NAV100: Getting the Most Out of OpenCPN

Presented by Sherry McCampbell
s/v Soggy Paws

Version 1.7 (May 2023) – With Thanks to Terry Sargent s/v Valhalla

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St Francis 44 http://svsoggypaws.com

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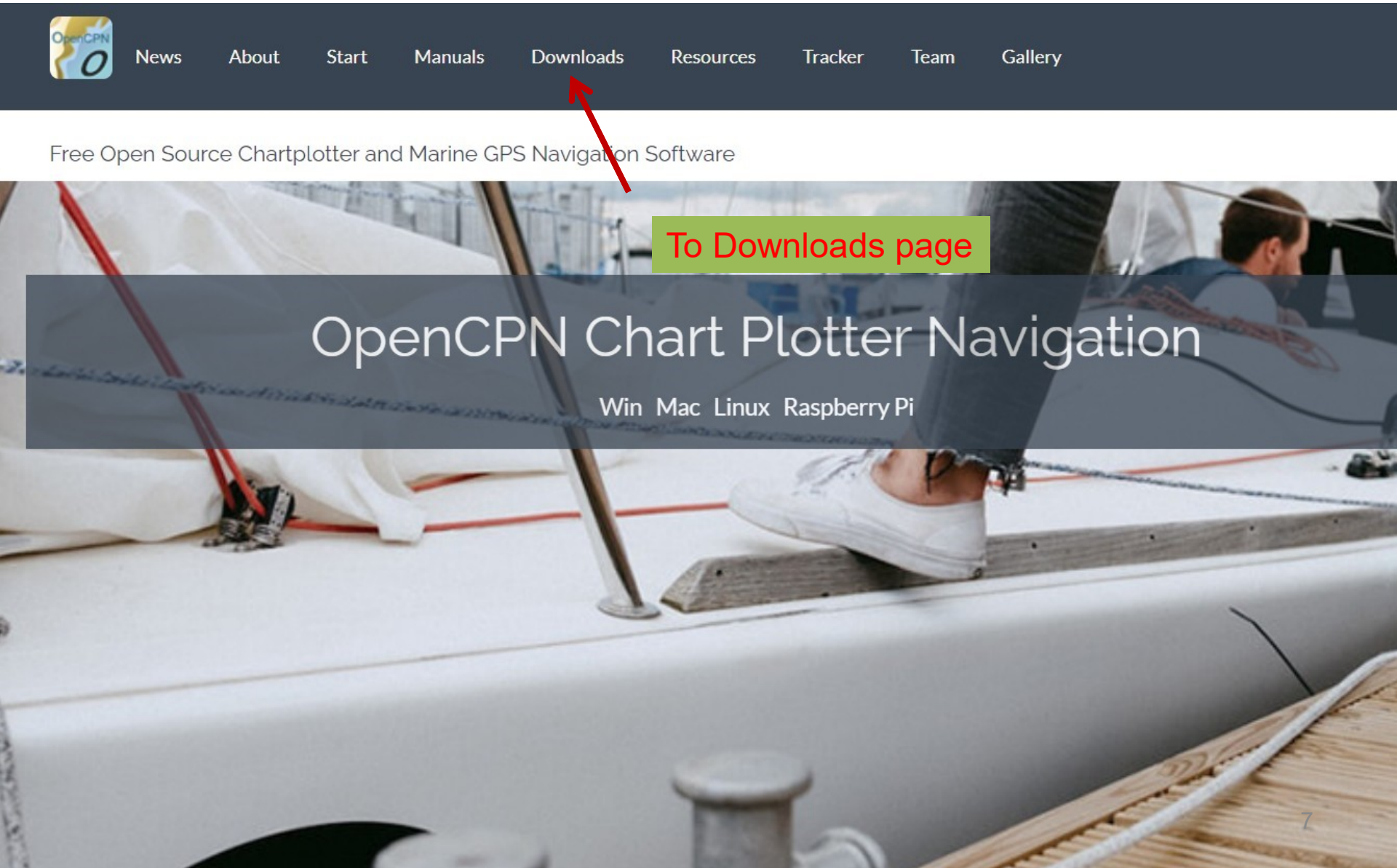
SV Soggy Paws Florida to the Philippines
ASIA
NORTH AMERICA
SOUTH AMERICA
AUSTRALIA
PACIFIC OCEAN
Melbourne
2007
Rio Dulce
Colombia
Panama
Galapagos
2008–09
Ecuador
2010
Easter Island
Juan Fernandez
Pitcairn Island
Hawai'i
2011
Marquesas
Tuamotus
Gambiers
Tahiti
French Polynesia
Samoas
Tonga
Fiji
2012
Tarawa
2013
Marshall Islands
2014
Pohnpei
F.S.M.
Truk
Yap
Palau
Philippines
2015–2022
Davao
Across the Pacific
~30,000 nm
N

South East Asia
2015–2022
CHINA SEA
PHILIPPINE SEA
INDIAN OCEAN
Thailand
Vietnam
Cambodia
Malaysia
Philippines
Porto Garlera
San Bernardino
2021
Samar
El Nido
Cebu
Surigao
2018
Kudat
Davao
Palau
2016
Pangkor
Melaka
2015
Singapore
2017
2019
Bitung
Wayag
Sulawesi
Sorong
Biak
Borneo
Ninigo
Hermit
Manus
Kavieng
New Ireland
Sumatra
Kumai
Belitung
McCluer G
Papua
Rabul
Kimbe
Triton Bay
Tual
Bougainville
Bawean
New Guinea
New Britain
Shortlands
Treasurys
Marovo
Java
Bali
Komodo
Alor
2022
Port Moresby
Liapari
Maumere
Guadalcanal
N

What is OpenCPN?

- An “open source” (**FREE**/ donationware) 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)

Download OpenCPN for Free from OpenCPN.org



Home Downloads

Download Directory

CDN for faster and more reliable OpenCPN downloads
generously provided by StackPath

OpenCPN Latest Release

OpenCPN is free, open source software for marine navigation. It is available for Mac OSX, Microsoft Windows, GNU/Linux, BSDs and Solaris.

[Current Version]

Download and do normal Windows Install (accept all the defaults)

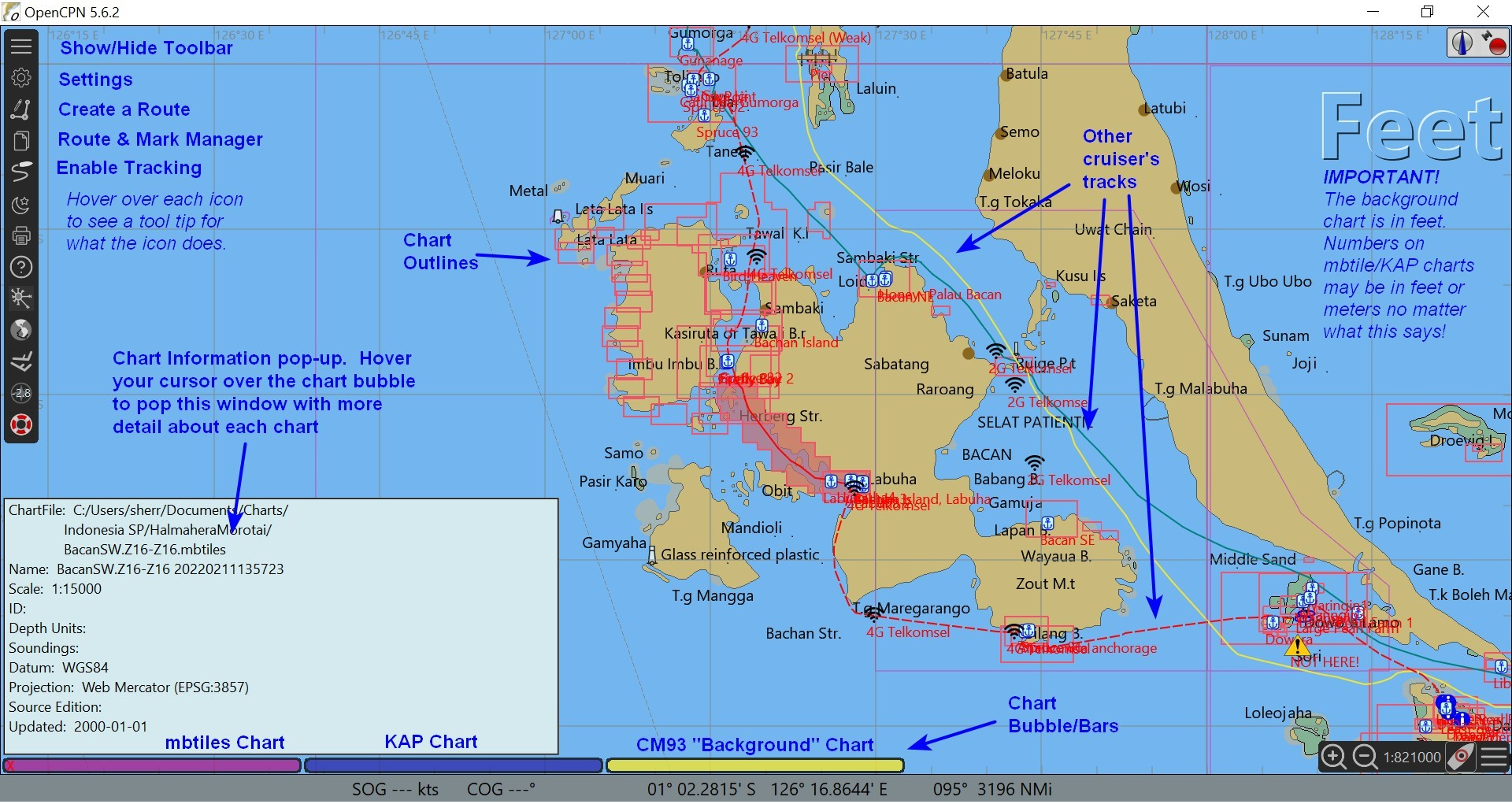
Plugins

Plugins for OpenCPN are third party feature additions that expand the functionality of OpenCPN into those niche areas. Over 40 plugins available.

[Latest Plugins]

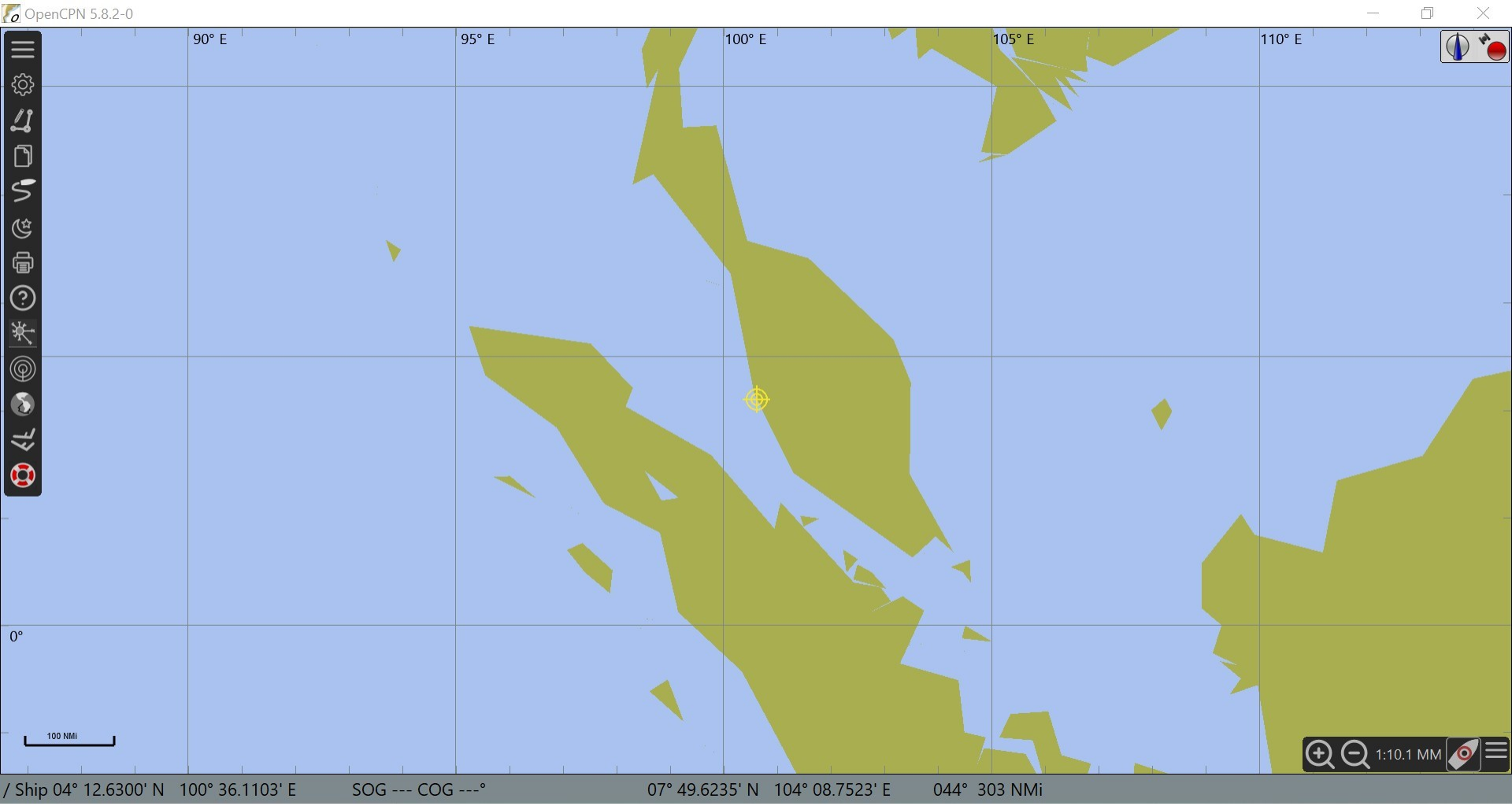
Come back and explore "Plug-ins" (extra functions) later

OpenCPN Overview



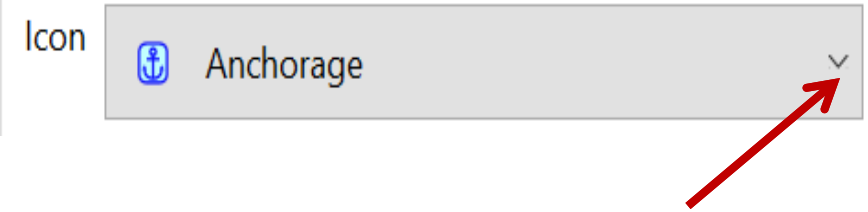
Zoom in and out… + and – keys, or mouse scroll wheel

But Wait… Mine Looks Like This!

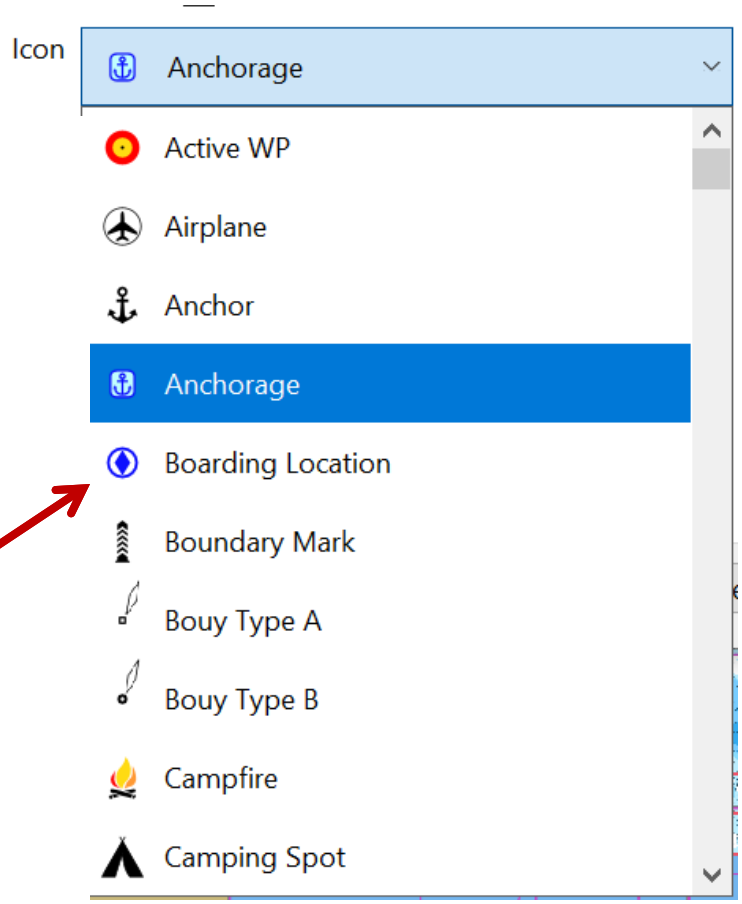


Terminology

Drop-down box

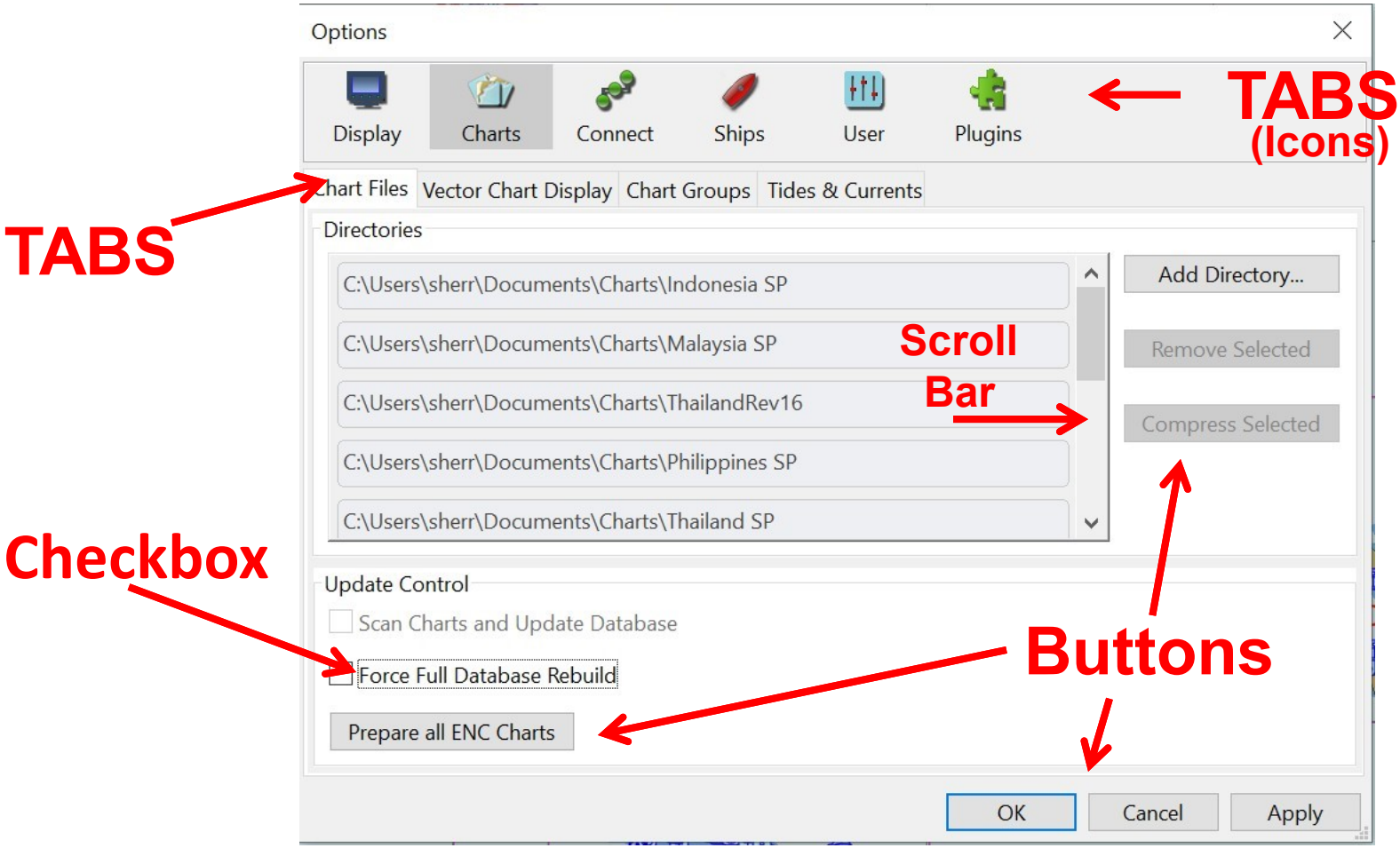


- Click the down arrow



- A selection box opens

Terminology
Tabs, Checkboxes, and Buttons



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

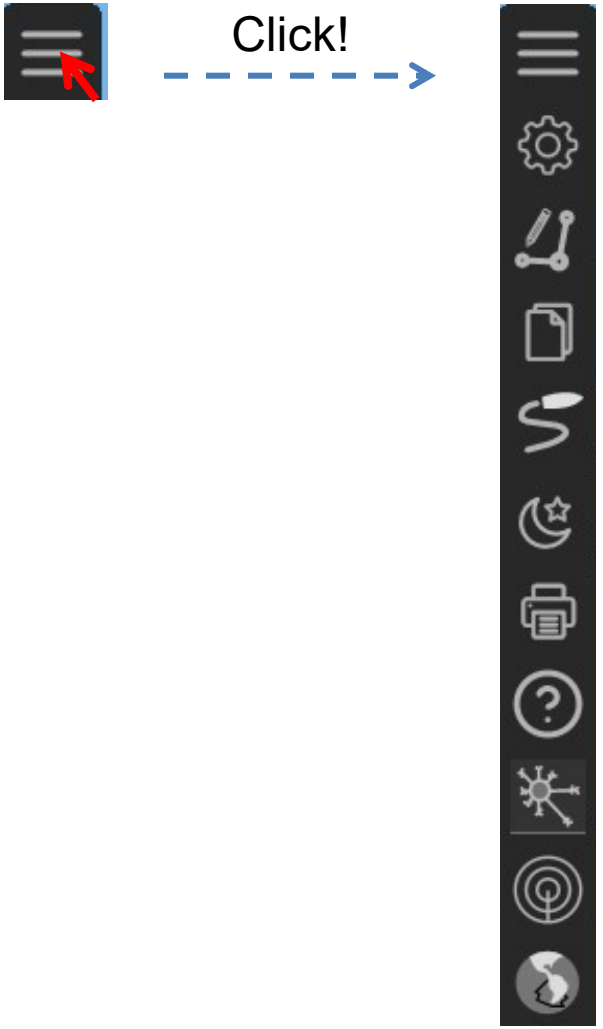
MAN OVERBOARD Marker

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

Offline manual is here

Terminology

- Hamburger (usually a menu drop-down)

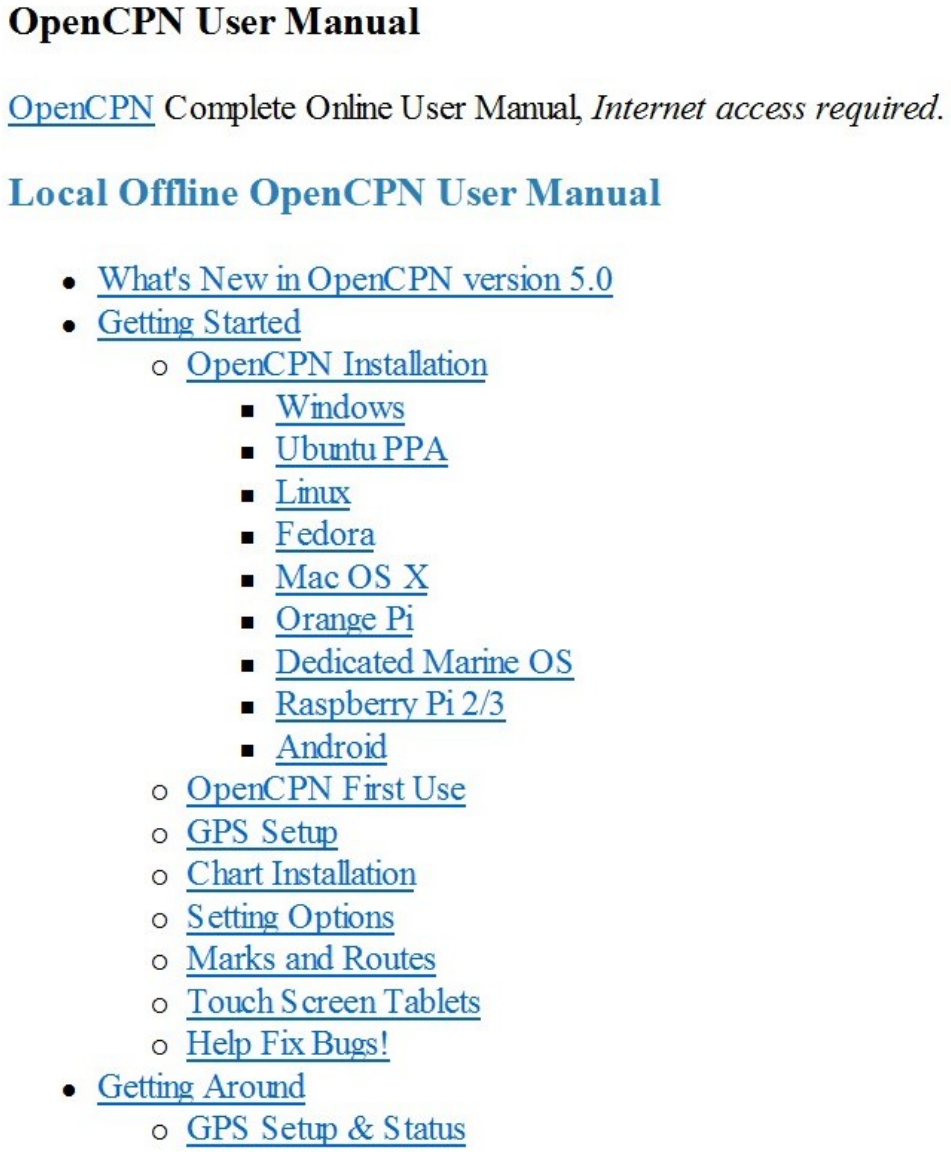


Find the manual

Find the manual

- The User Manual is installed on your computer when the program installs
- Excellent reference manual
- YOU DO NOT NEED TO BE ONLINE
- Can also be found online at opencpn.org

Direct Link to Online Manual



OpenCPN User Manual

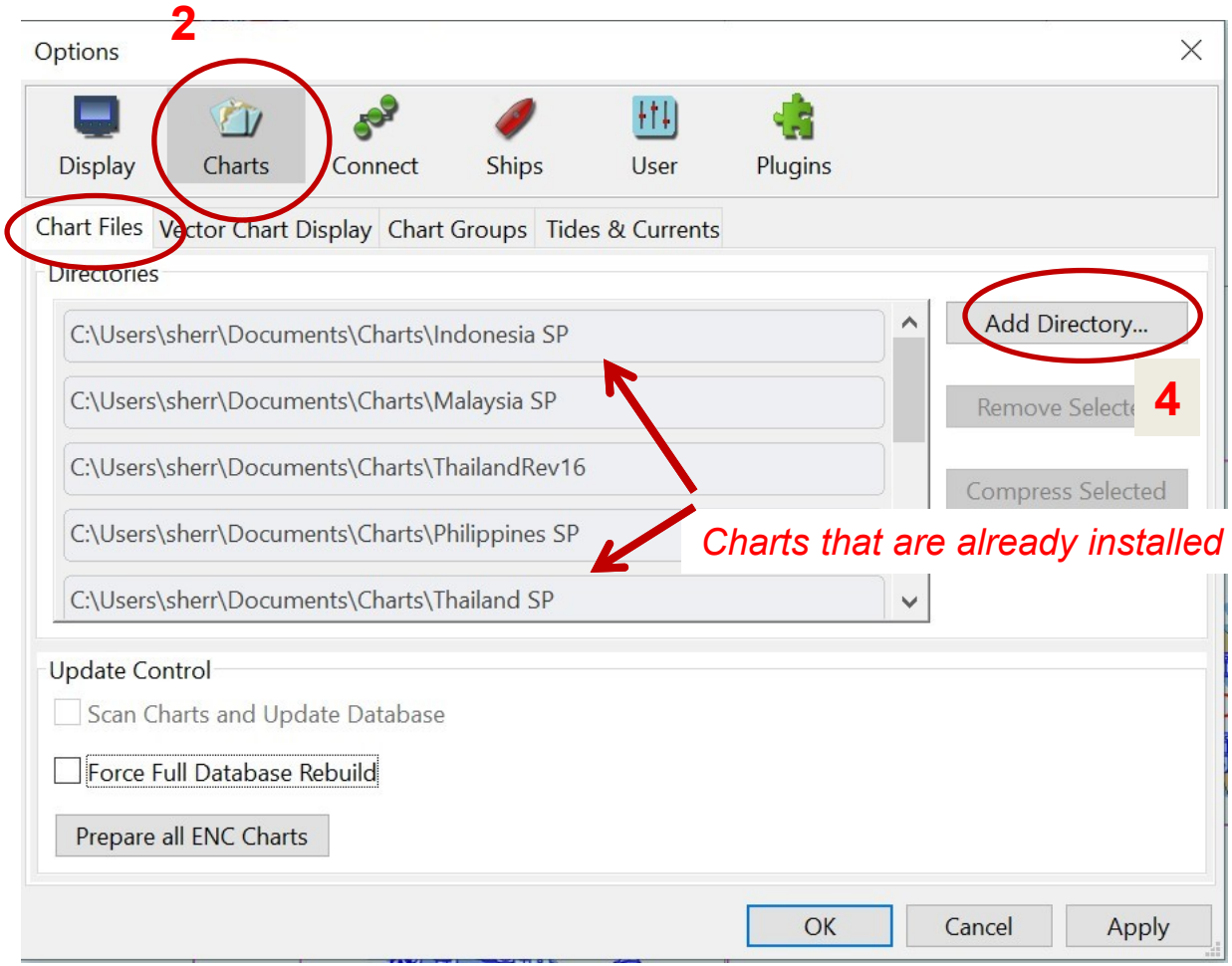
OpenCPN Complete Online User Manual, *Internet access required.*

Local Offline OpenCPN User Manual

- What's New in OpenCPN version 5.0
- Getting Started
  - OpenCPN Installation
    - Windows
    - Ubuntu PPA
    - Linux
    - Fedora
    - Mac OS X
    - Orange Pi
    - Dedicated Marine OS
    - Raspberry Pi 2/3
    - Android
  - OpenCPN First Use
  - GPS Setup
  - Chart Installation
  - Setting Options
  - Marks and Routes
  - Touch Screen Tablets
  - Help Fix Bugs!
- Getting Around
  - GPS Setup & Status

Adding Charts – Step 1

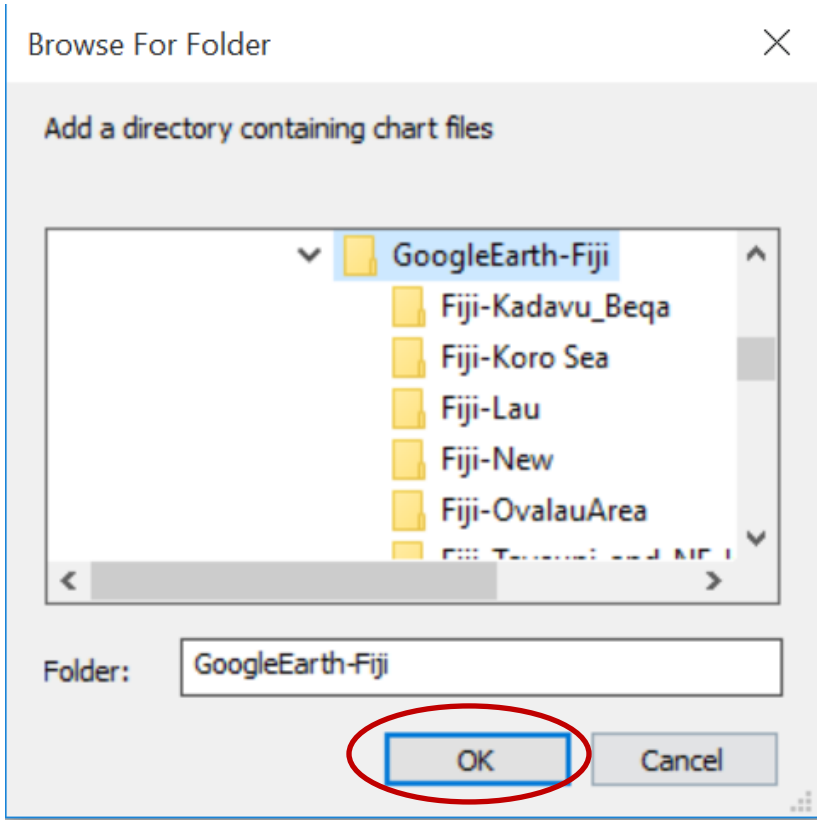
1 Click on ‘Options’ (the ‘gear’) in the Toolbar



Adding Charts – Step 2

- Navigate to chart directory
- Select the charts you want to add
- Click OK
- Adds ALL charts in that folder, including subdirectories
- Repeat as necessary

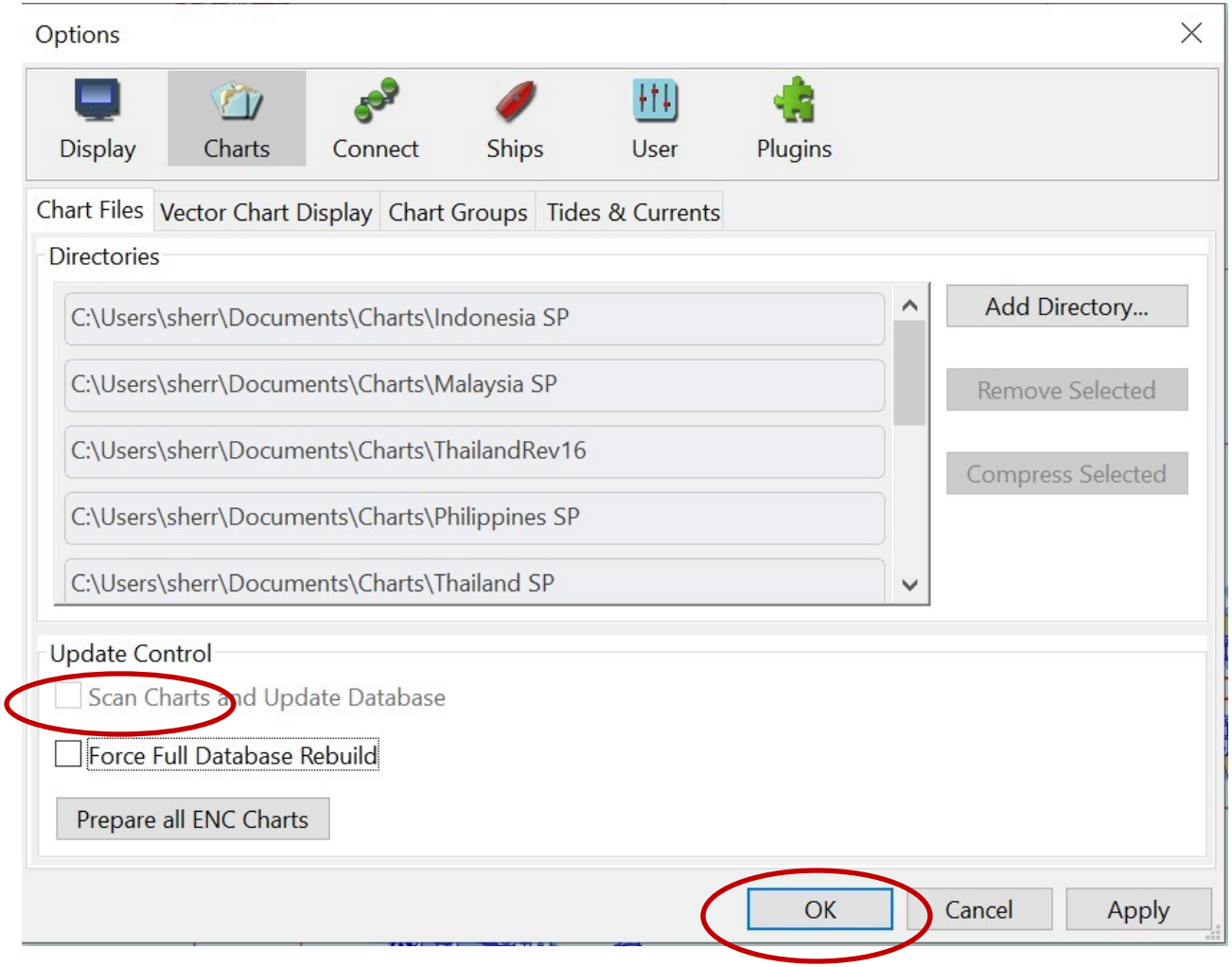
The more charts you load, the more resources OpenCPN takes on your system



Supported charts: mbtiles, kap, cap, S57 and S63, CM93v2.

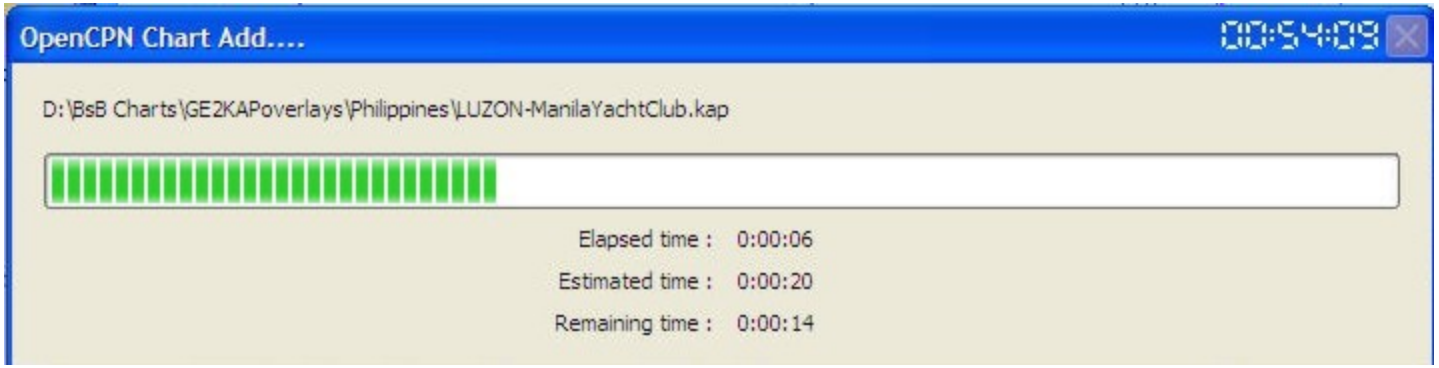
Adding Charts – Step 3

Rebuild your chart database



Adding Charts – Step 4

Wait while the chart database is updated



Most people start with a copy of the older CM93 World Chart Set as their “base chart” (download from Terrys Topics, or from a friend).

Sources of Additional Charts

- See long list in Chart Sources section of manual
- Satellite Charts http://svsoggypaws.coms/SatCharts/
- Crowd-sourced charts http://OpenSeaMap.org
- OpenCPN Chart Downloader
- Cruiser sharing (Legacy Raster and Vector Charts, sat charts)
- **Bottom line: Don’t leave home without an external drive!**

Sources of Free Satellite Charts

Location	Coverage
Migration's ChartLocker	Mexico, all the Pacific Islands, the Dominican Republic, Panama, Australia mbtiles 2021/2023
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://svsoggypaws.com/SatCharts/

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

The Chart Downloader

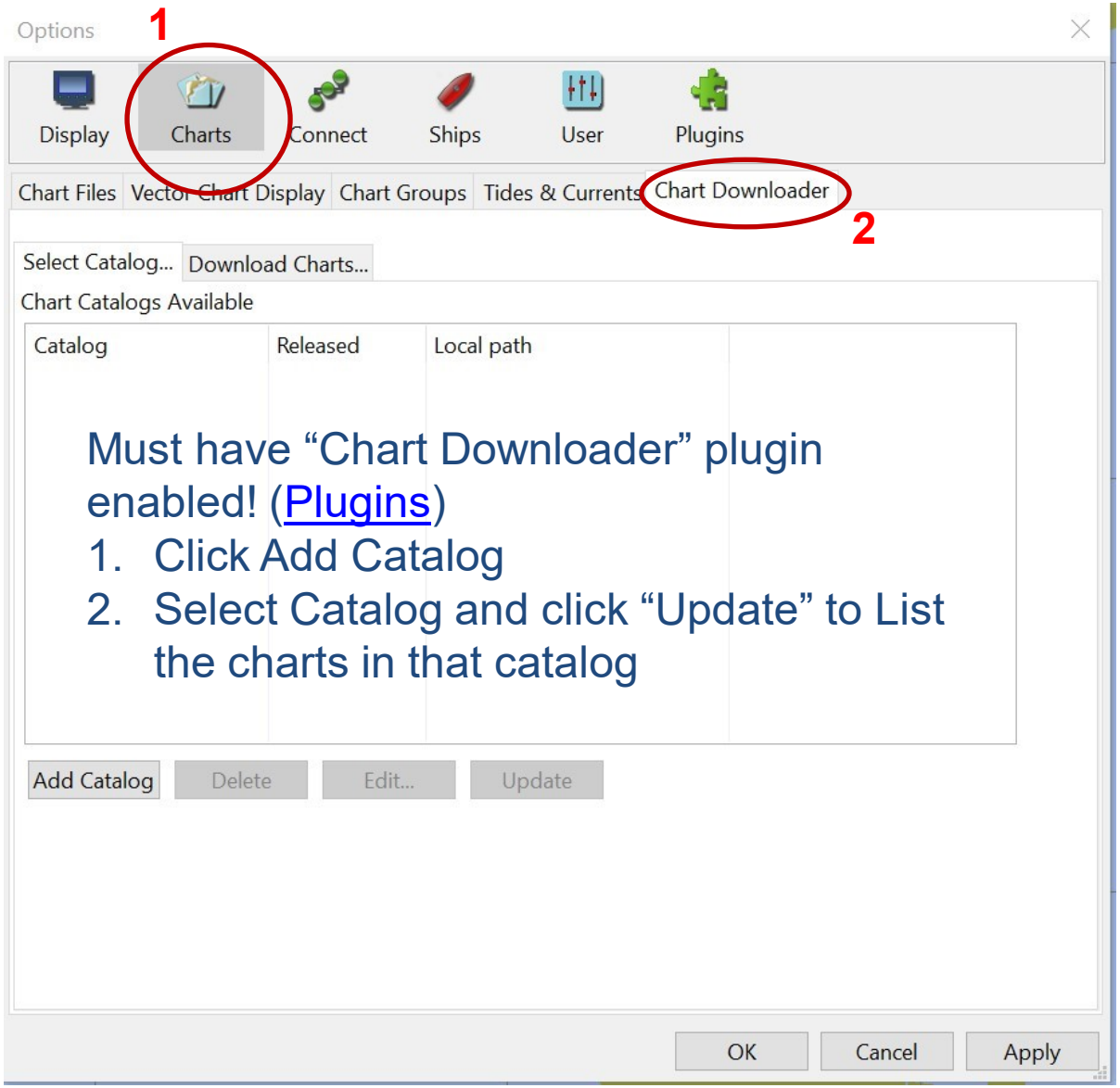


Chart Downloader-Add Catalog

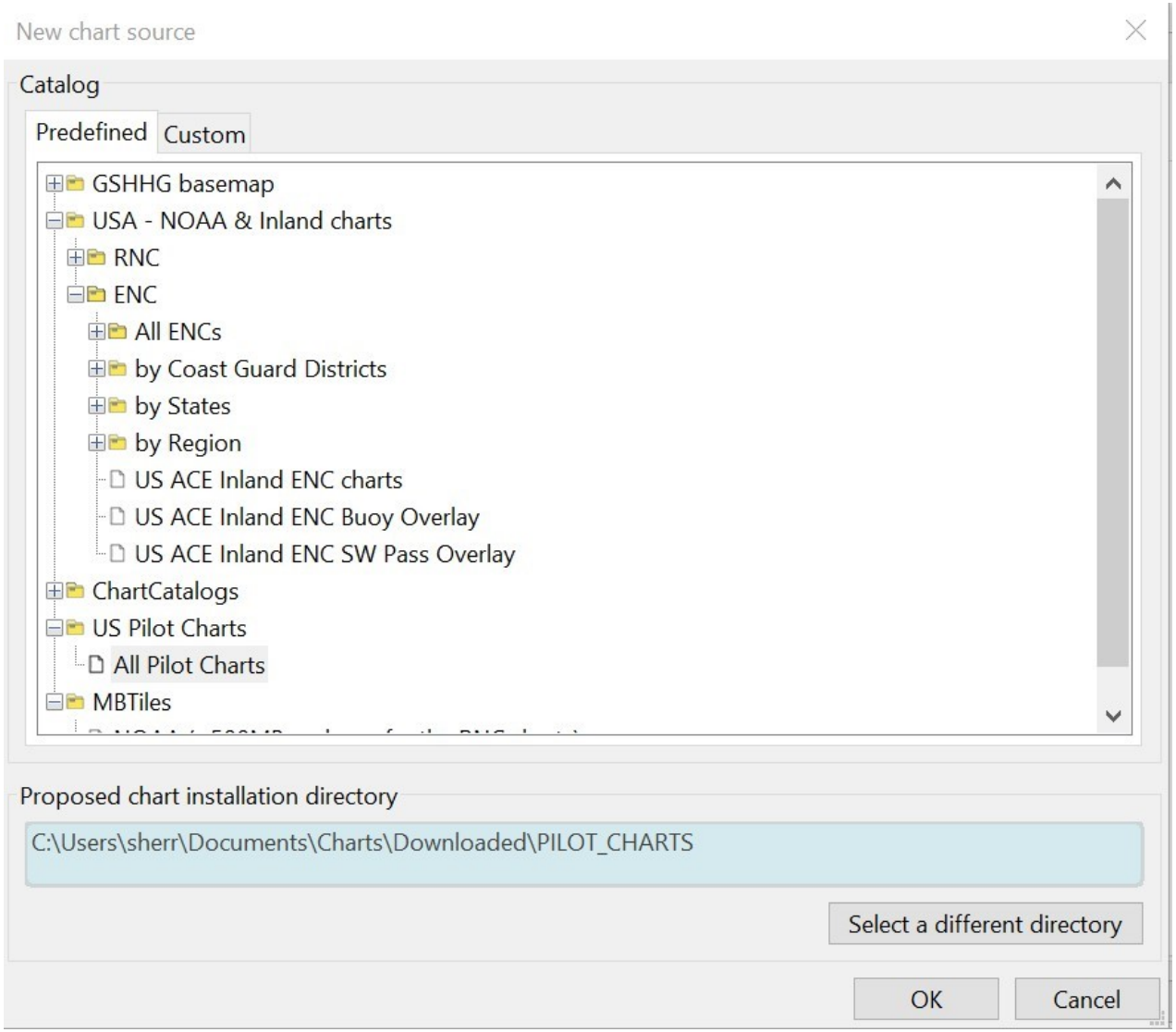
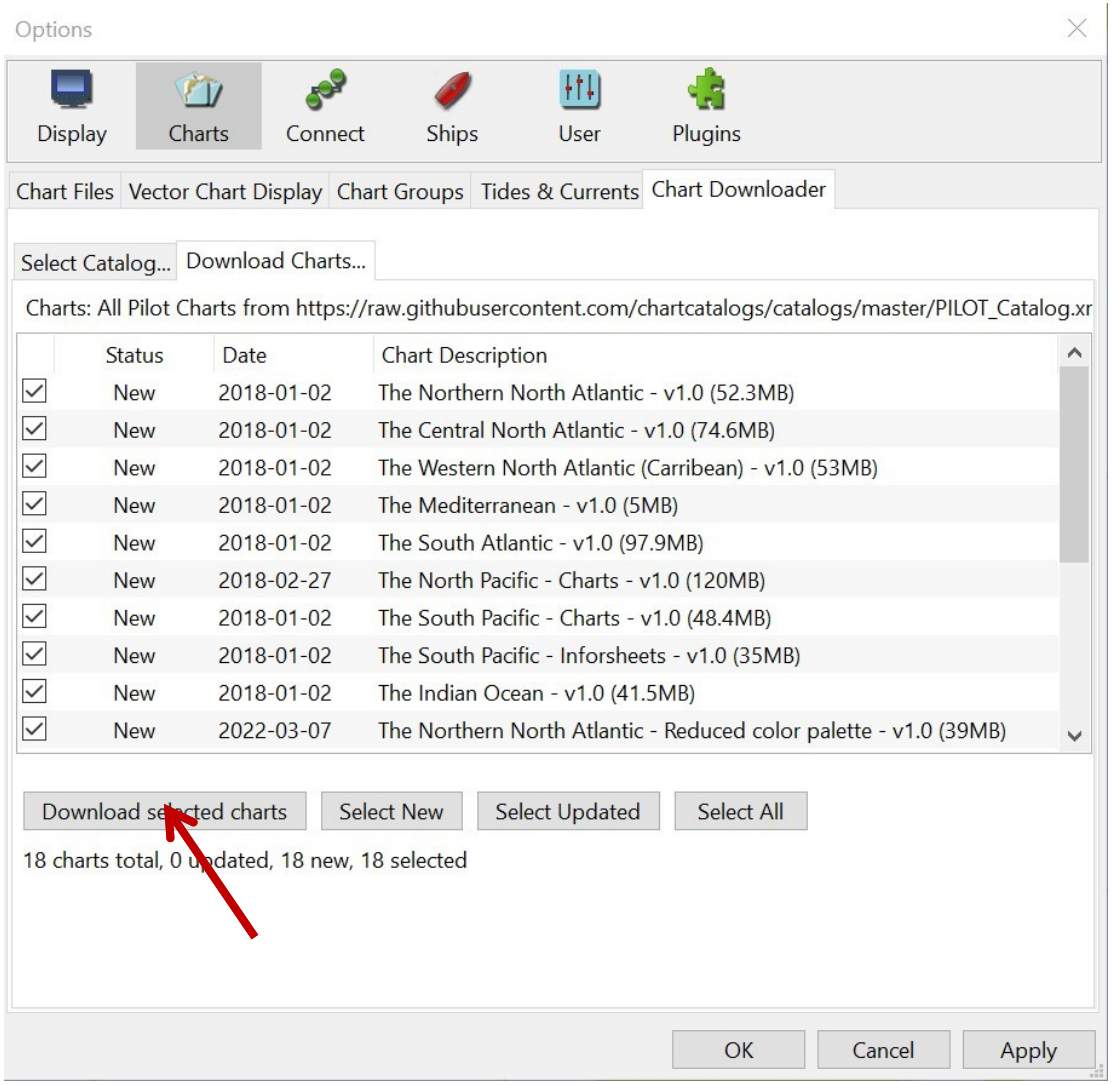
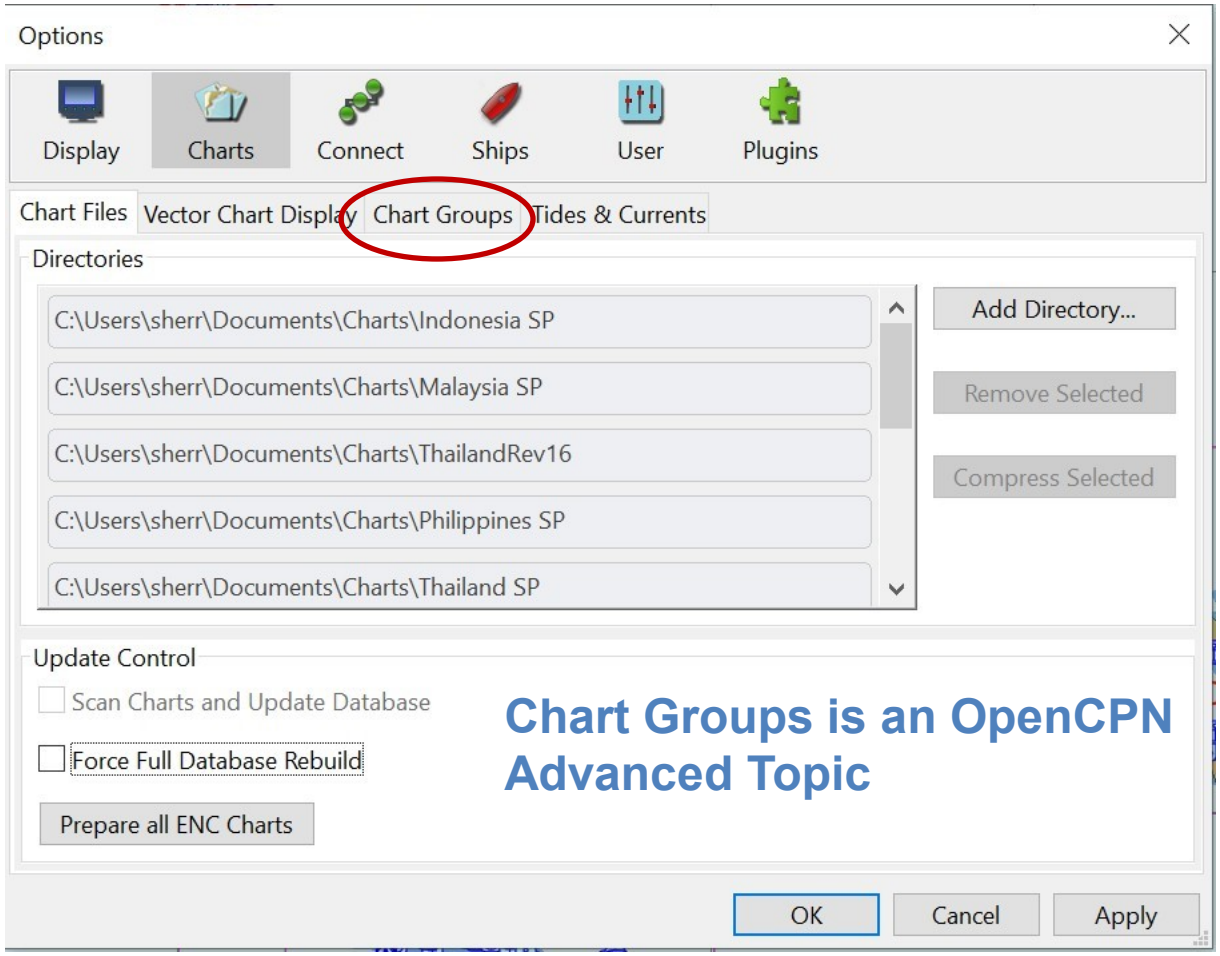


Chart Downloader-Add Charts

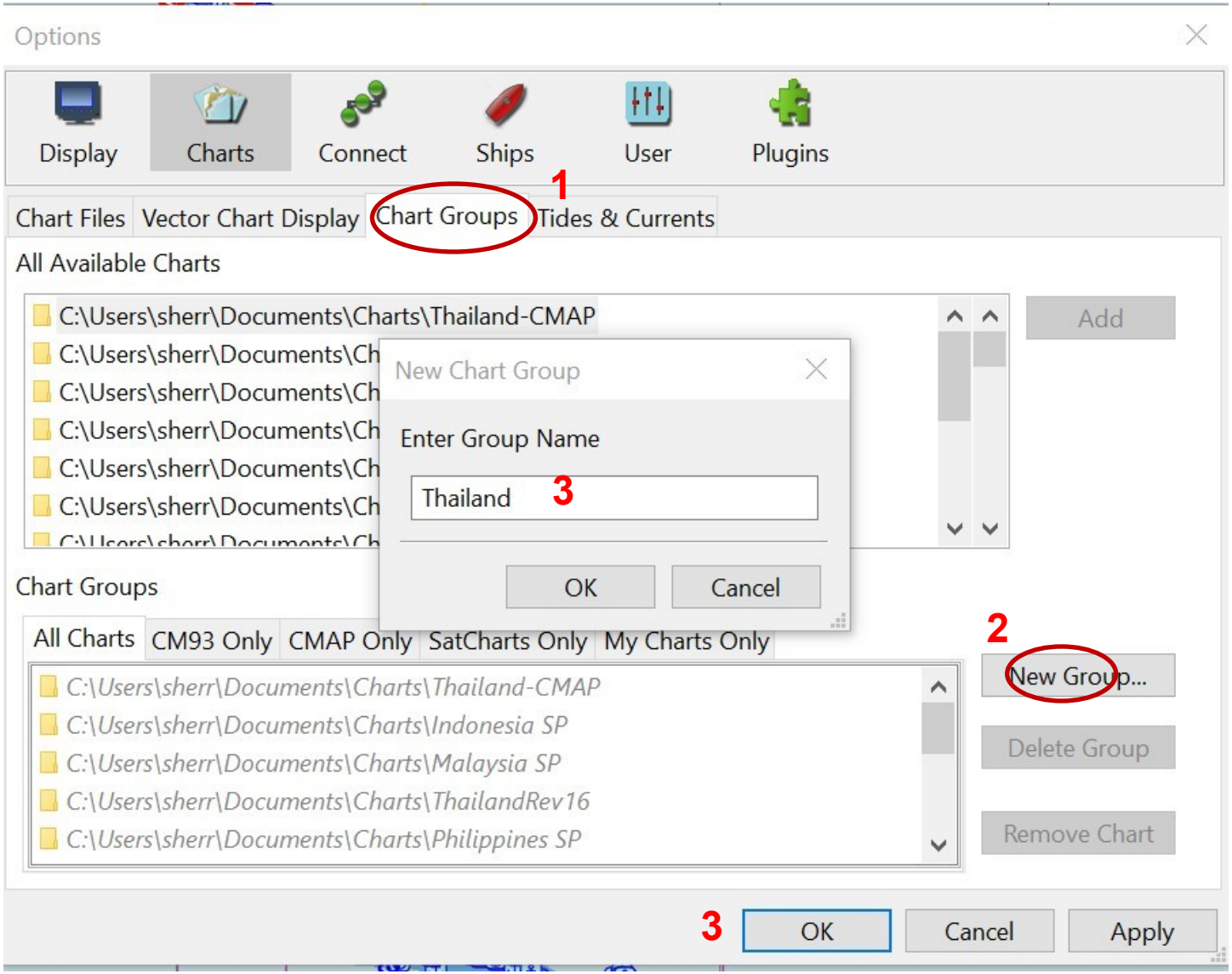


Managing Charts

The more charts you load, the longer it takes on startup
Overlapping charts from different sources can get confusing)
“Chart Groups” lets you manage groups of charts

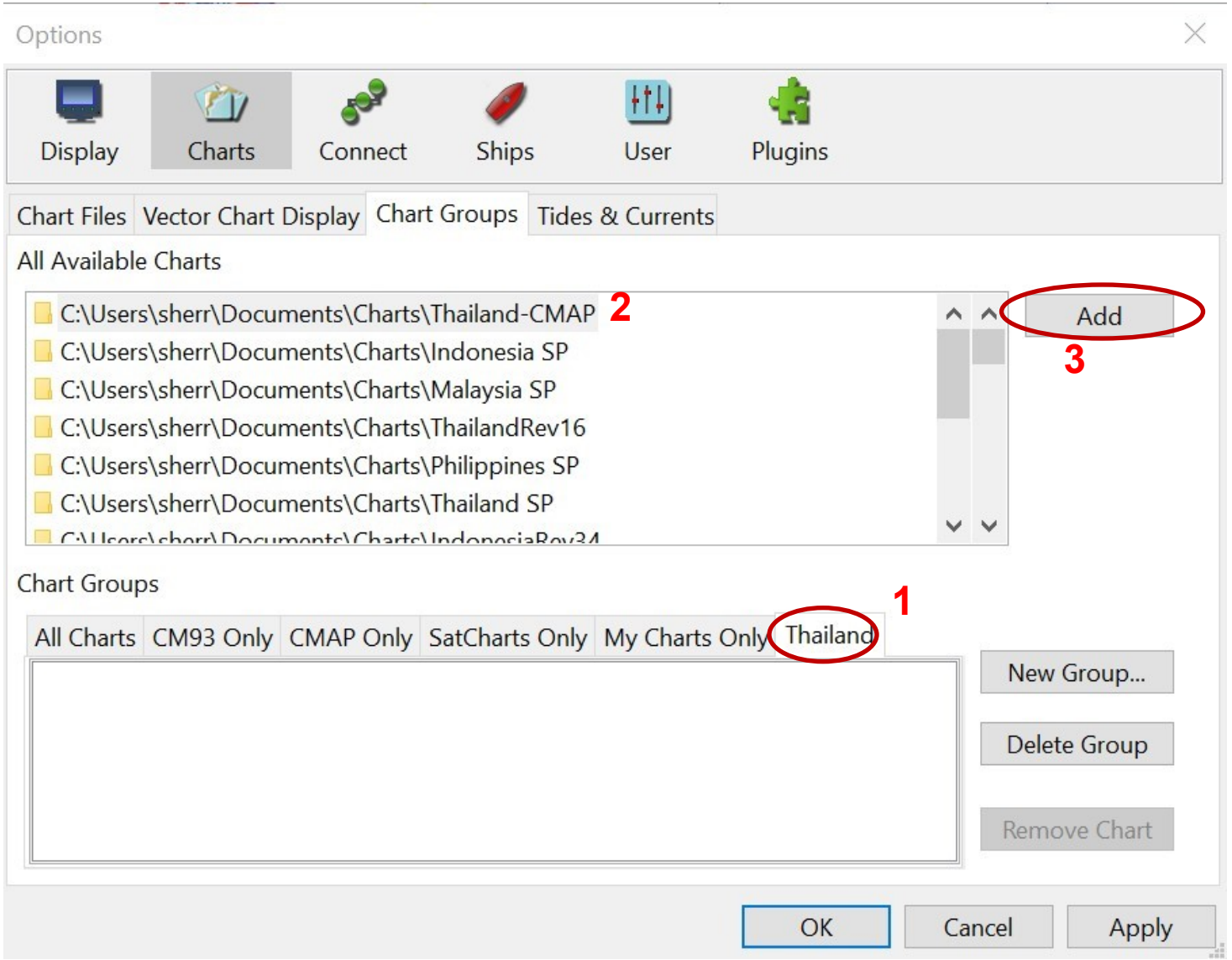


Creating Chart Groups

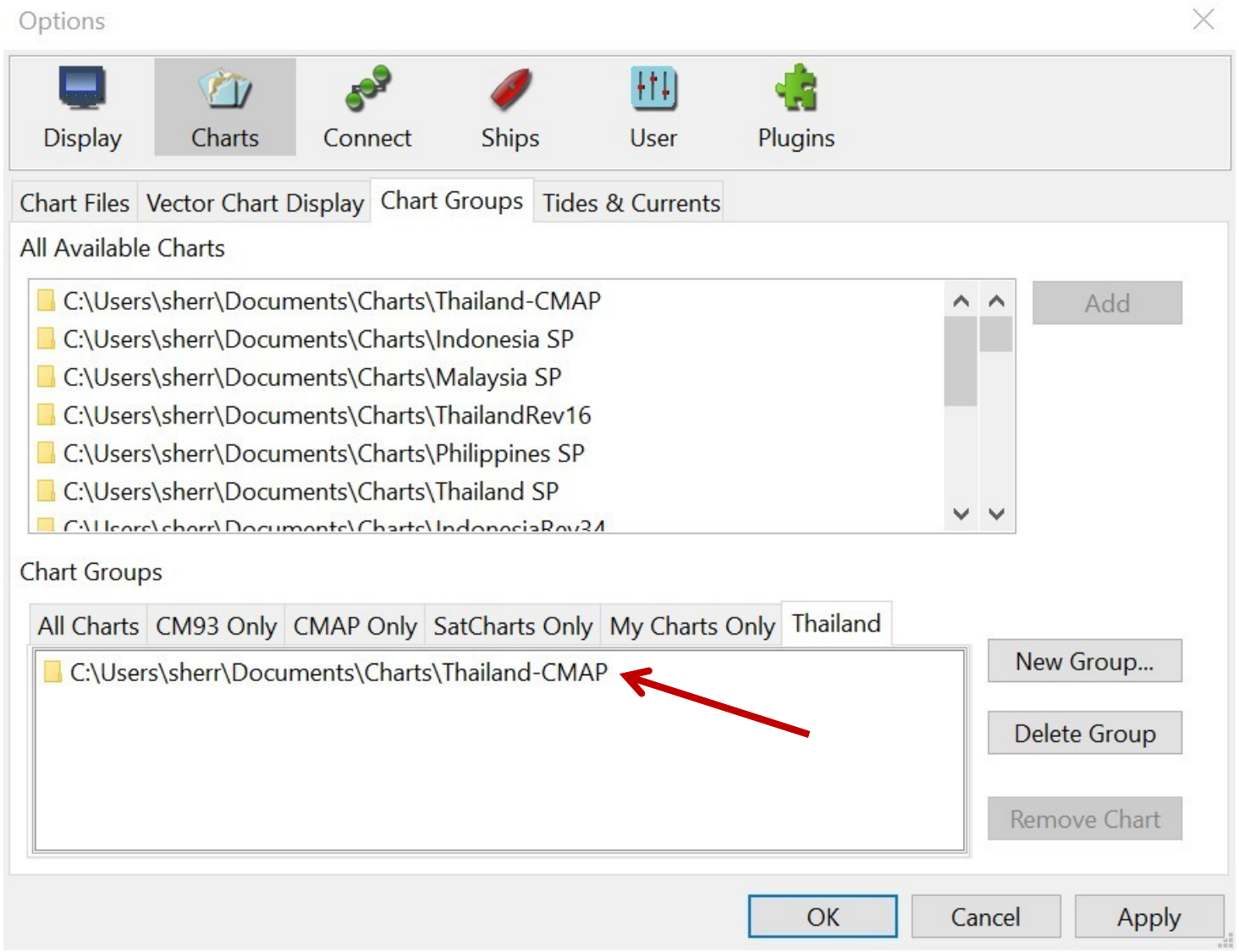


You must do Step 3 before proceeding with adding charts to the group

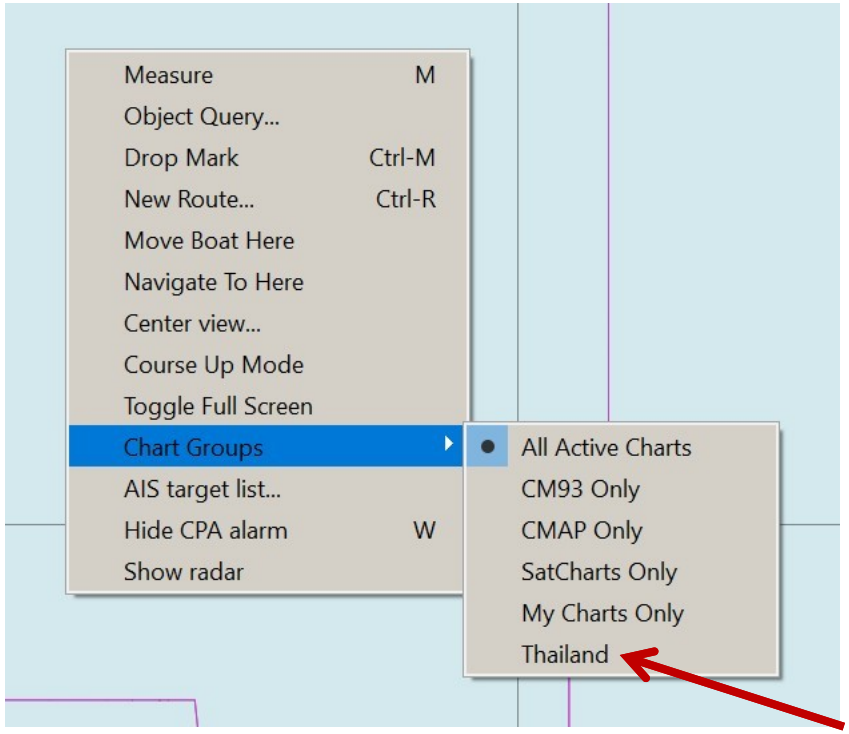
Adding Charts to a Chart Group



Adding Charts to a Chart Group

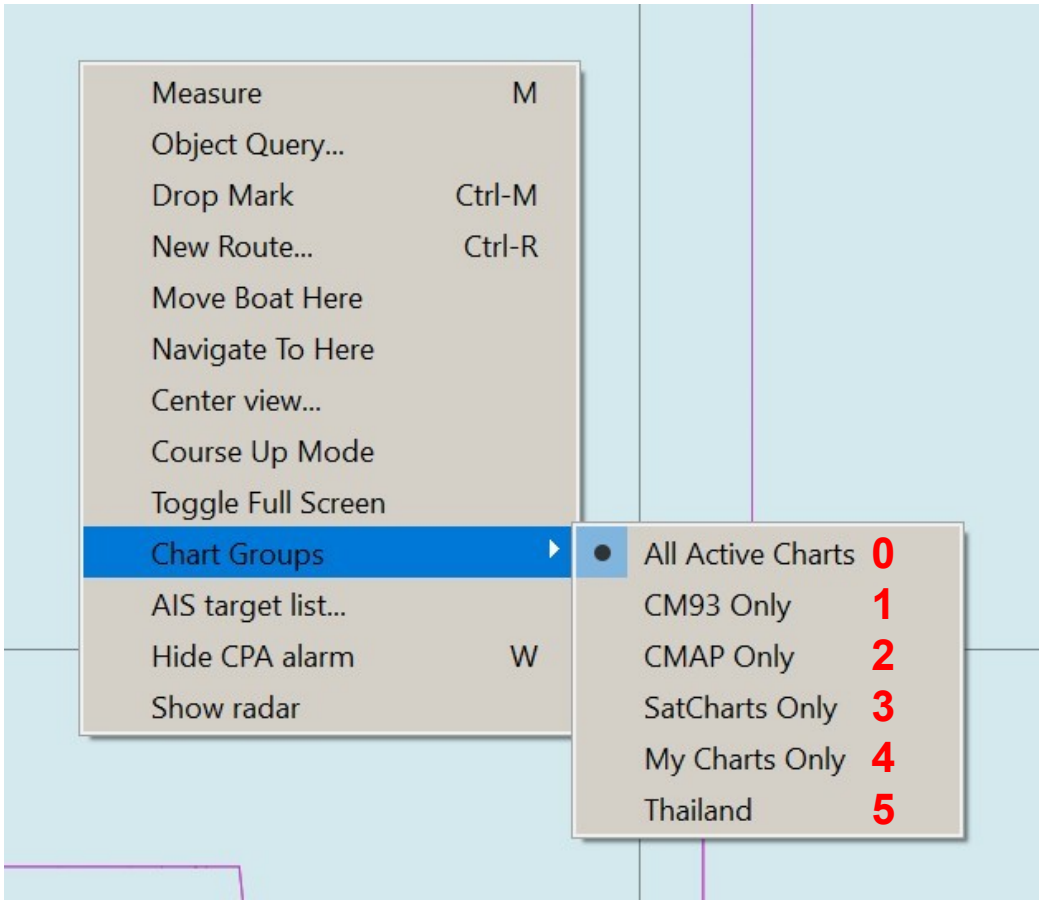


Selecting Chart Groups



Right-click on chart
Select appropriate Group
Only Charts in Group “Thailand” will be visible

Selecting Chart Groups

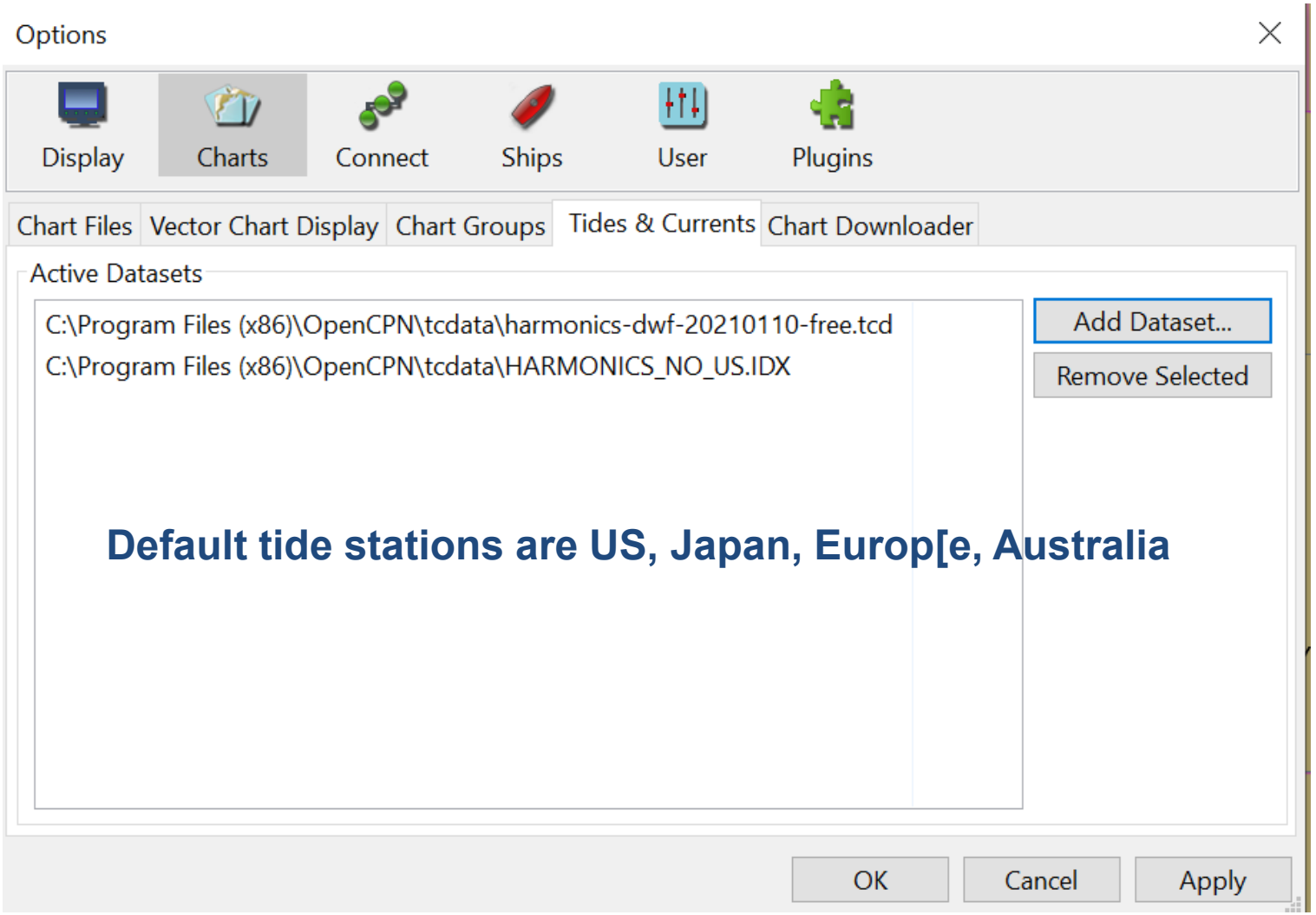


Or, use the number “Hot Key”
(one keystroke selects option)

No need to right-click
Typing “5” on the keyboard selects Thailand, 0=All charts

Tides

Options / Charts / Tides & Currents



Rest of the World Tides

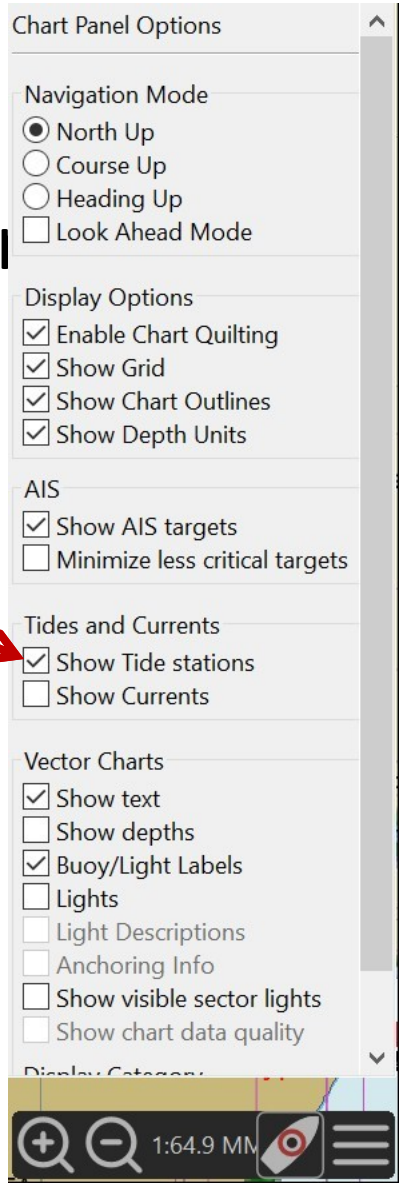
- Download from Terry's Topics [Link] (download both Harmonic Files)
- Put in new Tides folder in Documents
- Options / Charts / Tides & Currents
- Add Dataset
- Select HARMONIC.IDX

For some reason you will have to re-install tides

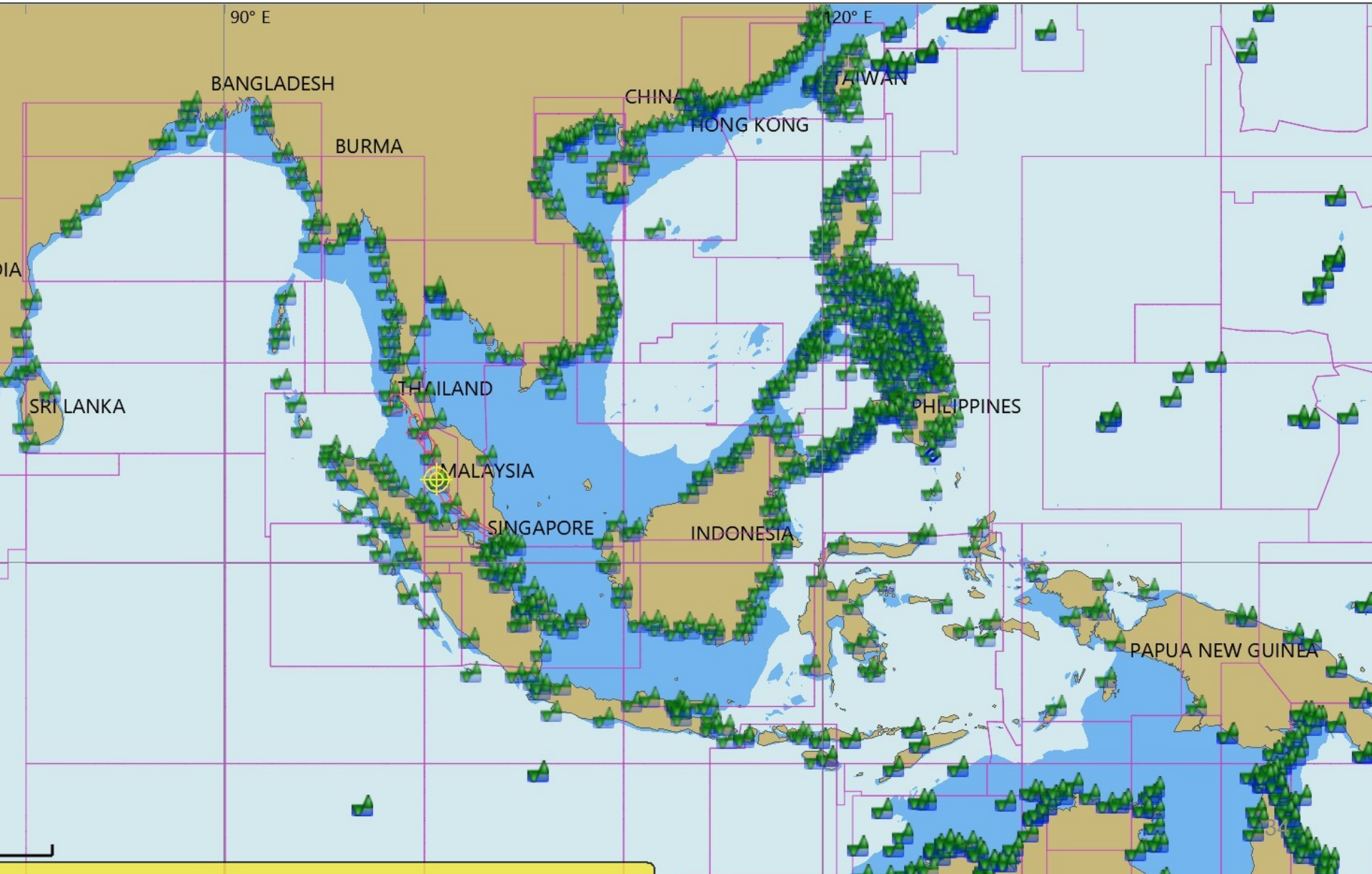
Every time you re-install or upgrade OpenCPN

To show the tide stations

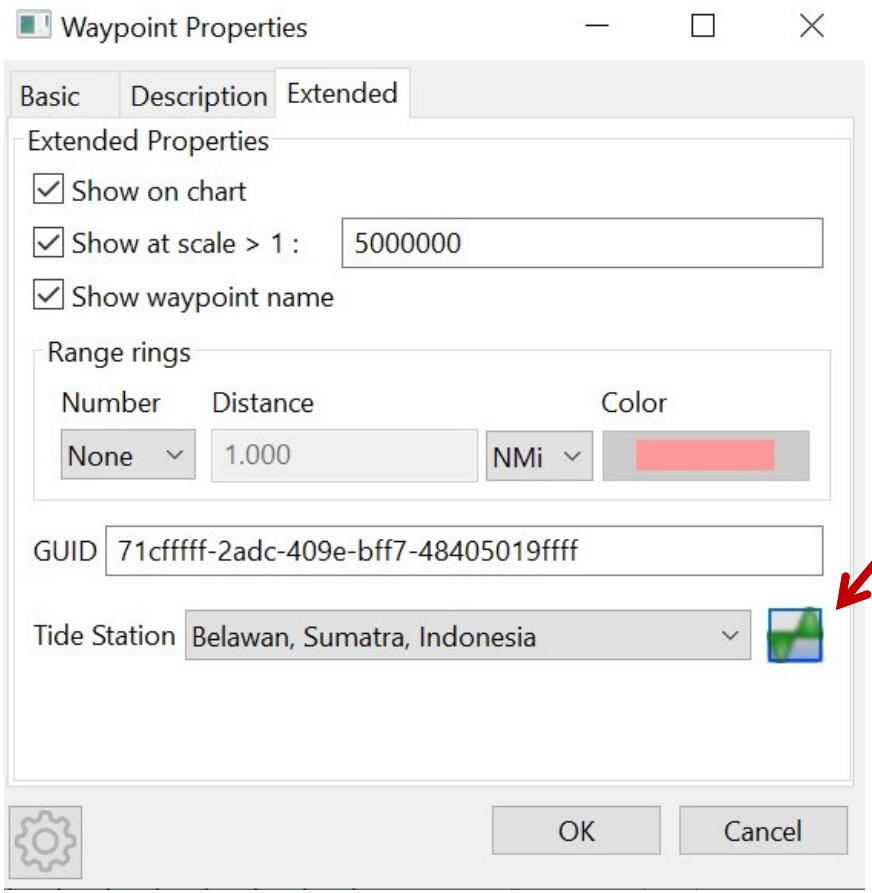
- Click on the “hamburger” in the lower to show chart options
- Check Show Tide stations



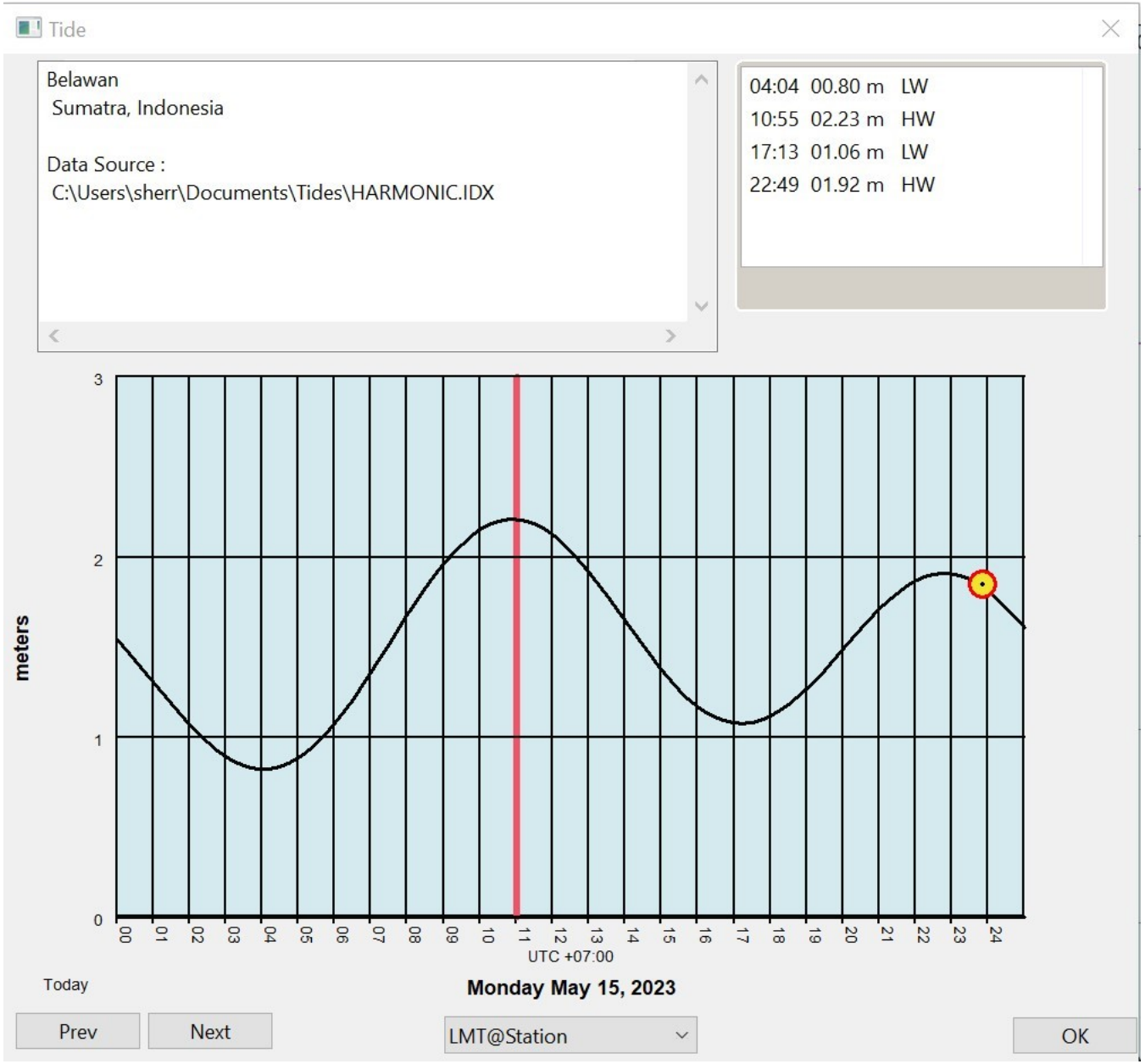
Tide stations all over!



Showing a Tide Station



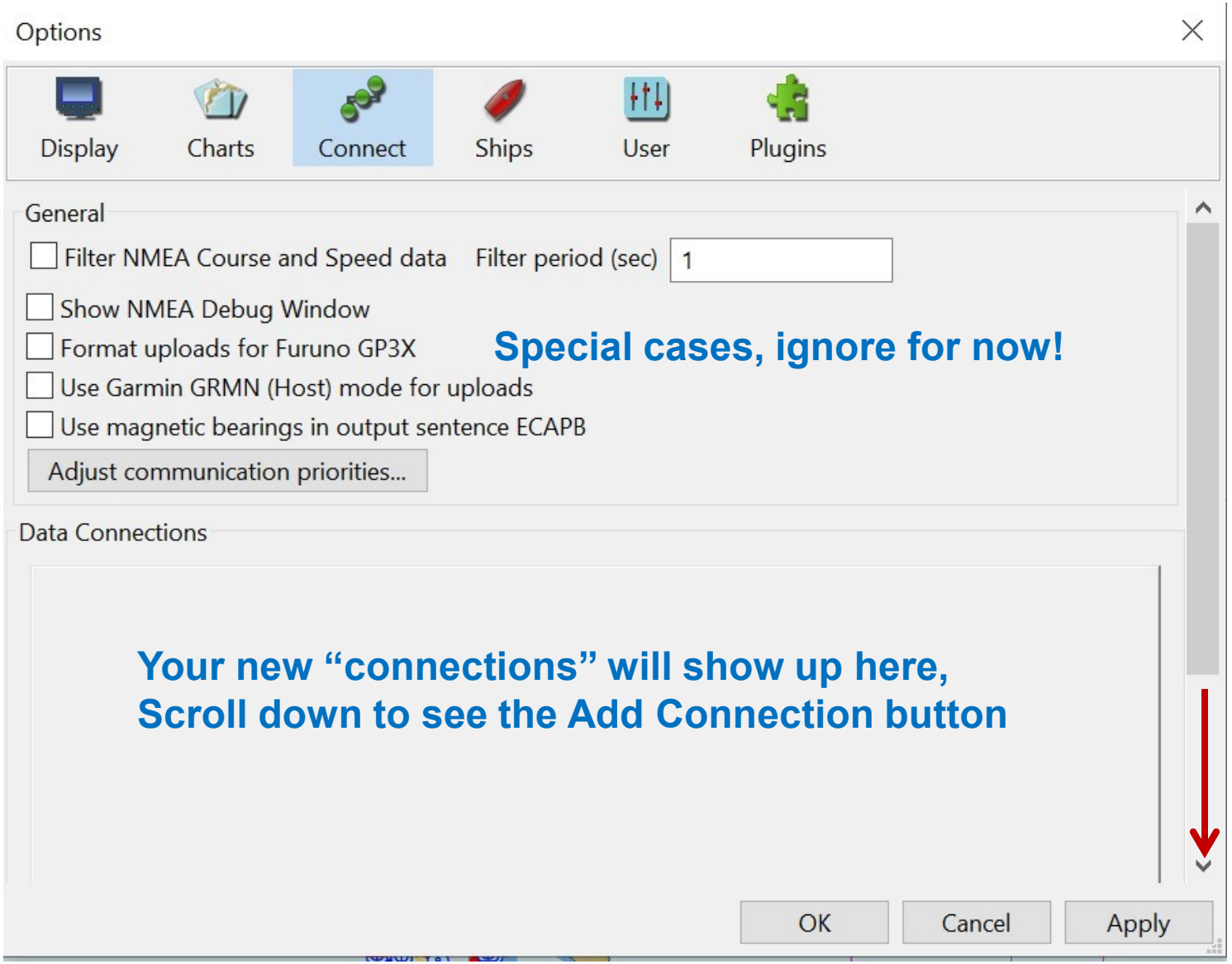
On Waypoint Properties
Click on the Tide Icon


Tide
Belawan
Sumatra, Indonesia
Data Source :
C:\Users\sherr\Documents\Tides\HARMONIC.IDX
04:04 00.80 m LW
10:55 02.23 m HW
17:13 01.06 m LW
22:49 01.92 m HW
meters
3
2
1
0
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
UTC +07:00
Today
Monday May 15, 2023
Prev
Next
LMT@Station
OK

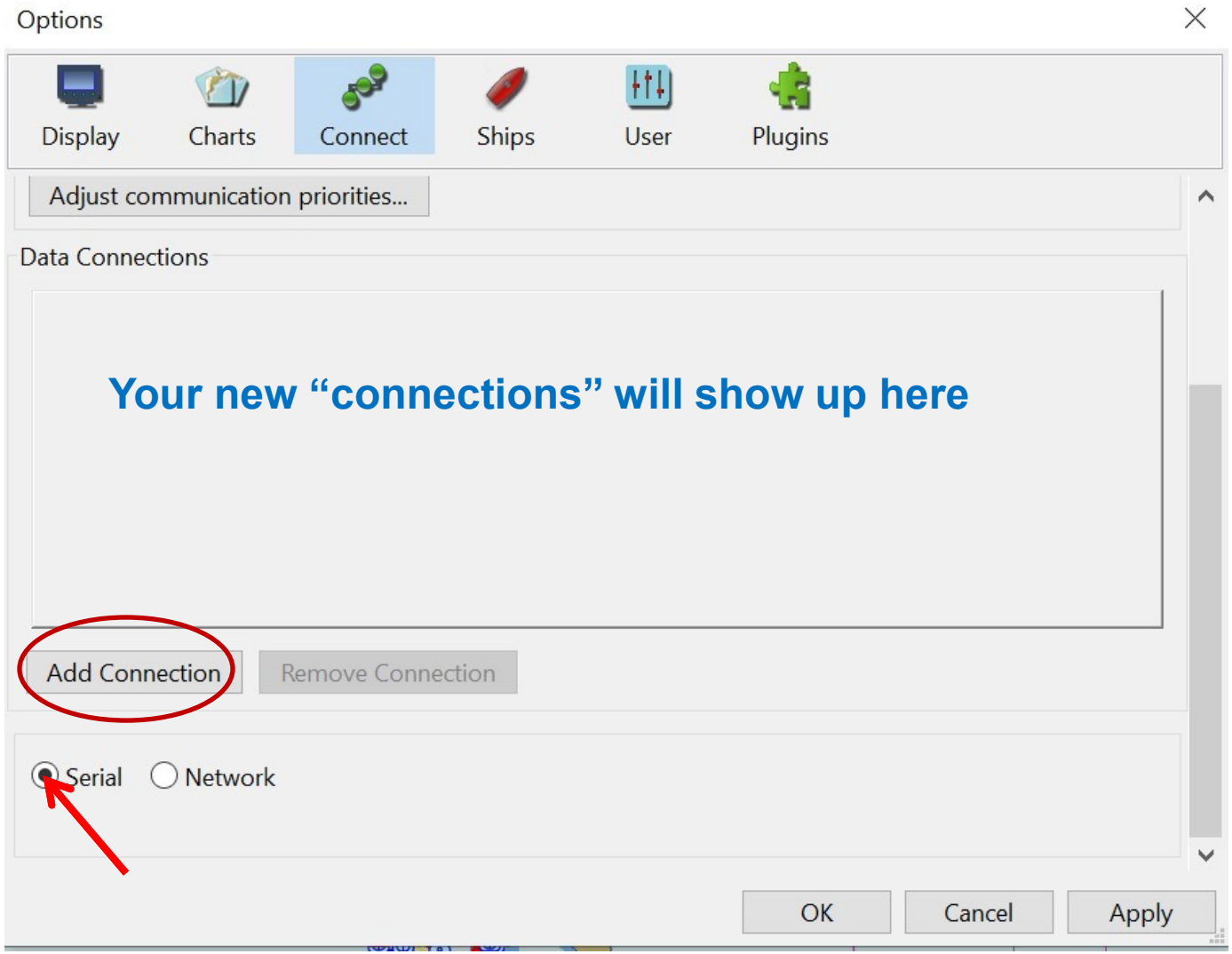
Setting Up a GPS

- Cheap and easy:
  - GlobalSat BU-353-S4 (or N5) USB GPS Receiver (Amazon.com $30)
- OpenCPN also "plays well" with Garmin devices
- Any NMEA standard devices, including AIS
- Any on-board wifi NMEA stream (techie)

Setting Up a GPS

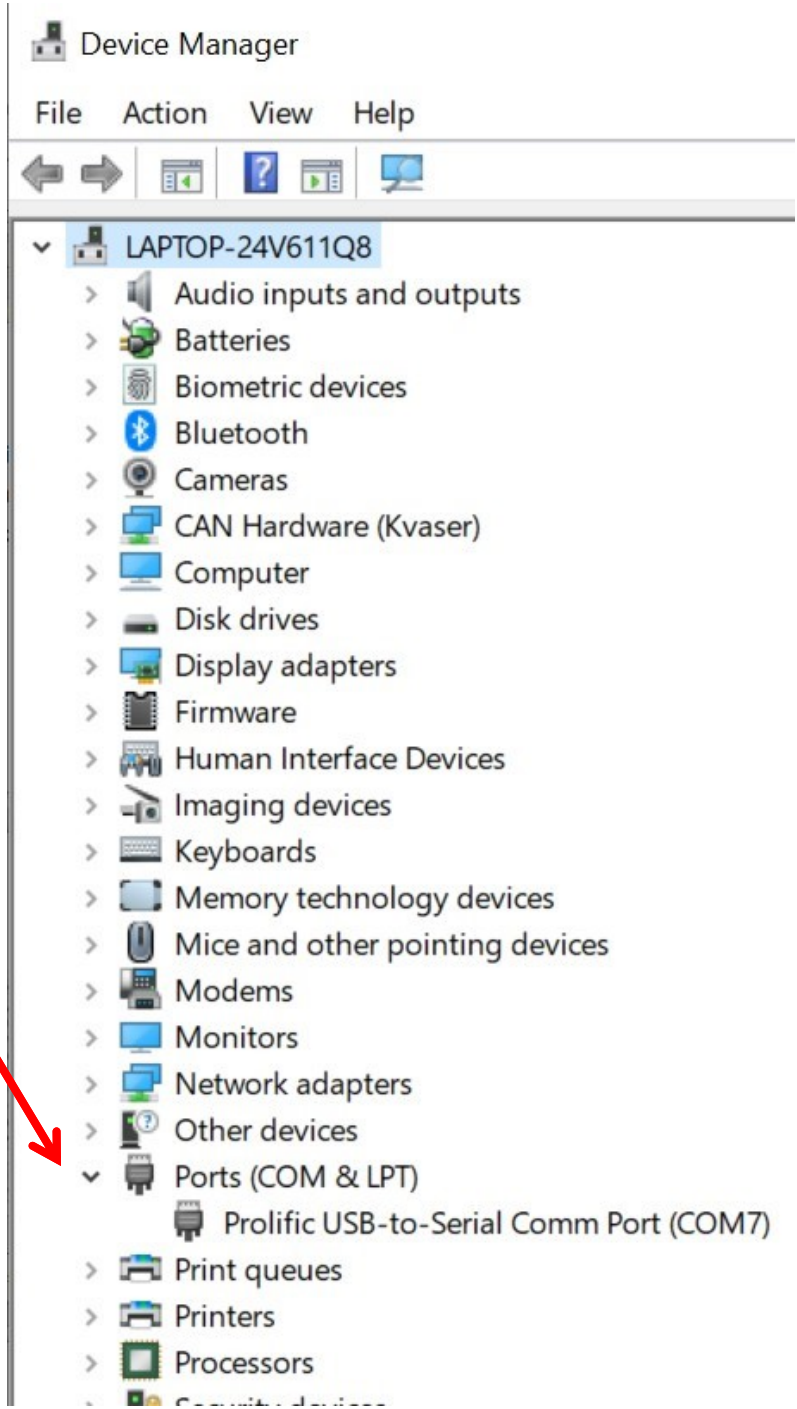


Setting Up a NMEA GPS (Serial Connection)



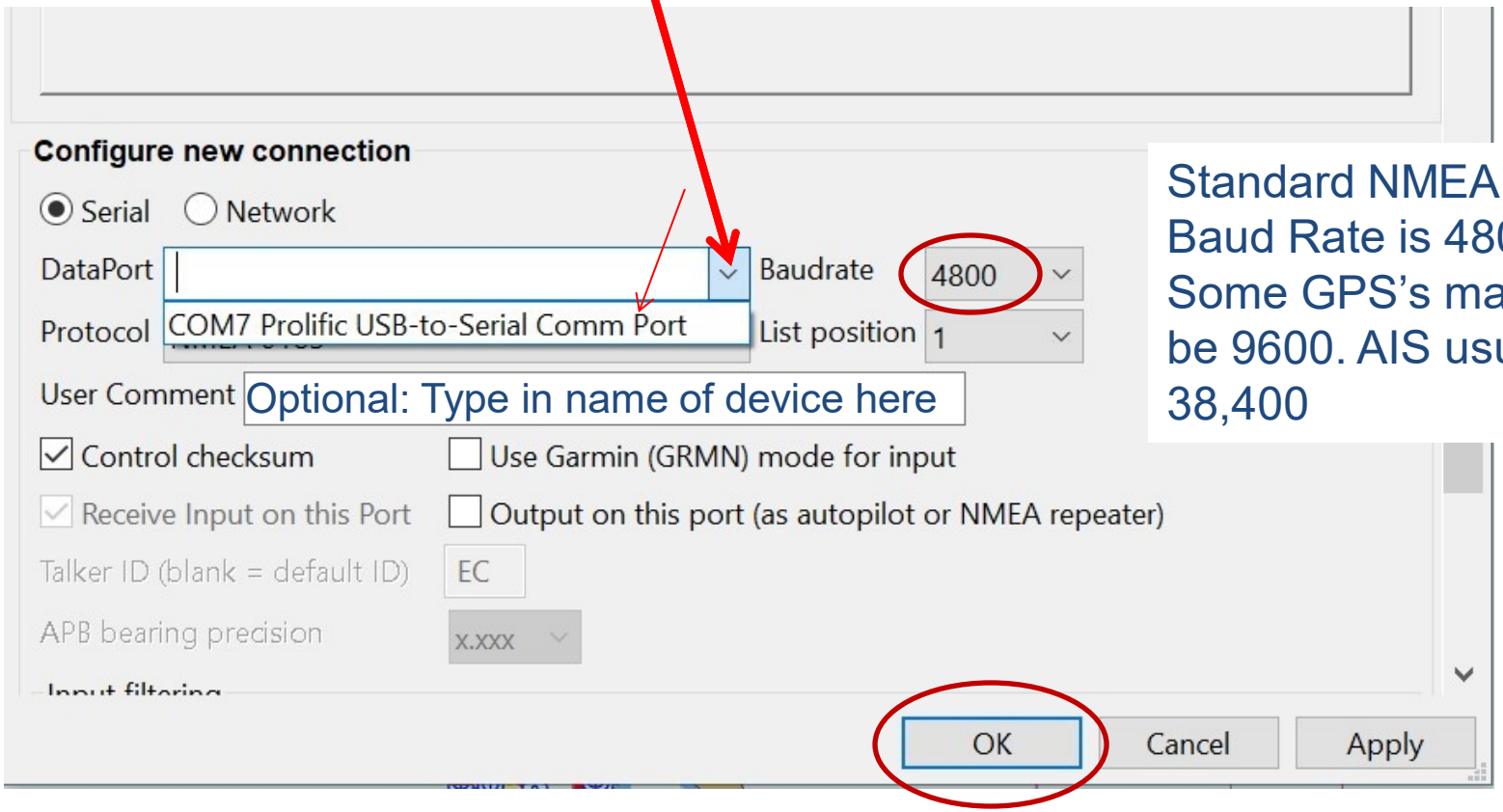
Setting up a GPS

- First, install driver(s)
- Plug in GPS
- Check Device Manager under Ports Heading
- Make sure no errors in Device Manager



Setting Up a GPS

With your GPS on and plugged in, click this drop-down
OpenCPN will show available com ports



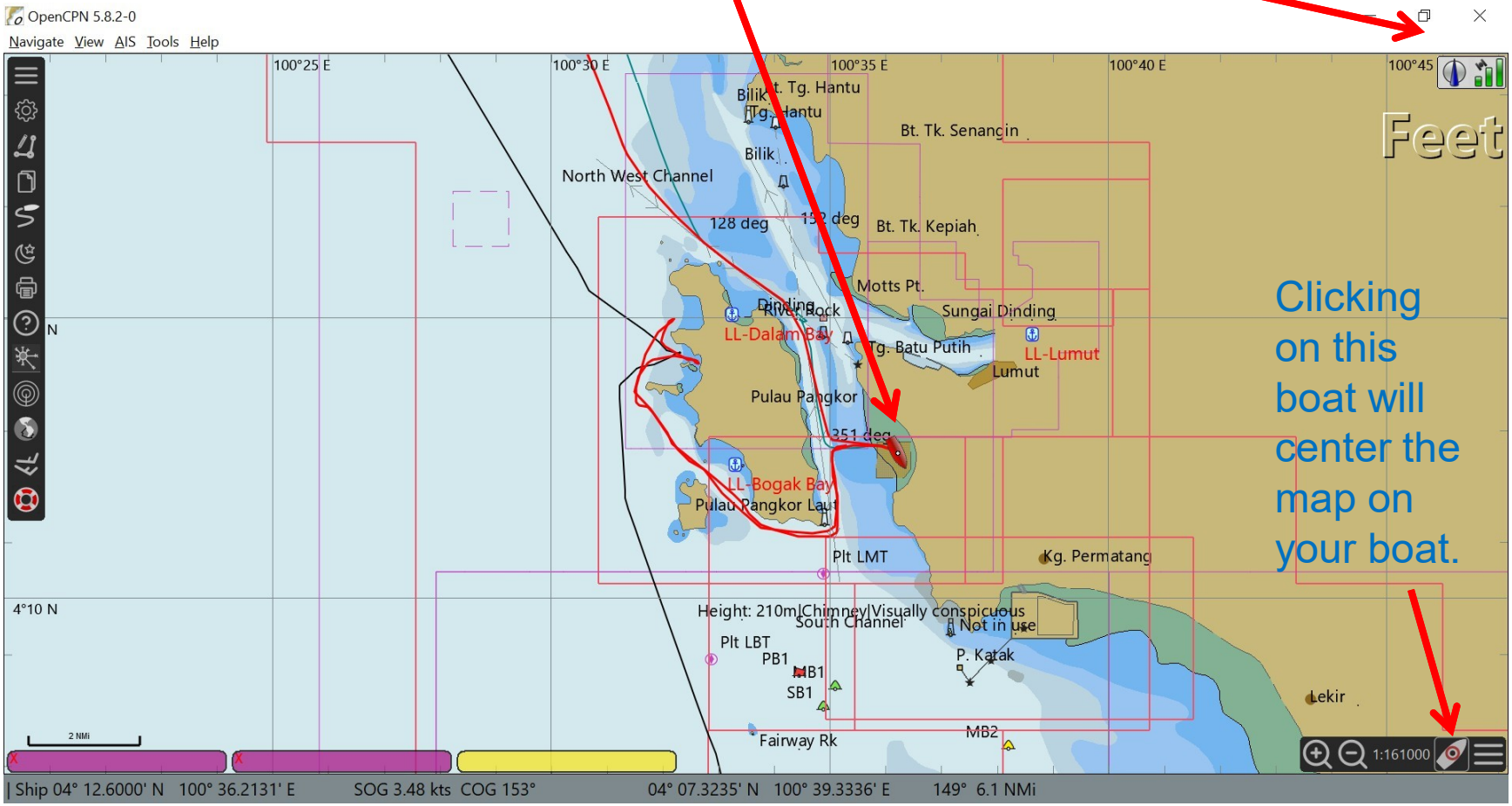
Standard NMEA Baud Rate is 4800 Some GPS's may be 9600. AIS usually 38,400

For a simple NMEA GPS for position input, that's all you need to do!

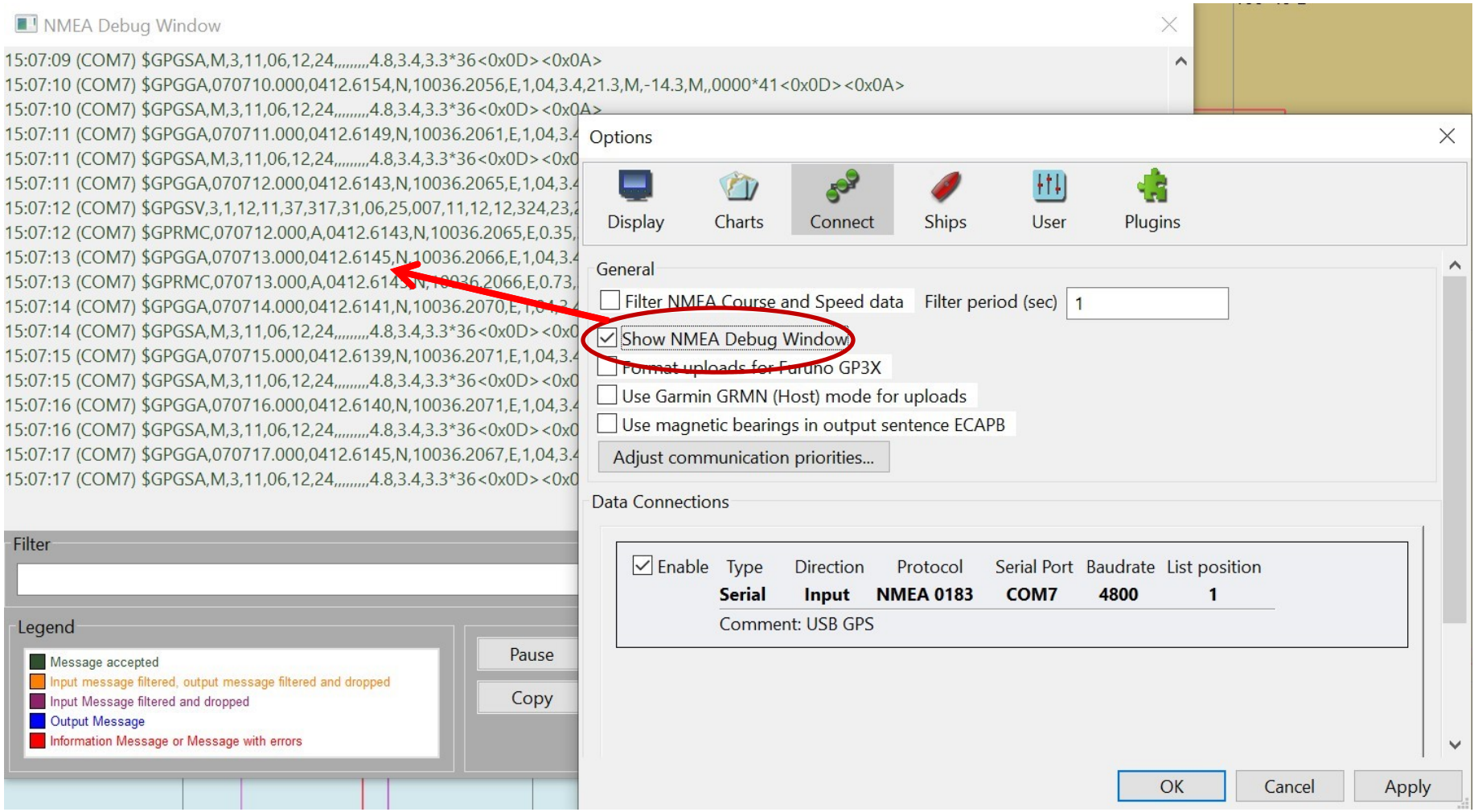
Setting Up a GPS

Once GPS configured

- GPS Status Panel should show Green
- Boat Icon should show Red



Do I Have a Working GPS?



If you have stuff scrolling across the NMEA Debug screen, there is data

Do I have a Working GPS?

$GPRMC,071238.000,A,0412.6012,N,10036.2109,E,0.90,40.20,120523,,,A*55<0x0D><0x0A>

This is a GPS position “sentence”.

- The “A” in the sentence means “thumbs up, we have a position”
- A “V” in the sentence means “thumbs down, no GPS position”

It’s a quick way to tell whether your problem is with the serial port
Or the GPS is not able to obtain a position.

If you see data, but have a V, take your GPS out where it has a clear view of the sky. (put your USB GPS out a hatch/porthole)

Most modern GPS’s will get position data fairly quickly, older ones may take a few minutes.

Getting Your AIS on the Chart

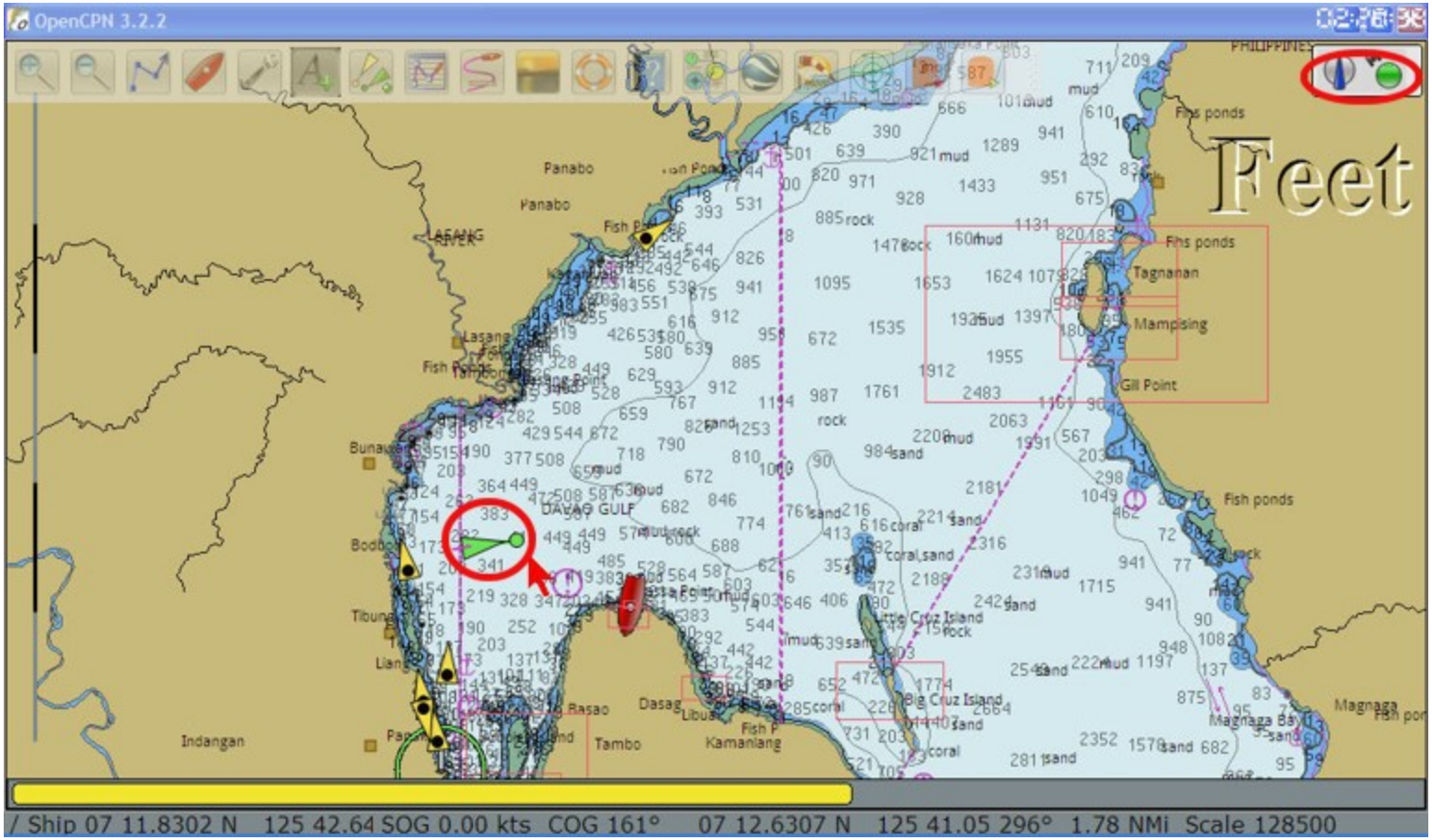
- Plug AIS into your computer
  - Usually a USB connection, using manufacturer-supplied cables and drivers
- Setup / Connections / Add Connection just like GPS
- Select the appropriate Com port
- Set Baud Rate to 38400 (usual default rate for AIS)
- Some AIS's ALSO send Position. You only want ONE position indicator into OpenCPN. Use accept/reject settings to filter unwanted position information out.

Newer AIS's may supply AIS (and maybe position) by Wifi. OpenCPN can do this by adding the connection as a Network connection.
- Consult your Mfg's manual, and the OpenCPN manual.

Getting Your AIS on the Chart

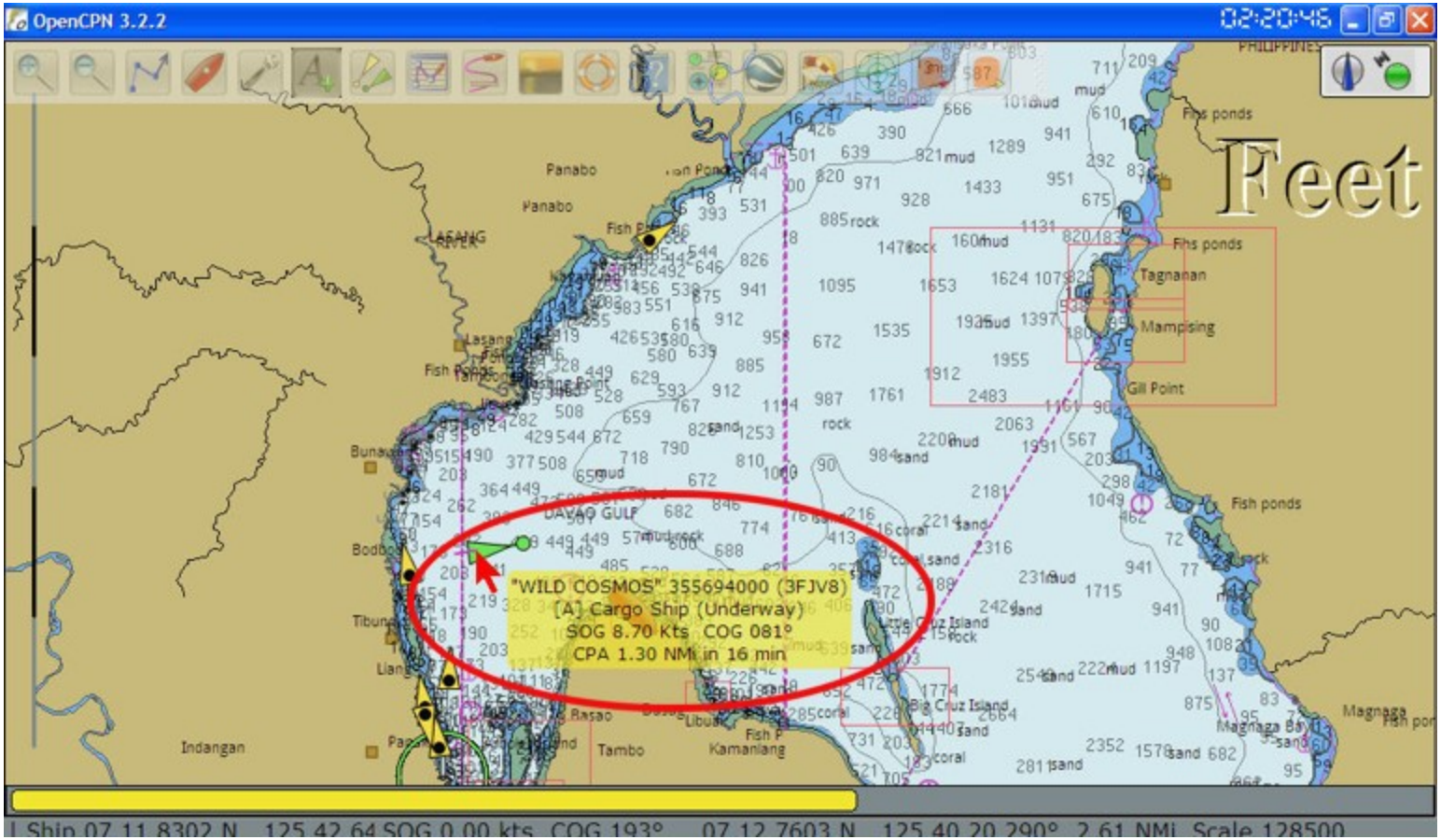
Once installed and configured – Ships with AIS on your chart!

- Ships at anchor – Yellow with black dot
- Ships underway – Green
- GPS Status Indicator Green Ball



Getting Your AIS on the Chart

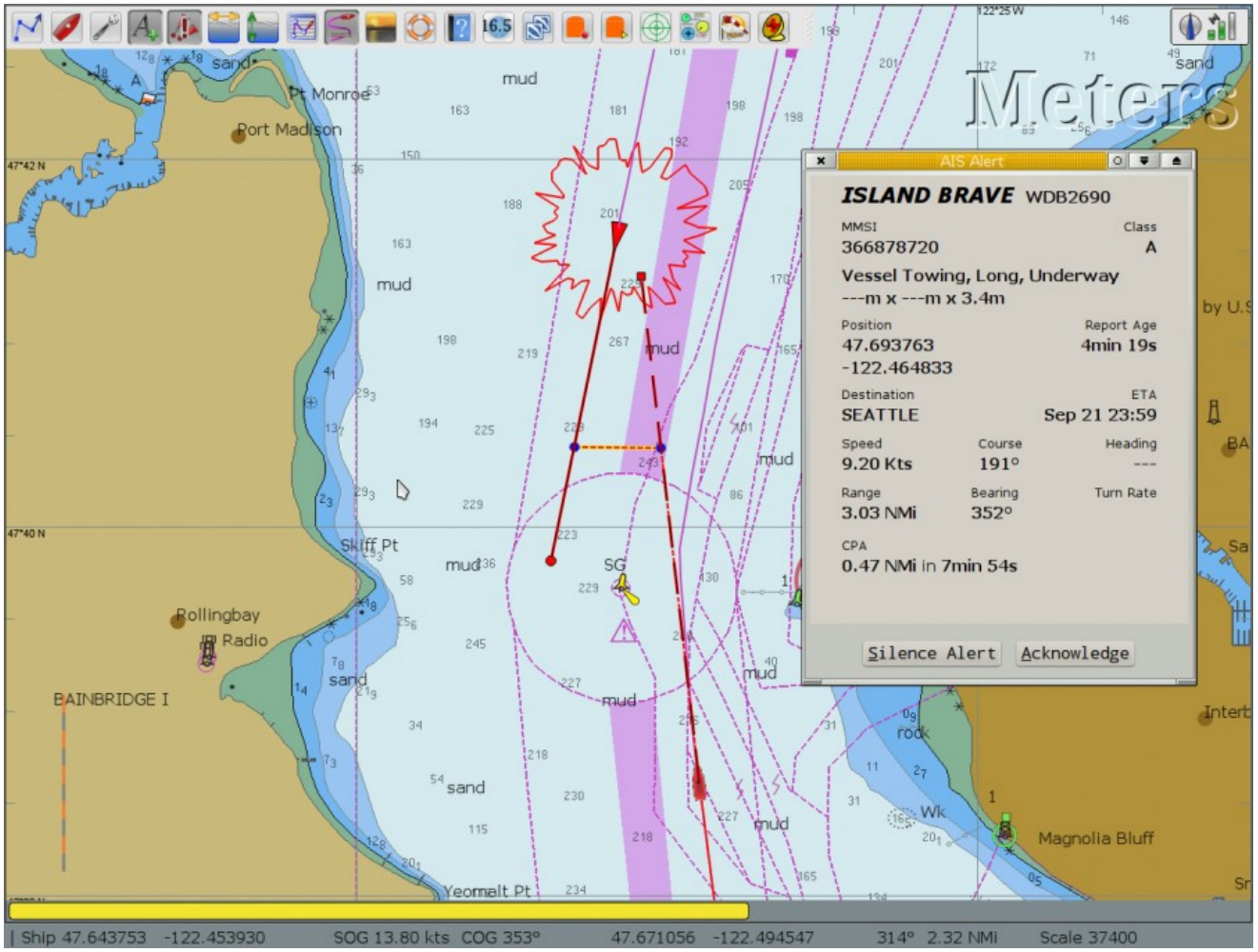
Placing your cursor on a ship gives a pop-up information box



Getting Your AIS on the Chart

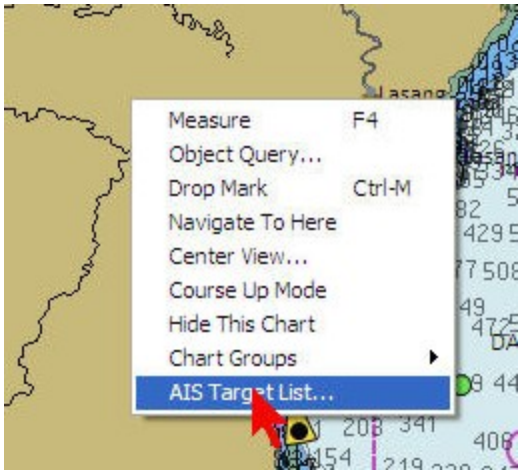
Right click on target to show AIS Target Data and CPA

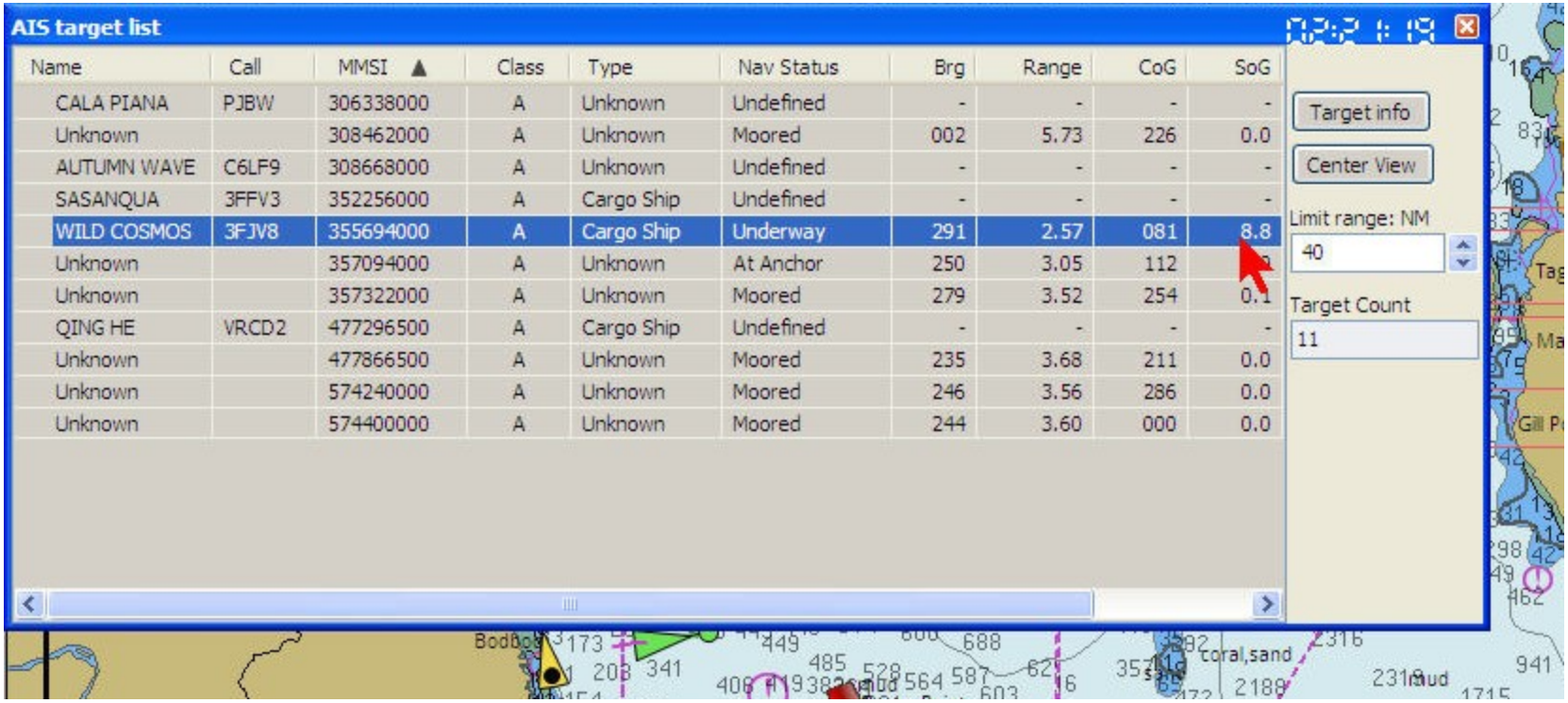
See OpenCPN Manual for LOTS more on AIS in OpenCPN



Getting Your AIS on the Chart

- Right-click anywhere on chart to pop up the AIS Target List
- Note details of ships in the list

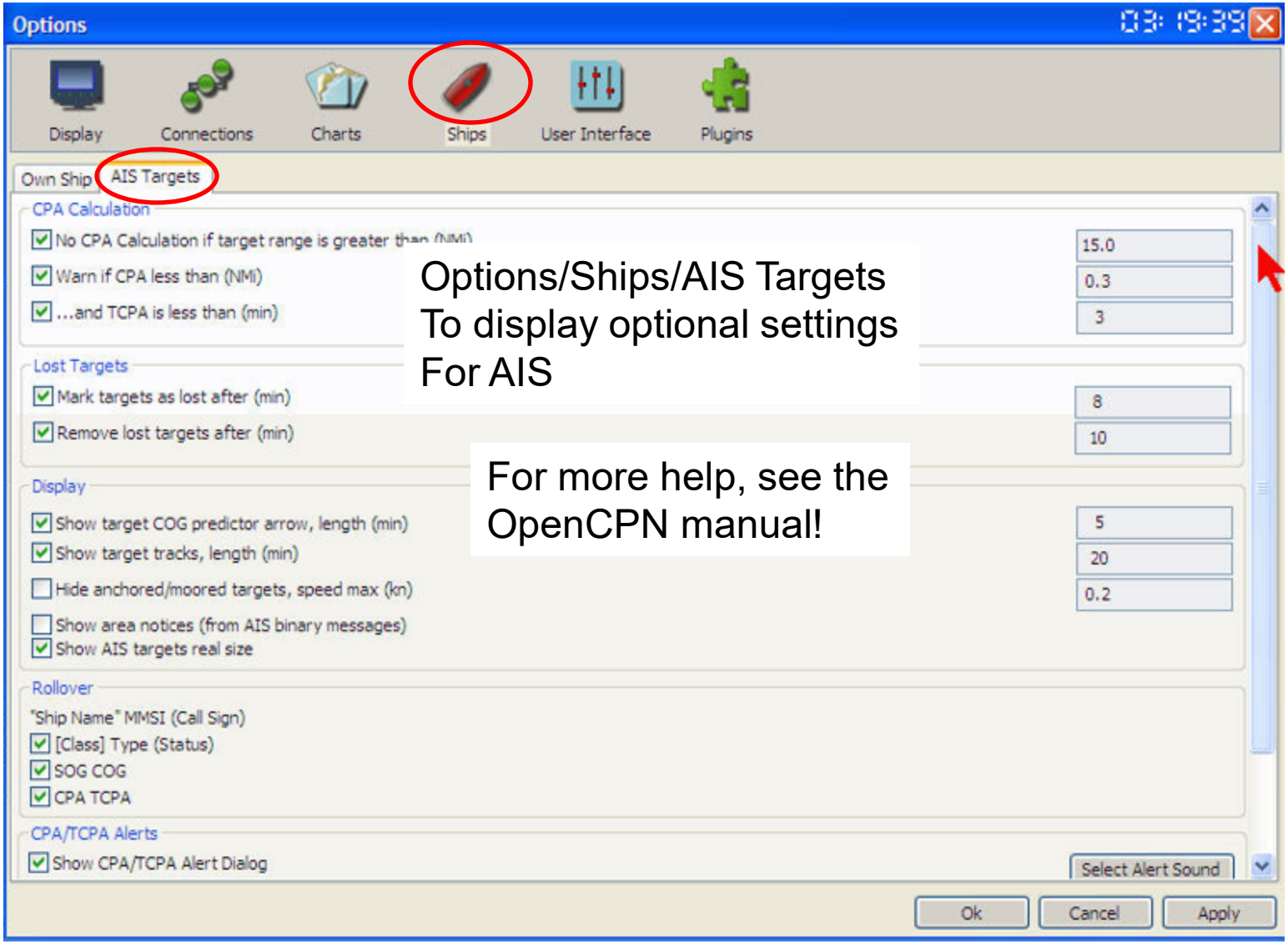




Getting Your AIS on the Chart

Optional AIS Radar View Plugin
(May have been removed in 5.8)

Getting Your AIS on the Chart



Notes on Com Ports

- (If you're not sure which Com port is which, unplug one and see which one goes away), then label in OpenCPN, and tape a label on the USB cord.
- Also label the exact USB port you plug it into. (some devices will give a different com port number if plugged into a different port)
- Plugging in a new device, especially with other devices unplugged, may change your com ports!

What we do on Soggy Paws

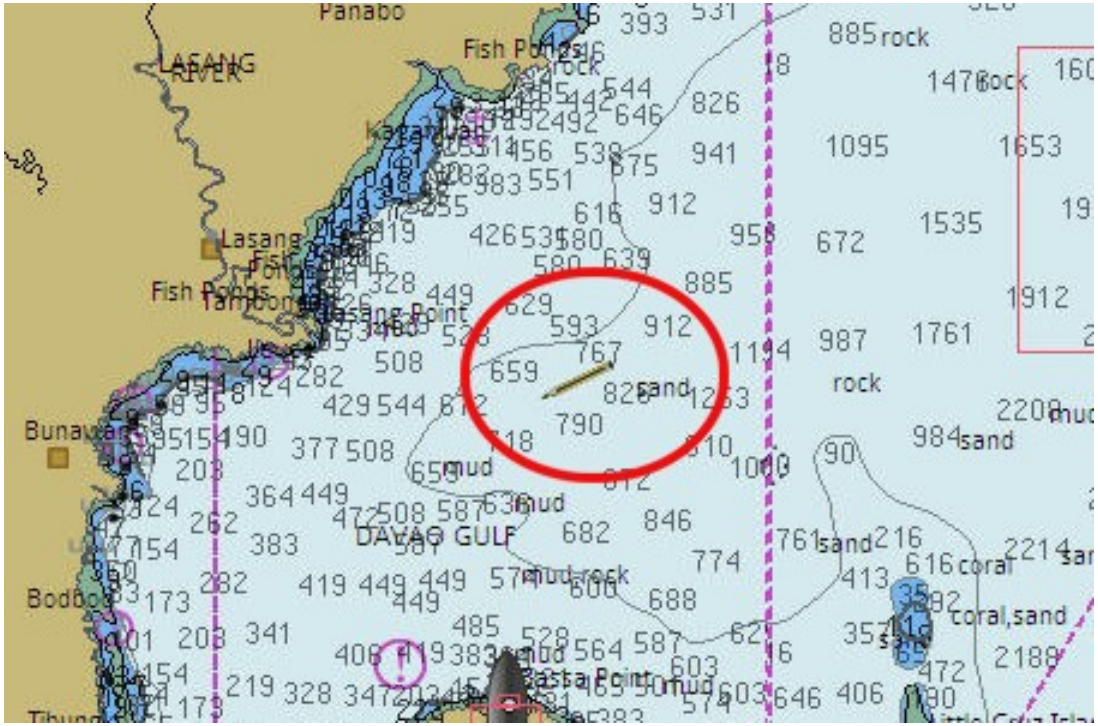
- All connections go into the Nav Computer
- Backup devices are configured but disabled (eg. USB GPS)
- OpenCPN has an “output” capability that broadcasts info over the boat wifi network.
- Tablets and mobile phones can receive position, instrument data, and AIS over the boat wifi.
- OpenCPN and Navionics on mobile devices and laptops can receive the same data simultaneously
- Imagine watching your depth sounder numbers while standing on the bow looking for coral heads!
- A bit tricky to set up initially—once working, back it up and write it down!!!

Routes

Create a Route

Select “Create Route”

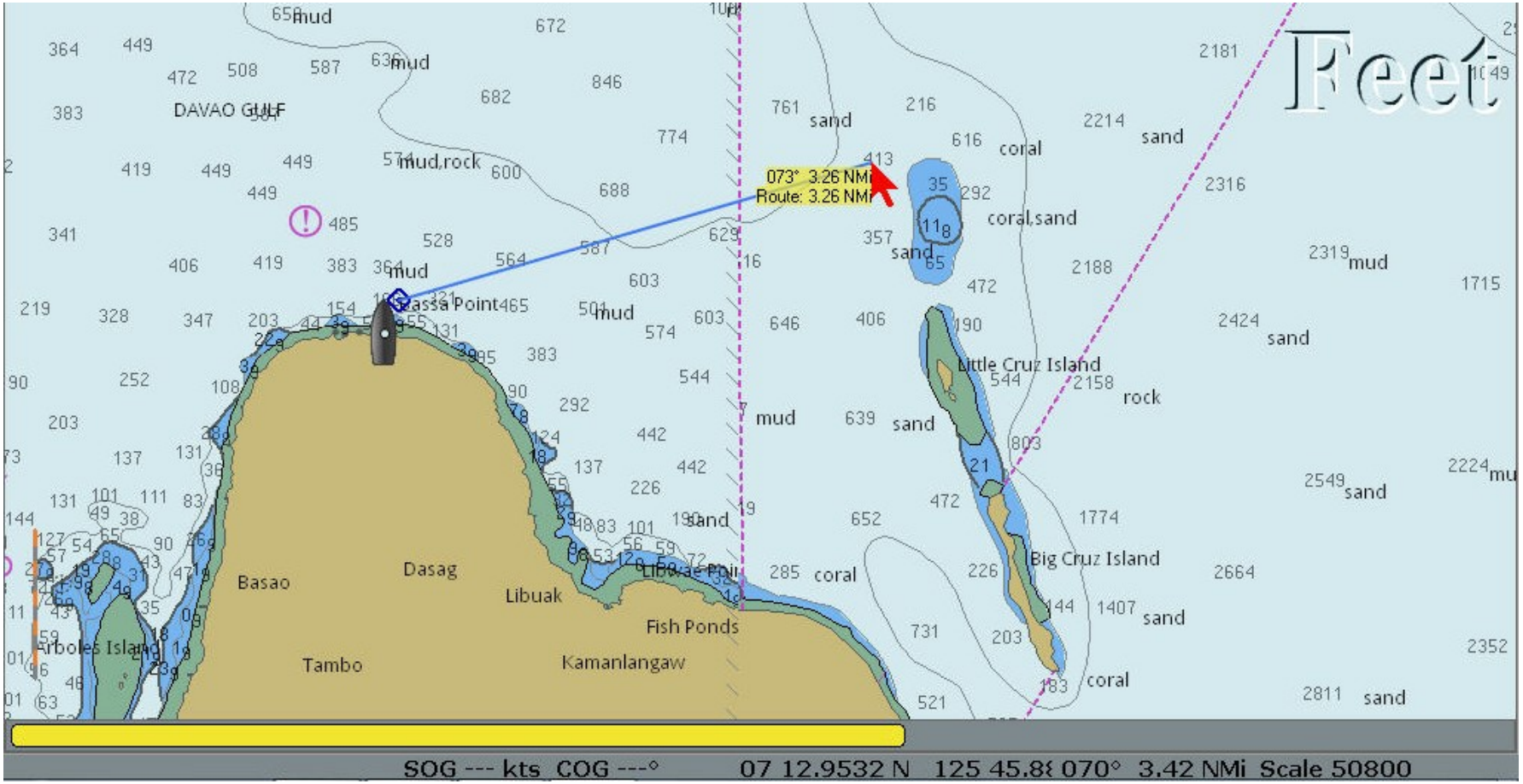
The Cursor turns into a pencil shape



Routes

Create a Route

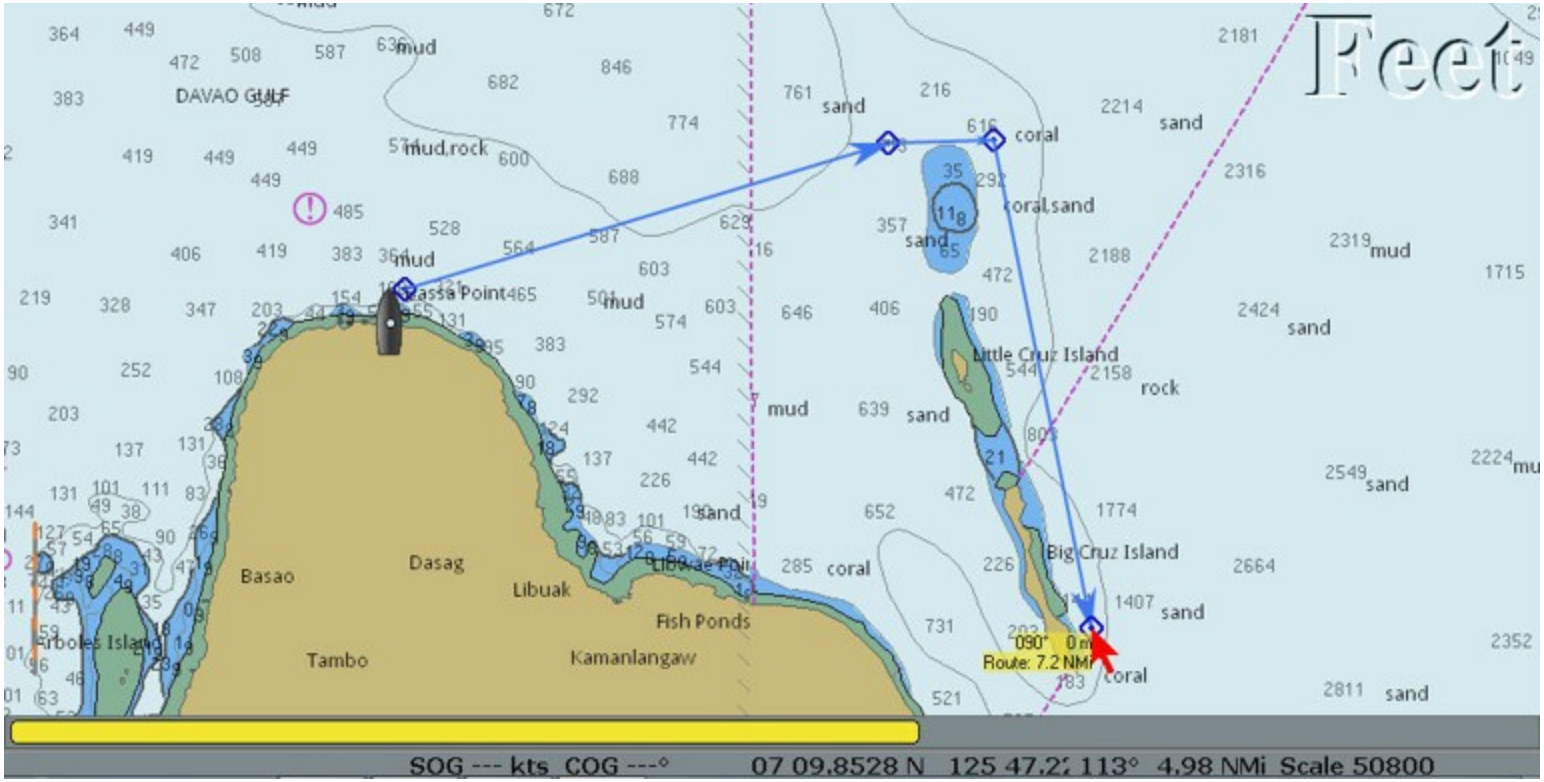
Click the pencil pointer at the desired location to describe a route



Routes

Create a Route

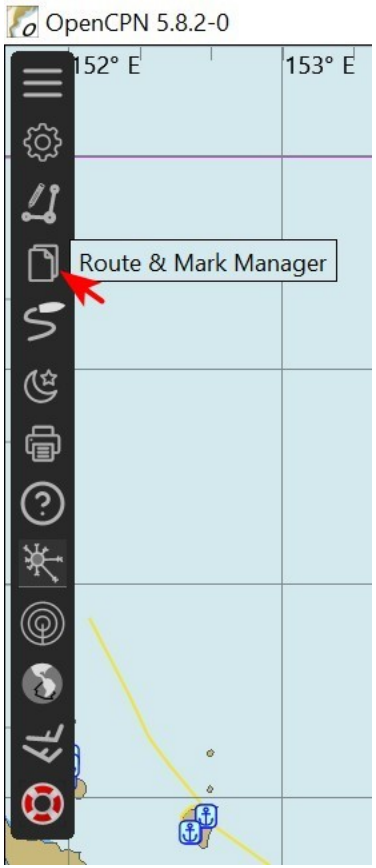
- Continue dropping waypoints (with a click) until you are finished.
- Press the ESC key to stop



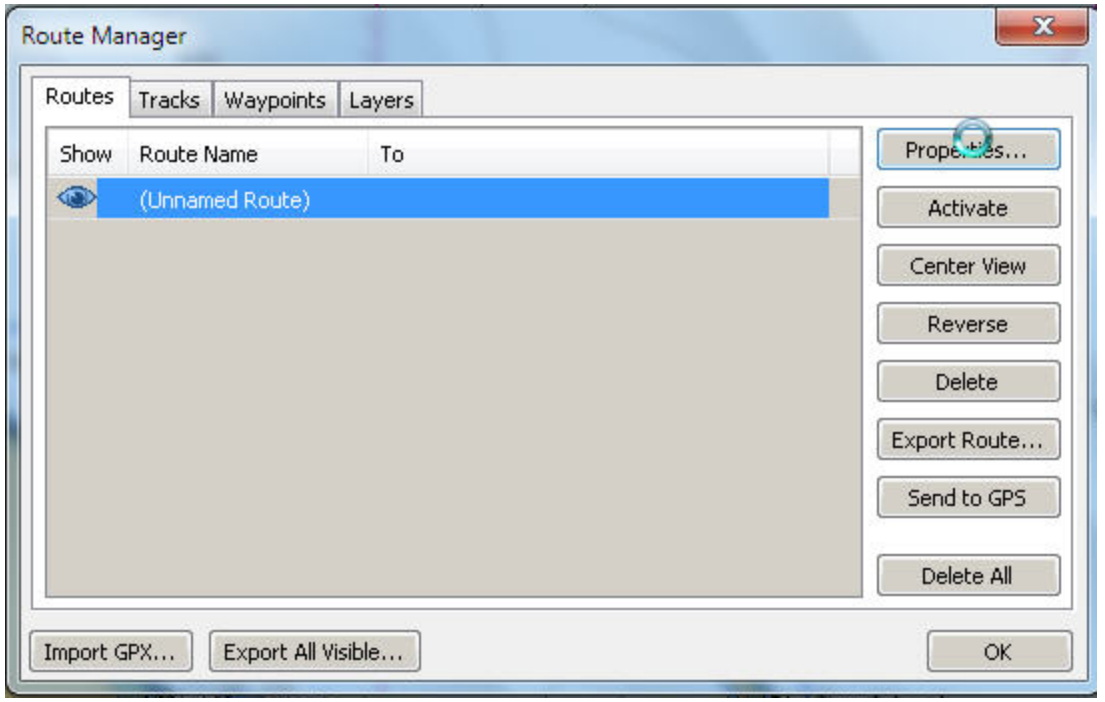
Routes

Editing/Viewing a Route

Open the Route Manager from the toolbar



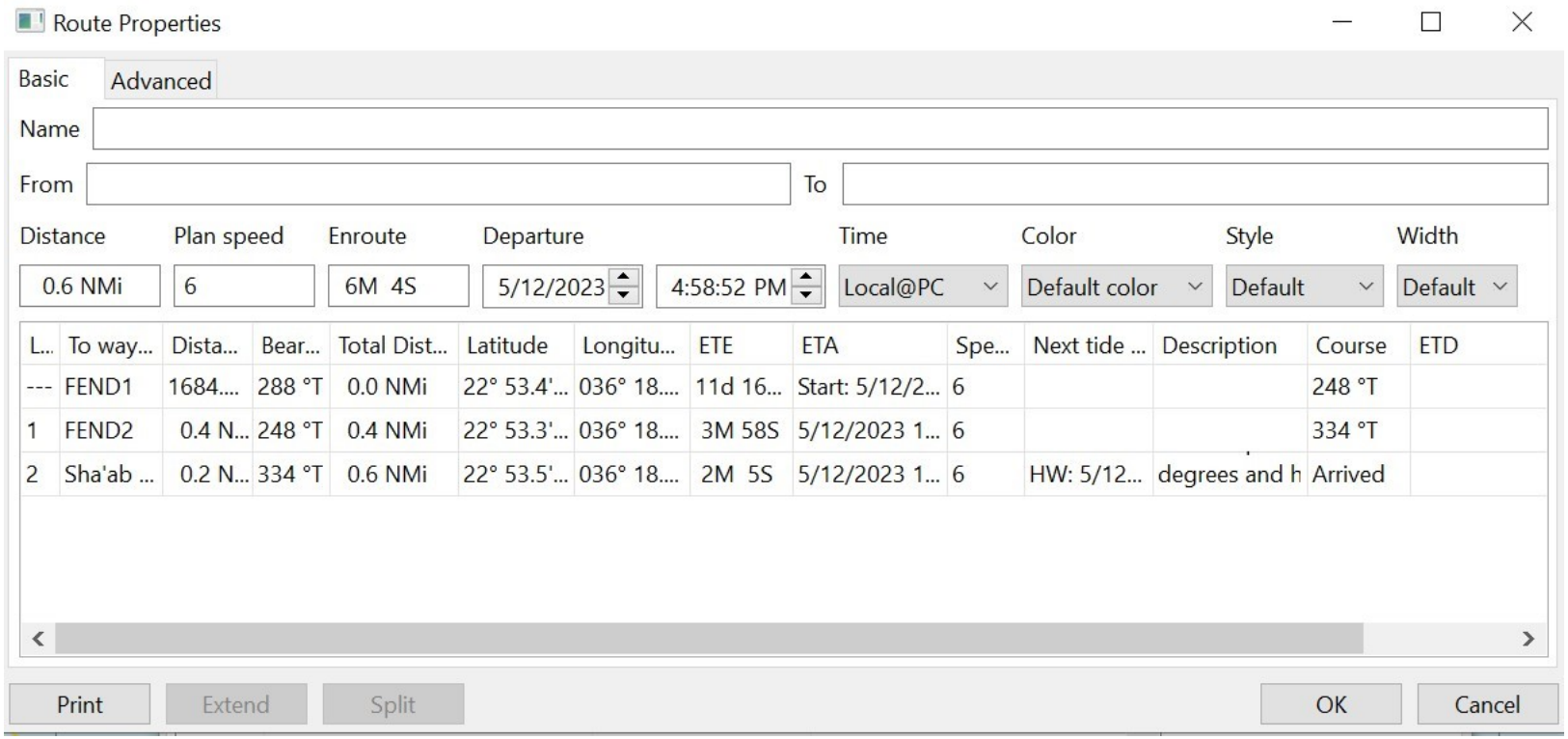
On the Routes tab, select the new route and click Properties



Routes

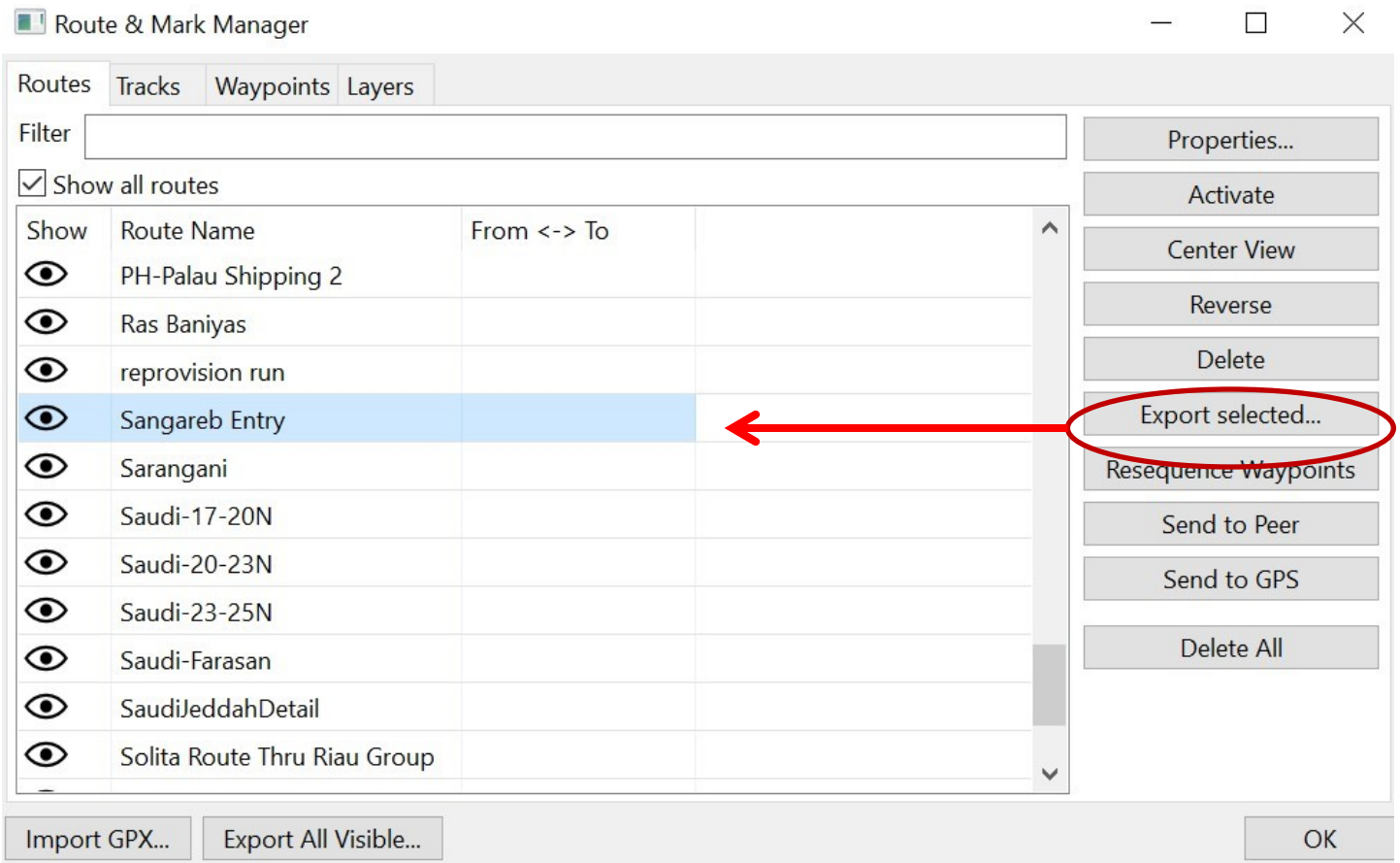
Editing/Viewing a Route

- Name the route (for future reference)
- Check distances and estimate ETA's



Routes
Save/Export a Route

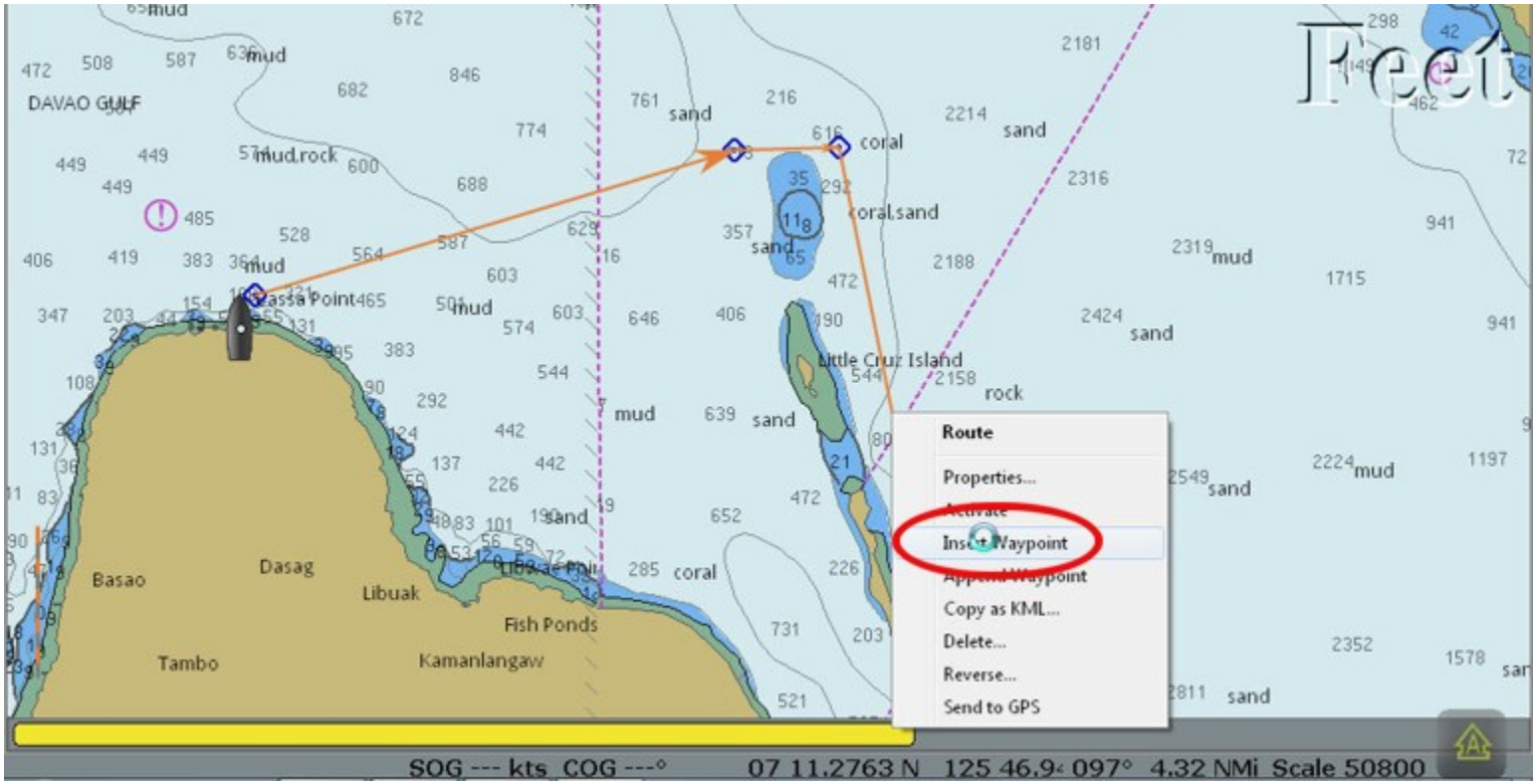
- To save a route outside of OpenCPN (for backup, to share with others)
  - Highlight route
  - Click Export Selected and Save as a file



Routes

Change a Route

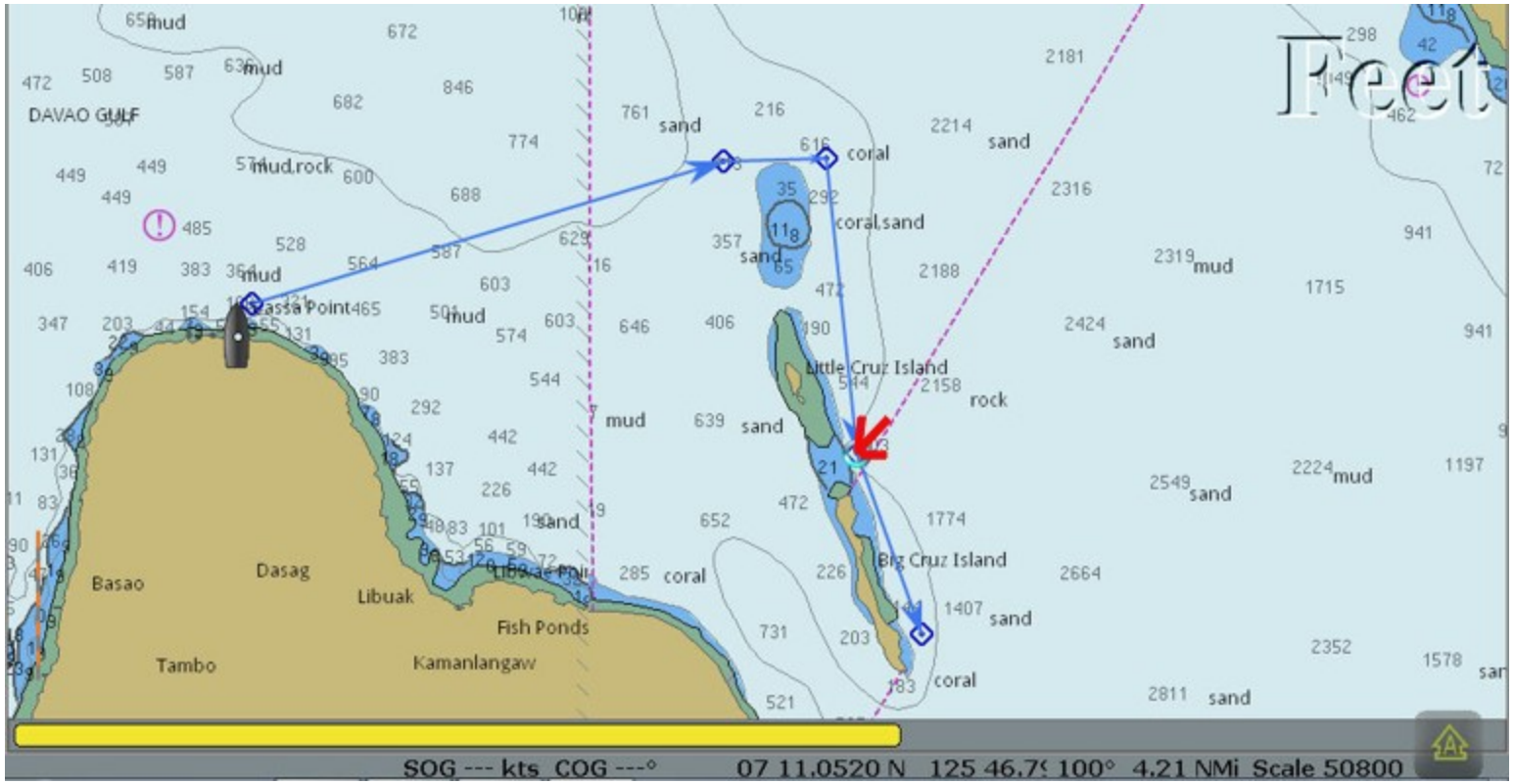
- To change a route
  - Right click on a point on the route
  - Select “Insert Waypoint”



Routes

Change a Route

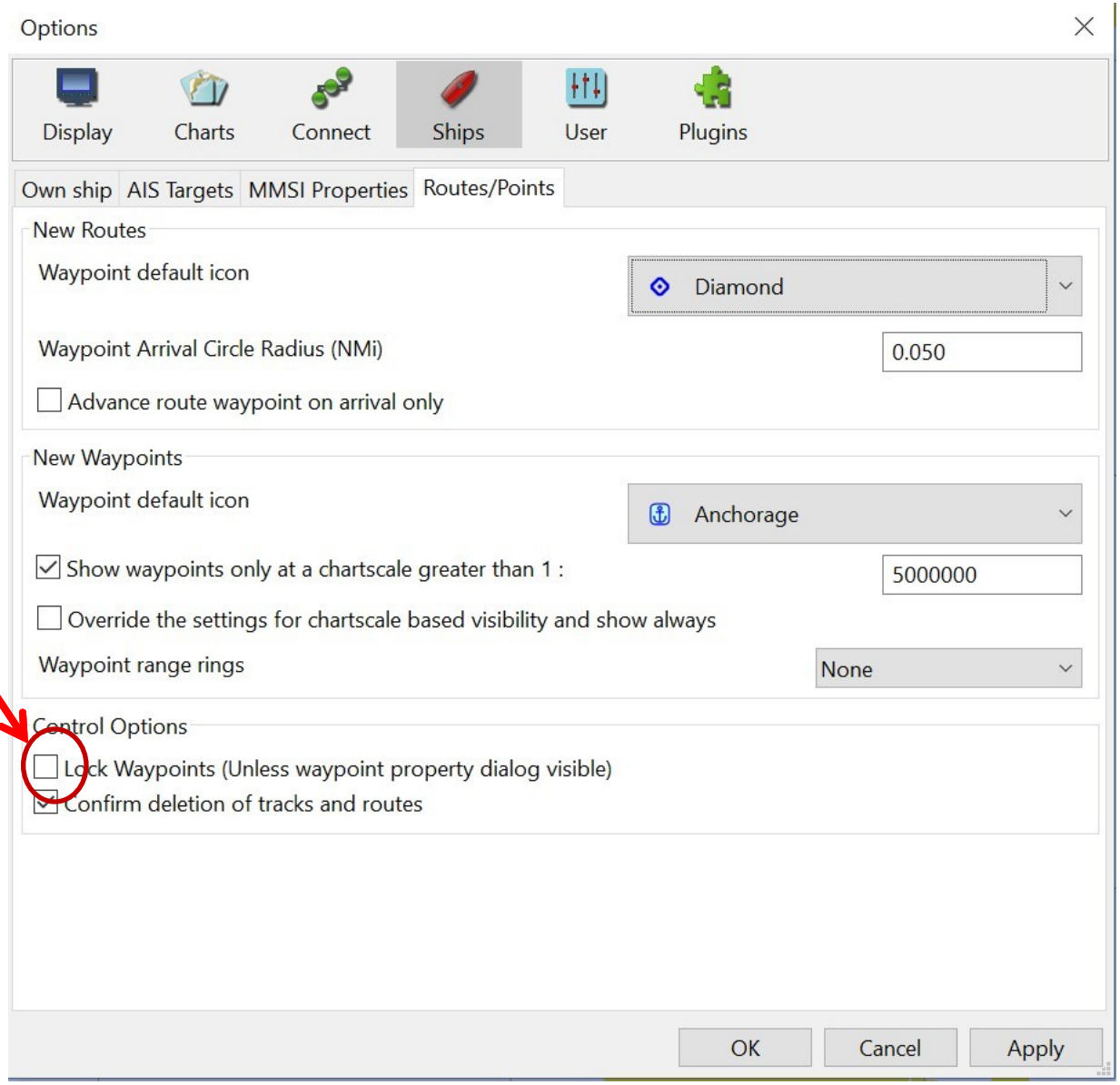
Place cursor on new waypoint, and drag it where it should be



Routes

Change a Route

If you can't drag a waypoint, check settings



Tracks

Creating a Track

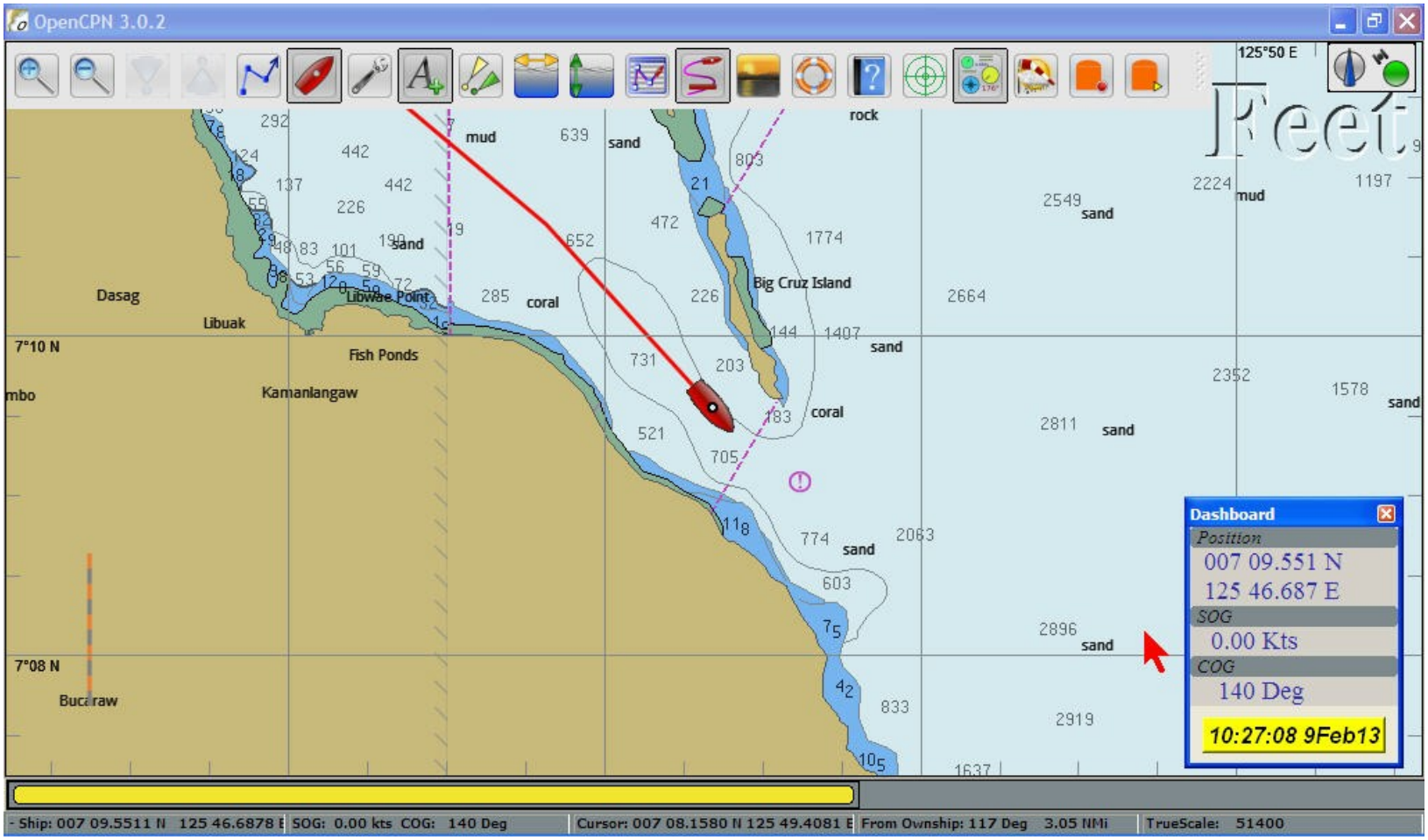
Click on the Tracking
Icon to activate tracking

Now it is highlighted
Click again to Disable

Tracking precision
Is set in
Options/Ships/Own Ship
- Medium is good

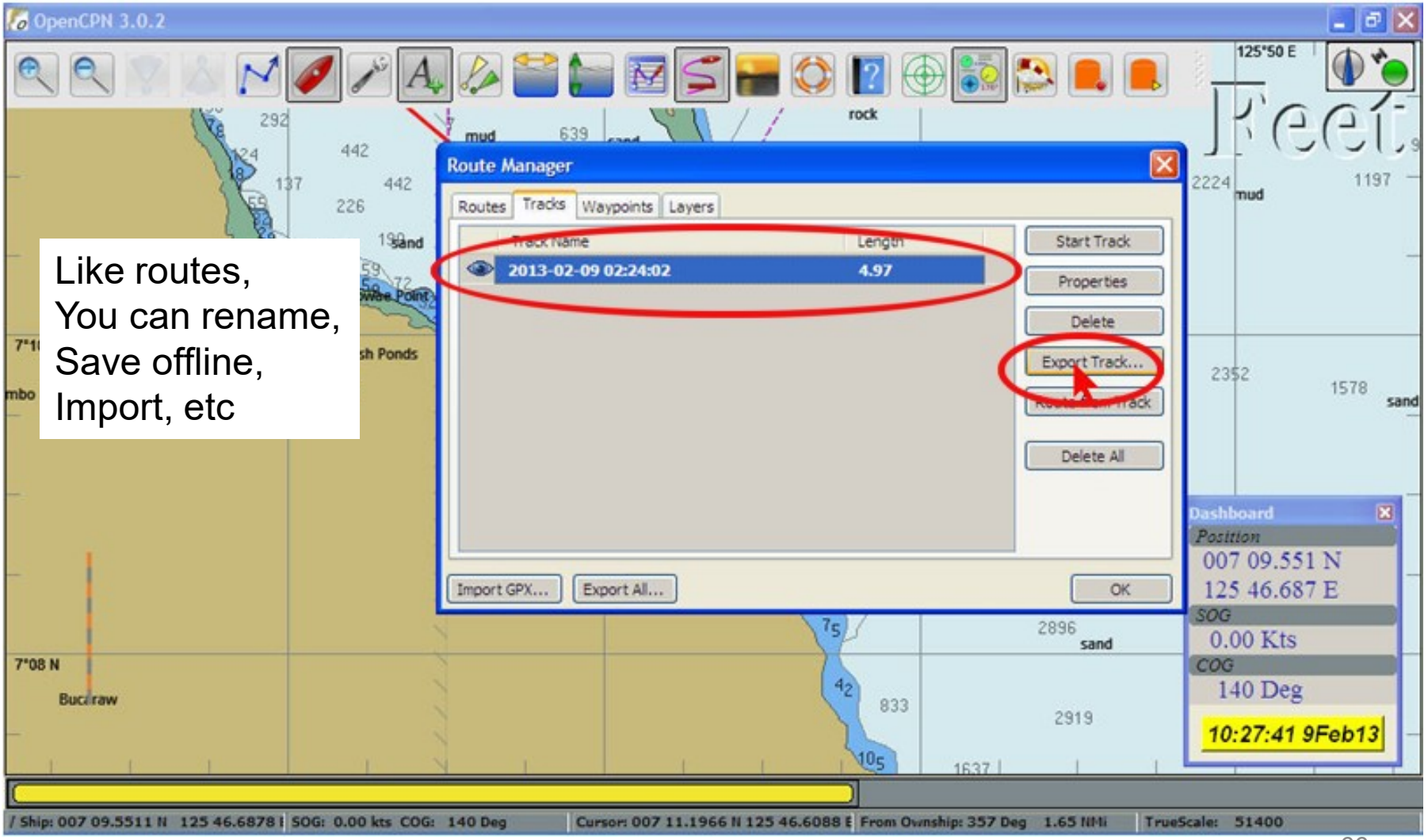
Tracks

Creating a Track



Tracks

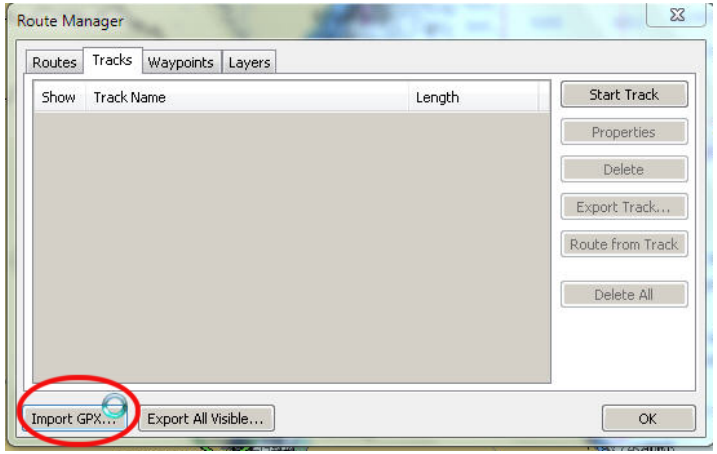
Saving Tracks

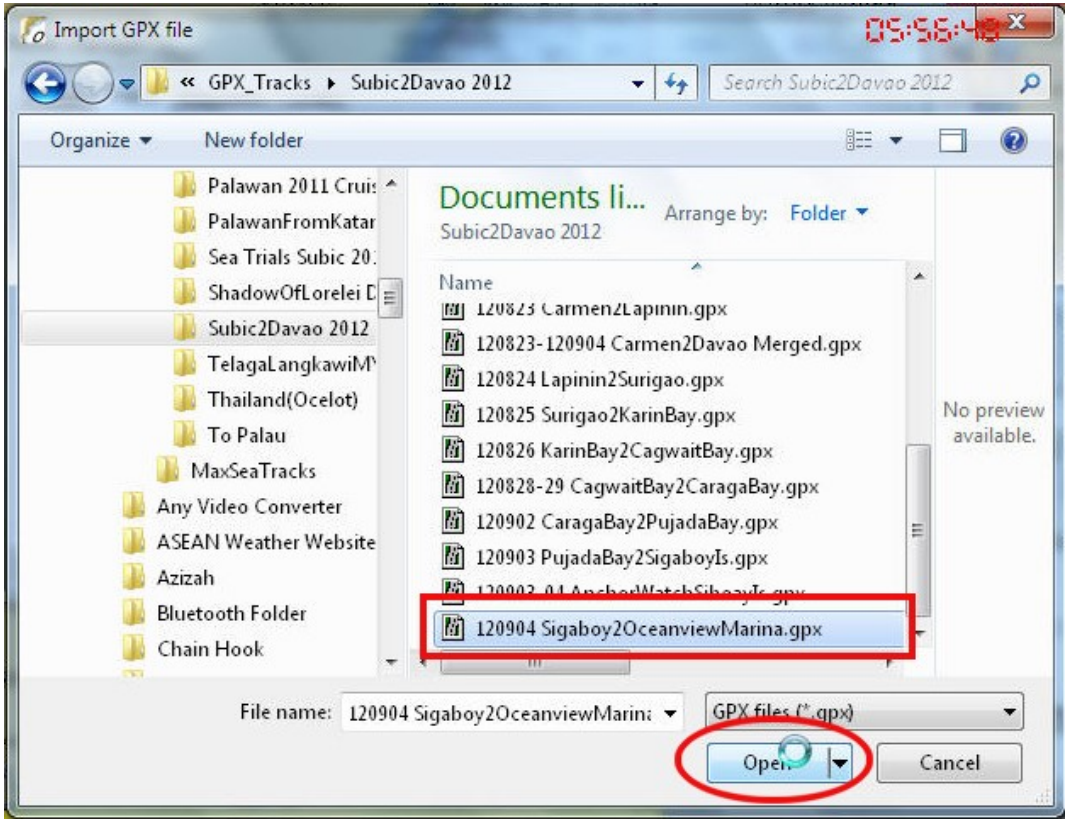


Importing Tracks

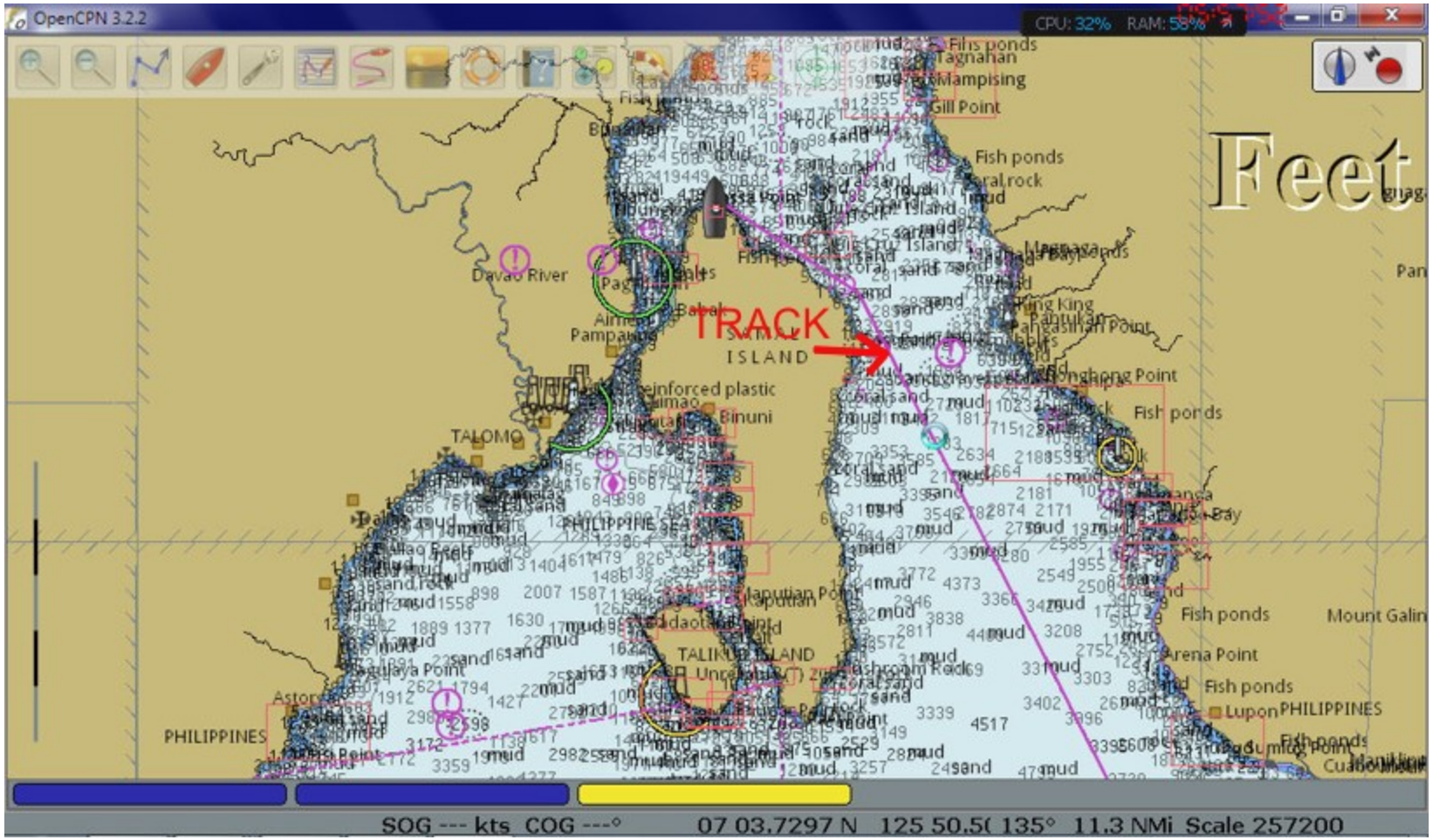
Route Manager
- Select Tracks tab
- Click on Import

Navigate to saved tracks location
Click Open



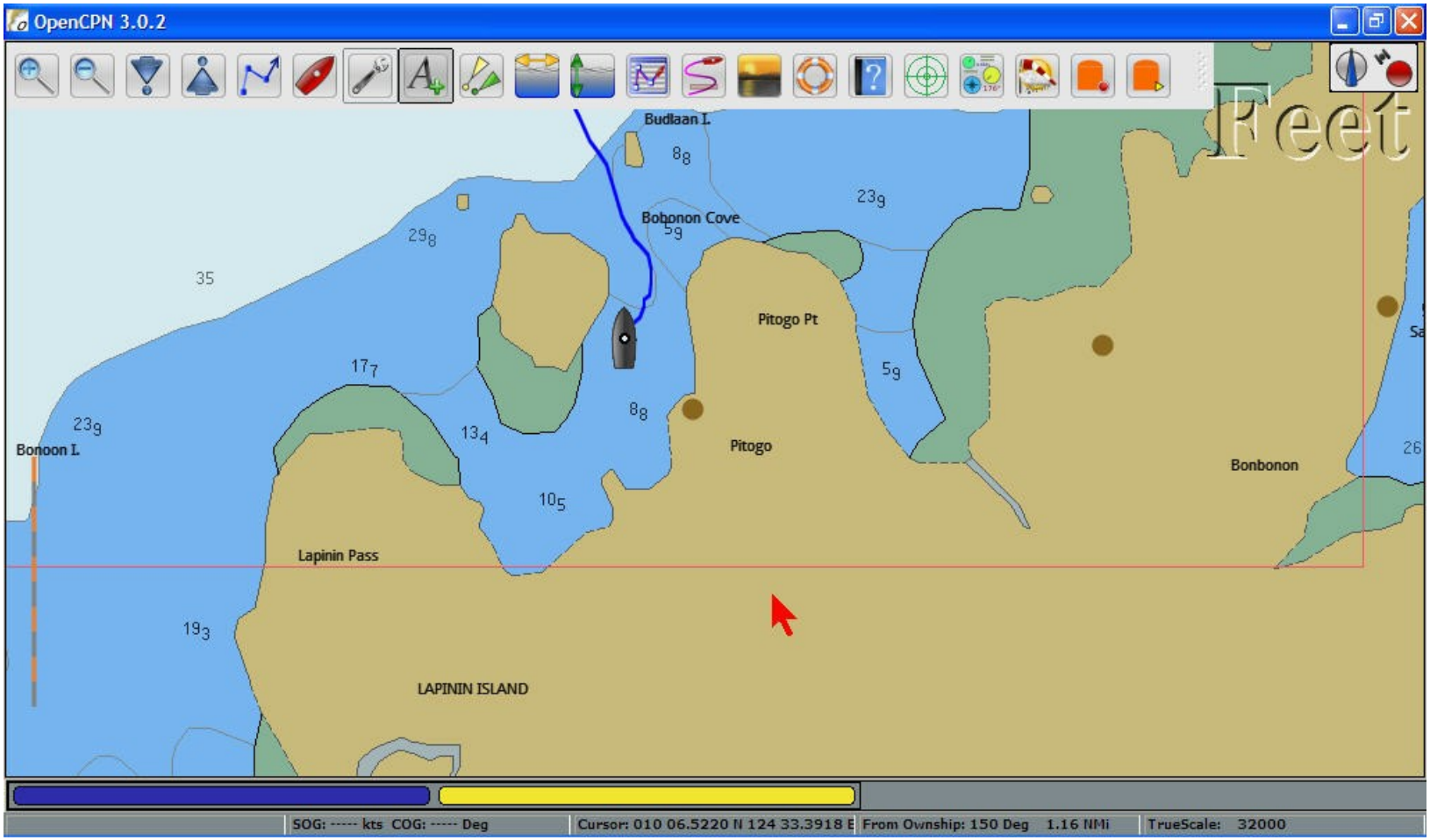


Importing Tracks



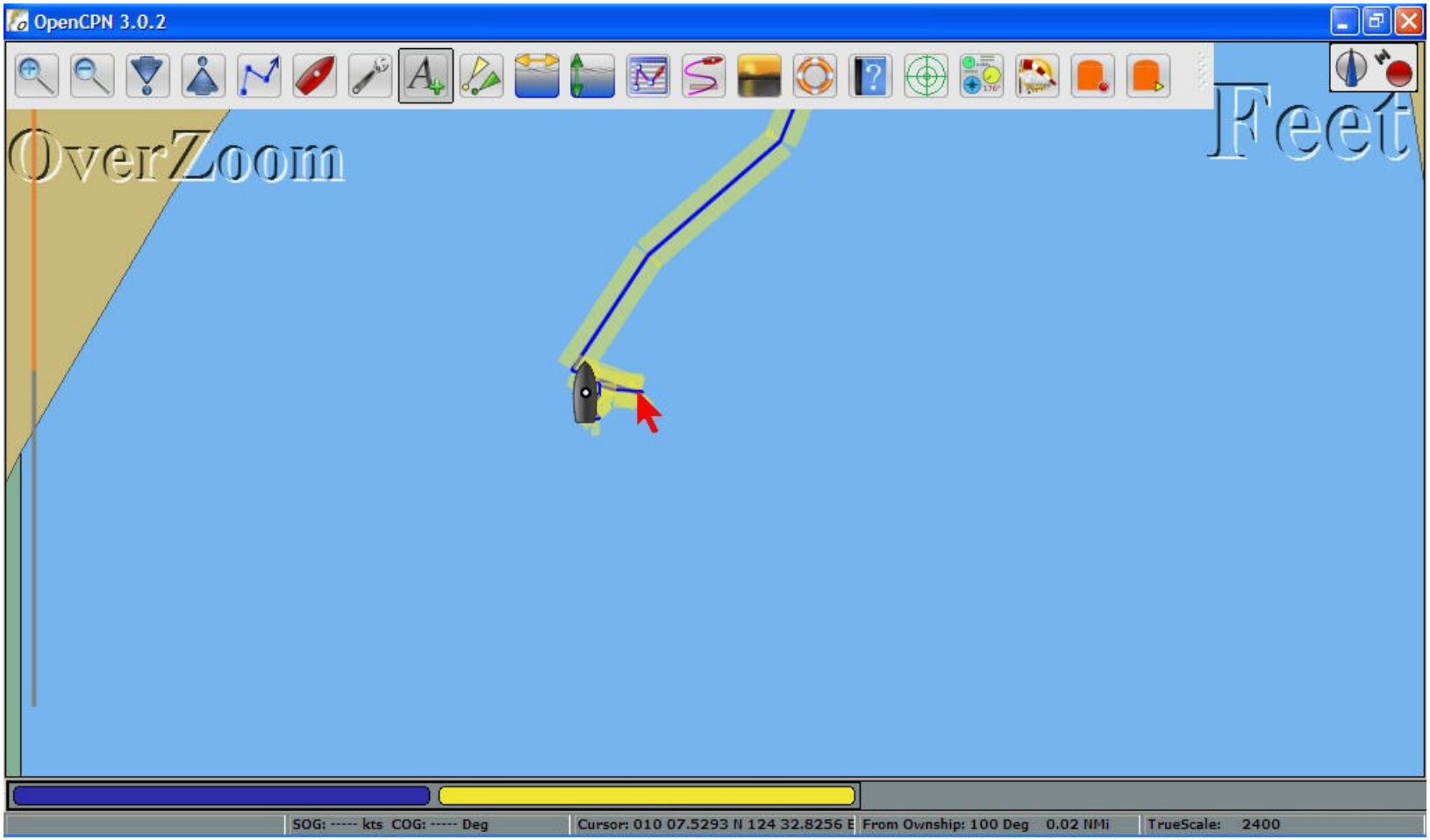
Saving Waypoints (Marks)

Shown below is the arrival at an anchorage



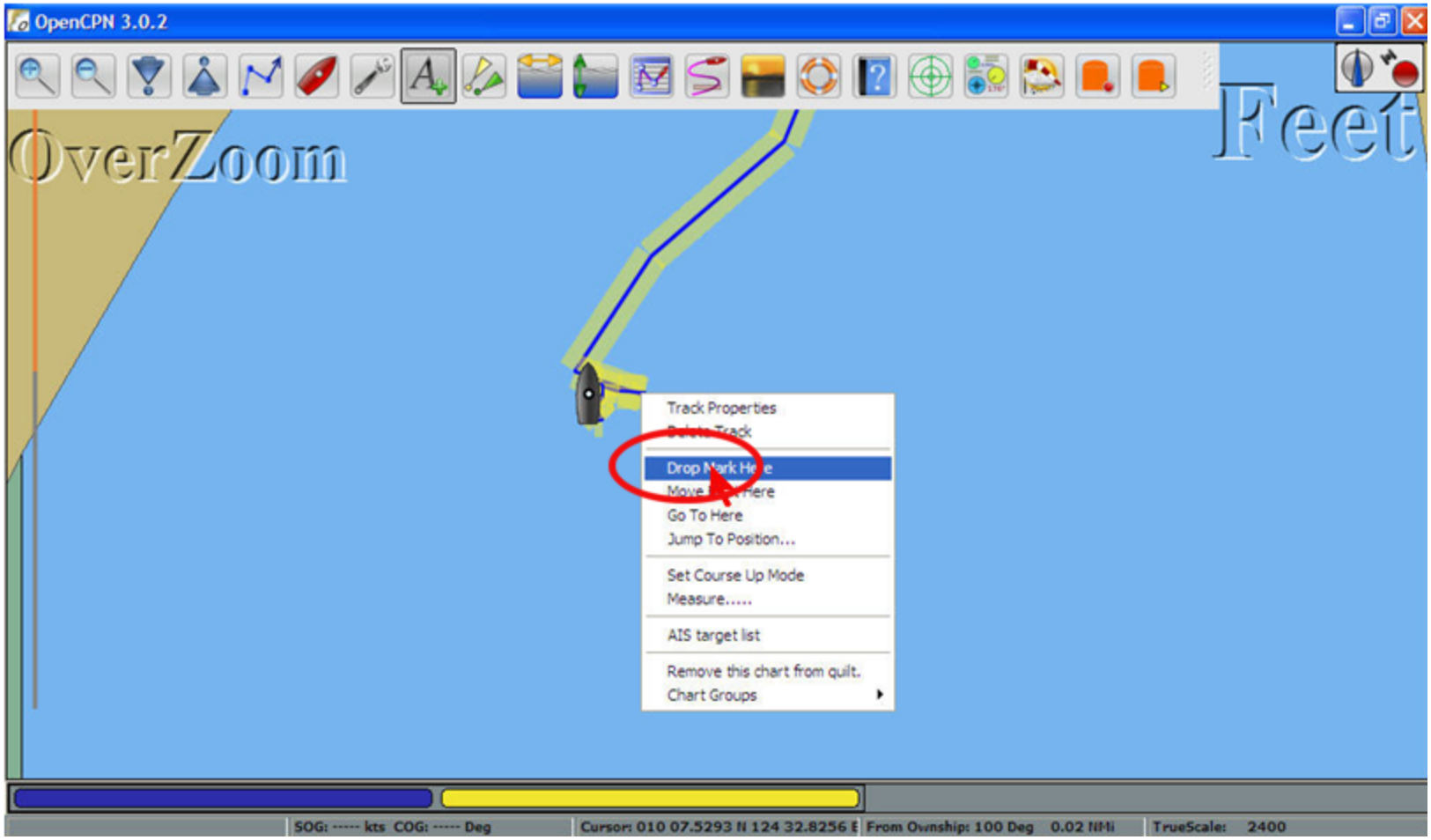
Saving Waypoints (Marks)

Zoom in to see where the anchor was dropped



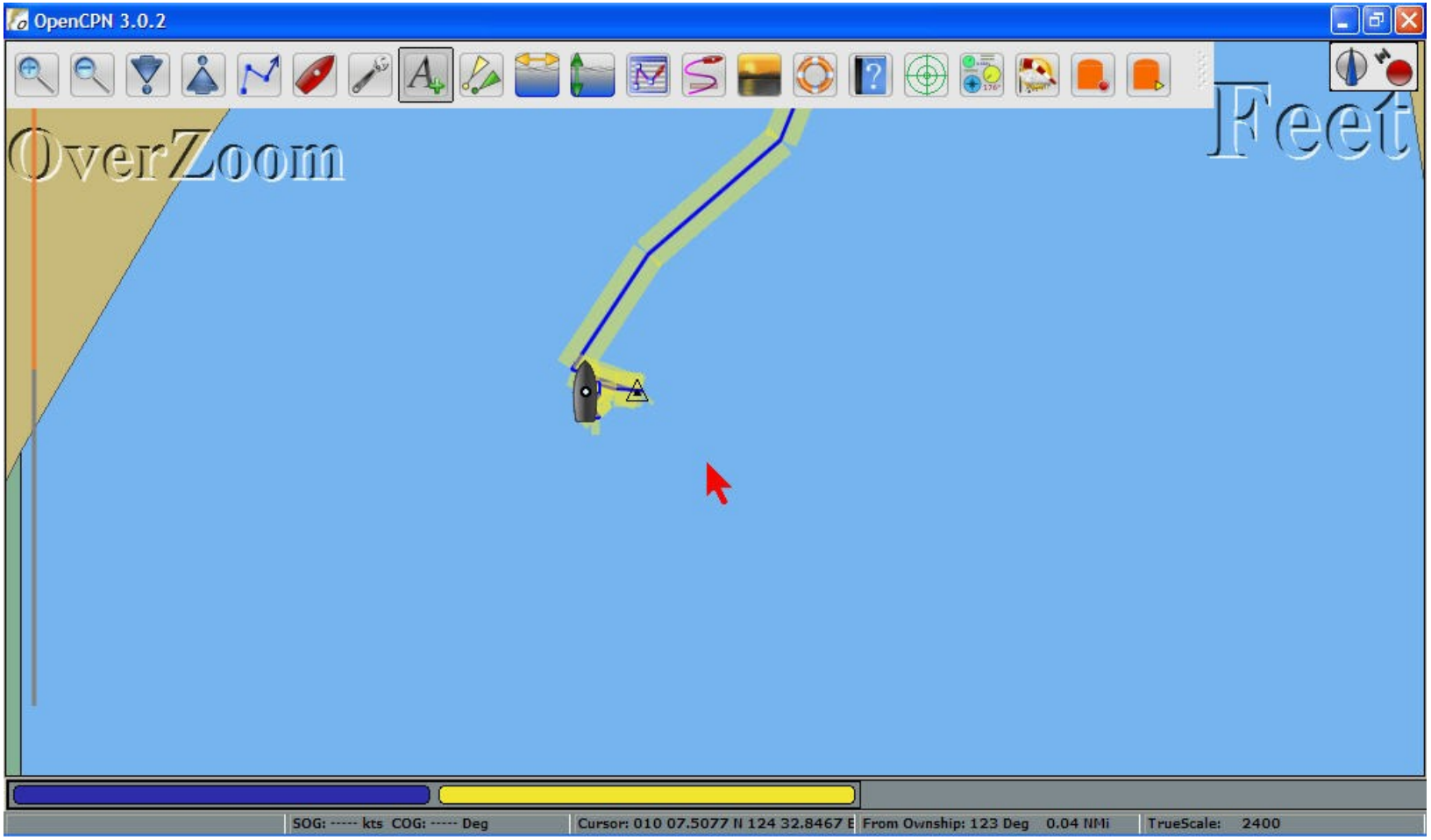
Saving Waypoints (Marks)

RIGHT-CLICK AND CLICK ON ‘Drop Mark (Ctl-M’)



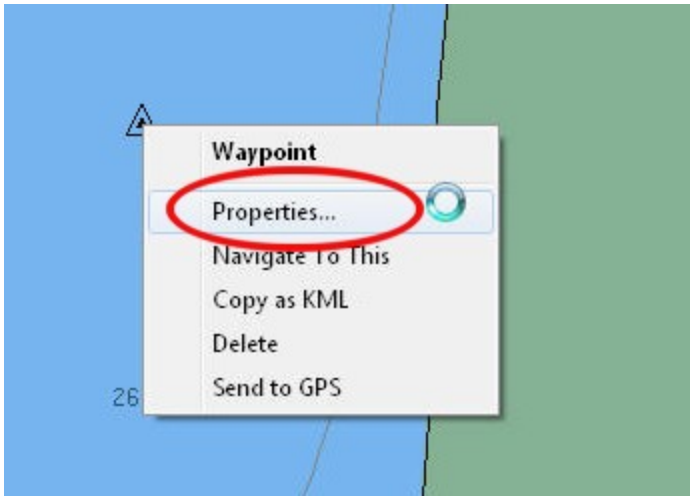
Saving Waypoints (Marks)

A MARK APPEARS AT THE SELECTED POINT
(Which mark type depends on your mark defaults)



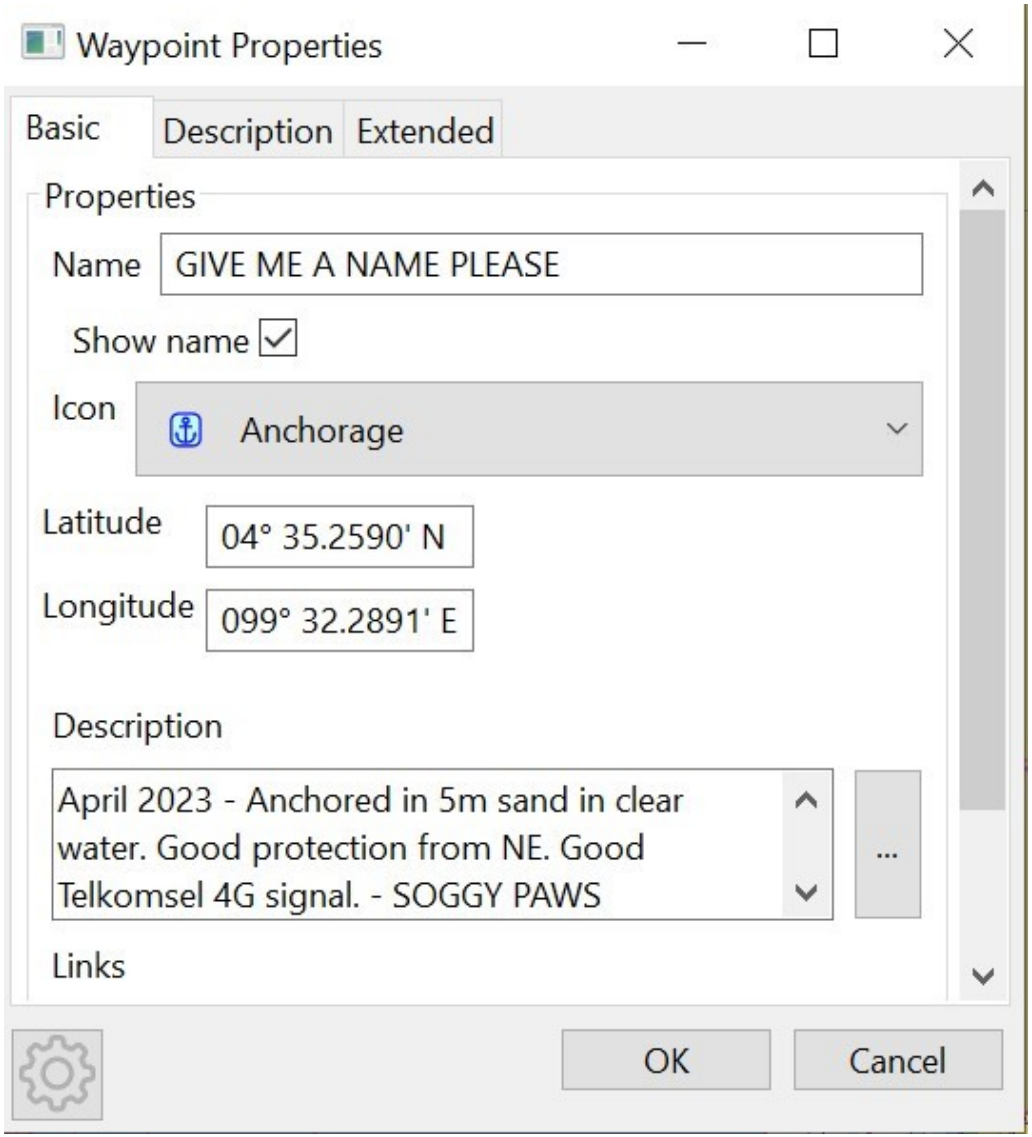
Changing Waypoints (Marks)

Right-click on the mark
and select ‘Properties’
Or
Double-click on mark



Changing Waypoints (Marks)

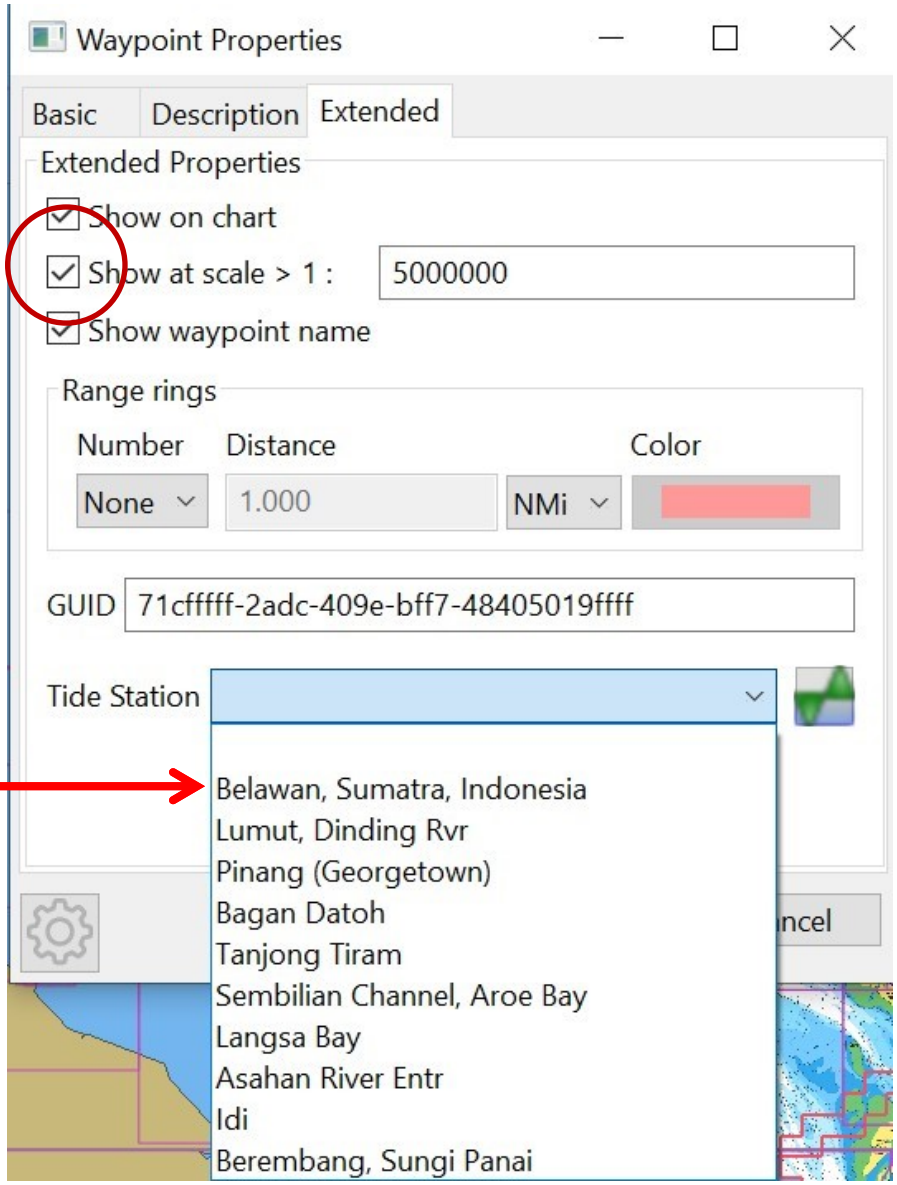
Change waypoint icon
to a different icon,
Add descriptive info



Waypoints Extended Info

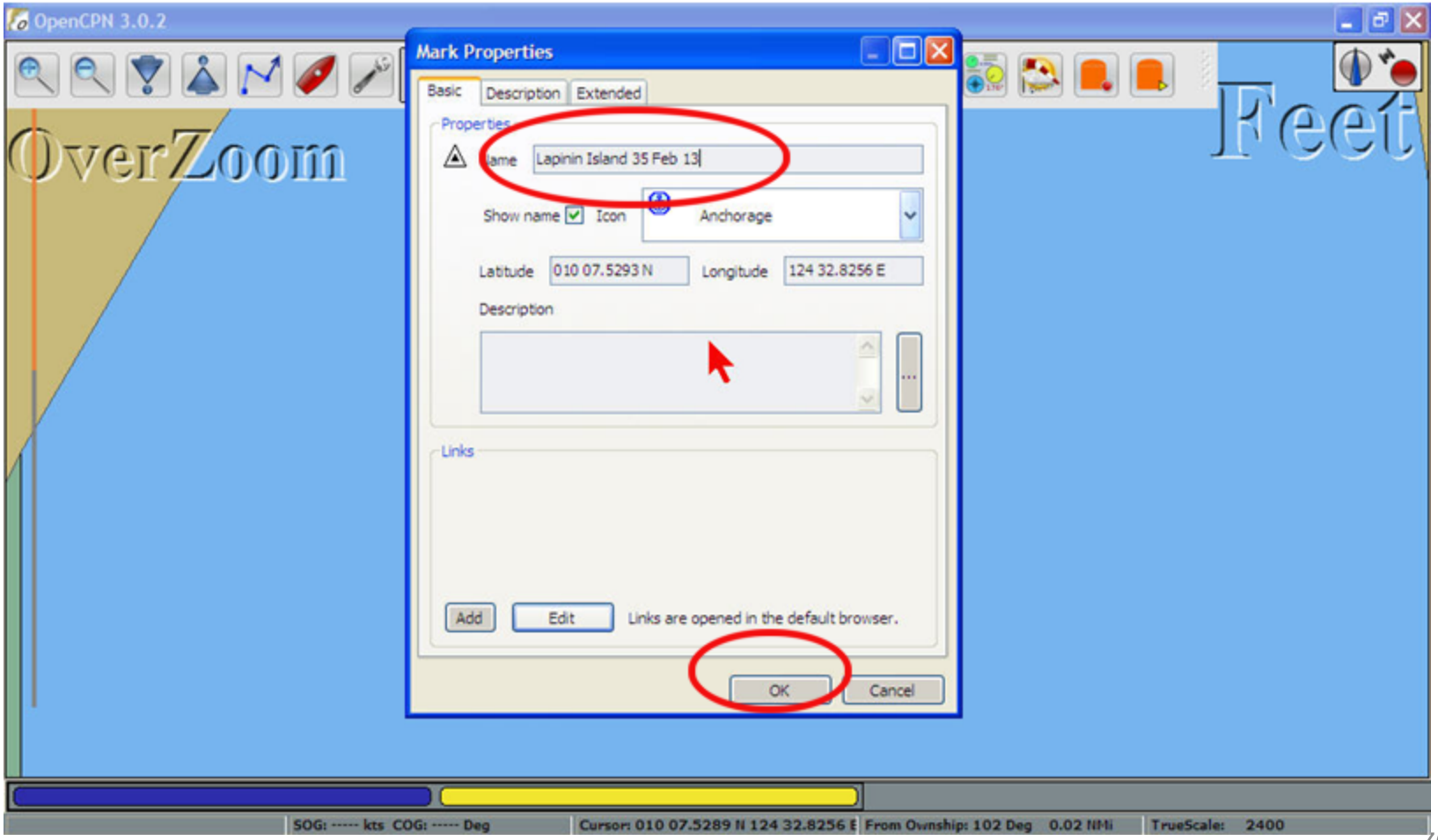
Hide waypoints
On zoom out
(set as default
For new wpts)

Select Tide Station
(closest tide to the
wpt is listed first)

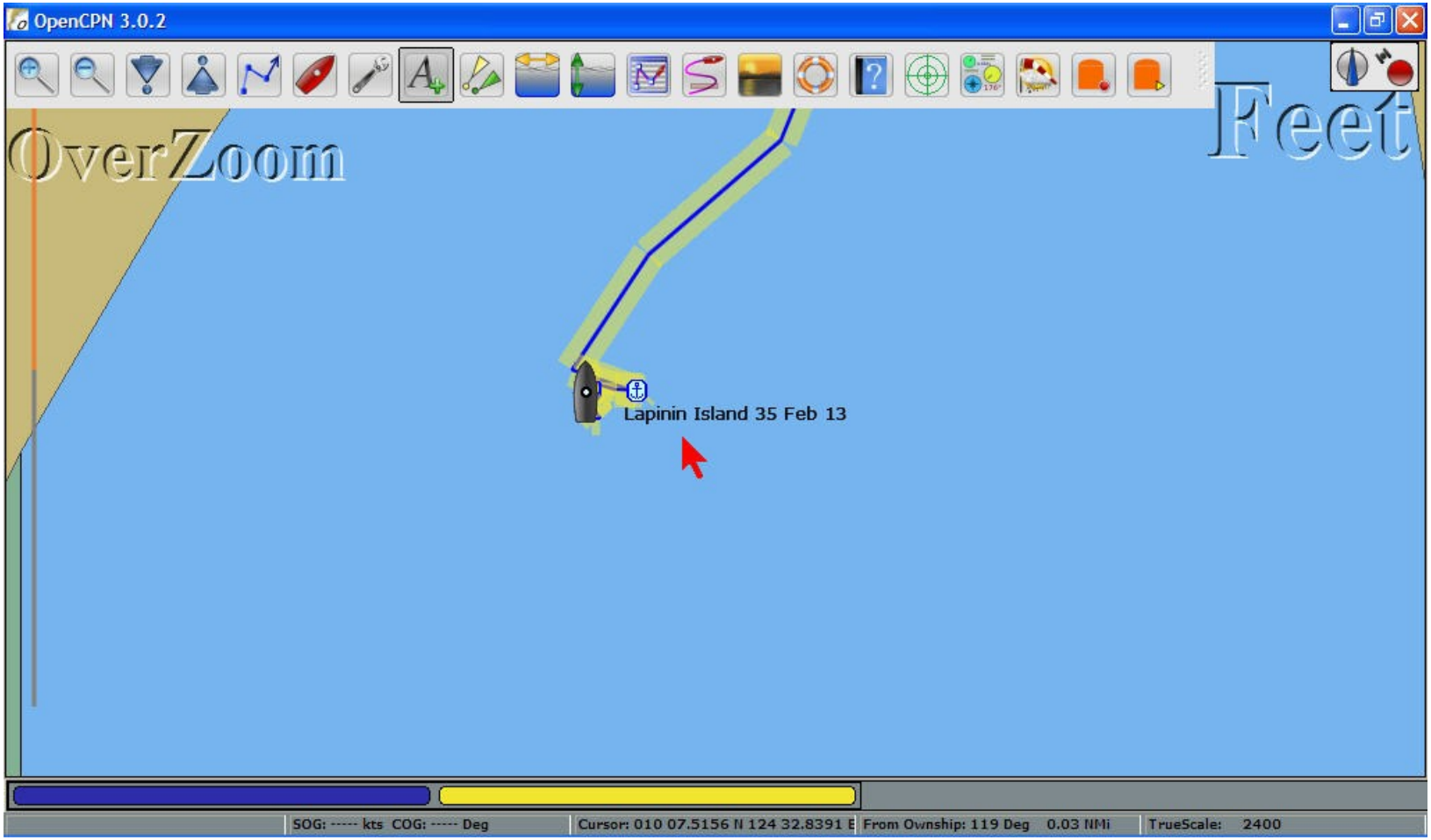


Changing Waypoints (Marks)

Also change name, and add a short description



Changing Waypoints (Marks)



Saving Waypoints (Marks)

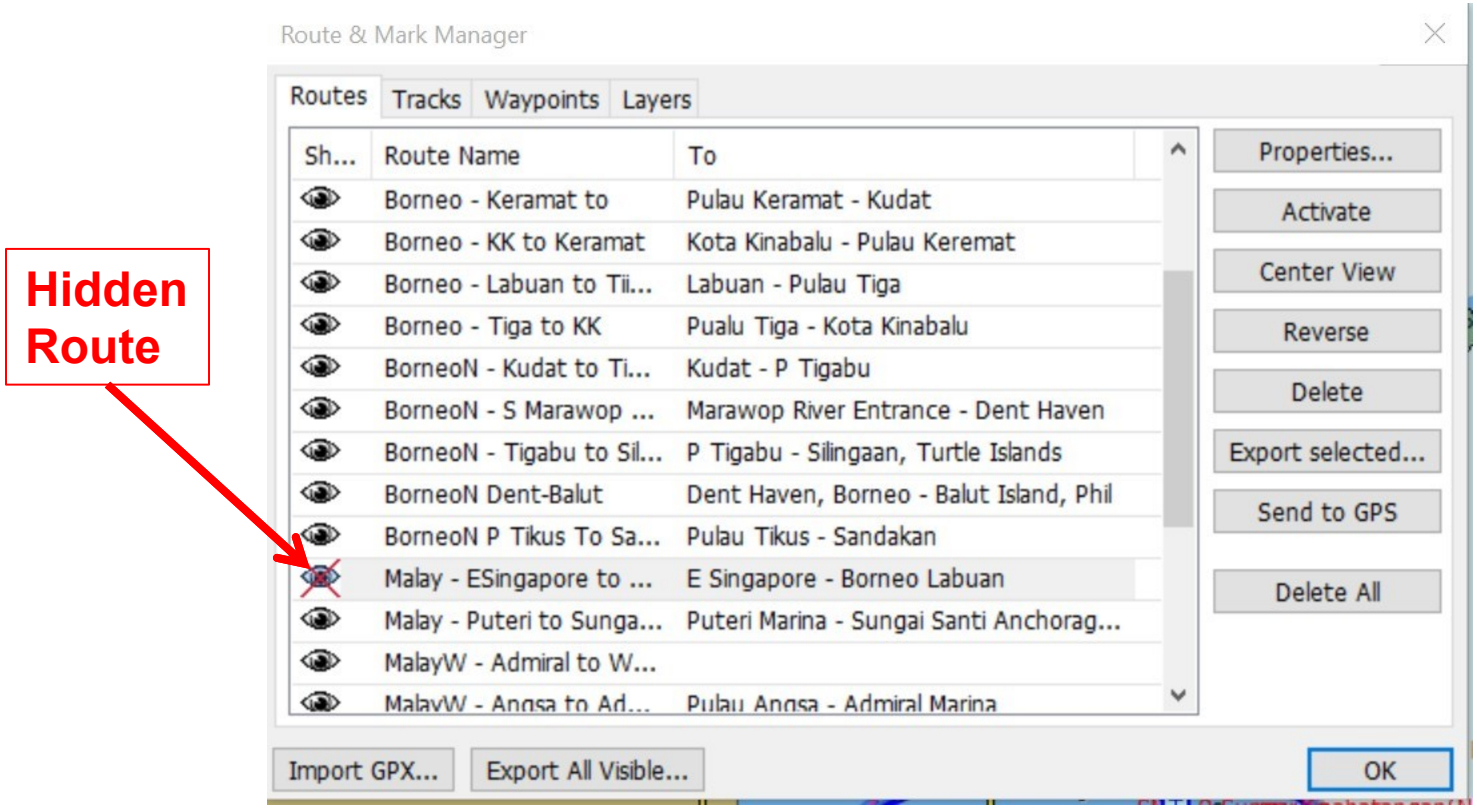
Waypoints can be manipulated just like routes and tracks

- Export to file
- Import from file

Waypoints can also be exported in groups

At the end of a sailing season, export Routes, Waypoints, Tracks to files

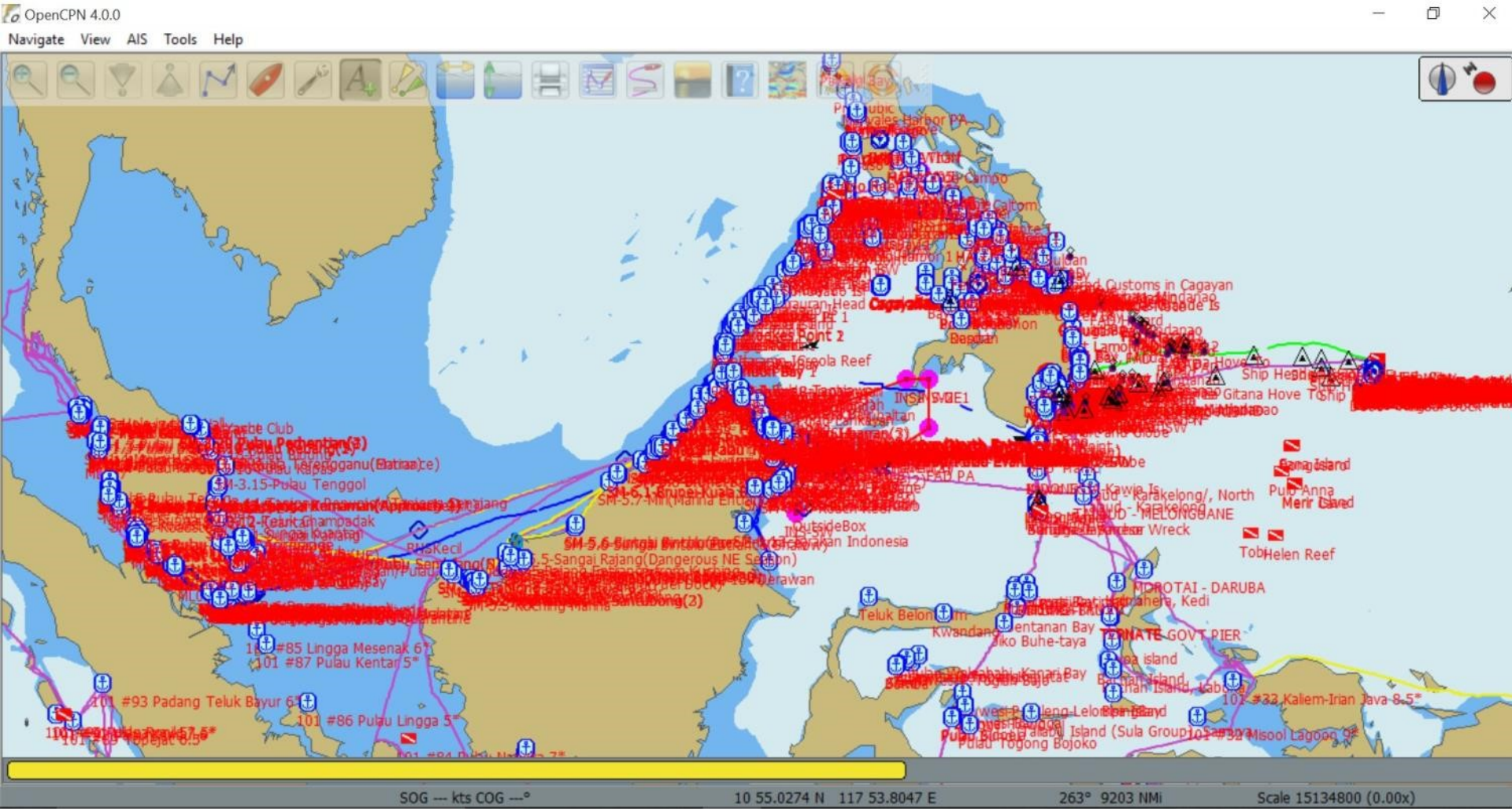
Hiding and Un-Hiding Routes and Tracks



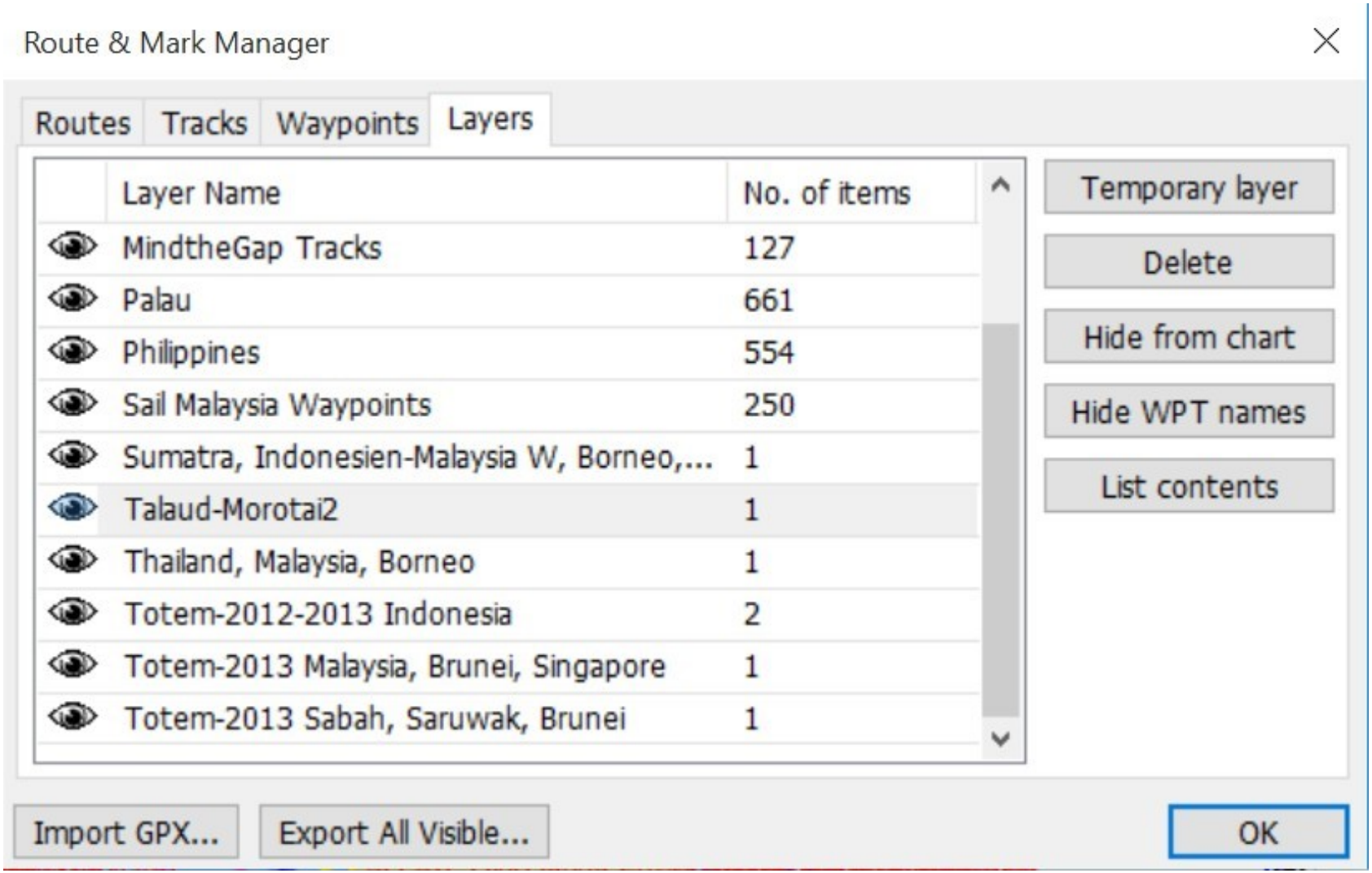
The Power of Layers

- A collection of waypoints, routes, and/or tracks that can be hidden and un-hidden with one click.
- It is kept separate from your own waypoints, routes, and tracks
- Temporary layer – lets you “import” data that stays only until you restart the program
- Permanent layers – Persist until uninstalled
- On the Layers tab of Route Manager

Why You Need Layers



Lots of Shared Info

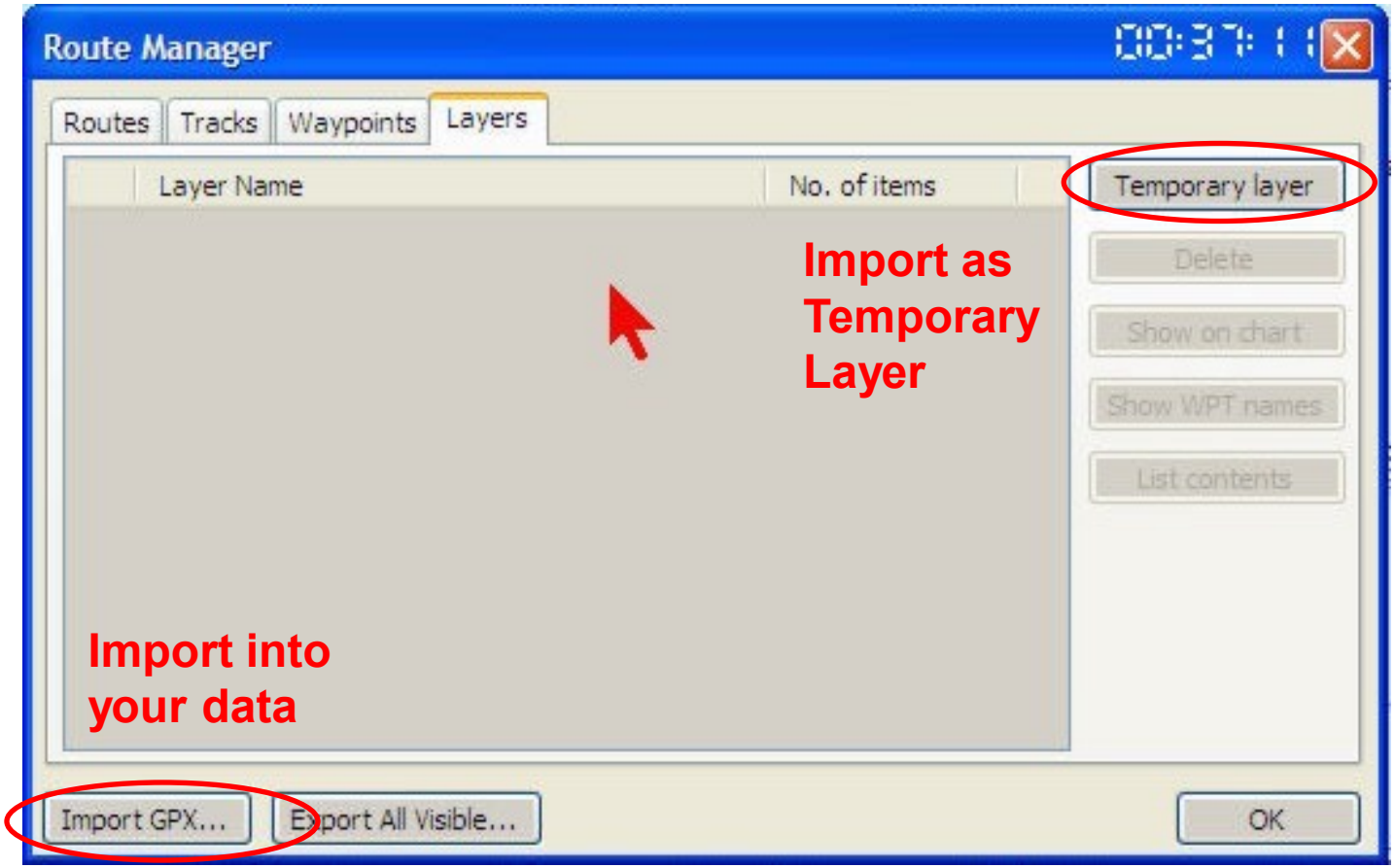


Importing Others' GPX Files

- Just Import
  - Intermingles with your routes/tracks/wpts
  - Difficult to get rid of
  - Eventually impacts performance
- Import as Temporary Layer
  - Lets you temporarily load a GPX file
  - Can delete the layer in the Layers tab (doesn't delete the file) or just close OpenCPN

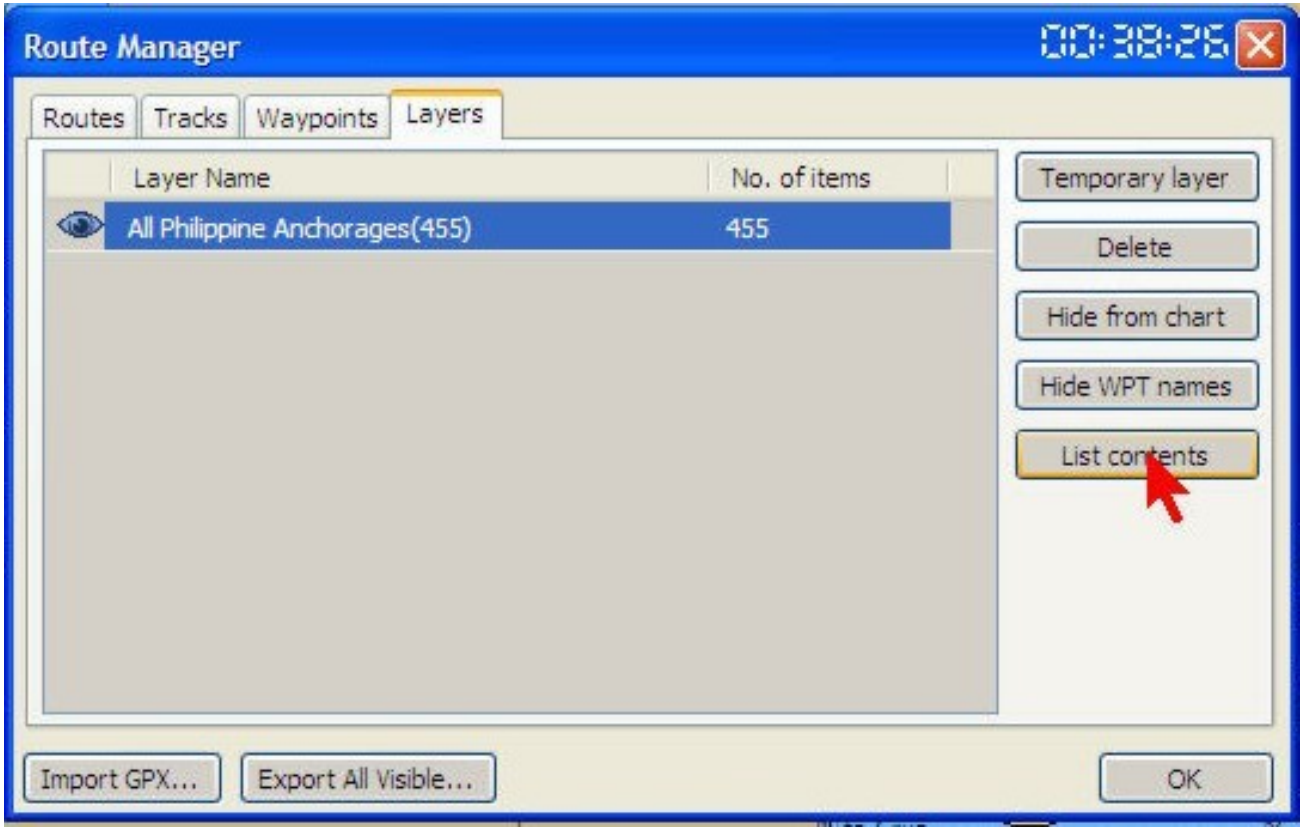
Importing Others' GPX Files

On OpenCPN open the Route Manager and click on the 'Layers' tab



Exploring OpenCPN – LAYERS

If “List Contents” is not selected, the individual waypoints, routes, and tracks won’t show in the list



For the Geeks: What A GPX File Looks Like

Sail Malaysia Waypoints.gpx * SciTE

File Edit Search View Tools Options Language Buffers Help

1 Sail Malaysia Waypoints.gpx *

```
1   <?xml version="1.0"?>
2   <gpx version="1.1" creator="OpenCPN" xmlns:xsi="http://www.w3.org/2001/XMLSchema
3    <wpt lat="2.513166667" lon="101.803833333">
4     <time>2013-11-16T08:34:56Z</time>
5     <name>SM-1.11-Palau Burung 2</name>
6     <sym>anchorage</sym>
7     <type>WPT</type>
8     <extensions>
9      <opencpn:guid>4c1dffff-af83-4f1f-9224-0a5271faffff</opencpn:guid>
10     <opencpn:viz_name>1</opencpn:viz_name>
11    </extensions>
12   </wpt>
13   <wpt lat="2.542833333" lon="101.785500000">
14    <time>2013-11-16T08:33:40Z</time>
15    <name>SM-1.11-Pulau Burung</name>
16    <sym>anchorage</sym>
17    <type>WPT</type>
18    <extensions>
19     <opencpn:guid>5efbffff-c757-42e6-a33c-2bd4185d0000</opencpn:guid>
20     <opencpn:viz_name>1</opencpn:viz_name>
21    </extensions>
22   </wpt>
23   <wpt lat="2.476000000" lon="101.846000000">
24    <time>2013-11-16T08:31:05Z</time>
25    <name>SM-1.12-Port Dickson Admiral Marina</name>
26    <sym>anchorage</sym>
27    <type>WPT</type>
28    <extensions>
29     <opencpn:guid>71ceffff-787e-4a0d-8b13-d1851b3b0000</opencpn:guid>
30     <opencpn:viz_name>1</opencpn:viz_name>
31    </extensions>
32   </wpt>
```

Structured text (XML)
Can edit with Notepad
I use SciTE
Easy to email (zips well)

Permanent Layers

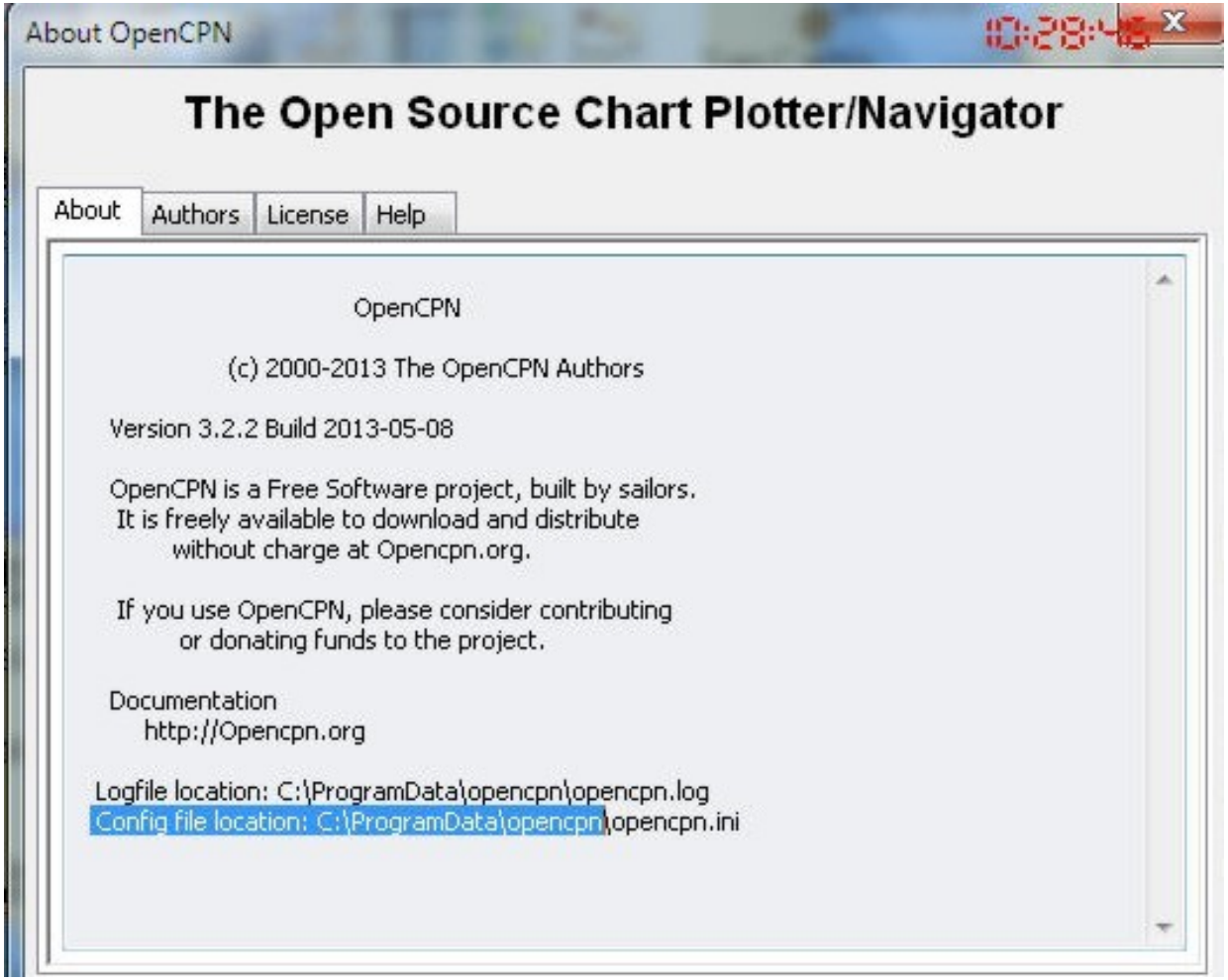
- For layers to be permanently available they must be manually placed in the OpenCPN data folder

-> *New! Can also be imported from Route Manager*

- The location of this folder is dependent on the operating system …
- But The OpenCPN program helps you find the location !!

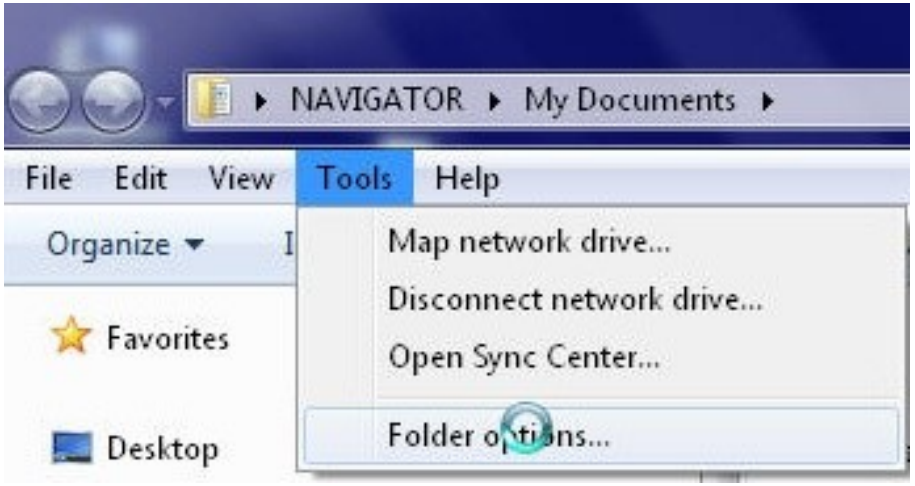
Permanent Layers Location

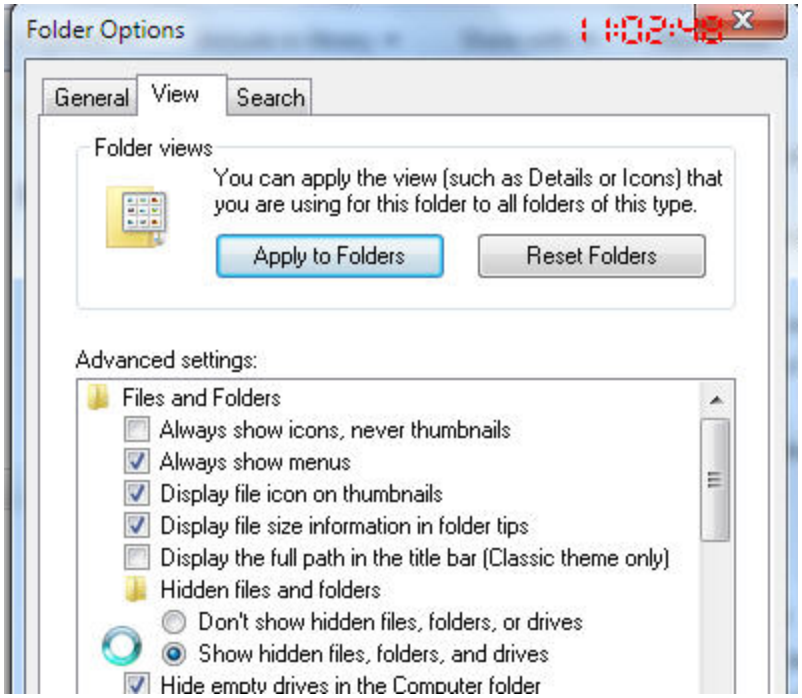
In the OpenCPN Data Folder (varies by OS)
Open the About tab for exact location



Windows 7-11, it's in ProgramData

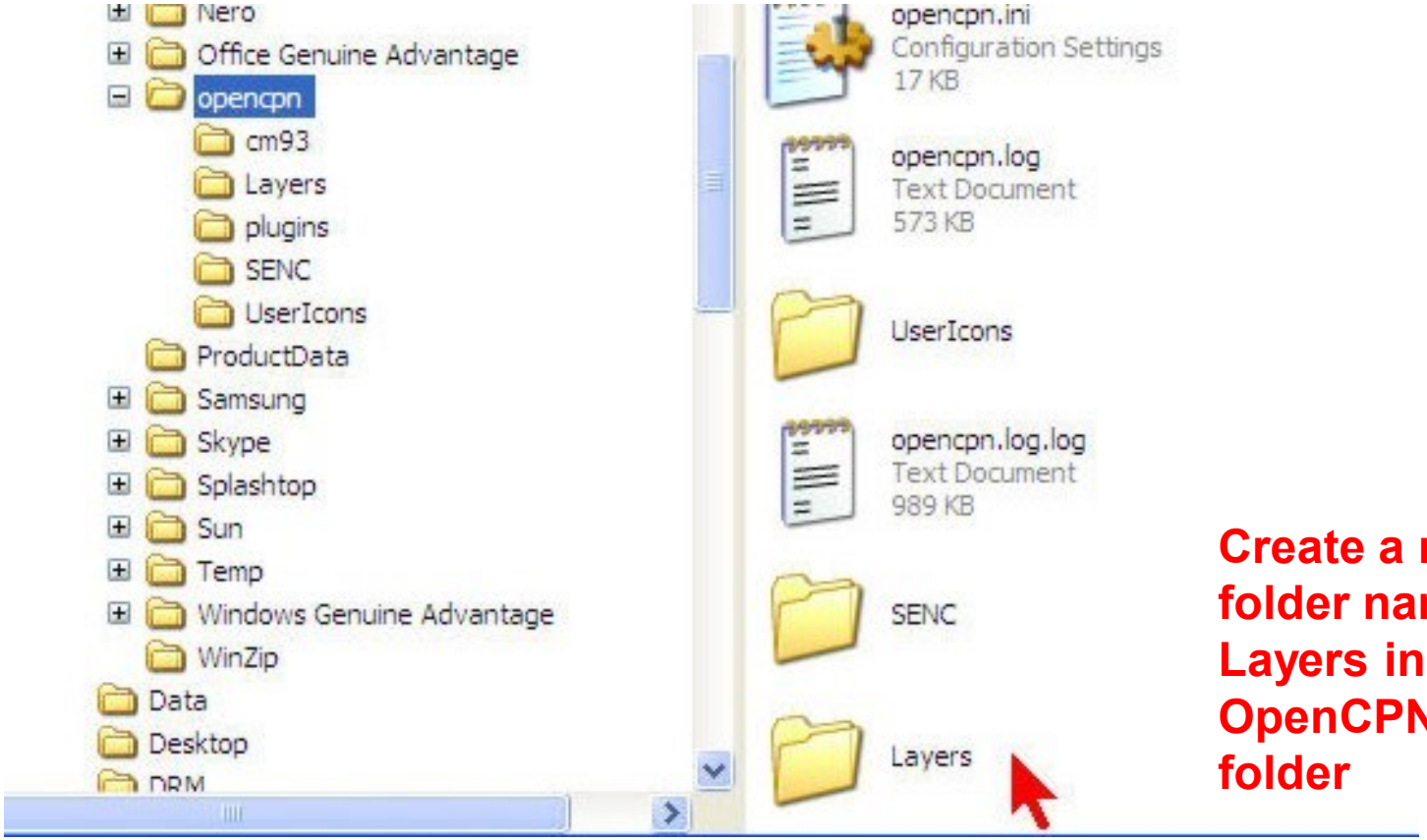
- The ProgramData folder is usually hidden
  Go to 'Tools' and click on 'Folder Options …'
- On the 'View' tab check the button
  'Show hidden files, folders or Drives'.
- Click 'OK'
- Only need to do once





Create Layers Folder

It's only necessary to create this folder once.
All future layer information will be placed in this folder.



Create a new folder named Layers in the OpenCPN Data folder

Managing Layers Files

- To put a layer in OpenCPN, copy the gpx file to the Layers folder, or import from Route Manager as Permanent Layer
  - Layers are loaded at startup (must restart OpenCPN)
- Make a shortcut to Layers in the folder where you manage your saved gpx files
- Move or copy gpx files in and out of OpenCpn/Layers

My Documents / Navigation /GPX Files

- My gpx data (folders by region)
- Others gpx data (folders by region)

If you delete a Permanent Layer in Route Manager, it WILL delete the gpx file. Make sure you have a copy somewhere else.

Managing Layers Files

- ANY .gpx file can be put in a layer.
  This includes routes, tracks, anchorages and other information that has been saved in the .gpx format.

- Waypoints and routes in a layer are locked and cannot be changed. This prevents the unplanned movement of a waypoint while clicking on the screen

- Only files with .gpx will be loaded (temporarily unload a layer by renaming .gpy)

- GPX Files within a folder will be loaded as one layer
  - MyRoutes.gpx and MyWpts.gpx placed in SoggyPaws folder will load as layer SoggyPaws

TIPS

To make a complete backup of all your routes, waypoints, and tracks data,

Copy the entire OpenCPN folder in ProgramData to a backup drive!

(navobj.xml is the OpenCPN database, moving that file to the OpenCPN data folder on a new computer will move all your routes, waypoints, and tracks!)

To share ALL your info with someone else, copy navobj.xml somewhere else, and rename it Whatever.gpx

Adding Functionality with Plugins

- Plugins: Snap-in functionality to extend basic OpenCPN functionality
- Two plugins built-in: Dashboard and Grib
- Others can be downloaded from OpenCPN site

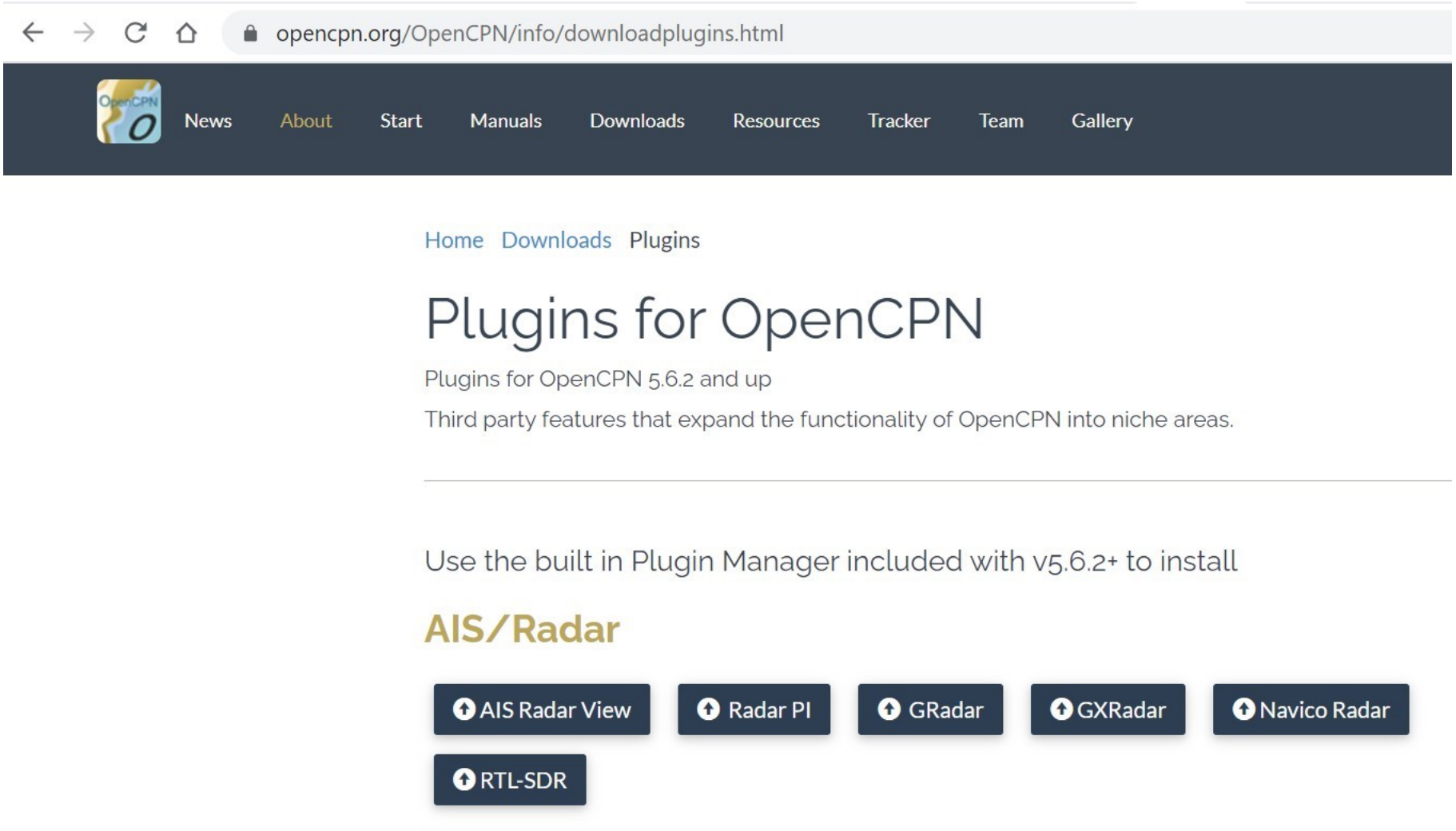
There are about 20 plugins!
Three we'll cover here:

GRIB File – View downloaded GRIB files on chart

Chart Downloader - Download charts from within OpenCPN

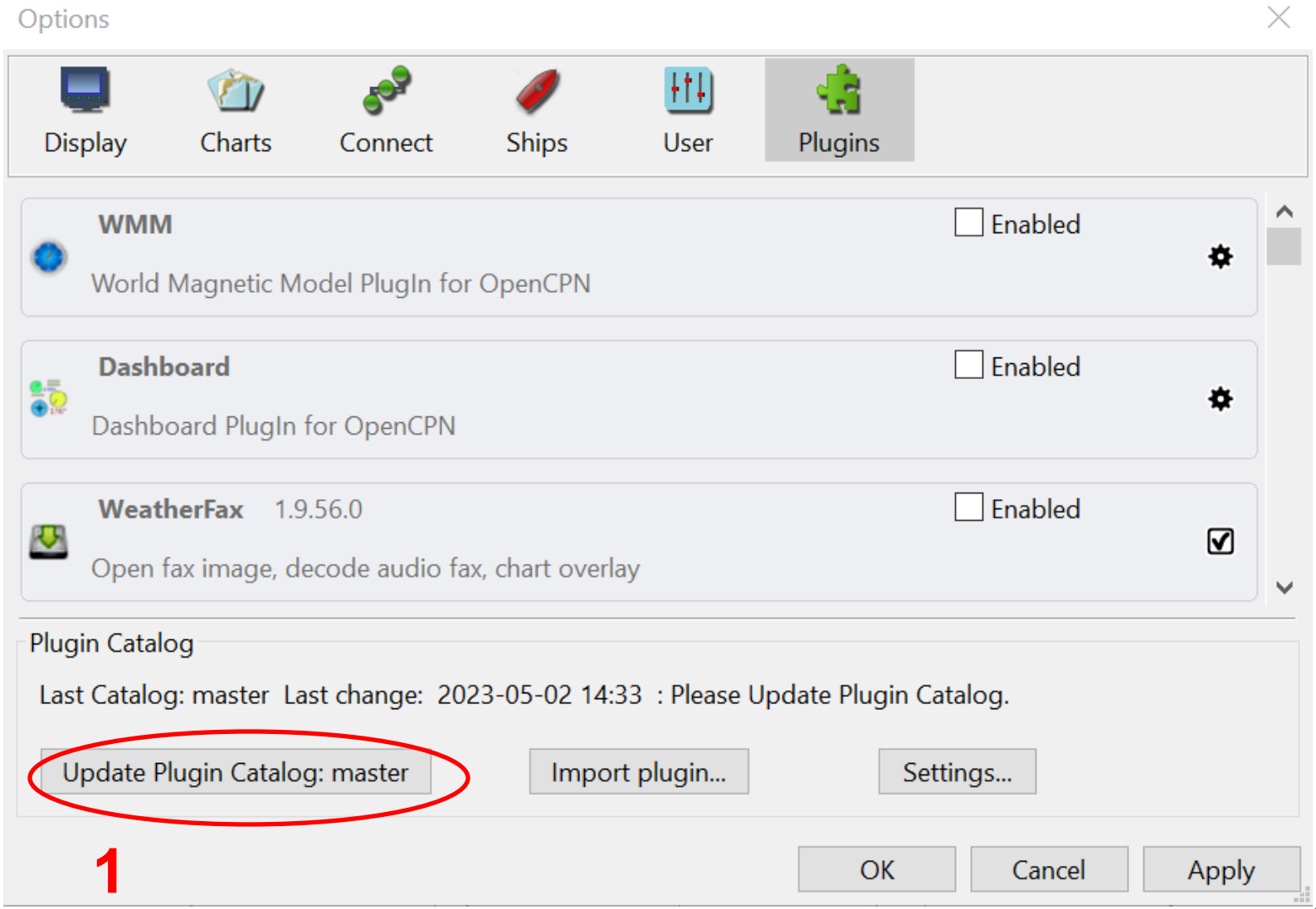
Climatology - Planning tool, to help visualize weather patterns. Better data than US Pilot Charts because wx data is updated.

Exploring OpenCPN - Plugins



Plugins

Options / Plugins

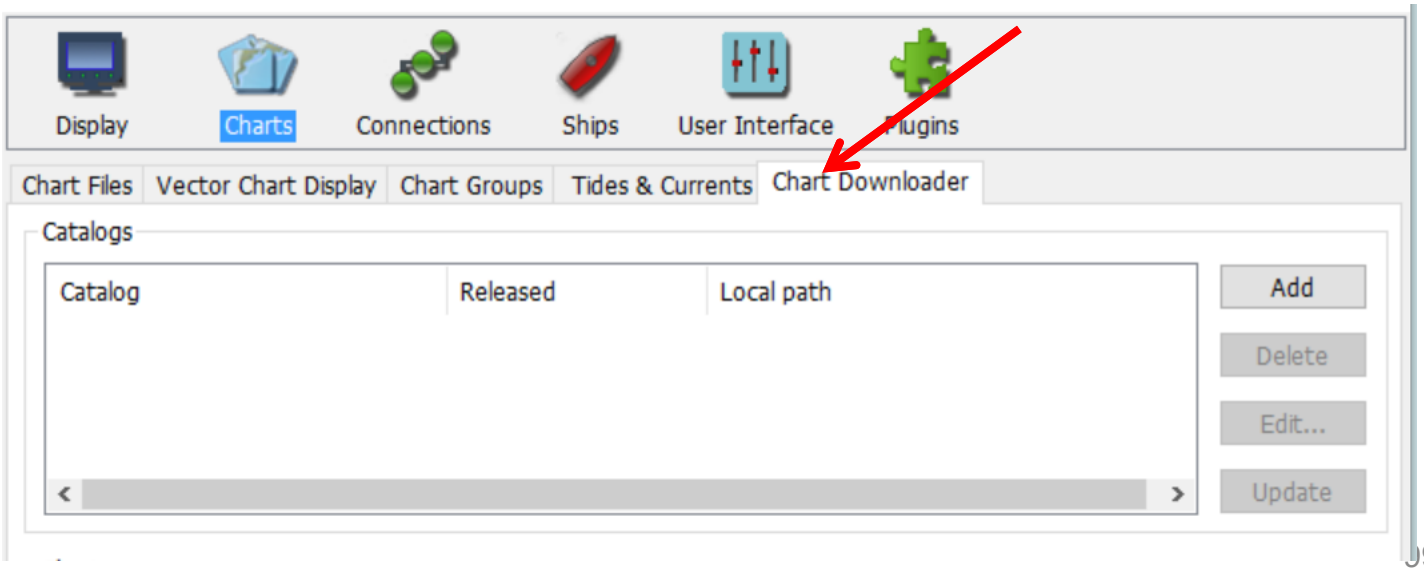


Enable Plugin and Set Preferences

Most Plugins Add a New Icon on the Toolbar

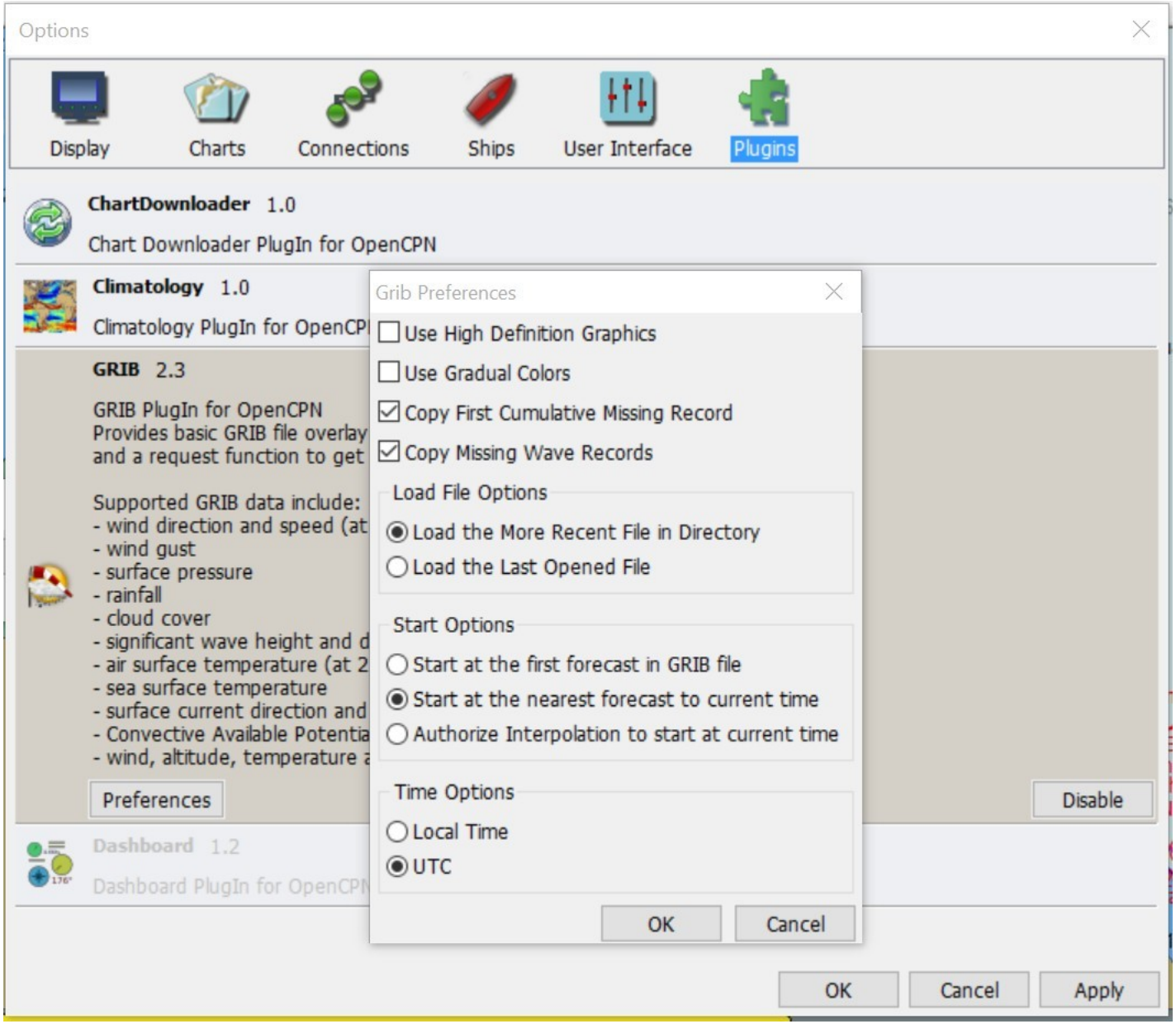
Plug-in Icons

Chart Downloader adds a new tab on the Charts page

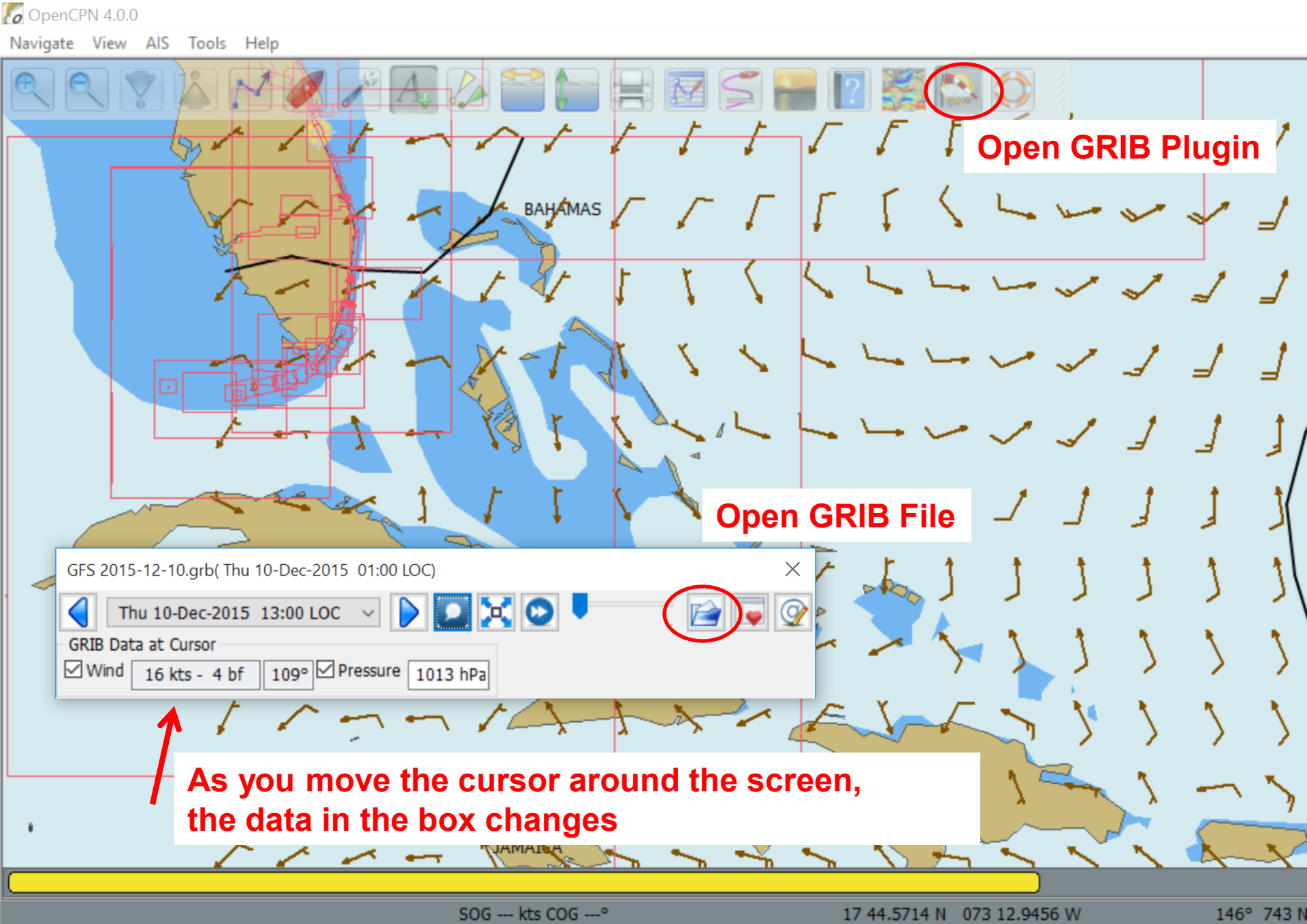


GRIB Plugin

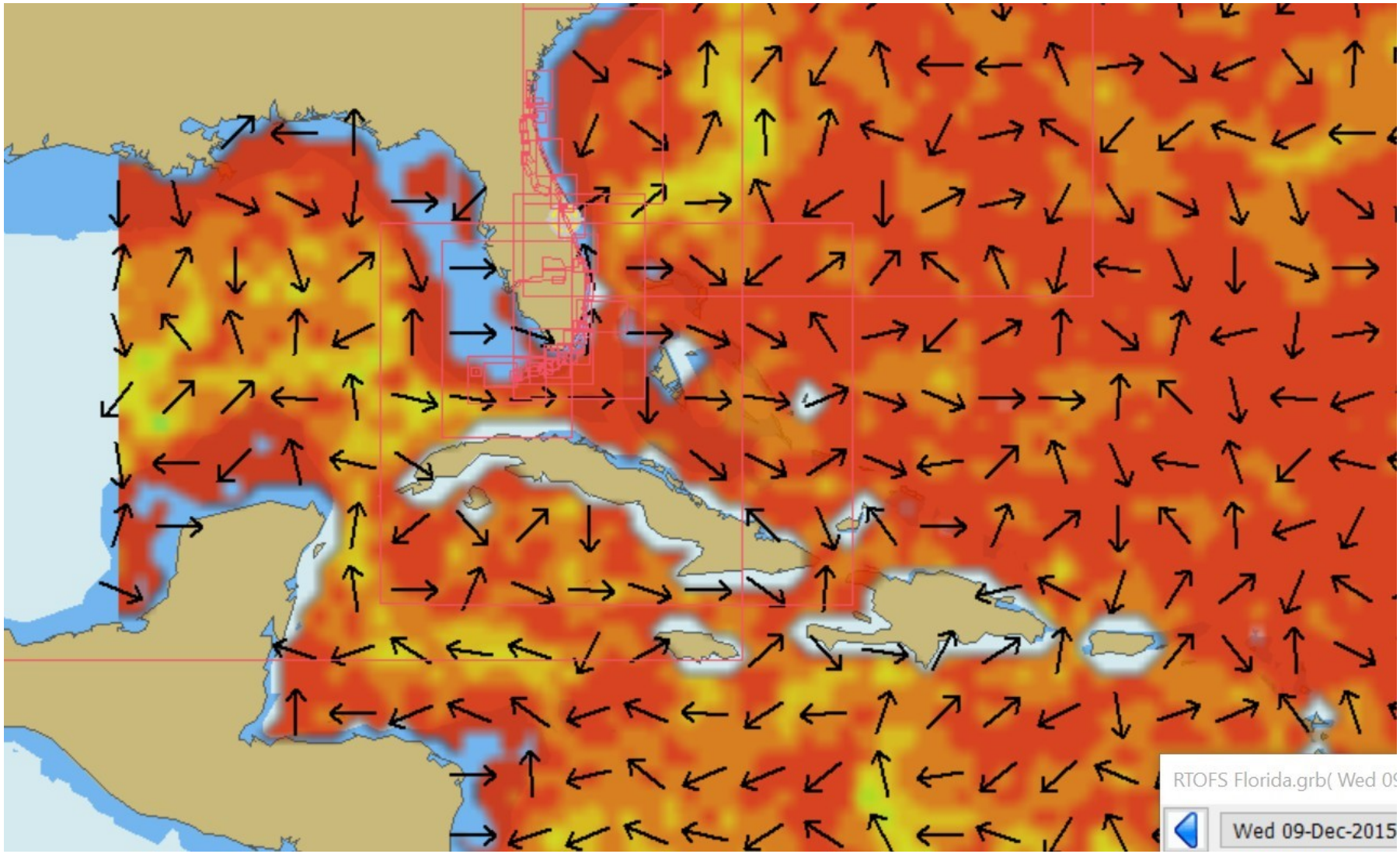
Check GRIB Plugin Preferences



Open GRIB Plugin



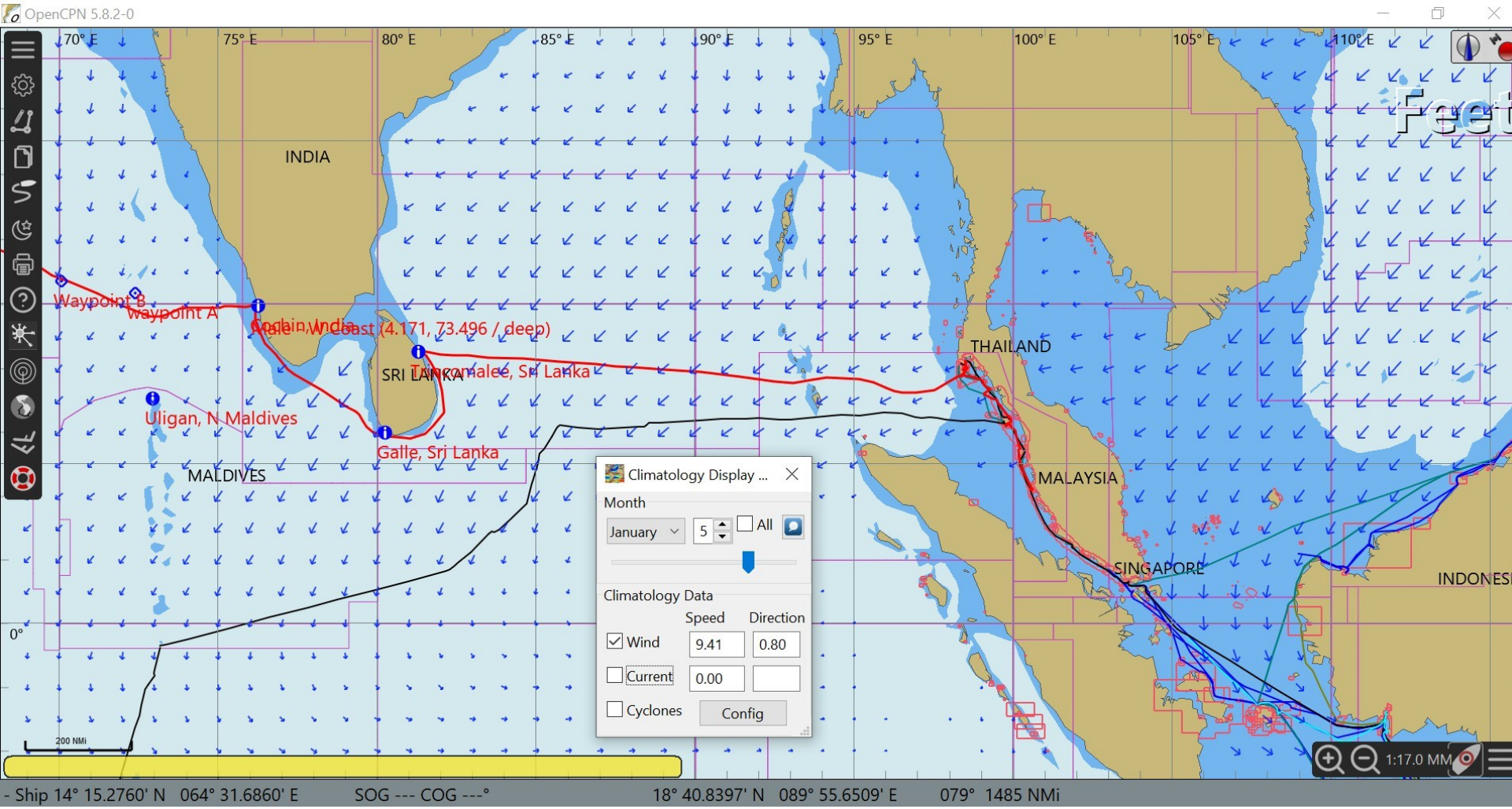
RTOFS (Current) Display



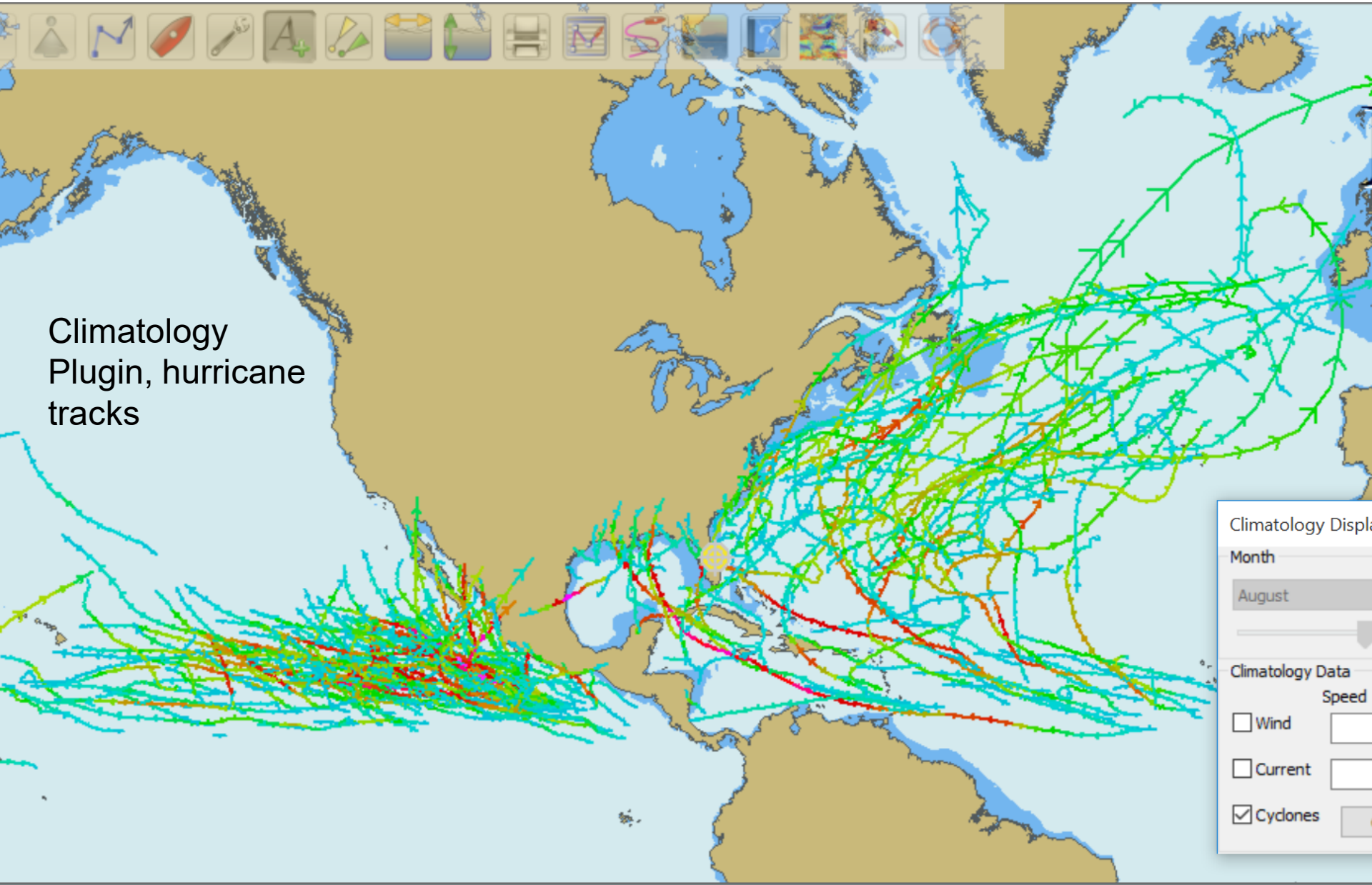
Climatology Plugin

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

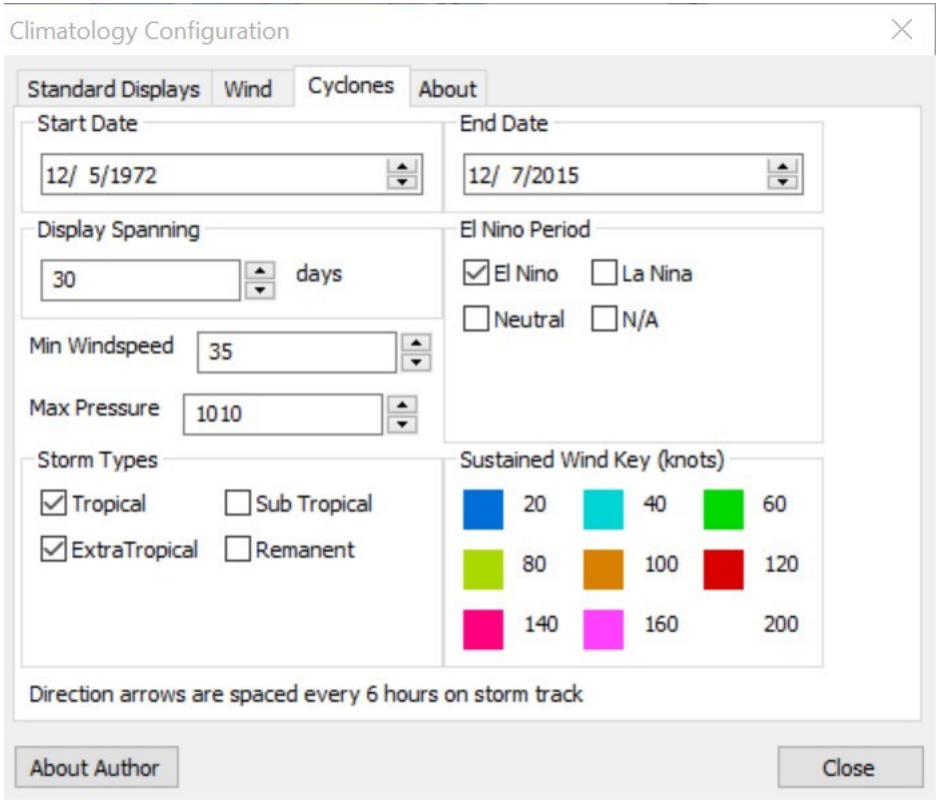
Climatology for January - Wind

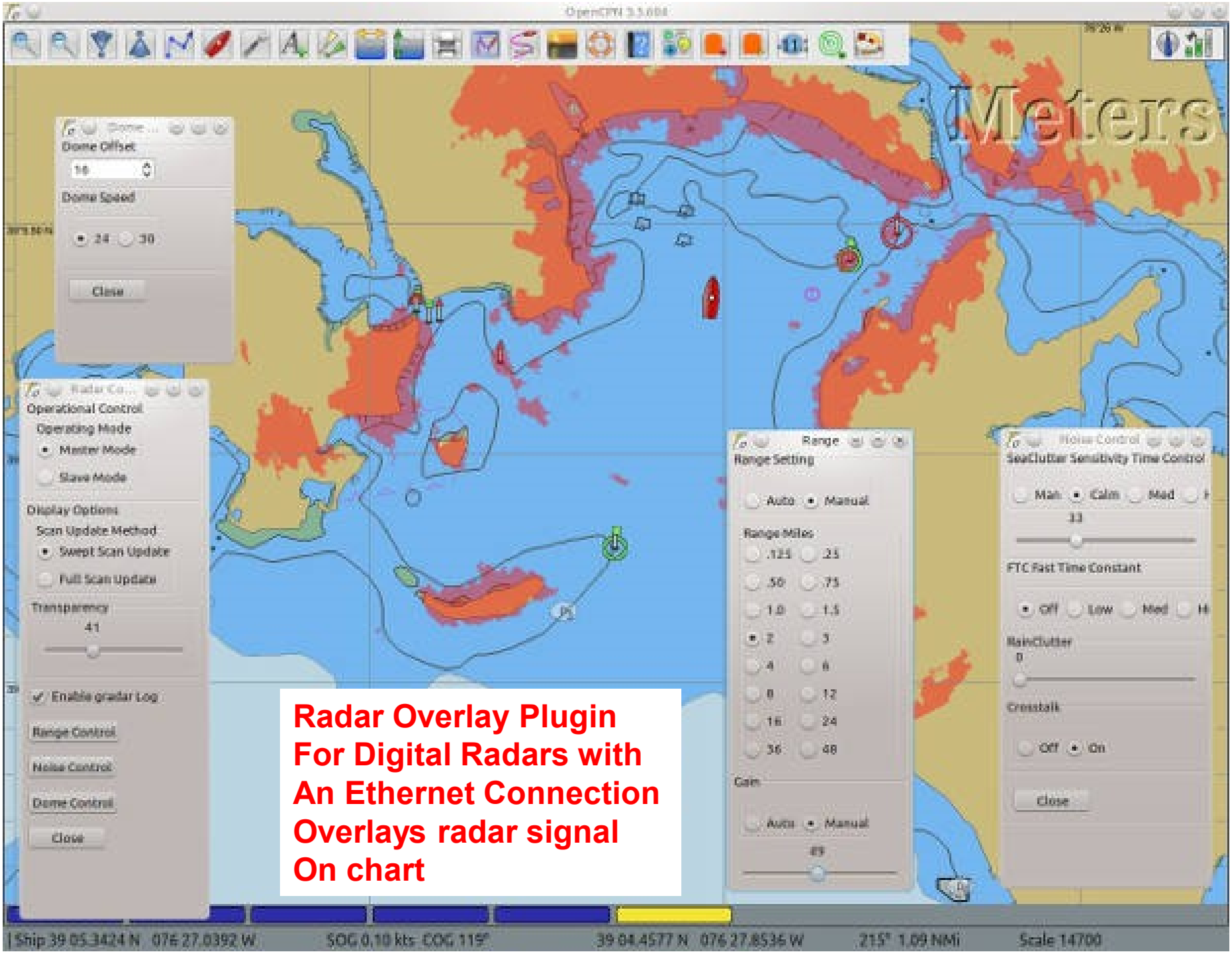


Where is a Safe Place to Be In August?

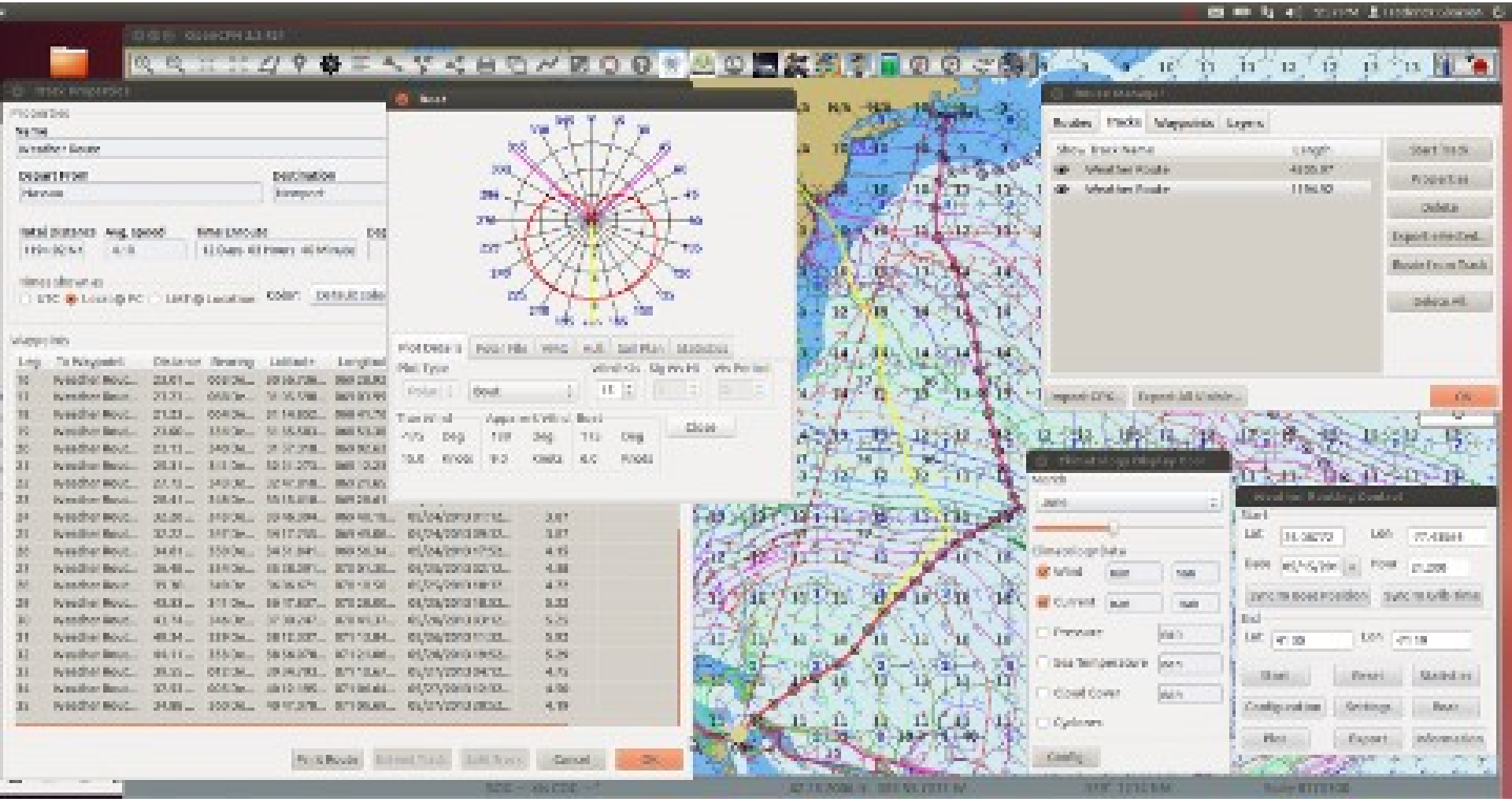


Climatology Config Screen




Meters
Dome Offset
Dome Speed
Close
Operational Control
Operating Mode
Master Mode
Slave Mode
Display Options
Scan Update Method
Swept Scan Update
Full Scan Update
Transparency
Enable radar Log
Range Control
Noise Control
Dome Control
Close
Range
Range Setting
Auto
Manual
Range Miles
Gain
Noise Control
SeaClutter Sensitivity Time Control
Main
Calm
Med
FTC Fast Time Constant
Off
Low
Med
RainClutter
Crosstalk
Off
On
Close
Radar Overlay Plugin
For Digital Radars with
An Ethernet Connection
Overlays radar signal
On chart
Ship 39 05.3424 N 076 27.0392 W
SOG 0.10 kts COG 119°
39 04.4577 N 076 27.8536 W
215° 1.09 NMi
Scale 14700

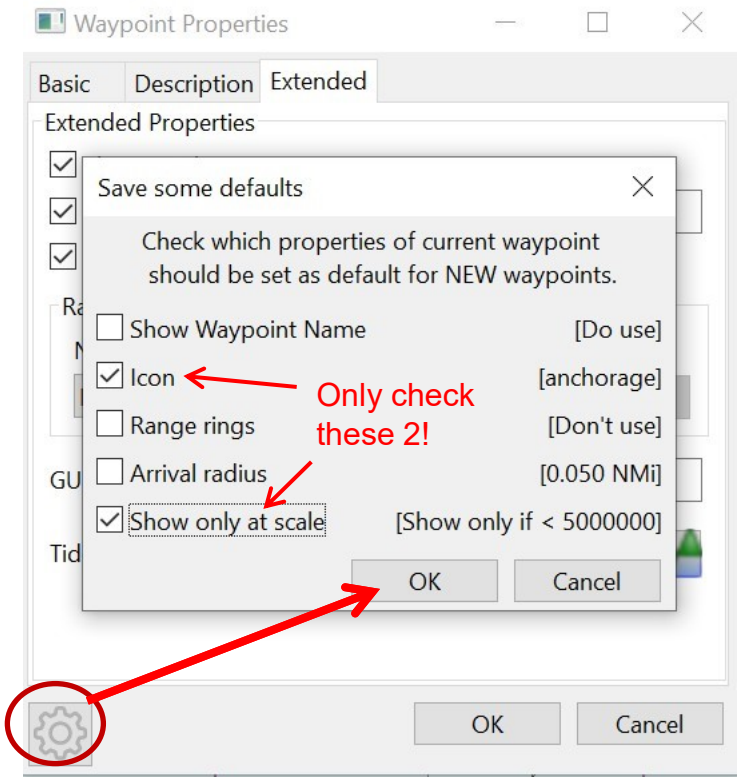
Weather Routing Plugin



Use GRIB & Climatology Data and boat polars to plan an optimized route

Tweeks to do on a new install

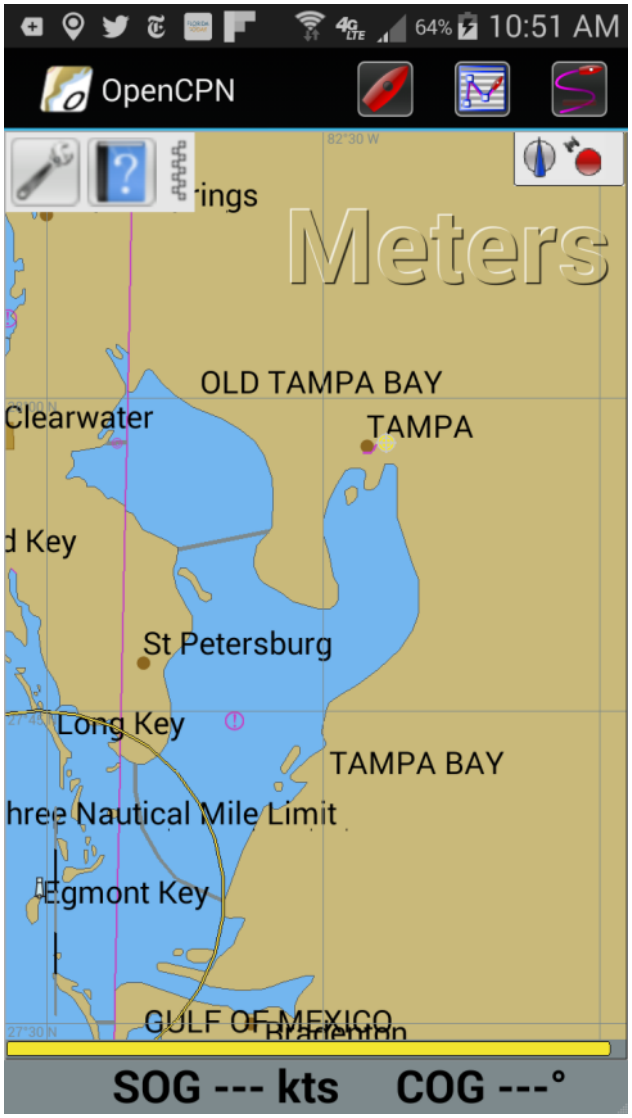
- Add Tides database (Terrys Topics)
- Change Options / User / Fonts / Marks to Red
- Create a waypoint, change to
  - Anchorage symbol
  - Extended / Check Show at Scale box and enter 5,000,000
  - Use options button in lower left of waypoint window to set the settings for this waypoint as your “default” new waypoint settings.
- Options / Ships and turn off “Highlight Tracks”



OpenCPN for Android

- Just released in October.
- Install $9.99 version from Google Play
  - this is the supported version & will receive automatic updates
  - There is a free version for Android, but not supported
- Identical in most respects to Windows version, just on a tiny screen
- Chart downloader plugin built-in (but pretty quirky on small phone)

Primary screen in Android



Click and hold to right click

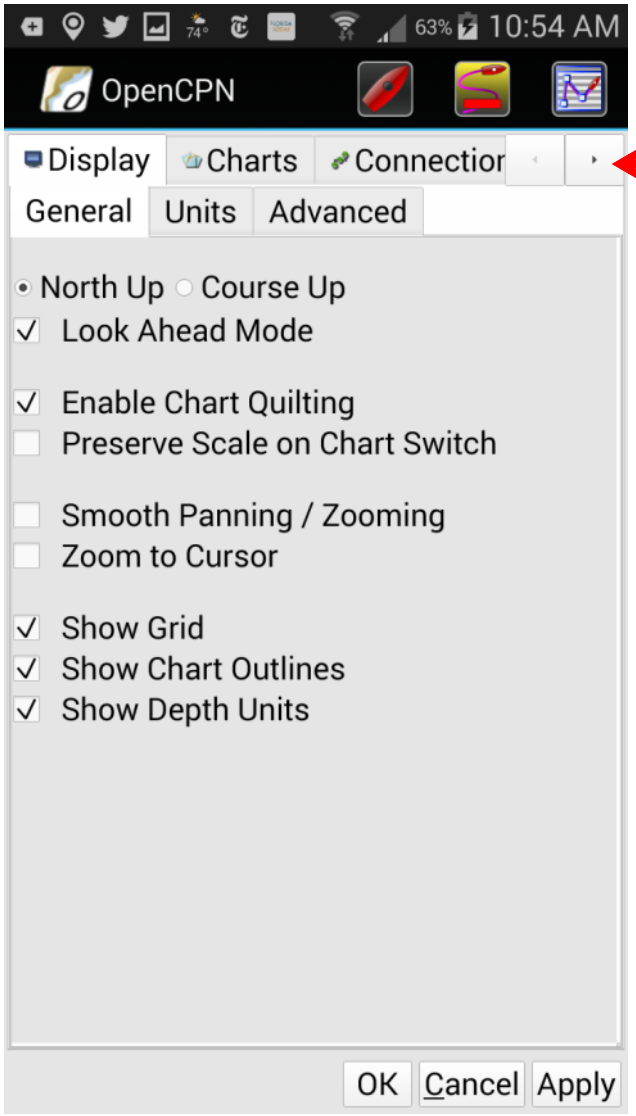
- Pops right-click menu (couldn't get screen shot)
- All the right click functions appropriate to where you are right-clicking

Pinch and un-pinch to zoom in/out

Swipe to move

Click and hold to get toolbar config screen up (add more tb icons)

Options screen in Android



Click on tab to change tabs

Scroll tabs horizontally

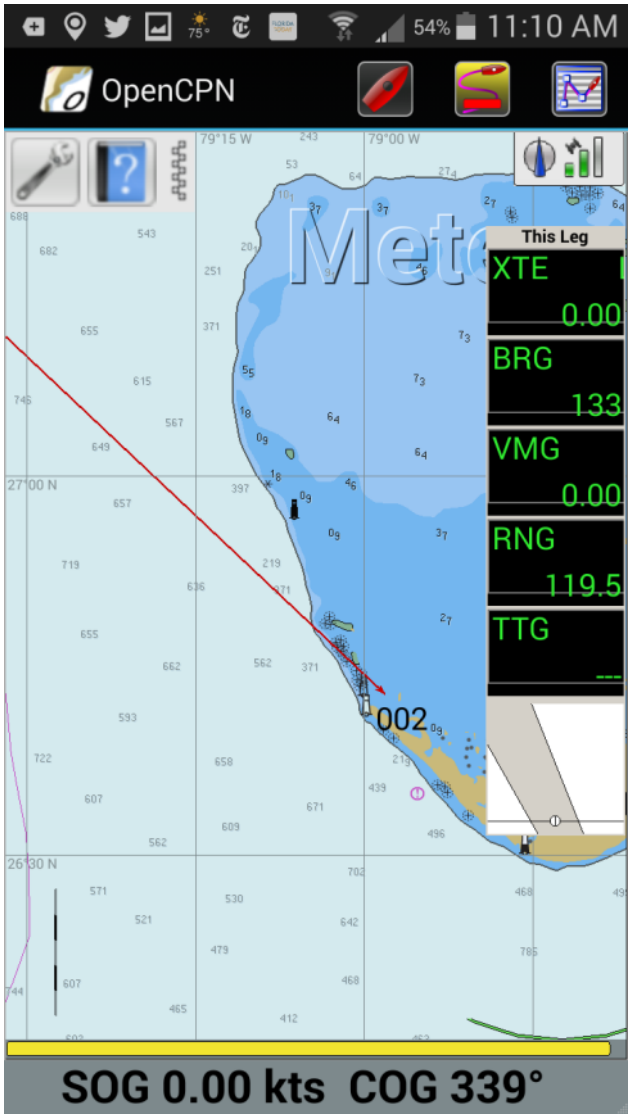
Loading charts & GPX files

- Manually move to device (put on SD card is best)
- Use Charts tab to load charts

Downloading charts

- Use downloader
- Difficult to select chart catalog (+ too small to select, no zoom)
- Difficult to navigate to Charts directory on SD Card
- Scoll bars need to be scrolled on bars, not in window area

Navigation Mode screen in Android



OpenCPN for Android

- Difficult to use fully on a phone (maybe better with stylus)
  - Difficult to move a waypoint
  - Chart Downloader config pop-up too big—unusable
  - No esc button
- Probably much better on a tablet
- Still a little buggy
  - Crashed when I tried to delete a waypoint—wants a quick click not a long click on ‘delete’
  - Chart Downloader seemed to hang (bad folder selection)
- Not quite ready for Prime Time, but getting there
- No documentation for Android yet
  - See Terry’s Sargent’s handout

The End

http://svsoggypaws.com

Questions?

More Info

- Just play with it—but NOT on your Nav computer!
- OpenCPN Website / User Manual
- Bigdumboat.com (videos)

A big THANKS to Terry Sargent, who loaned me his original presentation as a starting point. There are a lot of OpenCPN resources on his webpage.

http://svsoggypaws.com/TerrysTopics.htm