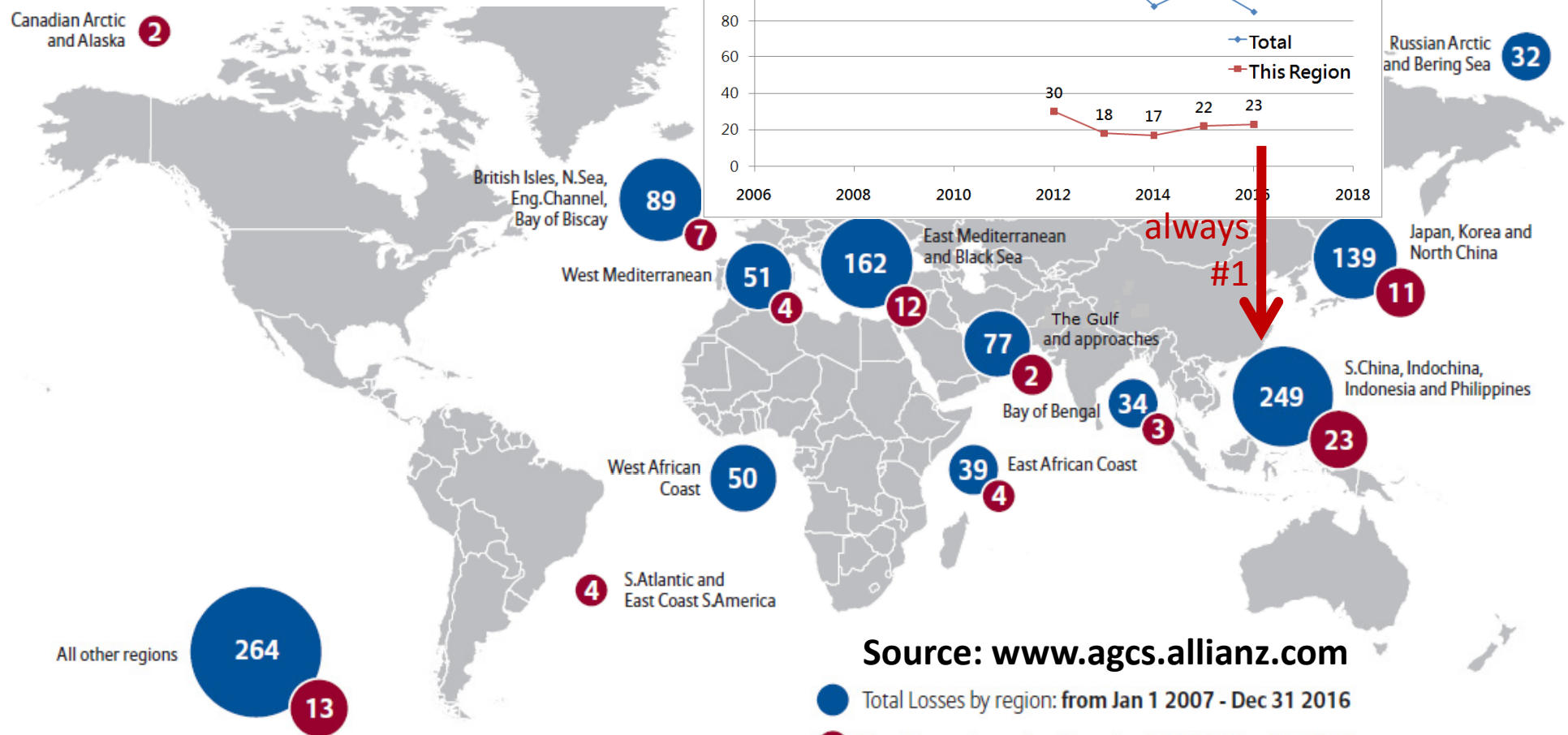
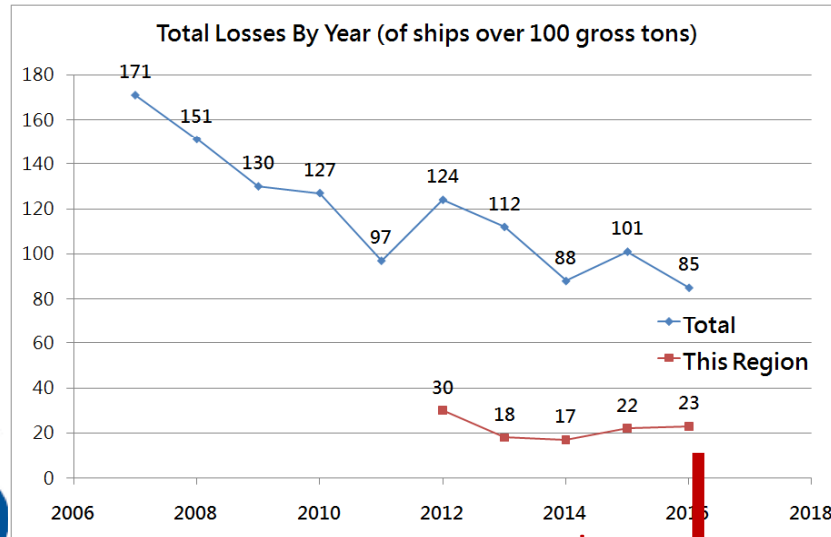
A map of Taiwan showing ENC coverage and navigational risks. The map is overlaid with a grid of colored rectangles. Orange rectangles represent areas with nominal ENC coverage, while light blue rectangles represent areas with navigational risks. The map includes labels for various locations such as Junxi, Penghu, Hutou, Tong'an, Zhangzhou, Taoyuan, Taipei, Ban Qiao Qu, Lan Shi, Gong Yuan, Tai Lu, Jia Gong, Pu Lu, Chen, Jia Lian, Nan Tou Shi, Dou Liu Shi, and Tainan. Elevation markers like 1828 m and 3897 m are also visible.

# Nominal ENC Coverage and the Navigational Risks

Shwu-Jing Chang  
National Taiwan Ocean University  
March 2018

# Total loss by year (of ships over 100 gross tons)

## Top 10 regions : 2007-2016 and 2016

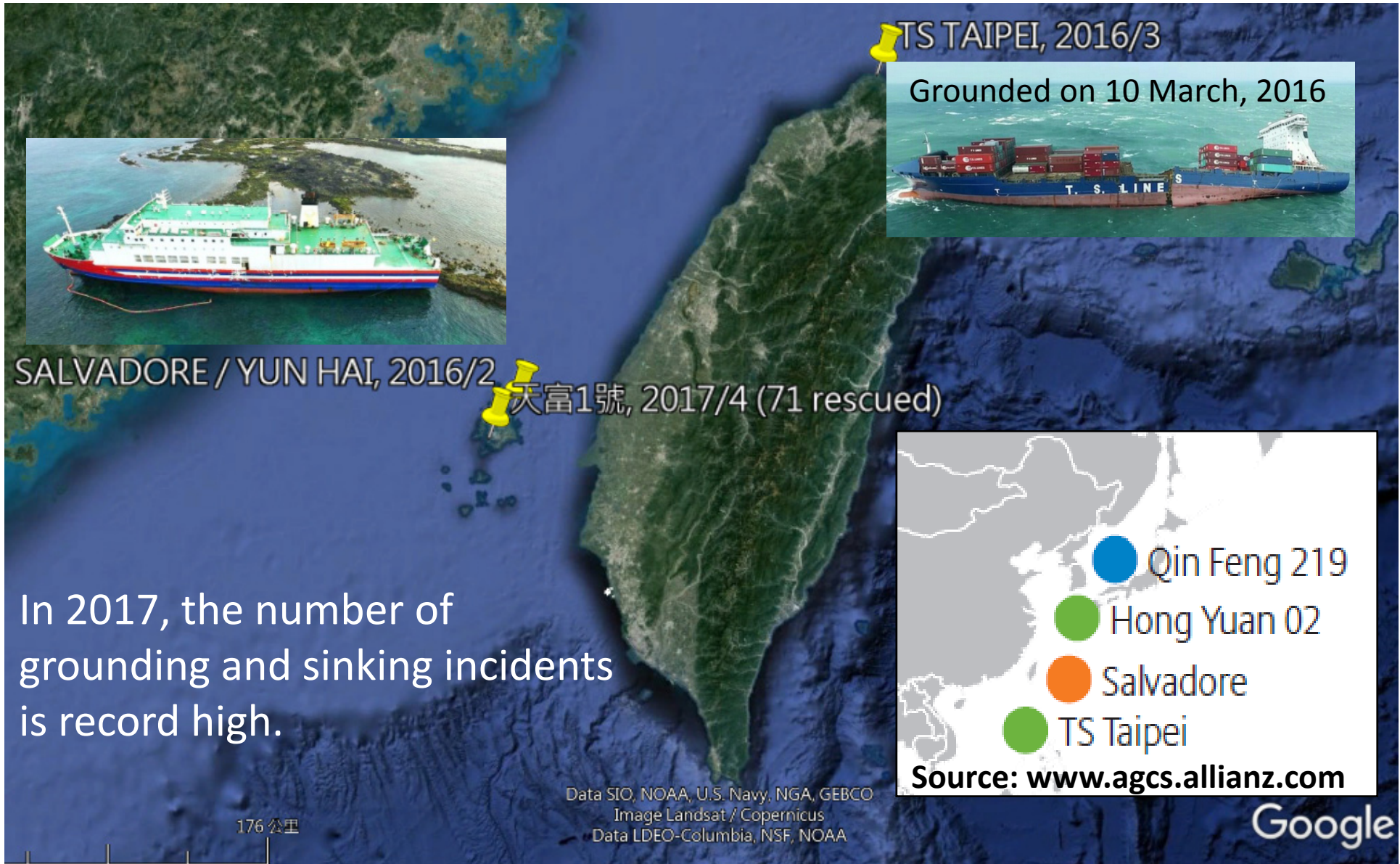


Source: [www.agcs.allianz.com](http://www.agcs.allianz.com)

- Total Losses by region: from Jan 1 2007 - Dec 31 2016
- Total Losses by region: from Jan 1 2016 - Dec 31 2016

# Among the 10 largest losses in 2016

→ 2 occurred in Taiwan



In 2017, the number of grounding and sinking incidents is record high.

# Each grounding or sinking has its implication to navigational charts

Browser ?

Charts		Objects
Description	Acronym	Cellname
Wreck	WRECKS	1U1WRECK.000
Wreck	WRECKS	1U1WRECK.000
Wreck	WRECKS	1U1WRECK.000
Wreck	WRECKS	1U1WRECK.000
Wreck	WRECKS	1U1WRECK.000
Covera...	M_CO...	1U1WRECK.000

6 objects

Inspector ?

Database of WRECKS  
- Need to track the source,  
status, the unknowns

## Wreck

Information in national language  
**航船布告102年第06號**

Water level effect  
**always under water/submerged**

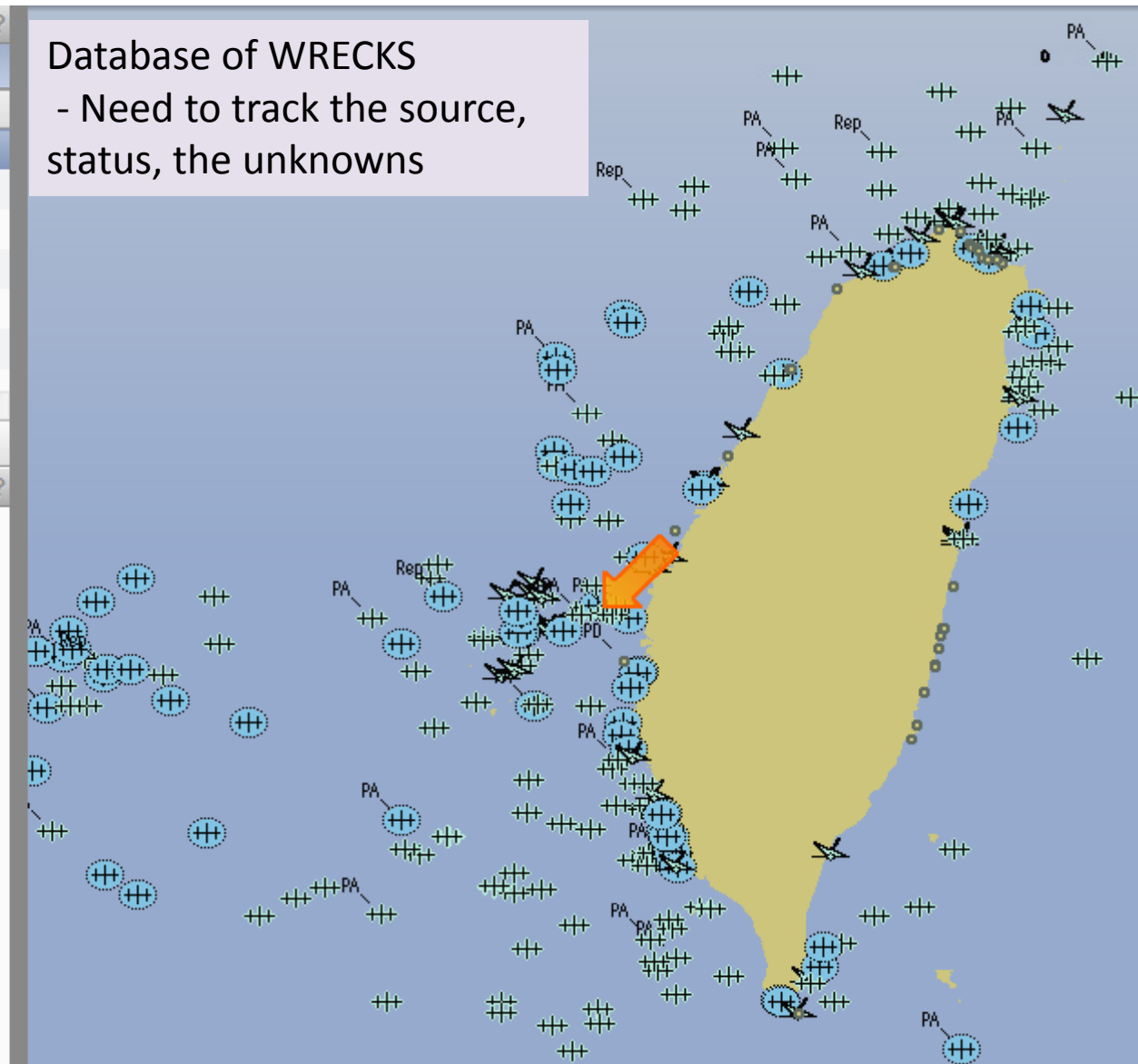
Information  
**NtM No. 06 of 2013**

Value of sounding  
**unknown**

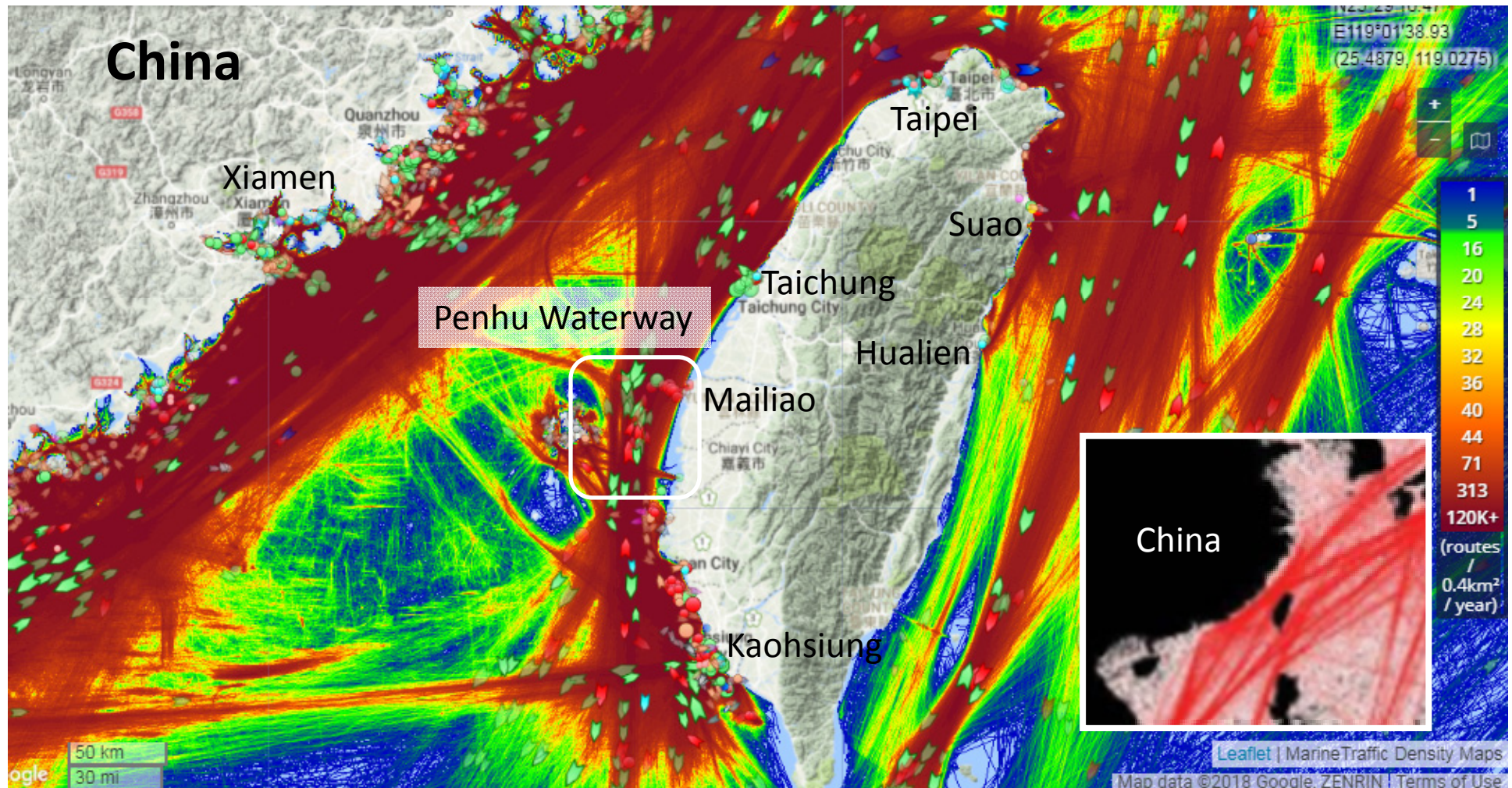
Category of wreck  
**dangerous wreck**

Exposition of sounding  
**unknown**

Quality of sounding measurement  
**depth unknown**



# Marine Traffic Density & Routes

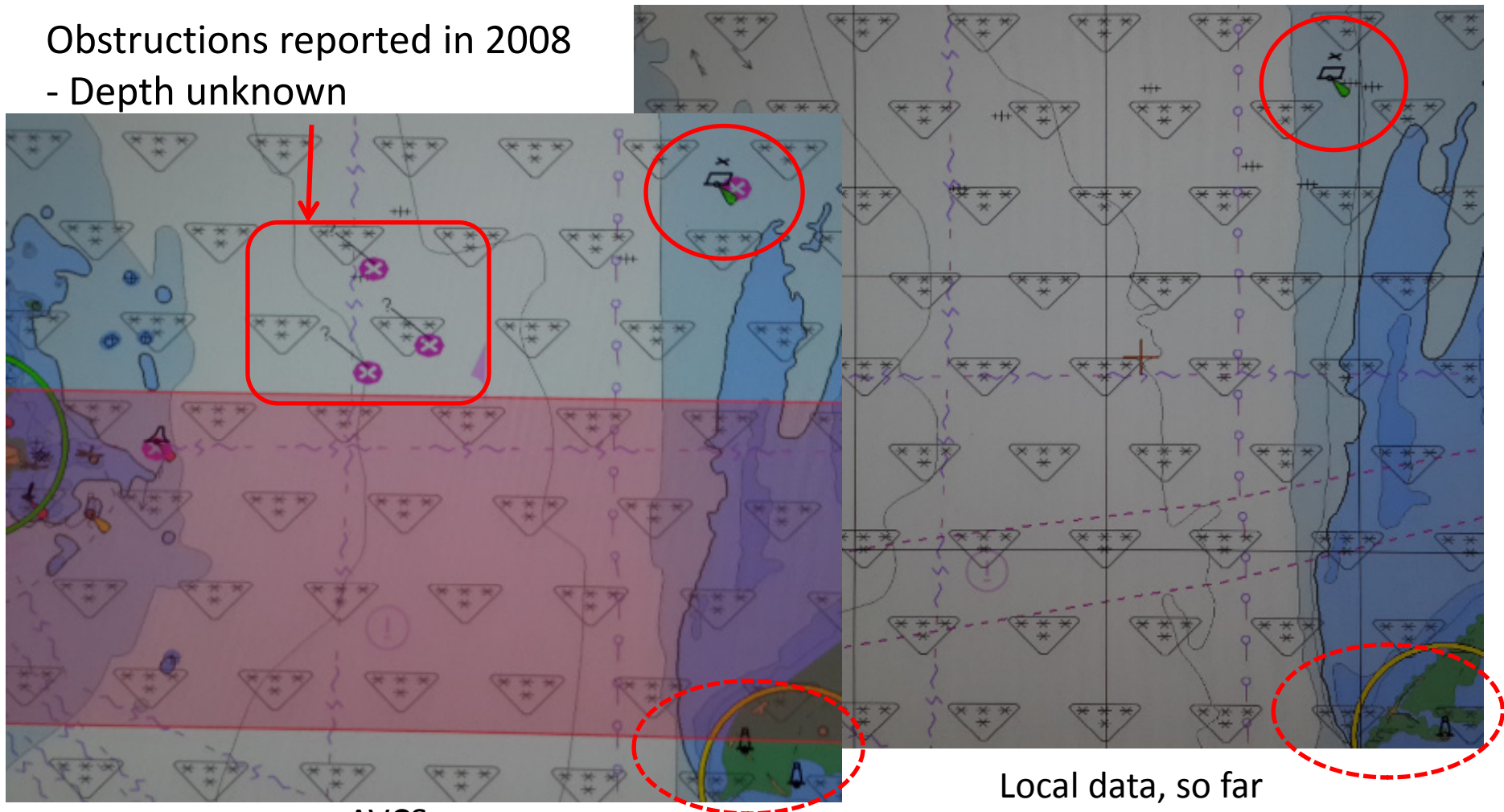


Source: <https://www.marinetraffic.com/>

# Wrecks /Obstructions in Penghu Waterway

## How many ? Dangerous or not ?

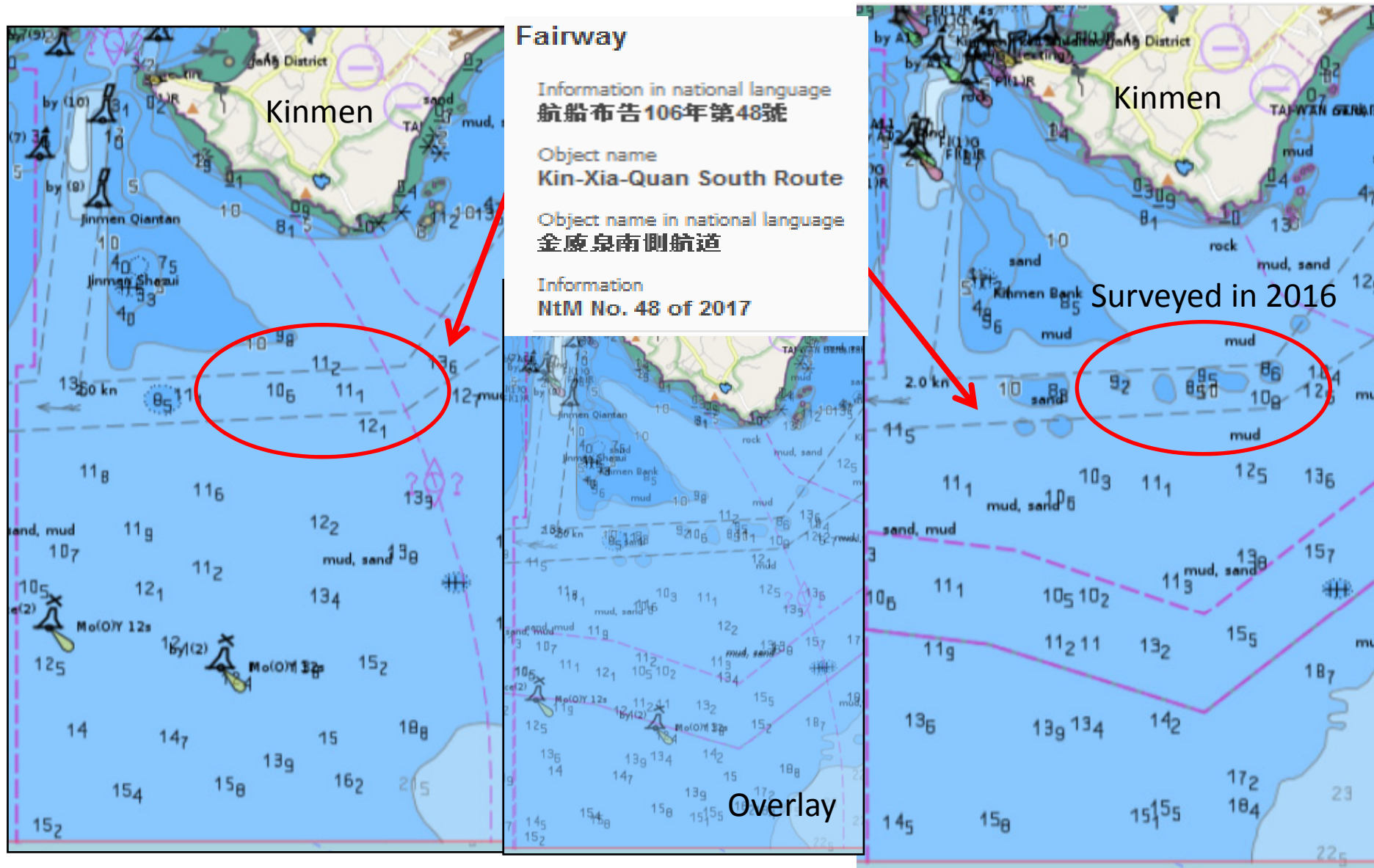
Obstructions reported in 2008  
- Depth unknown



AVCS

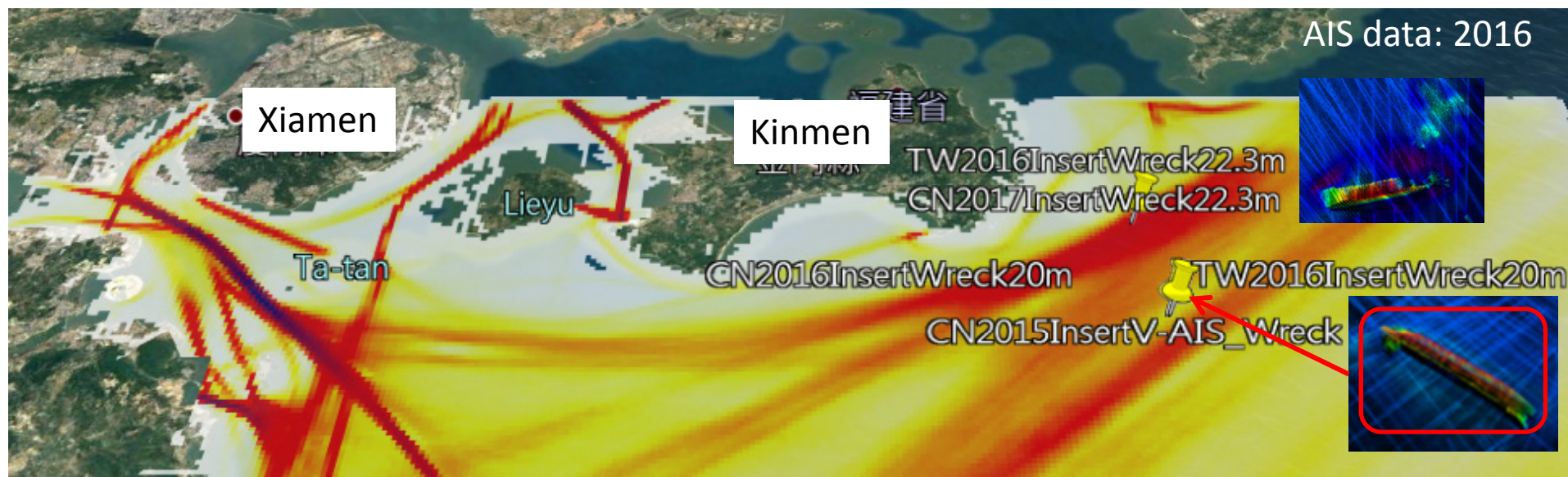
Local data, so far

# ENCs of the same area can be very different for various reasons, including lack of info. exchange



# NtM history of an ‘unreported’ wreck

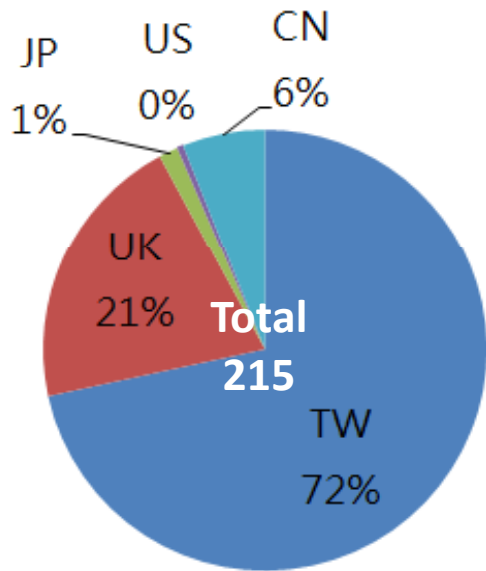
- 2016 hydro. survey found wrecks & issued NtMs in Oct.
  - 2016 wk49 CN NGD NtM: insert wreck, 20m
  - 2016 wk49 UK NtM: insert wreck, 20m & replace V-AIS
- 2017 NtM survey noticed: it’s marked with V-AIS in 2015
  - 2015 wk28 CN NtM: insert V-AIS, named “Min Guang 188 wreck”
  - 2015 CN NtM wk34: move V-AIS



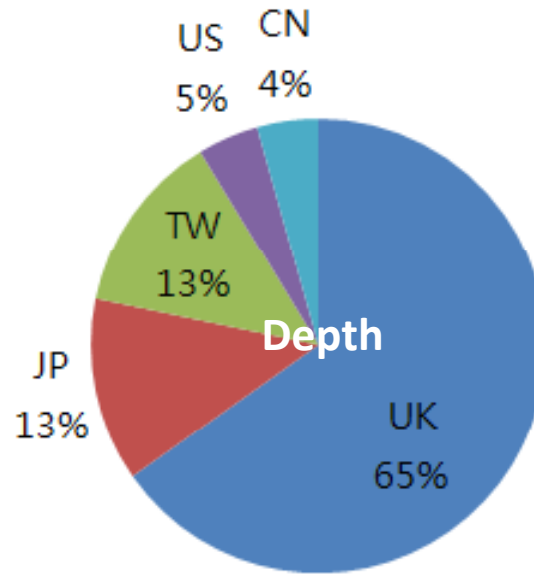


# Regional NtM Survey for Chart Corrections

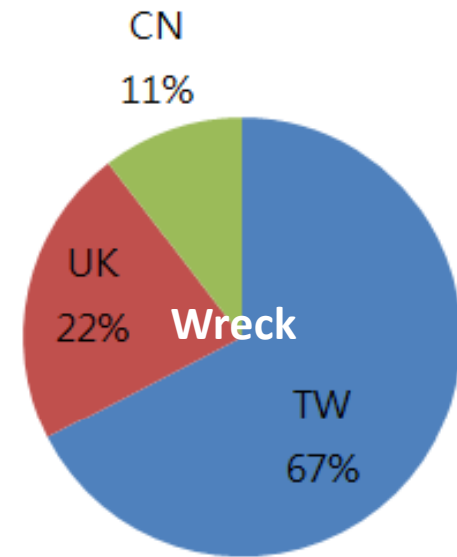
(analyzed based on CN NGD NtMs, 2009~ 2017 wk24 )



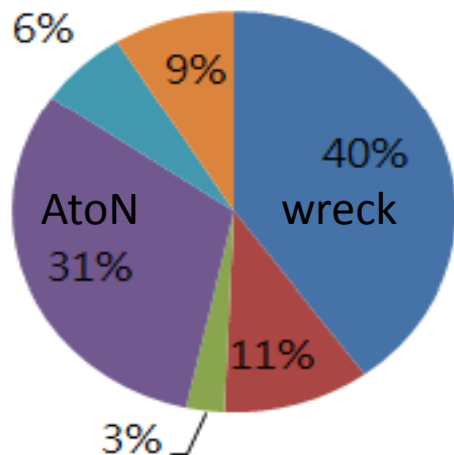
NGD NtM Source (around Taiwan and Peng-Hu Isl)



(Depth: 23 NtMs)



(Wreck, 86 NtMs)



- wreck
- depth rock
- cable pipeline
- AtoN
- obstructions
- others

Taiwanese NtMs of NMOO:  
usually only base one local sources & when formally informed

# Those NtMs on Submarine Cables & Pipelines are all from Taiwanese source

The S-57 layer of  
CBLSUB & PIPSOL  
(for ENC production)

Chart	Objects	
Description	Acronym	Cellname
Covera...	M_CO...	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000
Cable, s...	CBLSUB	1U1CP000.000

8 objects

Inspector

**Cable, submarine**

Object name  
TPE-SEG-S4

Category of cable  
telephone

Object name in national language  
橫太平洋快速海纜網路系統

Primitive  
Line

Position  
27 40.6030 N 124 51.5000 E

The screenshot shows a software interface with a list of objects on the left and a map of Taiwan on the right. The list contains 8 entries, all with the acronym 'CBLSUB' and cellname '1U1CP000.000'. The 'Inspector' panel shows details for a selected object: 'Cable, submarine' with object name 'TPE-SEG-S4', category 'telephone', and national language name '橫太平洋快速海纜網路系統'. The primitive is 'Line' and the position is '27 40.6030 N 124 51.5000 E'. The map shows Taiwan in yellow with a blue rectangular area on the island. An orange arrow points to a specific location on the map, corresponding to the object in the list.

# An Example of NtM-Caused Error

- Two pilot boarding place ?

Source: Taiwanese Notice 71/13

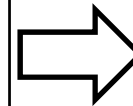
Hualien Harbor Offshore –  
Newly Established of Pilot Station

*Position* - Lat.23°57'11.0"N., Long.121°37'41.0"E. (WGS84)  
Lat.23°57'17.6"N., Long.121°37'11.7"E. (GRS67)

*Details* - A pilot station has been newly established at the above position. NMOO chart users are advised to add the related charts & publications.

NGD NtM

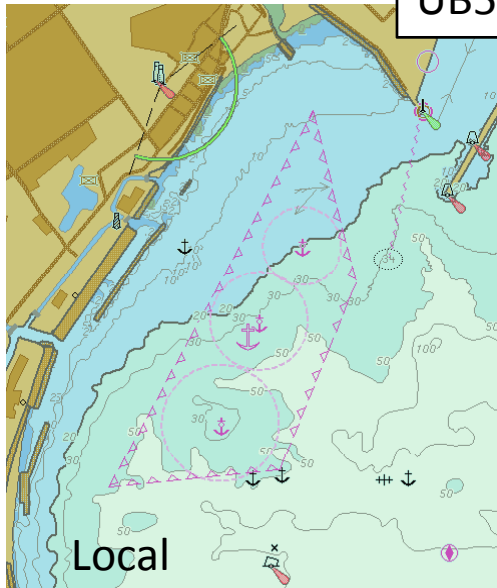
加繪



Insert (UKHO)

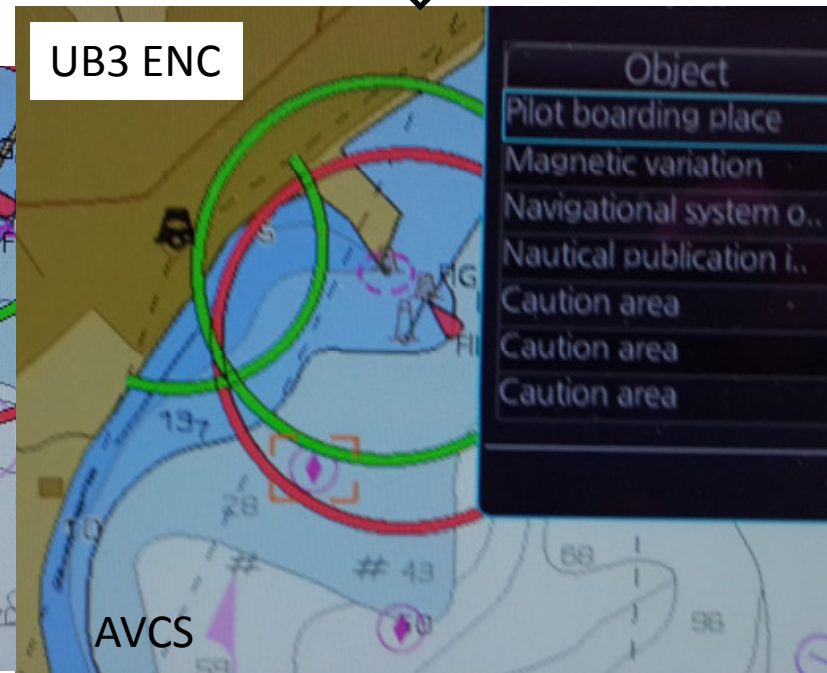


UB5 ENC

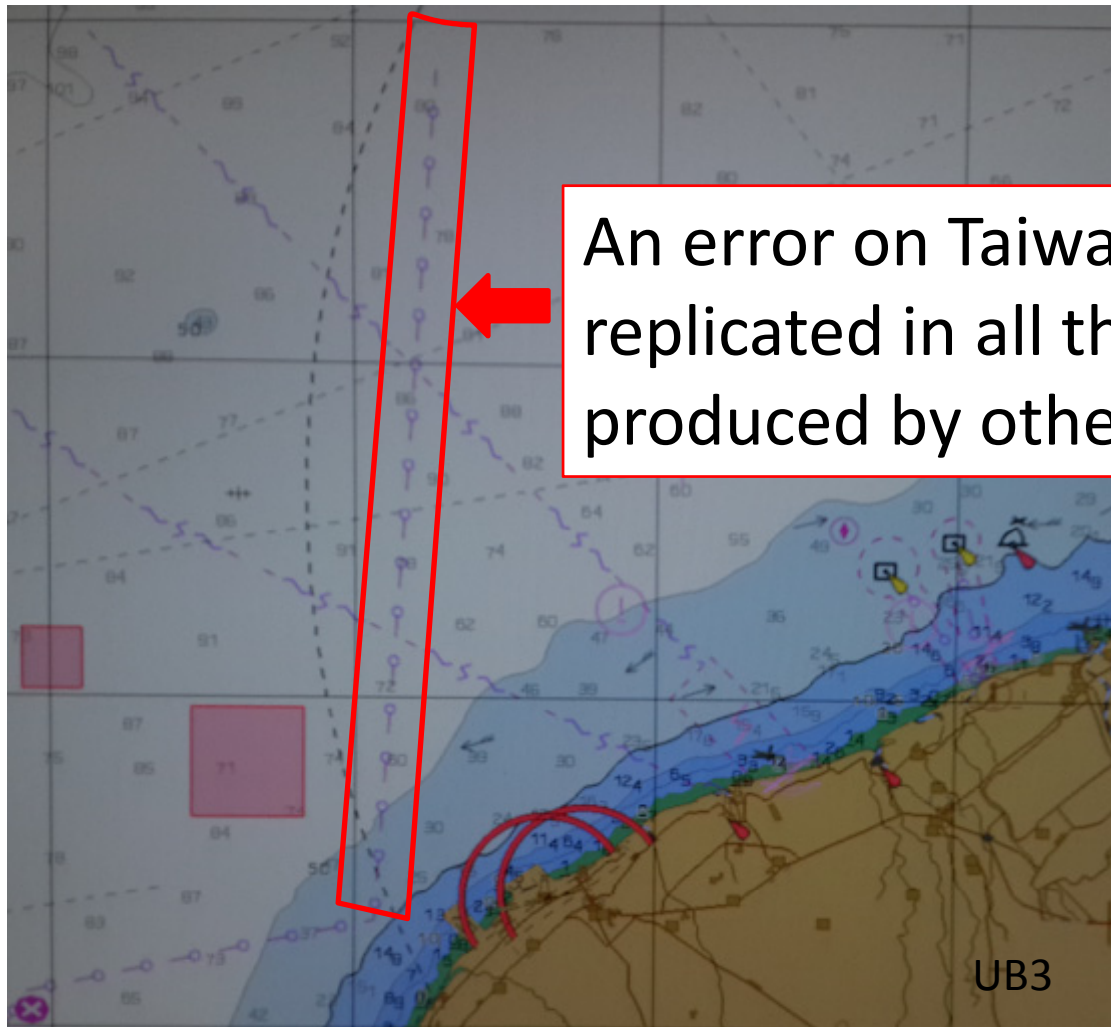


AVCS

UB3 ENC

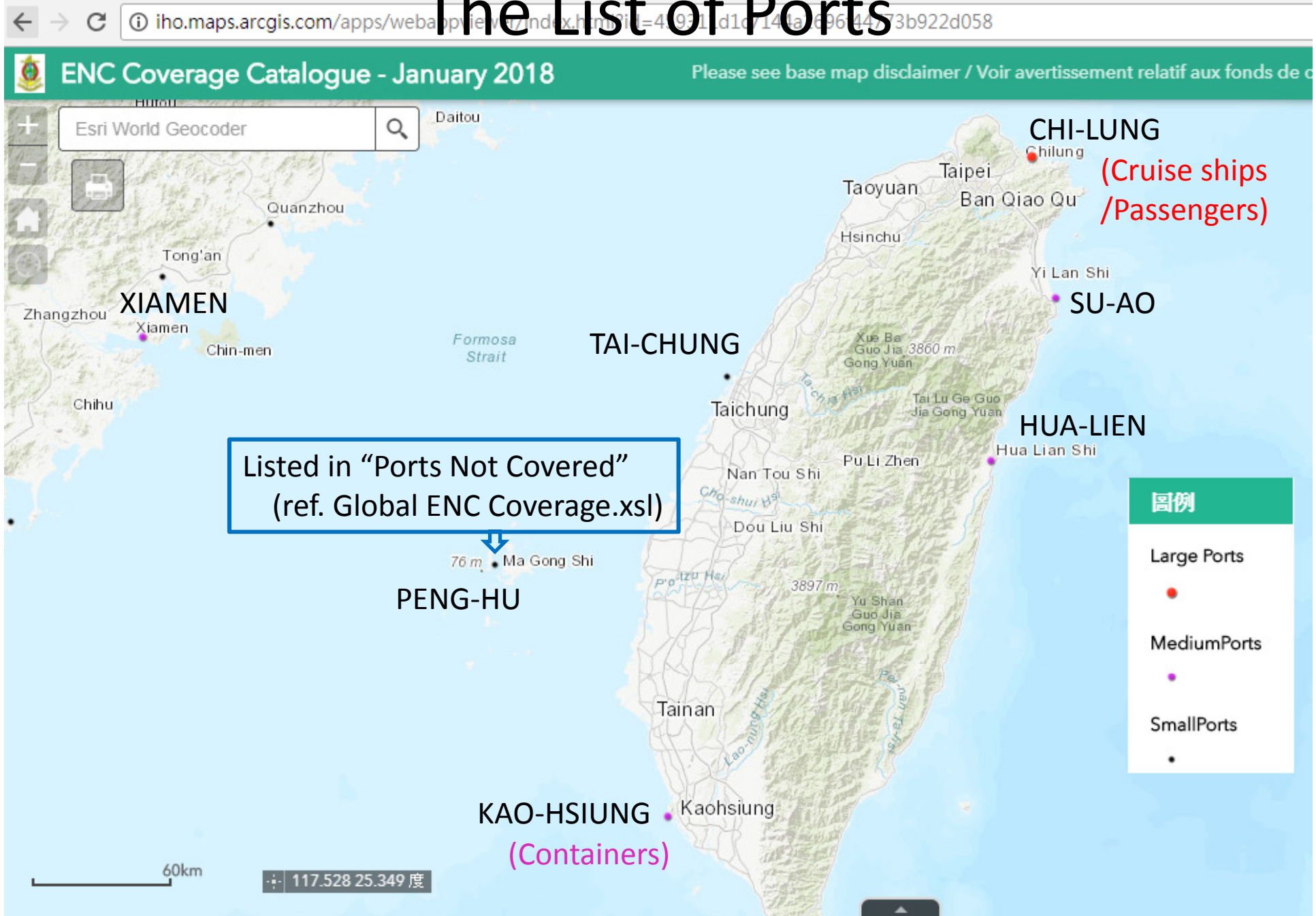


Known paper chart error  
might not have any NtM issued for it



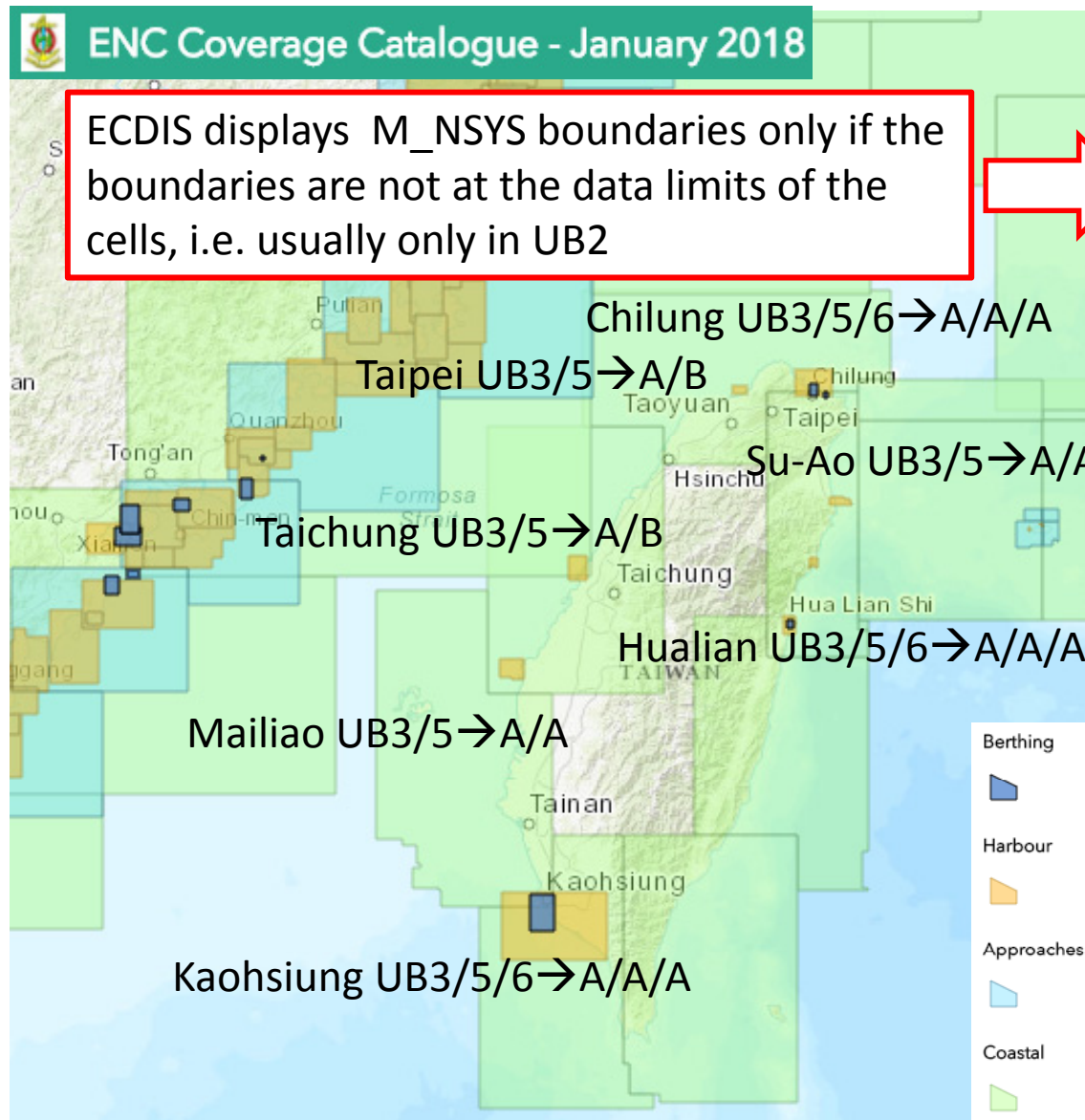
An error on Taiwanese paper chart  
replicated in all the ENC/charts  
produced by others

# The List of Ports



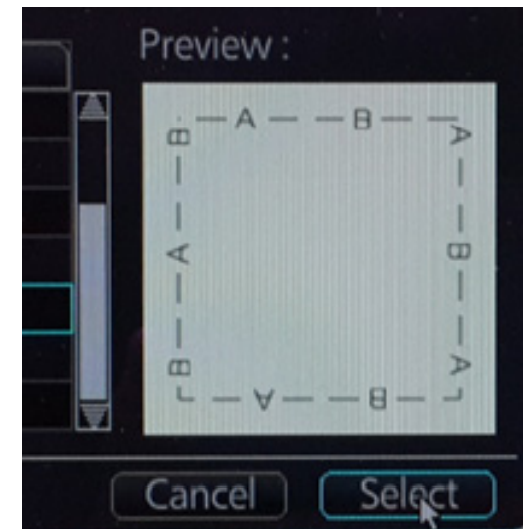
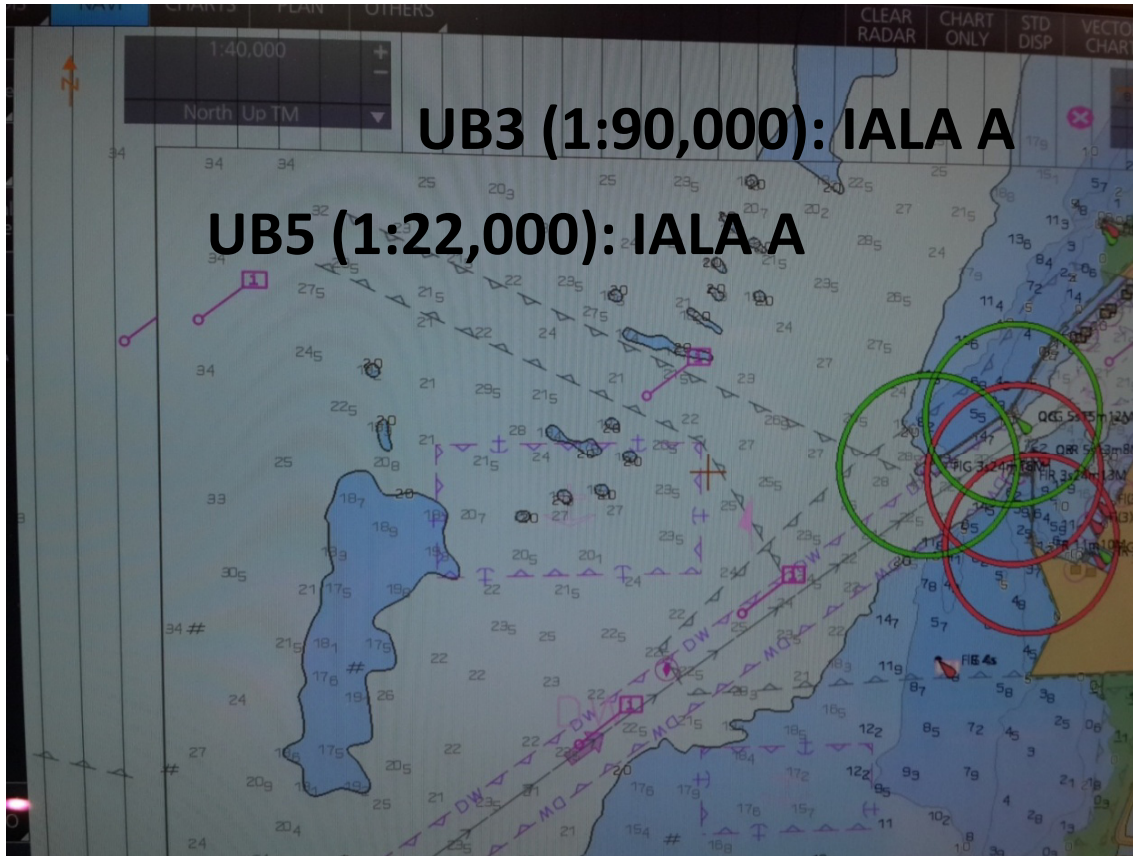
# IALA Buoyage System → in fact, B region

## What do mariners see on ECDIS now?



M\_NSYS, mandatory in ENC cells (Navigational System of Marks)

# MAI-LIAO Industrial Port (Tanker, VLCC), not listed ENC Status UB3 → UB5: IALA A → A



Marks navigational - System of: IALA A

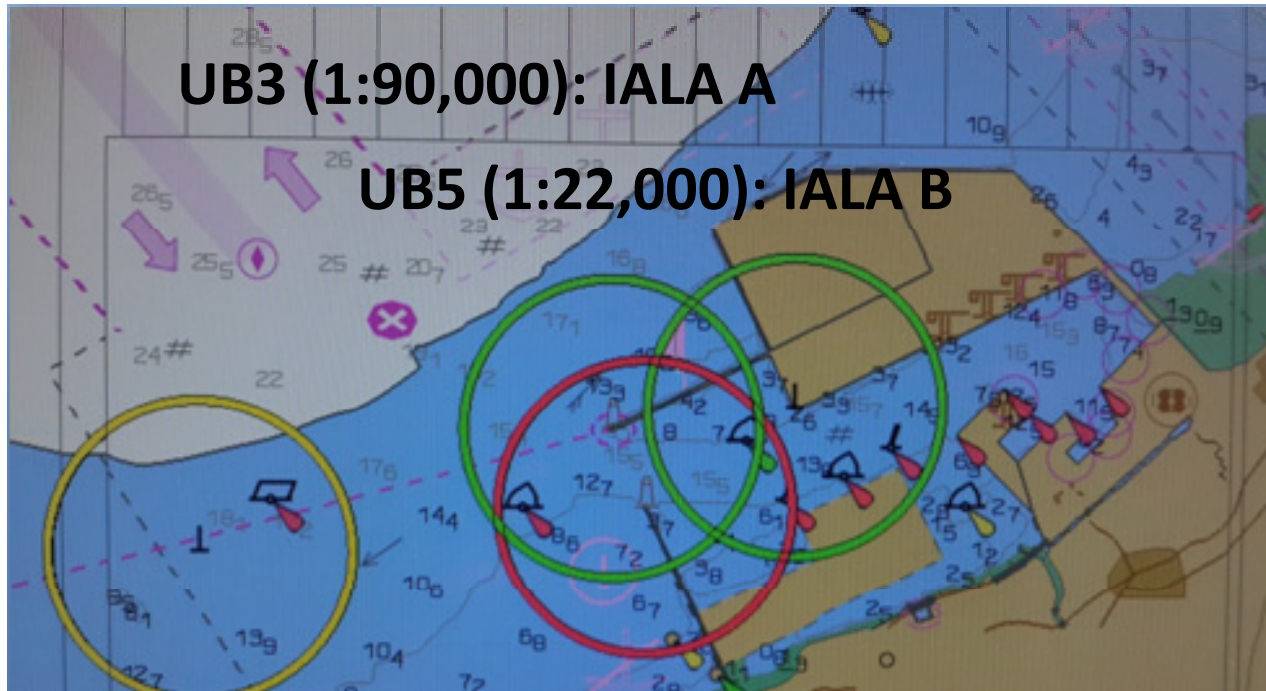
Symbol explanation:

boundary between IALA-A and IALA-B systems of lateral buoys and beacons

In fact, IALA B !!

# Taipei port (expanding, not listed)

ENC Status UB3 → UB5: IALA A → B



Information: NAVIGATIONAL MARKS  
Scale minimum: 1: 89,999  
Textual description:  
NAVIGATIONAL MARKS

Taiwan - North Coast - T'aipei Kang  
UB5 (1:12,000), Caution Area

Mariners are advised that buoys and beacons may not conform to the IALA system.

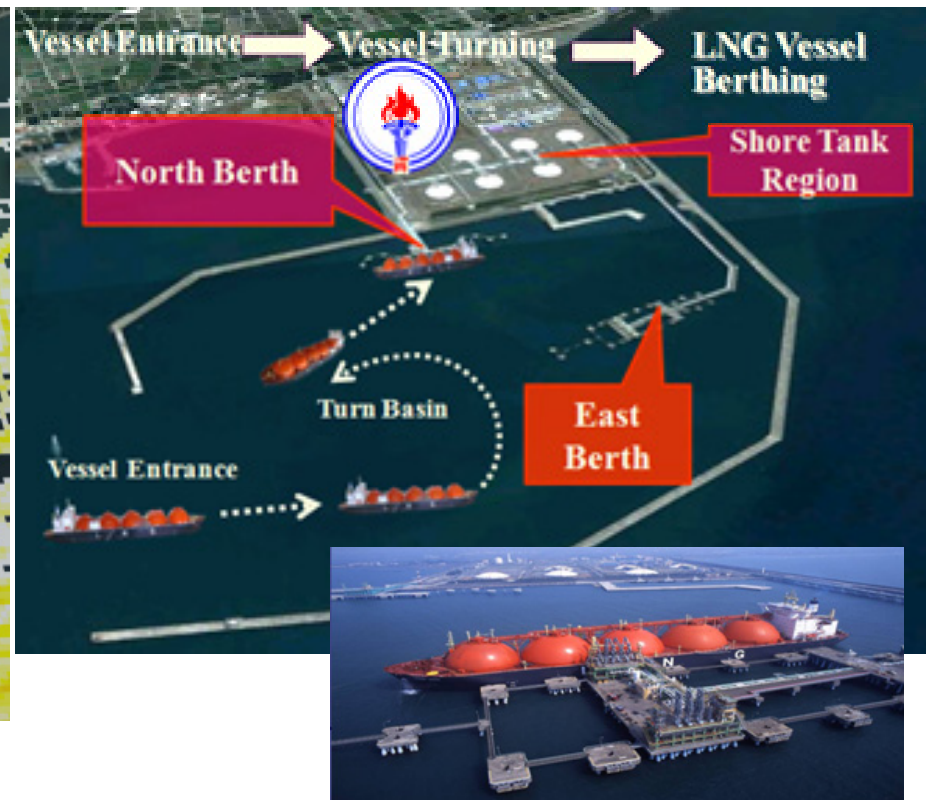
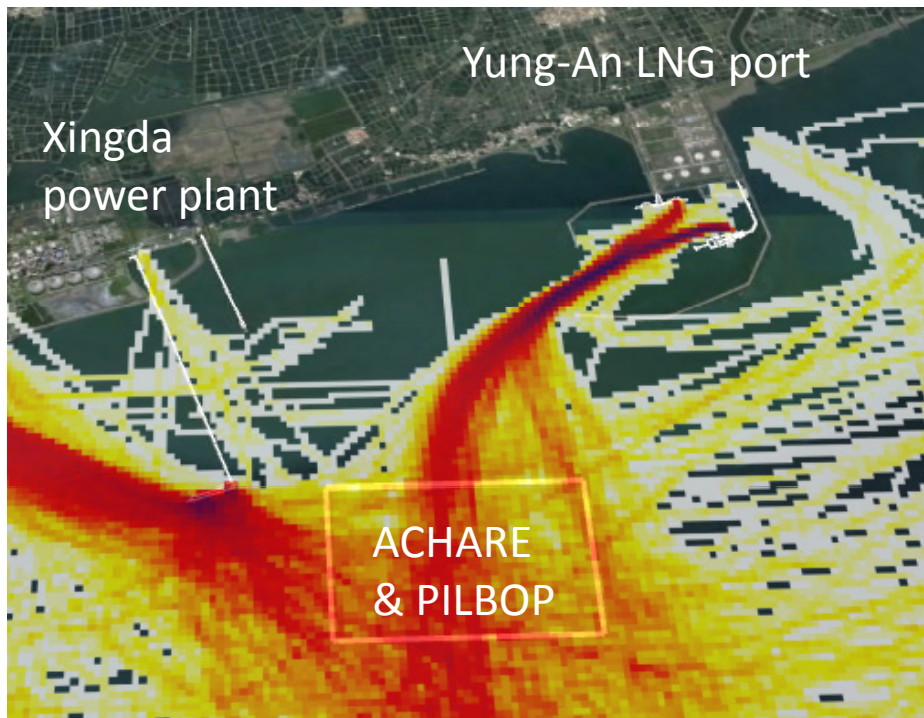
Cancel Select

The screenshot shows a software interface with a warning message. The message is displayed in a dark box with white text. The message reads: 'Information: NAVIGATIONAL MARKS', 'Scale minimum: 1: 89,999', 'Textual description: NAVIGATIONAL MARKS', and 'Mariners are advised that buoys and beacons may not conform to the IALA system.' Below the message, there are two buttons: 'Cancel' and 'Select'. To the right of the message, there is a white box containing the text: 'Taiwan - North Coast - T'aipei Kang', 'UB5 (1:12,000), Caution Area'.

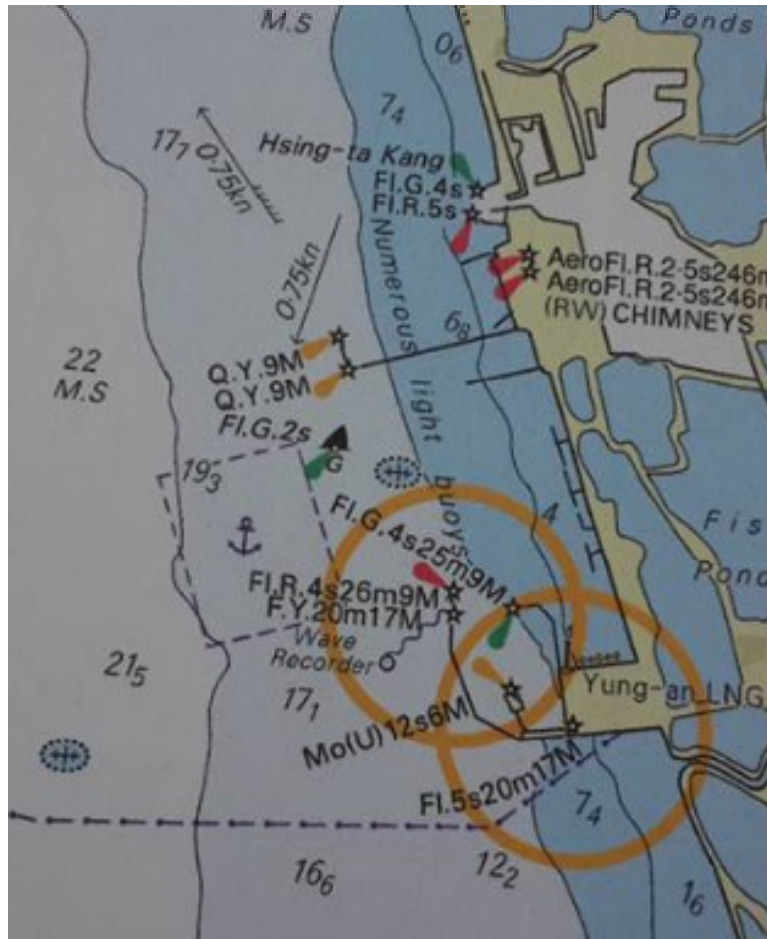


# Yun-An LNG Port/Terminal

- A safety critical request for a suitable chart
- “For now, large LNG vessels more or less sail with pilot’s advice and an overview chart with no details on it.”



# Available Charts (the largest scale)



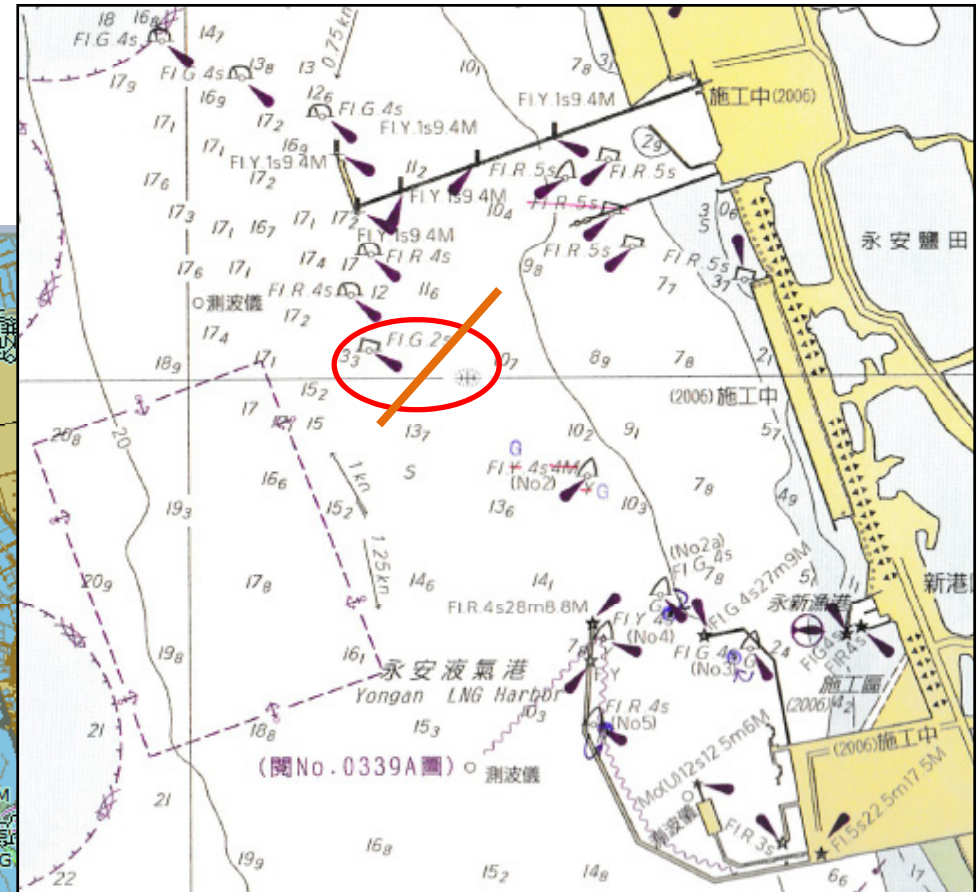
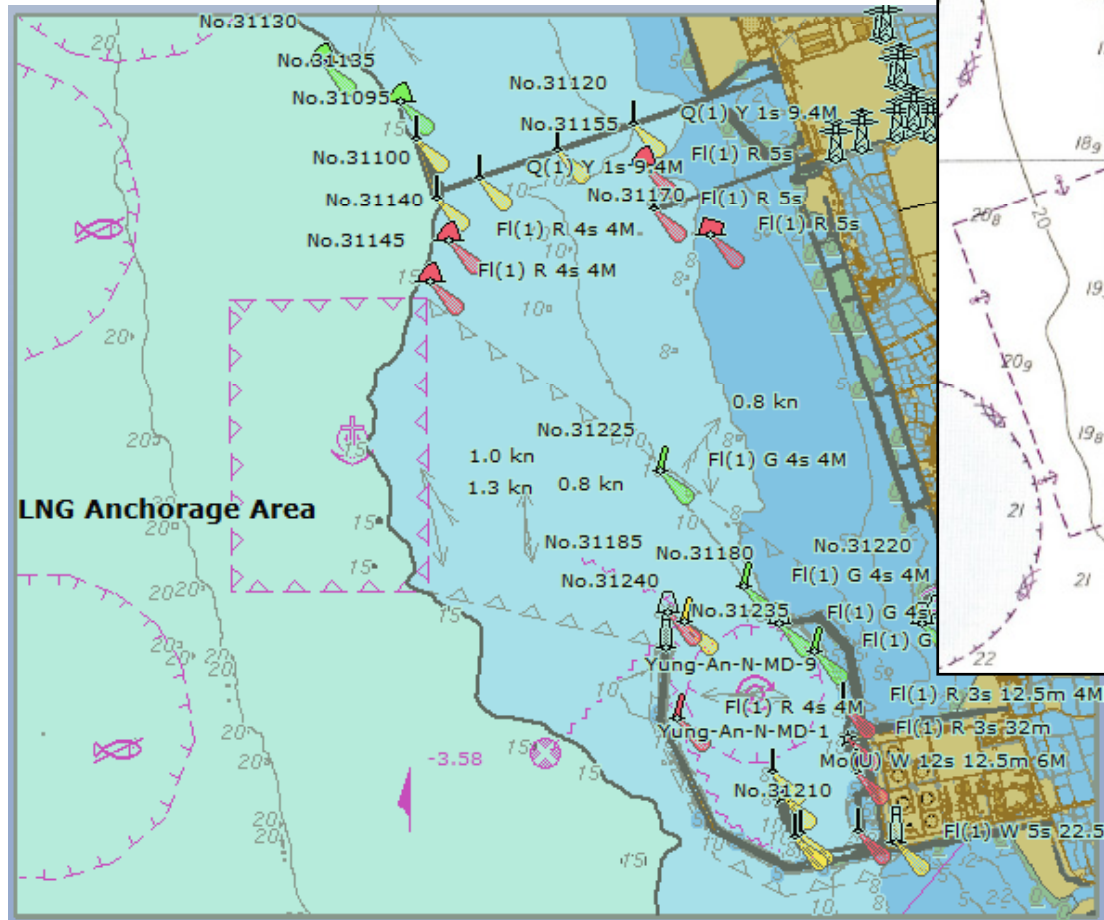
1:150,000 paper chart



UB3 ENC (AVCS)

# Locally Produced & Updated Charts

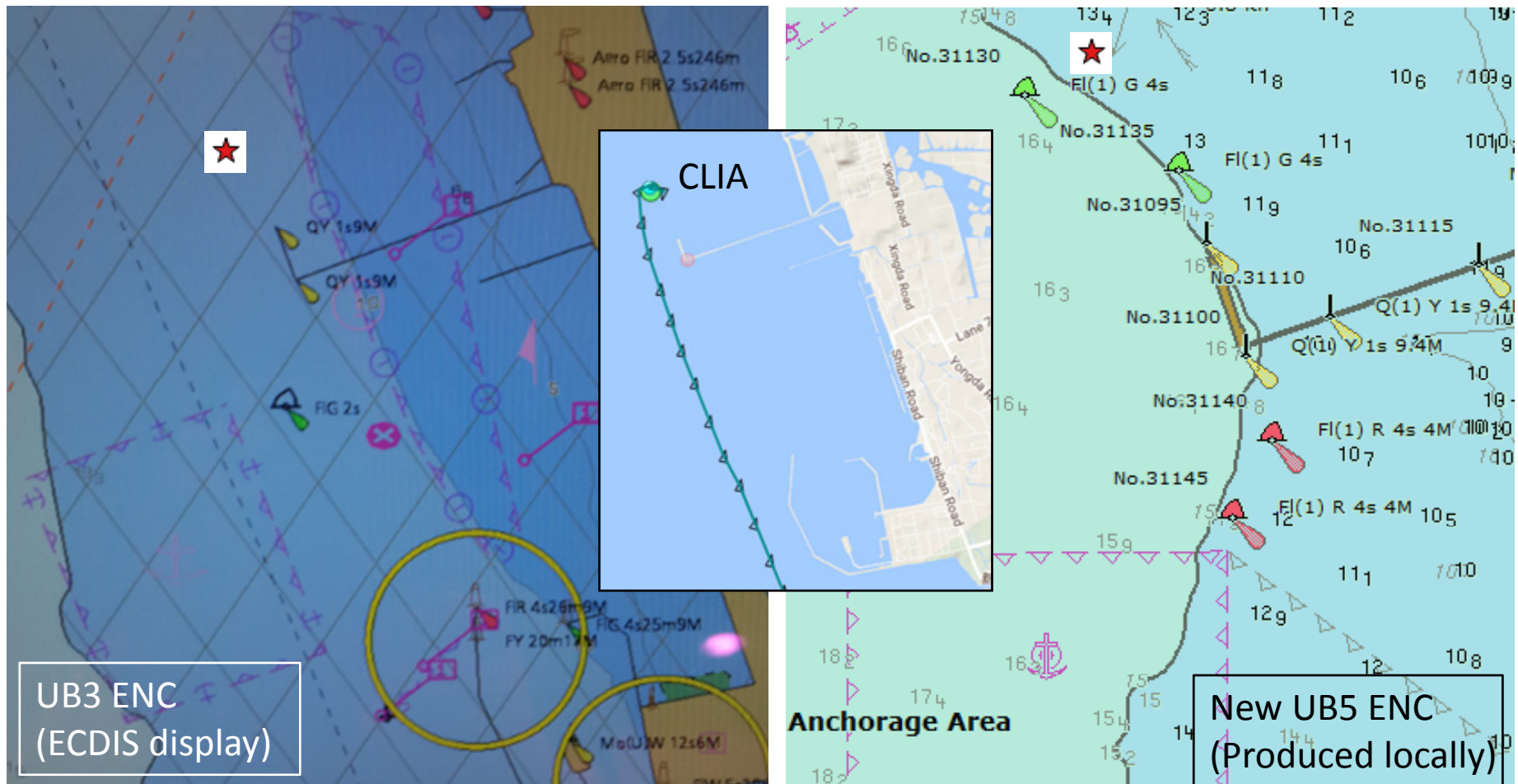
UB5 ENC based on latest survey (2017)



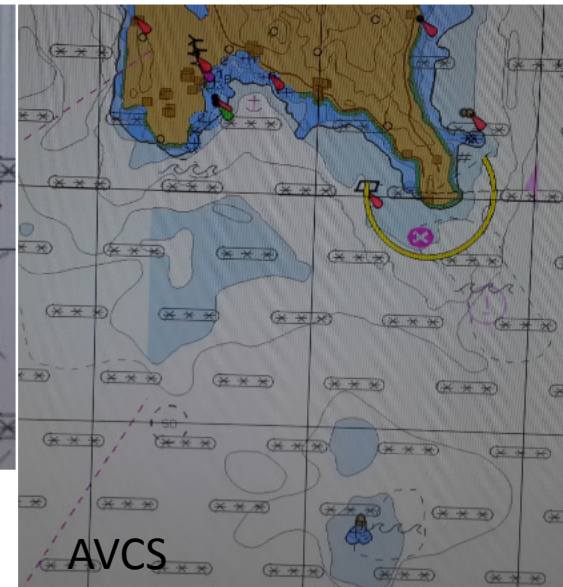
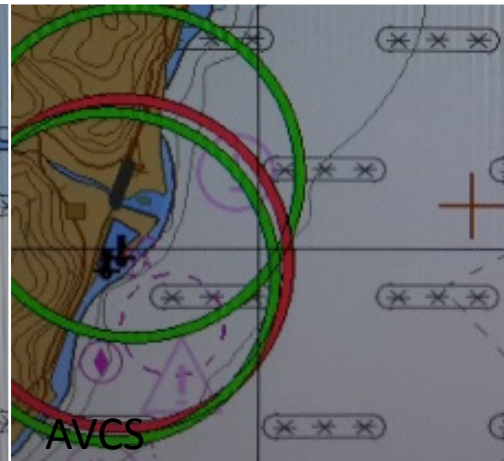
1:50,000 local paper chart (Ed3.2006)

# Recent grounding near Yung-An

- CLIA (max. draught 14.9m) ran aground on 14 August, 2017, transporting more than 80,000 tons of coal to Taiwan Power's Xingda power plant.



# ENC status– East & South Coast



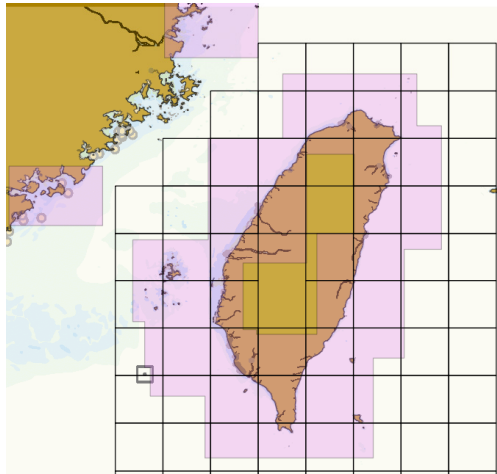
- UB3 Caution Area : Cell Accuracy
- UB5 Caution Area : Chart Accuracy & Nav. Marks

<p>Information: CELL ACCURACY Scale minimum: 1: 349,999 Textual description: CHART ACCURACY</p> <p>Owing to the age and quality of the source information, some of the charted detail may not be positioned accurately. Particular caution is advised when navigating in the vicinity of dangers, even when using an electronic positioning system</p>	<p>Information: CHART ACCURACY Scale minimum: 1: 44,999 Textual description: CHART ACCURACY</p> <p>Owing to the age and quality of the source information, some of the charted detail may not be positioned accurately. Particular caution is advised when navigating in the vicinity of dangers, even when using an electronic positioning system</p>
--	--

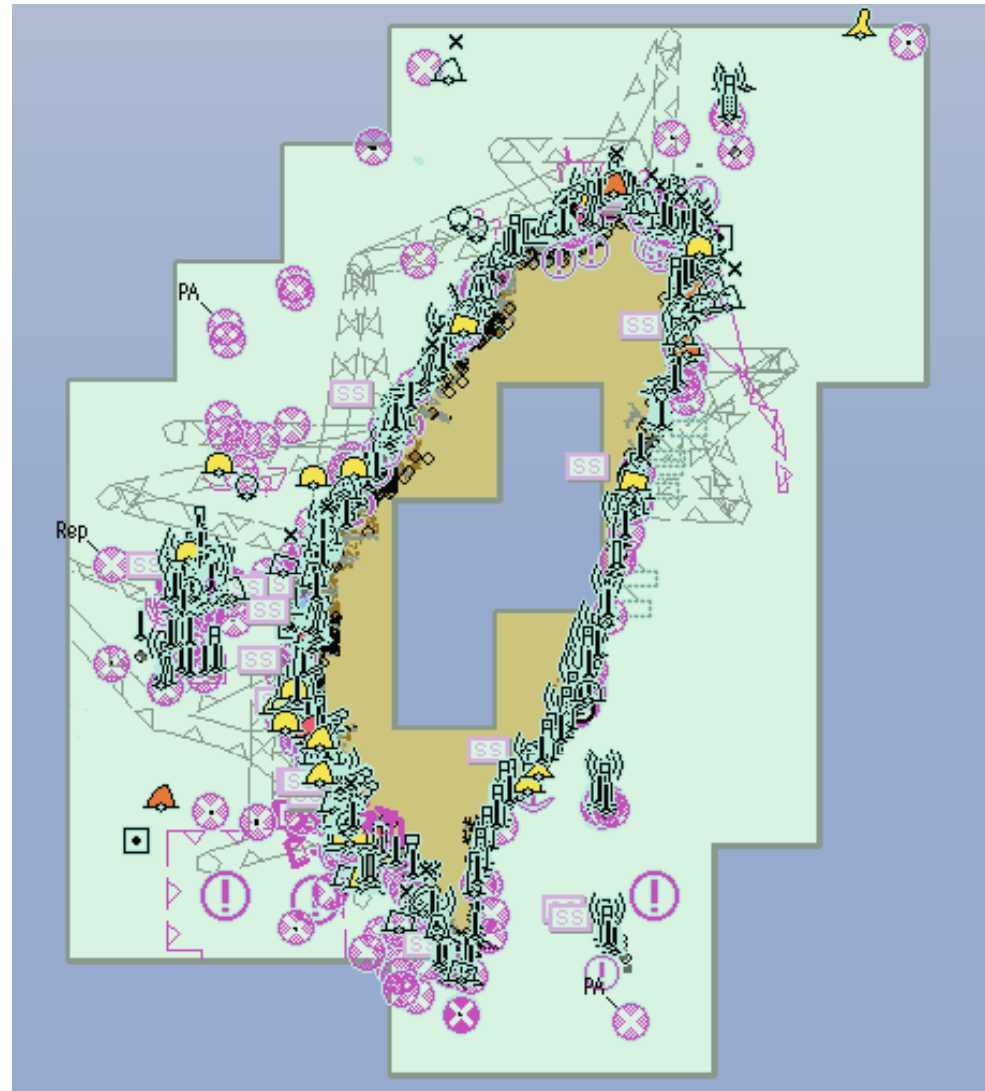
# New ENC's produced

- being updated with newly collected data

- UB3 : 17 cells
- UB4: 56 cells (30' x30')
- UB5: 20 cells  
+Yung An LNG port
- UB6: 7 cells

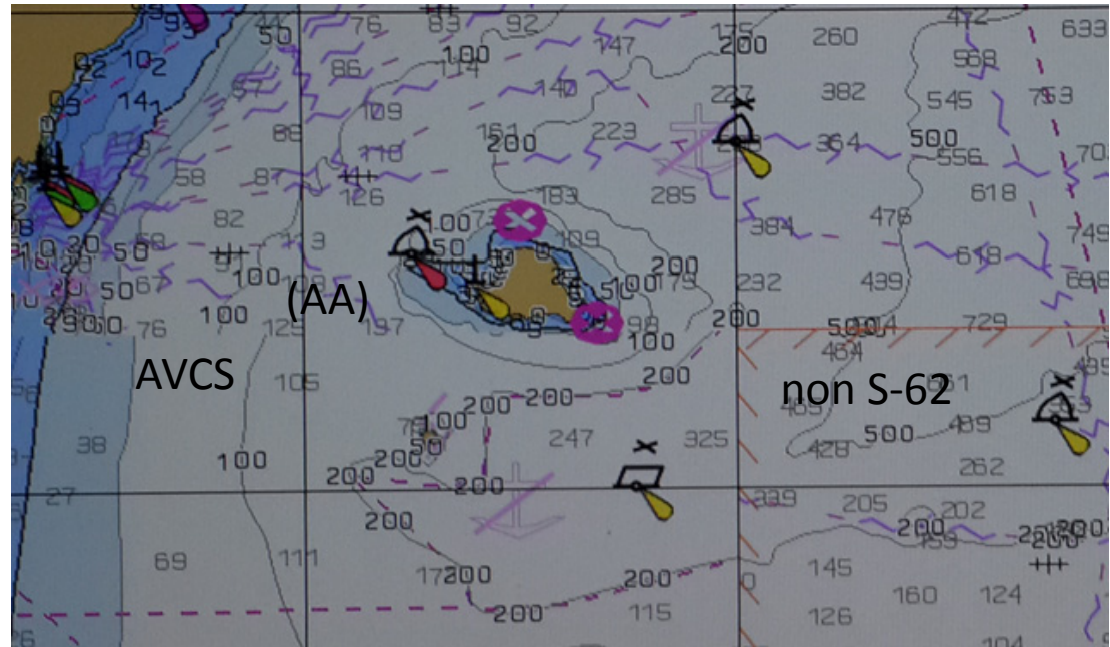
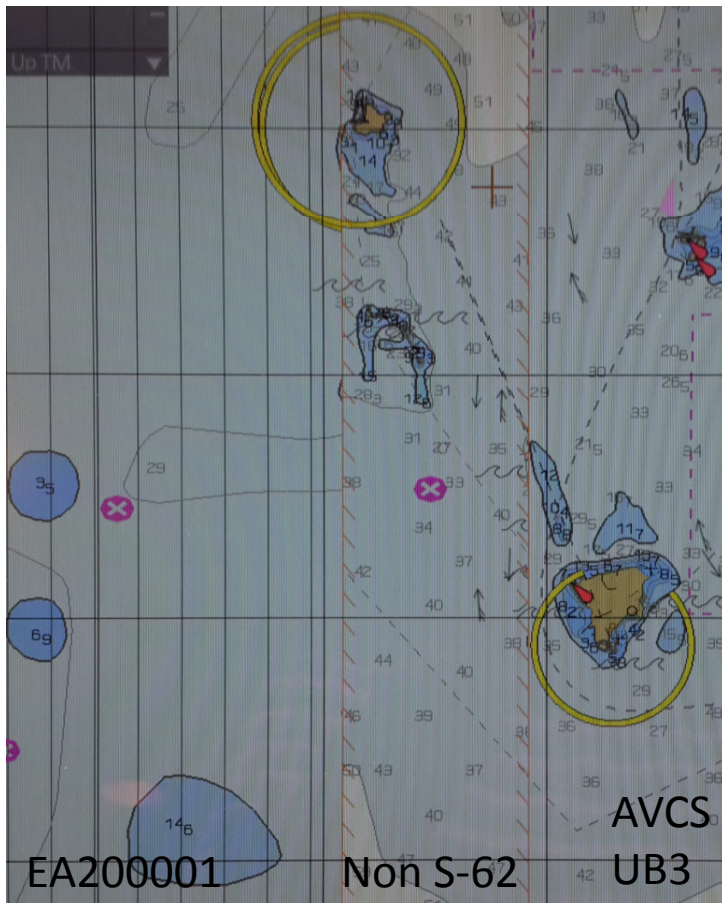


+ Dongsha island in SCS

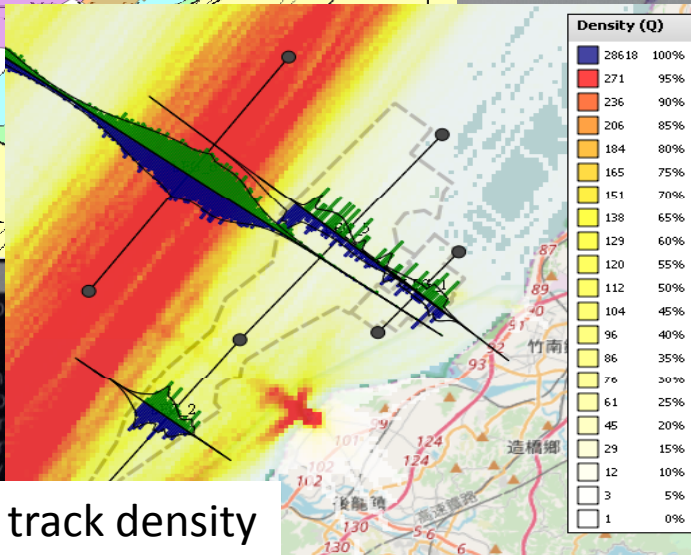
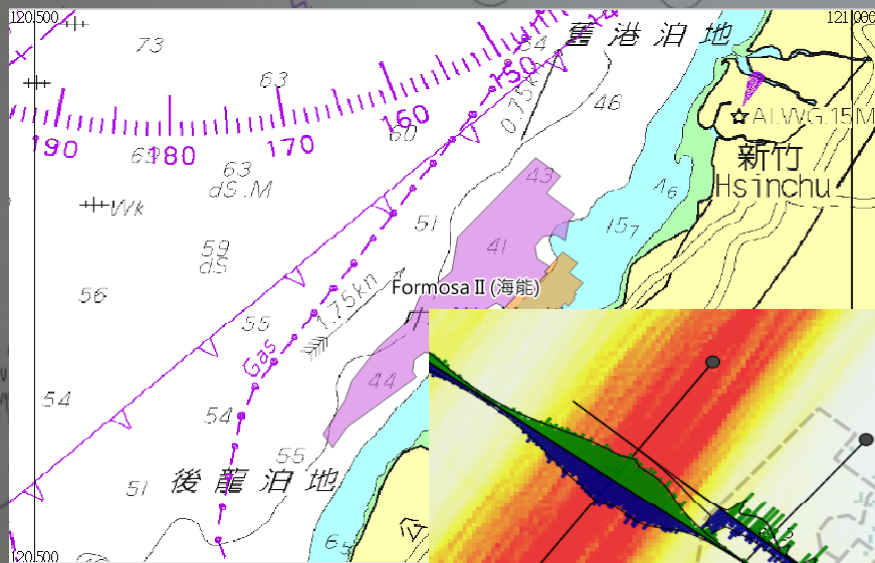


# Test in a Type-Approved ECDIS

- Local ENC data show up only in gap areas or UBs, unless with a proper S-62 official producer code, such as AA



# Vessel traffic is about to shift towards (ENC) areas of unreliable soundings



AIS track density

Formosa I & II  
Offshore OWF

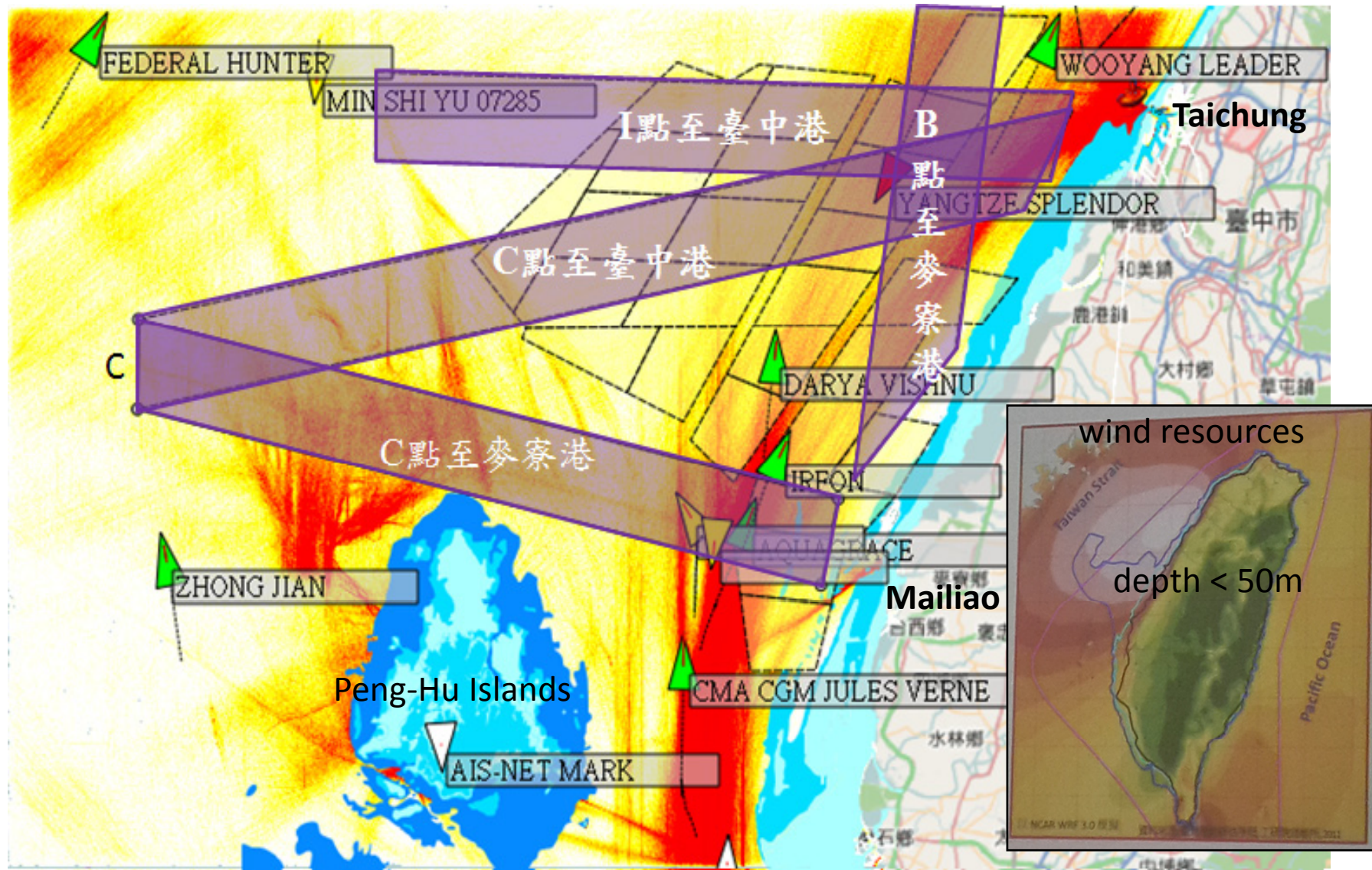
Miao-Li

unreliable sounding  
(in 2017)



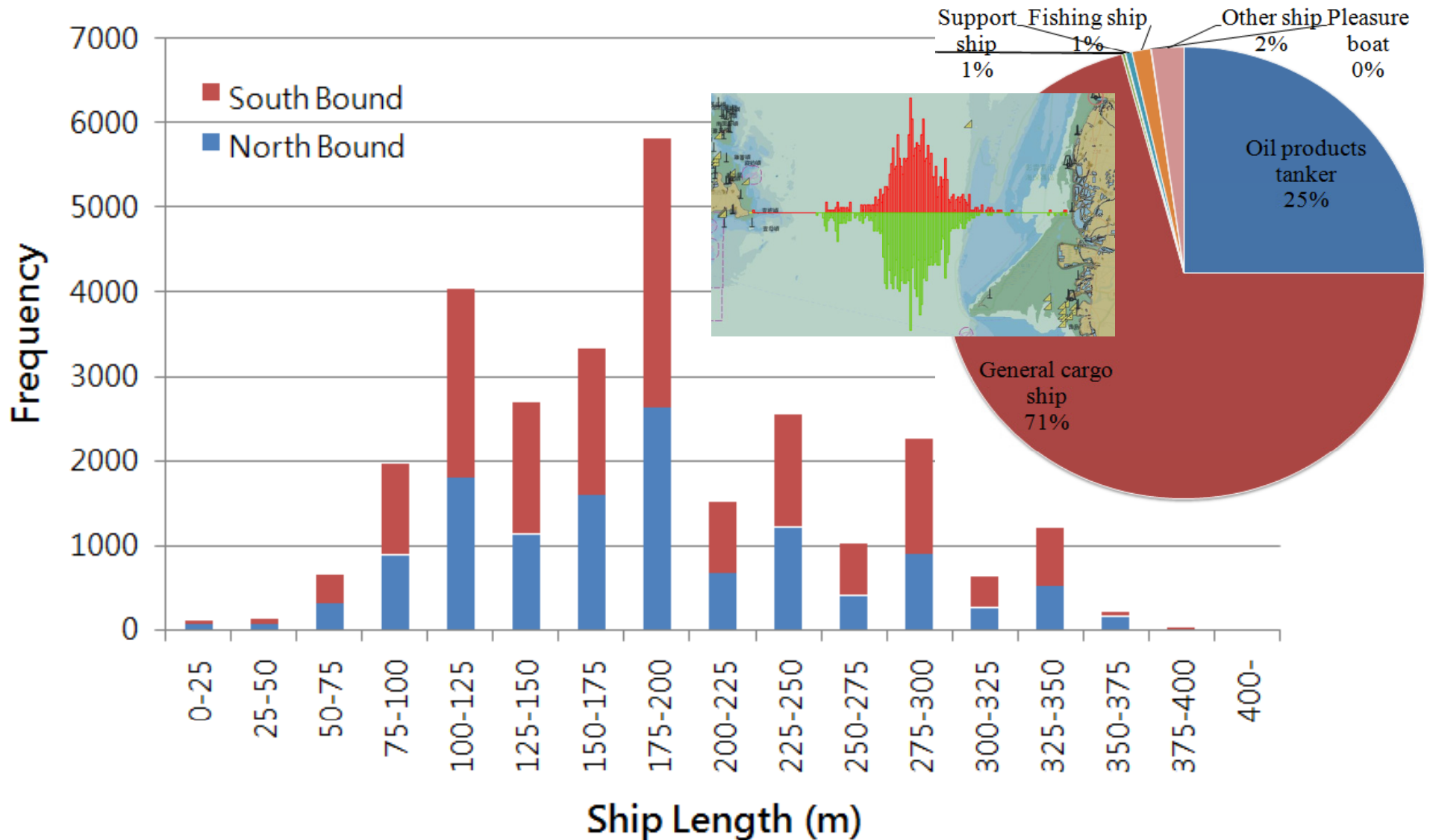
# The Most Challenging Area

coexistence of shipping, fishing & offshore wind farms



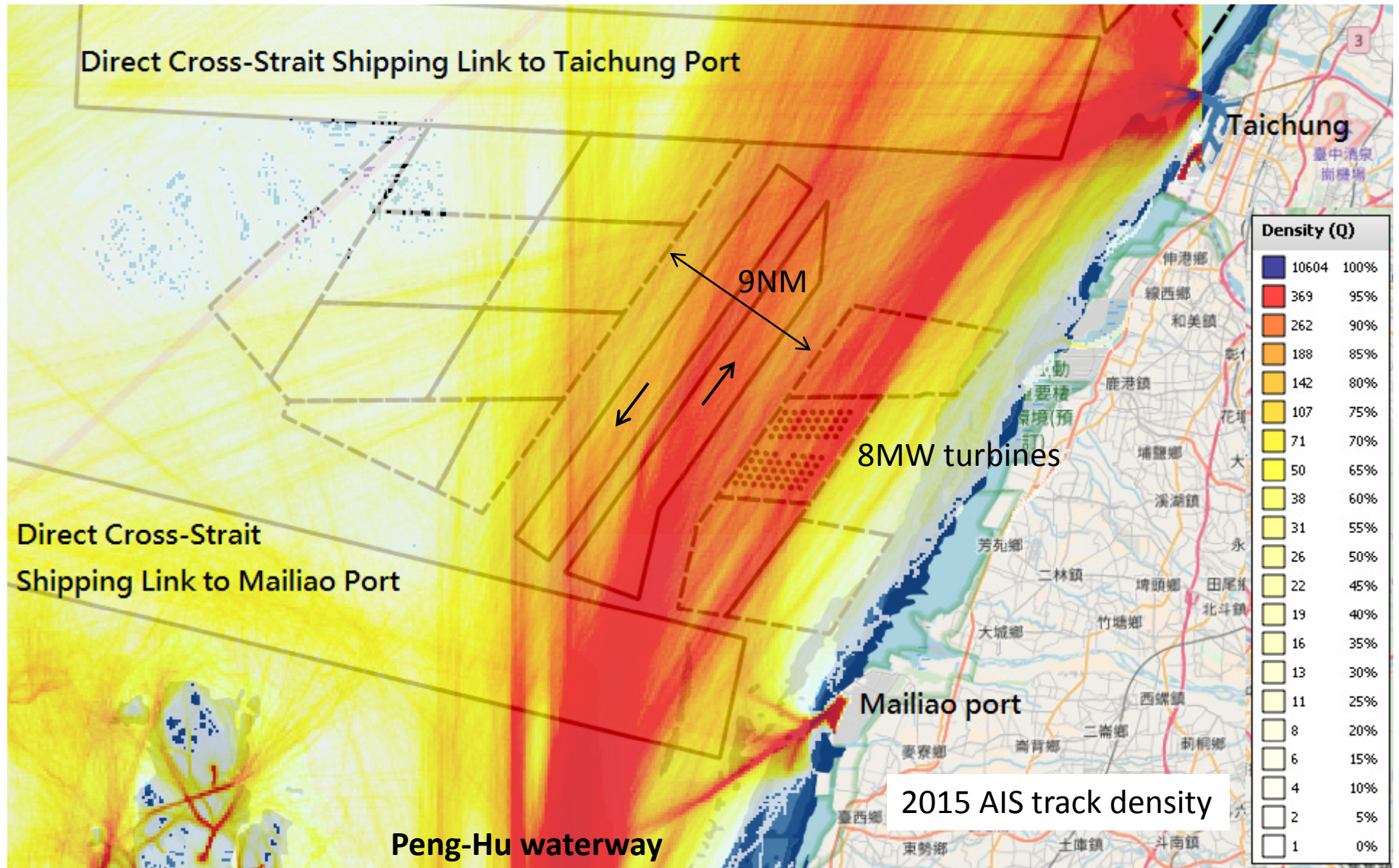
# Vessel Traffic through Peng-Hu Waterway

> 70 vessel trips/day, 71% Cargo, 25% Tankers



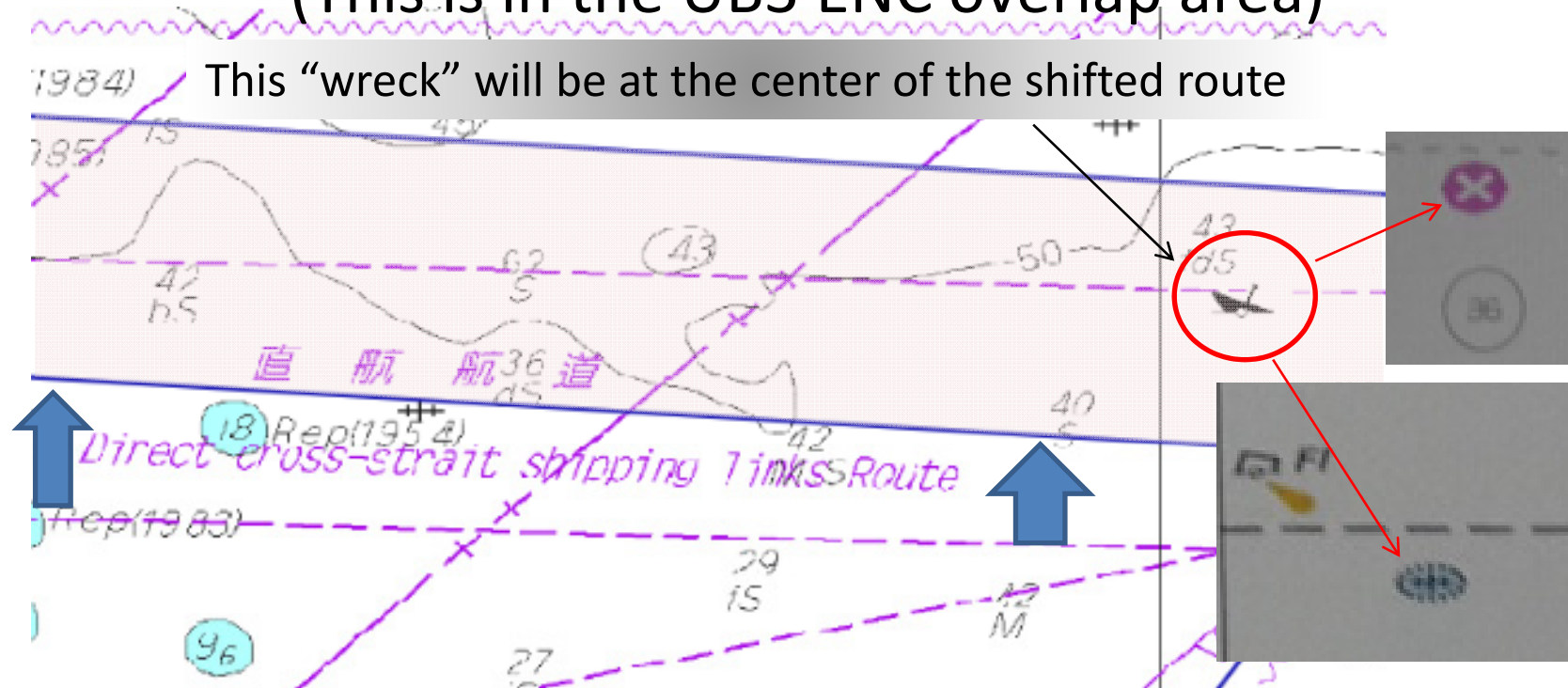
# Require Major Reorganization of the Traffic

Target : offshore wind power 520MW by 2020, 3GW by 2025

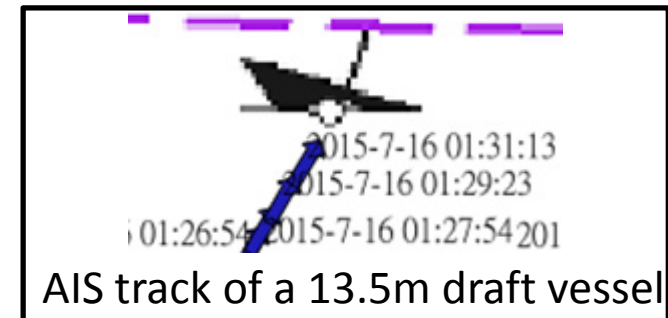


# Is there a dangerous wreck ?

(This is in the UB3 ENC overlap area)



- Charted differently by the producers, with inconsistency also in different usage bands
  - dangerous wreck / always under water
  - wreck / covers & uncovers
- Hydro. survey found no features there !



Taichung Port

UB3 (1:90,000)

pipeline (gas)

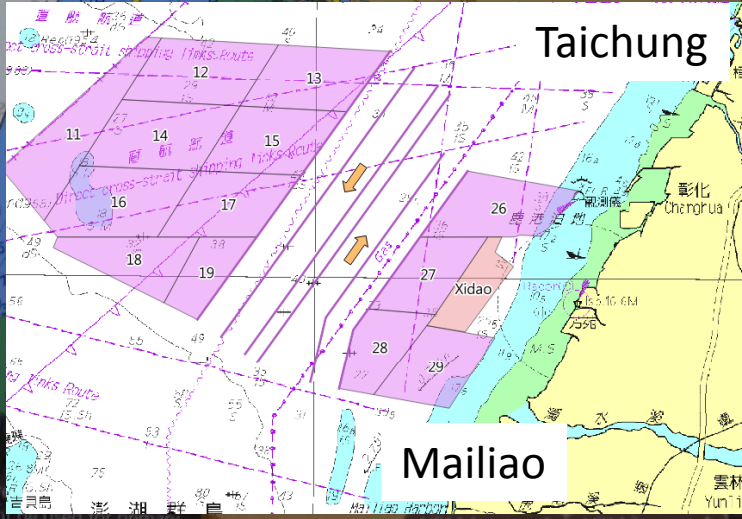
(Traffic Separation Scheme)

Unreliable Soundings

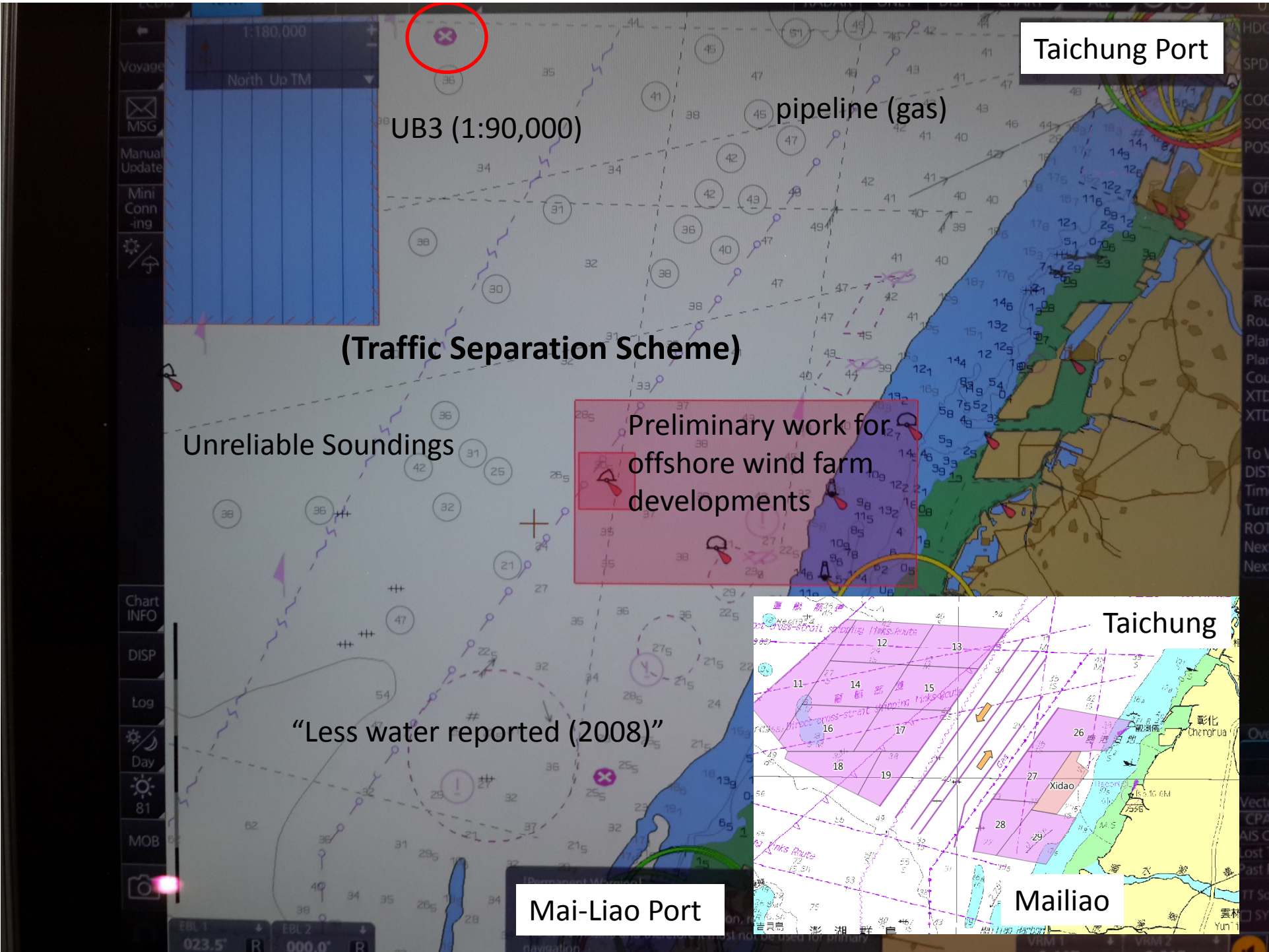
Preliminary work for offshore wind farm developments

“Less water reported (2008)”

Mai-Liao Port



Mailiao



# How do we manage the change & risk ?

- How to implement this mandatory TSS ?
- How to disseminate the MSI, NtMs, and ENC updating during the construction phase of the 14+ OWFs in this area ?
  - Safety zones, markings, submarine power cables crossing TSS
    - In WWNWS, the only way for us to send MSI is coastal radio (NAVTEX)
    - NtMs can take very long time (months) to reach mariners from local source to other chart producers, and may be interpreted wrongly.
- Need a fully functioning hydrographic service
  - To provide a better ENC coverage which is accurate, updated and easily accessible, to both SOLAS and non-SOLAS vessels, as well as the shore-side users.

# Actions to be considered by WENDWG

- Note the IALA MBS in and around this area
  - Boundary in UB2, encoding in UB3/4/5/6
- Incorporate data from this area to WEND in the way ECDIS technology is depending on to enhance navigation safety and efficiency
  - Official S-62 code, RENC distribution, ENC scheme
- Facilitate the enhancement of hydrographic service for this area
  - Cooperation and communication
  - Participation in IHO and regional activities