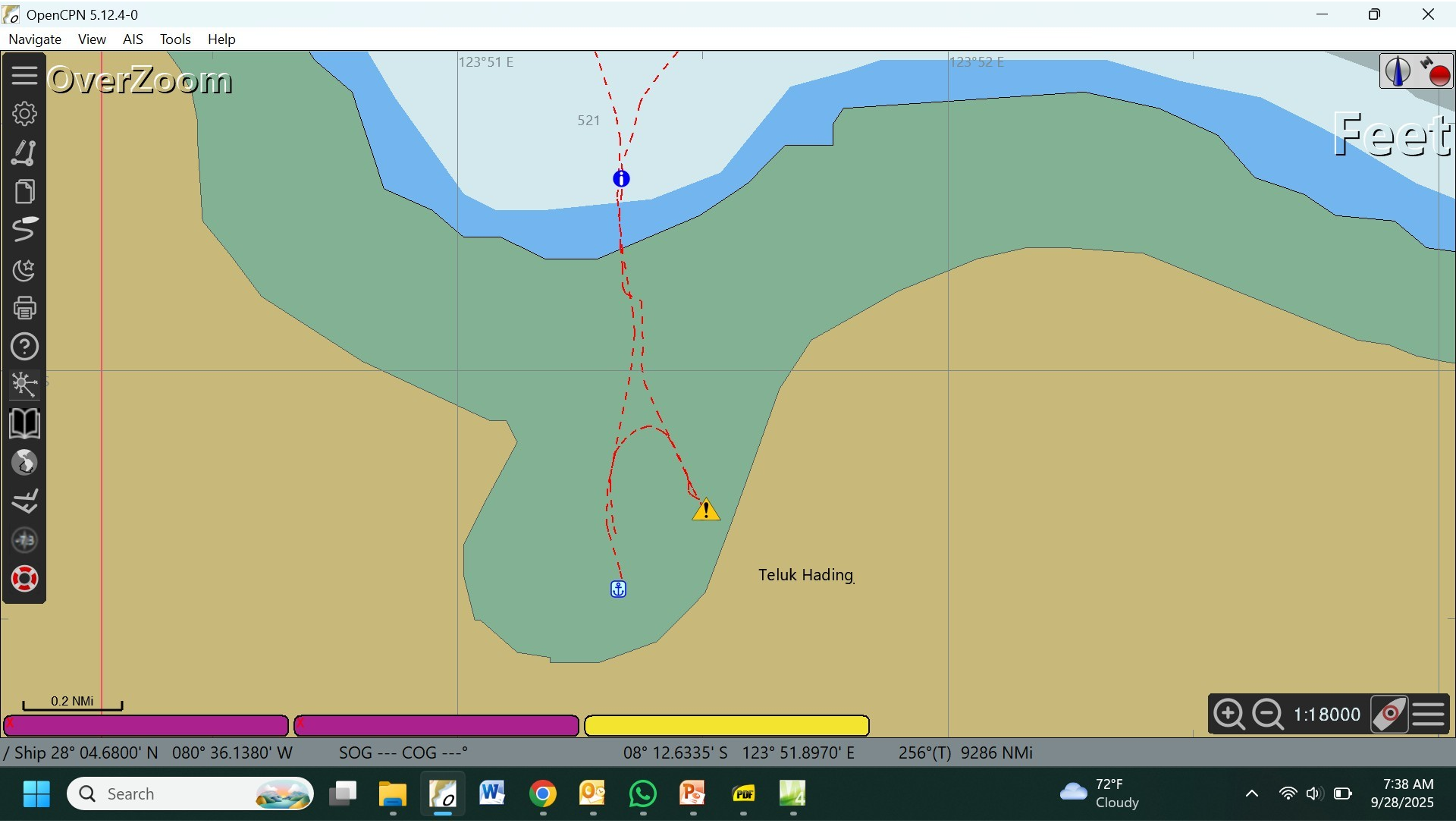
A Caution About Navionics

- Navionics has been acquired by Garmin
- July 1, 2025, **without warning**, Garmin Navionics app deleted charts if you were no longer a subscriber. (SE Asia to Africa)
  - Not accepting new subscriptions
  - “Charts will be available again Q3”
  - Now, the region has been chunked up and costs 3x for the same coverage. (Indonesia still not available)
- The “Navionics on my tablet is so cheap and easy” people were screaming!
- Don’t put all your eggs in one basket!

Benefits of OpenCPN

- **Free, free, free**
- Runs on almost everything
  - exc iPad, iPhone
  - NOT optimized for a cell phone
- 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

Easy to Share Tracks, waypoints, charts



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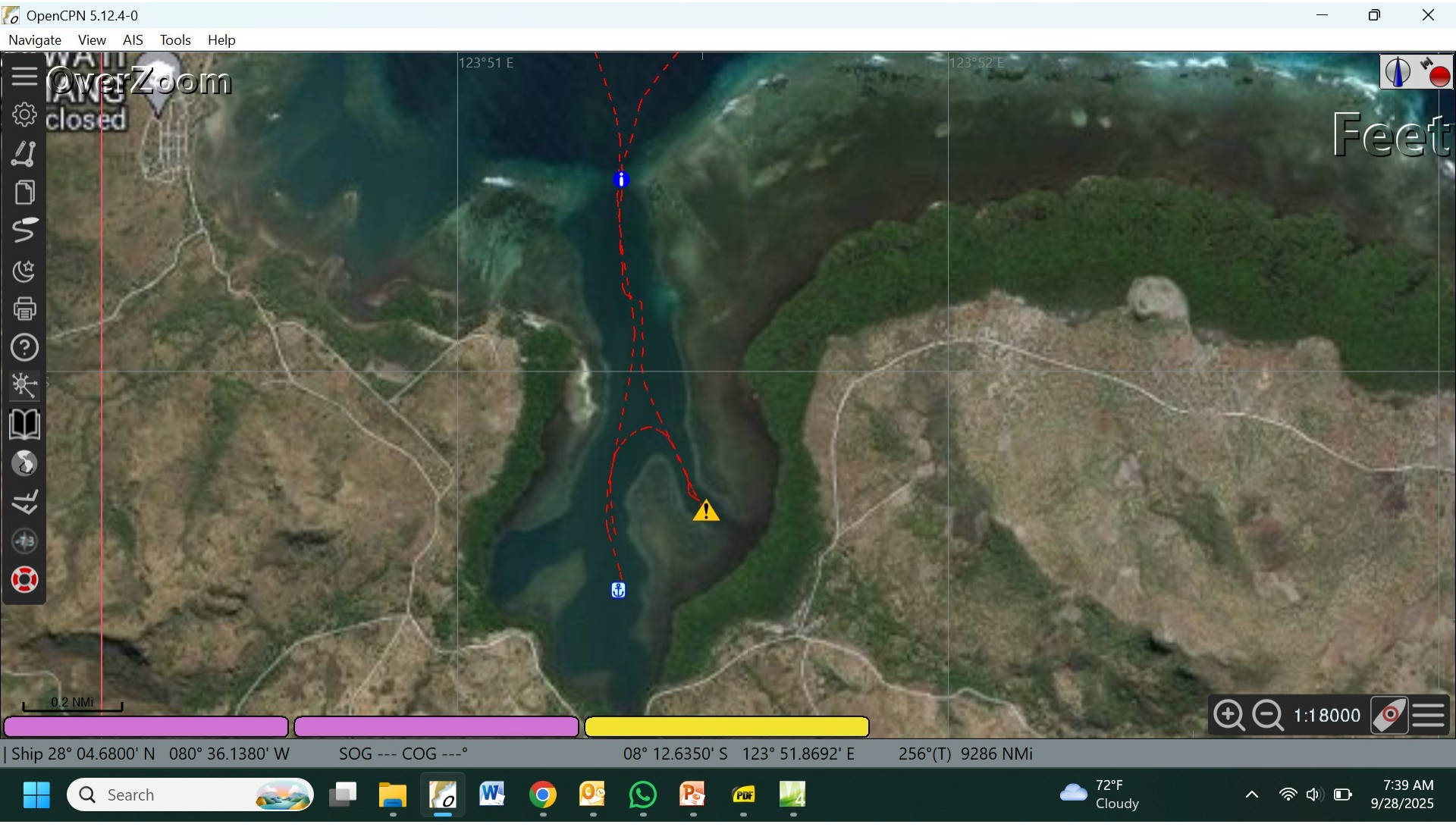
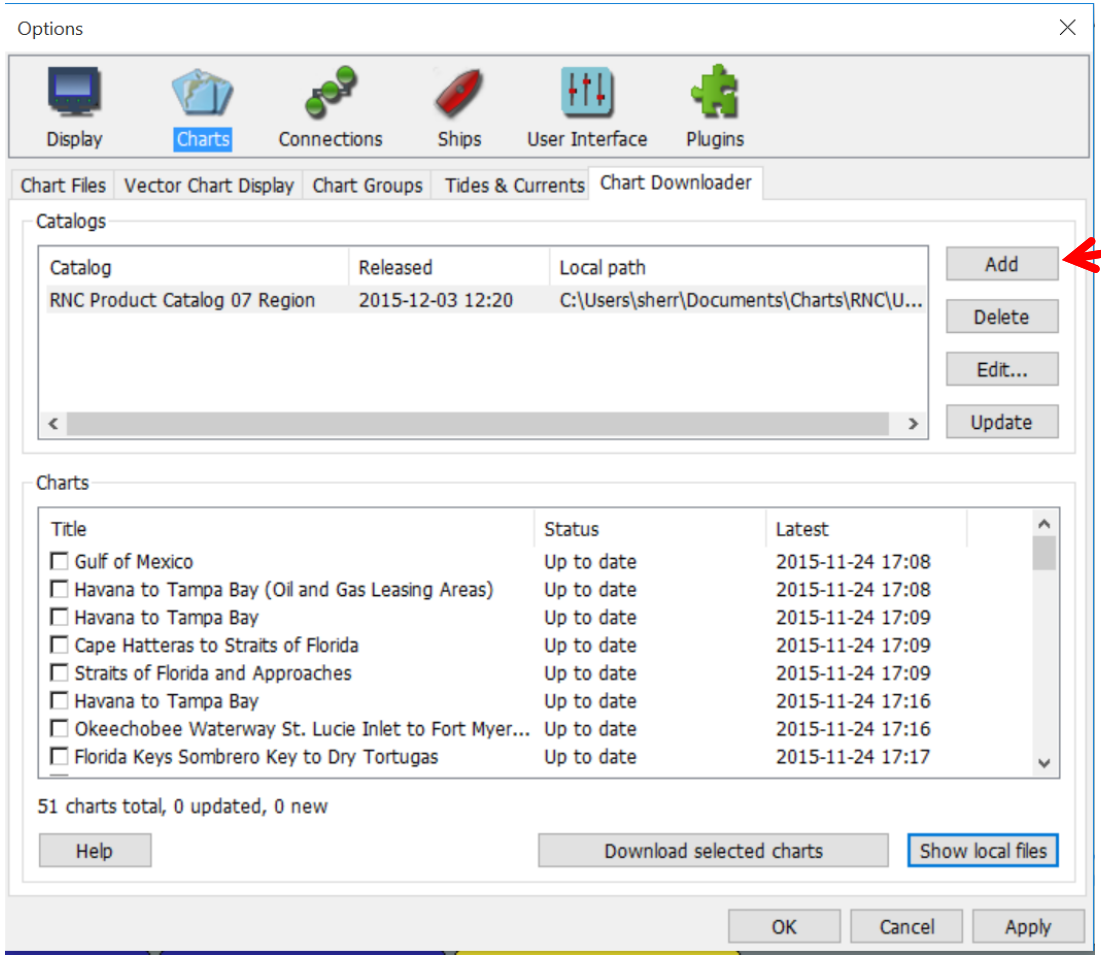


Chart Downloader Plugin

for downloading US charts



To download a new chart area

GRIB Plugin

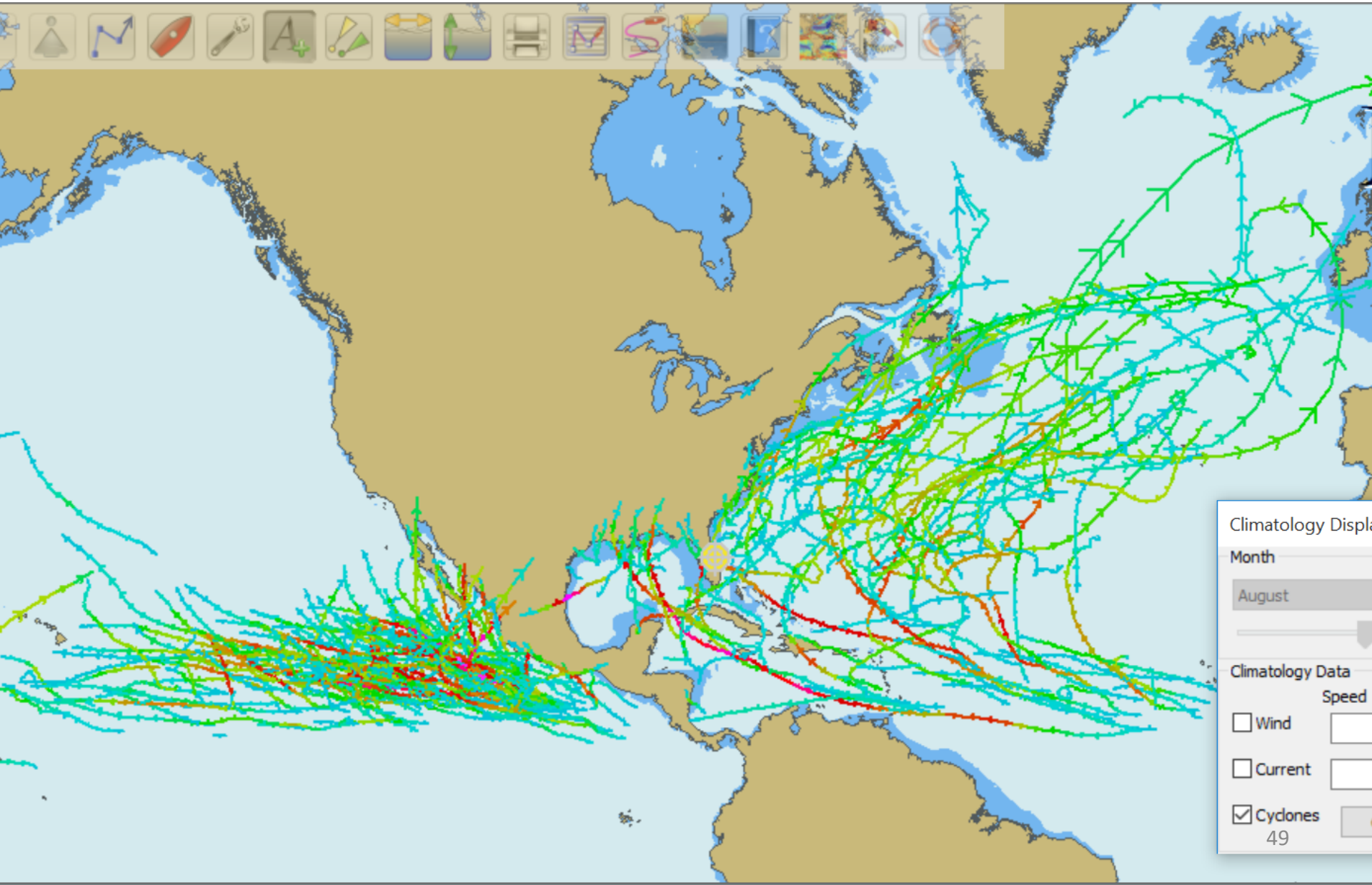
As you move the cursor around the screen, the data in the box changes

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 is generally averaged since 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?



More OpenCPN Plugins

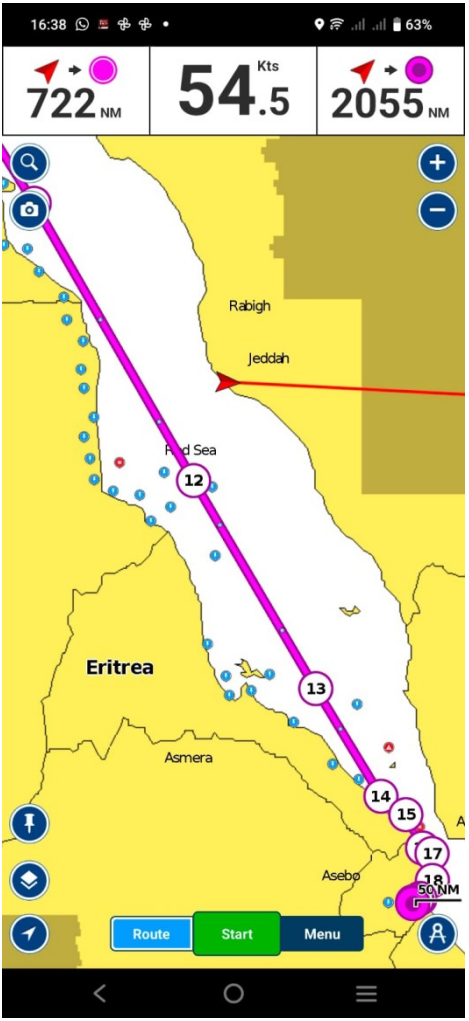
- Radar overlay (Garmin, Navico, B&G, Raymarine)
- Weather Routing
- Create your Polar file
- Voyage Data Recorder
- Stowage Manager
- Logbook Function
- NMEA Instrument Display
- Squidio – Alternative to Active Captain

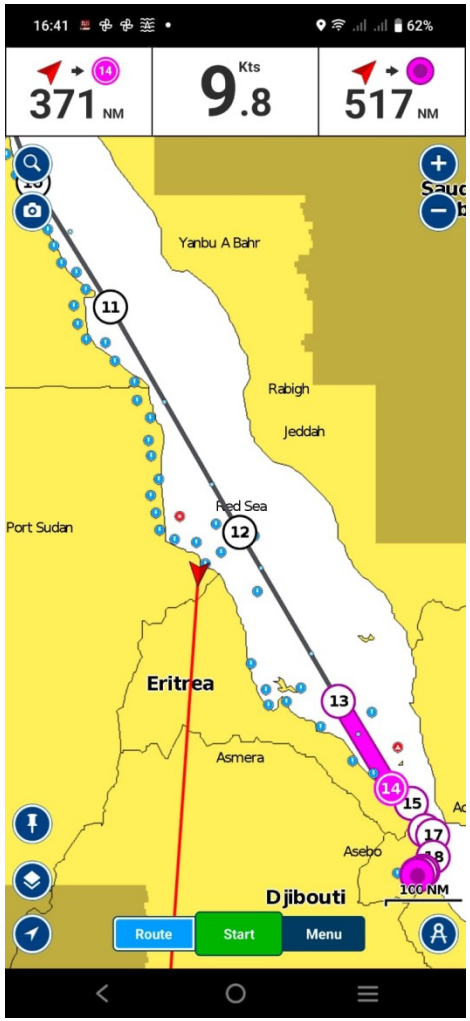
Accuracy of GPS

- 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, buidlings)
  - Newer devices can perform significantly better
- How easy is it to Jam?

  - Modern hand-held devices can receive signals from US, Russian, Indian, and Chinese satellite.

A Note about GPS Spoofing/Jamming





- **Both Chart plotters useless**
- **Navionics on one iPhone useless**
- **Navionics OK on second iPhone**
- **Cheap Chinese tablet in cockpit working OK**
- **GPS/AIS equipped VHF OK**
- **Phantom ships on AIS**
- **Radar working**

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

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

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 & other satellite charts
  - Other cruiser's tracks and waypoints
  - Cruising guides


The End
www.SVSoggyPaws.com

The End

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