





# Crowd Sourced Bathymetry

Andrew Schofield





# Imperial Trans-Antarctic Expedition

## MEN WANTED

for hazardous journey, small wages,  
bitter cold, long months of complete  
darkness, constant danger, safe re-  
turn doubtful, honor and recognition  
in case of success.

Ernest Shackleton 4 Burlington st.

MEN—Neat-appearing young men of  
pleasing personality

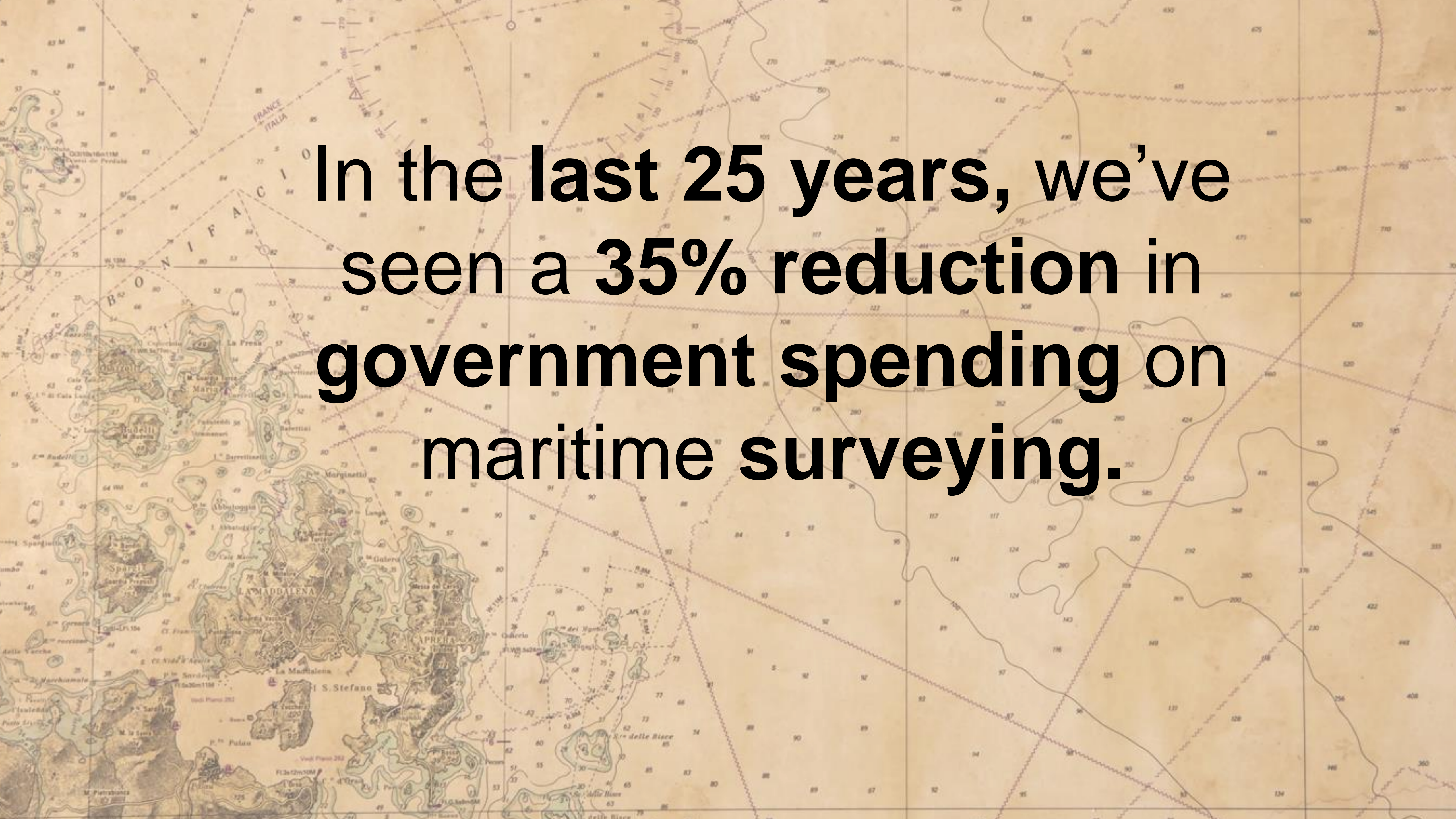




## Missing data from 0 to 200 meters

Southwest Pacific	> 95%
Polar regions	> 95%
West Africa	> 80%
Caribbean	> 80%
Australia	~ 65%
Greece	65%
United States of America	~ 40%
United Kingdom	30%
France	19%





**In the last 25 years, we've  
seen a 35% reduction in  
government spending on  
maritime surveying.**



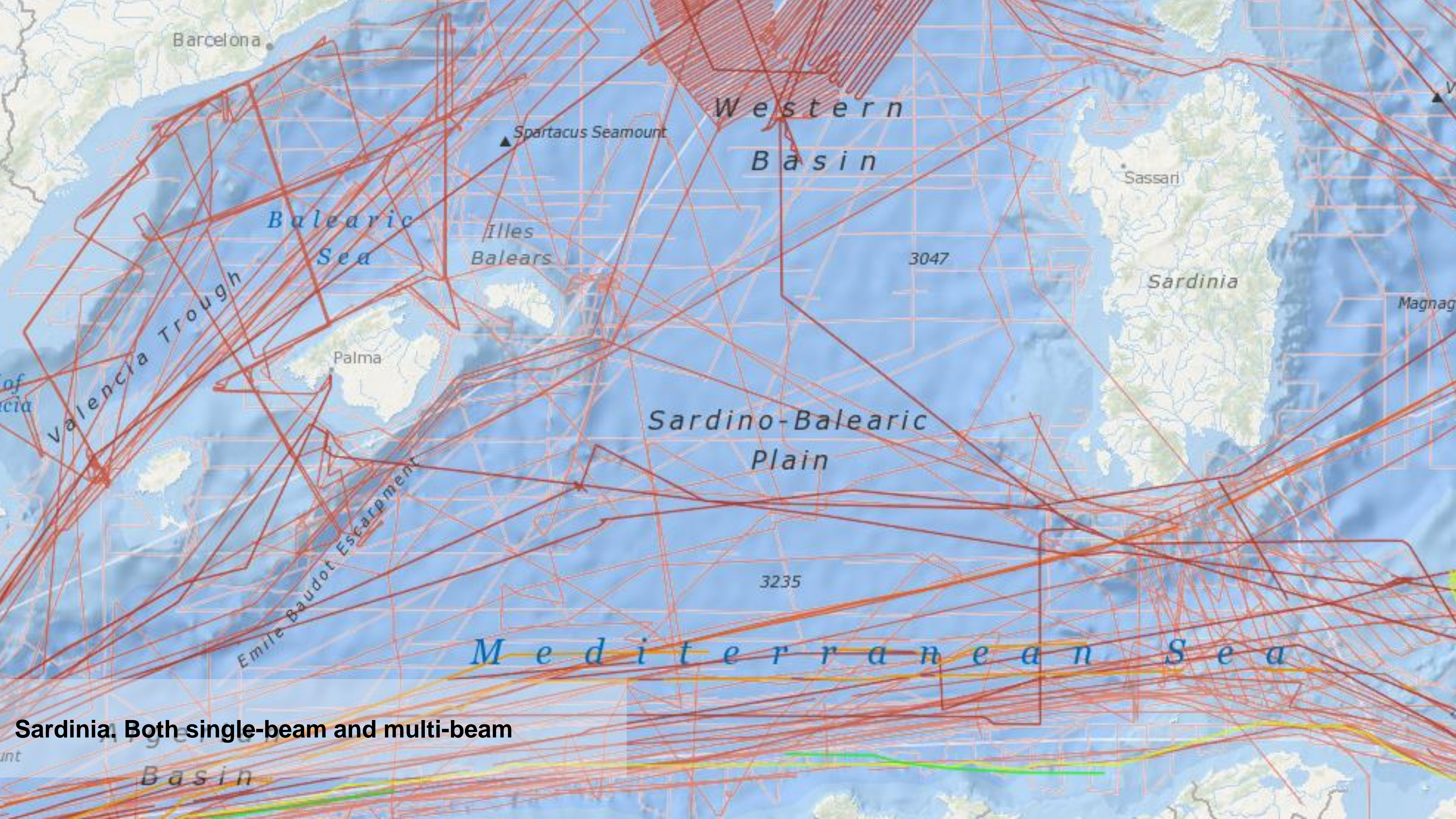


# **Captain Cook leadline soundings!**



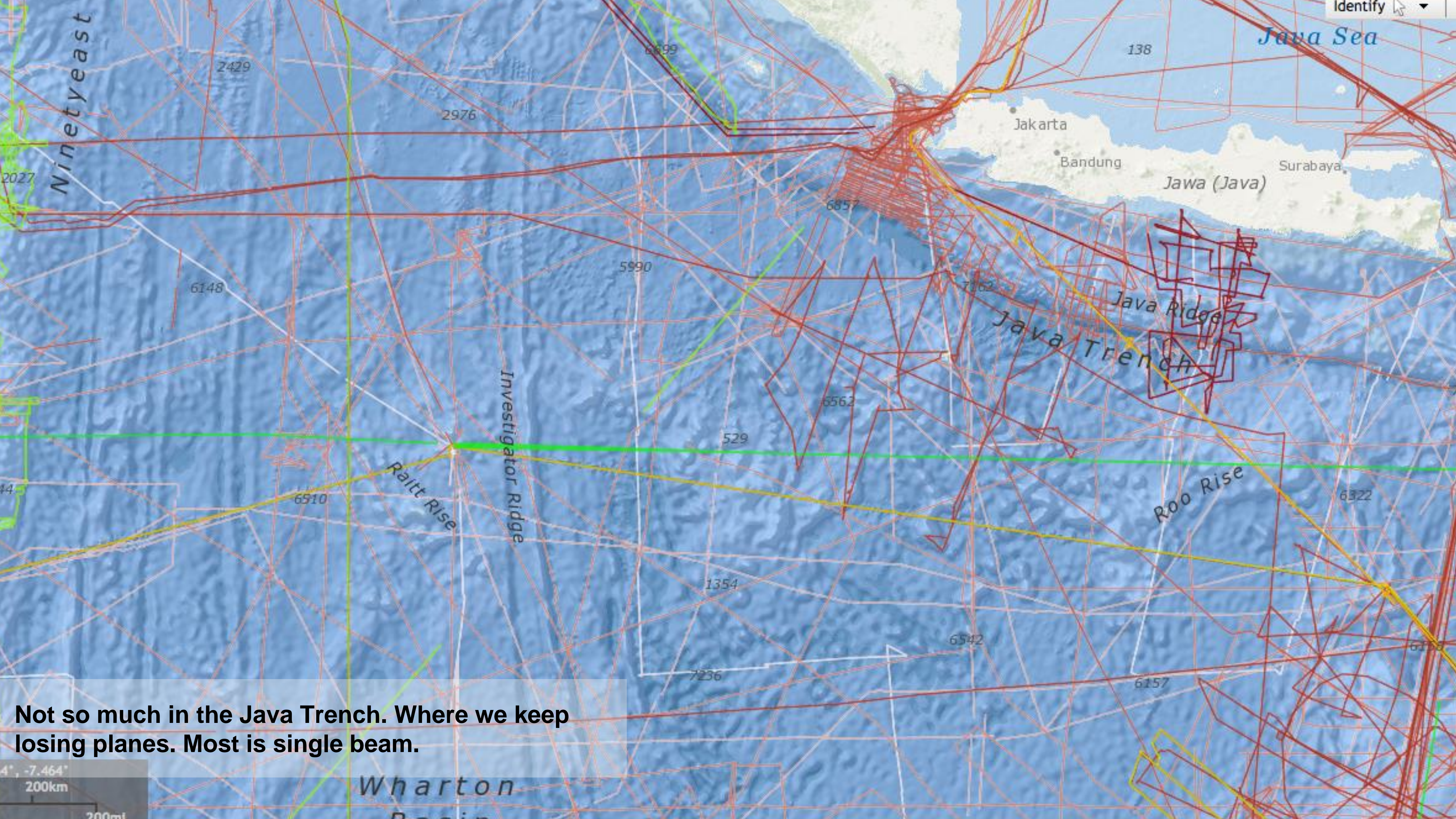






Sardinia. Both single-beam and multi-beam





Identify

Java Sea

138

Jakarta

Bandung

Surabaya

Jawa (Java)

Java Ridge

Java Trench

Roo Rise

Investigator Ridge

Raitt Rise

Wharton

Basin

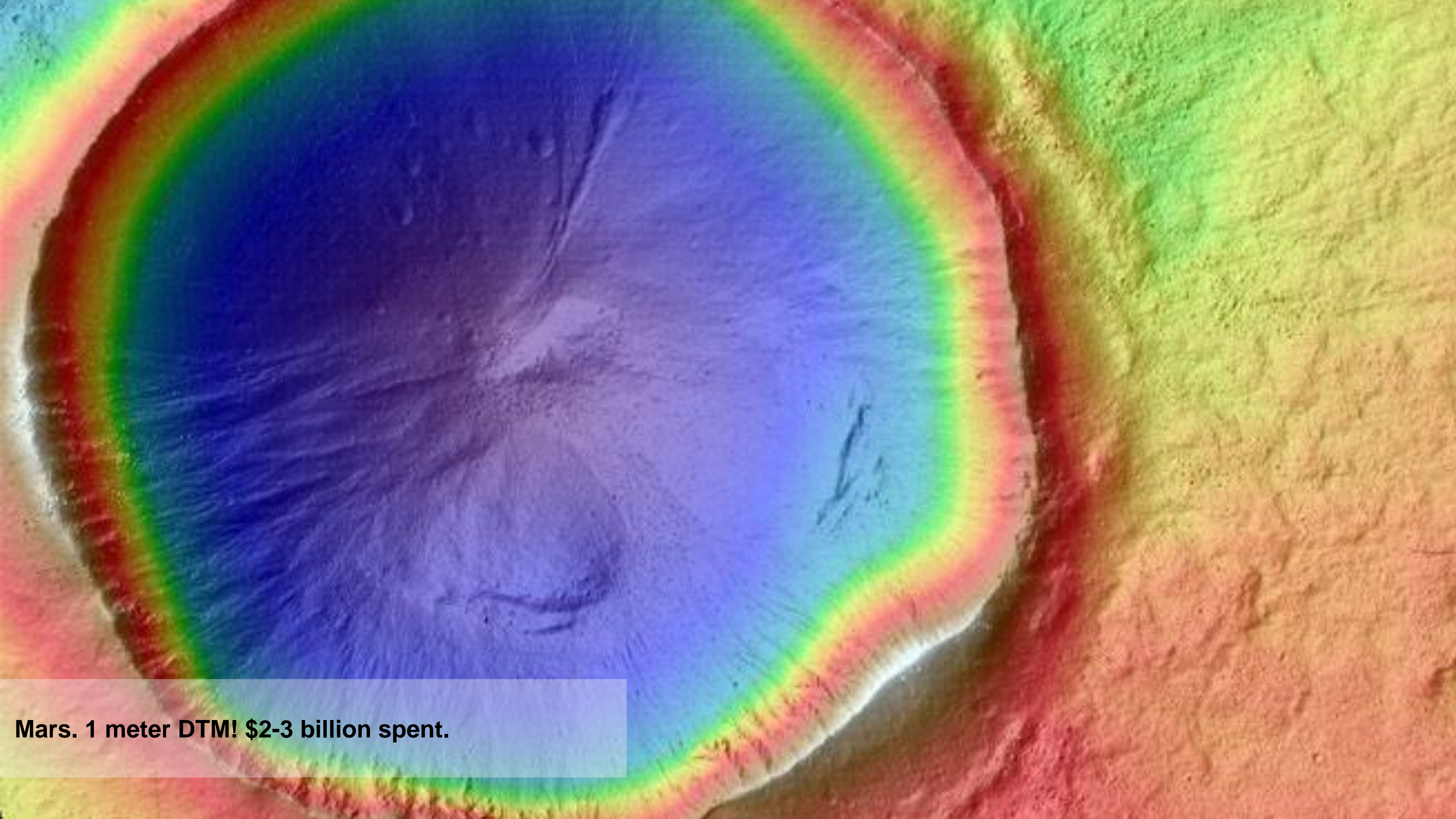
Not so much in the Java Trench. Where we keep losing planes. Most is single beam.

4°, -7.464°  
200km  
200mi



**“We have better maps of  
the Moon and Mars than  
of the ocean.”**





**Mars. 1 meter DTM! \$2-3 billion spent.**



**Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call.**

Jeff Howe, Wired, 2005



**But surely what we've got  
is good enough, right?**





**Grounding of VESTAS WIND during the 2014 Volvo Ocean Race (2014-11-29).**







**So what can Crowd  
Sourcing deliver?**





Sea ID

RoHS  
CE FC  
Q.COK B210400



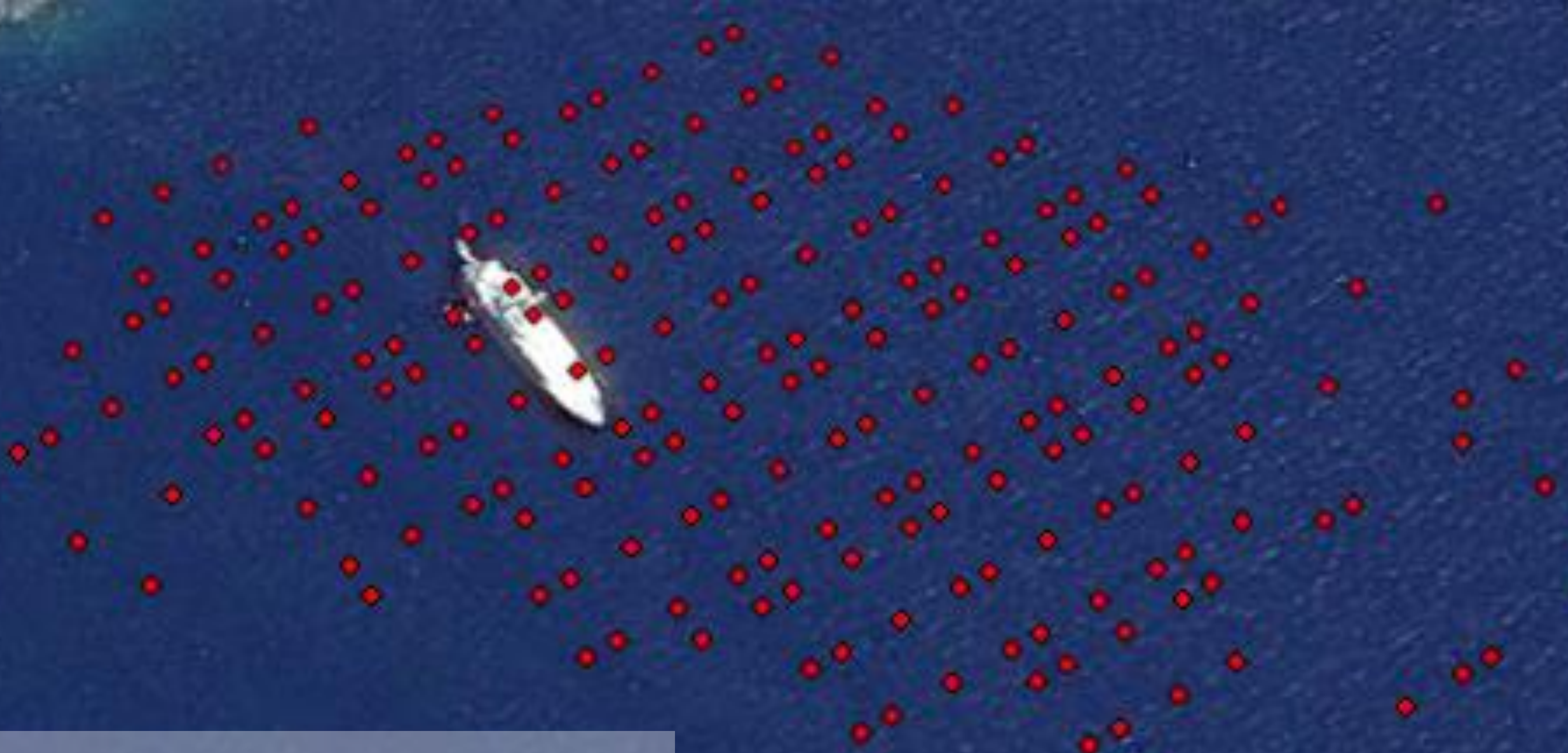
\$SDDBT,	25.9,f,	7.88,M,	4.3,F
\$SDDBT,	25.9,f,	7.88,M,	4.3,F
\$SDDBT,	26.1,f,	7.96,M,	4.4,F
\$SDDBT,	25.9,f,	7.88,M,	4.3,F
\$SDDBT,	26.0,f,	7.92,M,	4.3,F
\$SDDBT,	26.1,f,	7.96,M,	4.4,F
\$SDDBT,	26.0,f,	7.92,M,	4.3,F
\$SDDBT,	26.2,f,	8.00,M,	4.4,F
\$SDDBT,	26.1,f,	7.96,M,	4.4,F
\$SDDBT,	26.0,f,	7.92,M,	4.3,F
\$SDDBT,	25.9,f,	7.88,M,	4.3,F
\$SDDBT,	25.8,f,	7.85,M,	4.3,F
\$SDDBT,	25.6,f,	7.81,M,	4.3,F
\$SDDBT,	25.6,f,	7.81,M,	4.3,F
\$SDDBT,	25.8,f,	7.85,M,	4.3,F
\$SDDBT,	26.0,f,	7.92,M,	4.3,F
\$SDDBT,	26.0,f,	7.92,M,	4.3,F
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\$SDDBT,	26.1,f,	7.96,M,	4.4,F
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\$SDDBT,	26.1,f,	7.96,M,	4.4,F
\$SDDBT,	26.1,f,	7.96,M,	4.4,F
\$SDDBT,	26.2,f,	8.00,M,	4.4,F





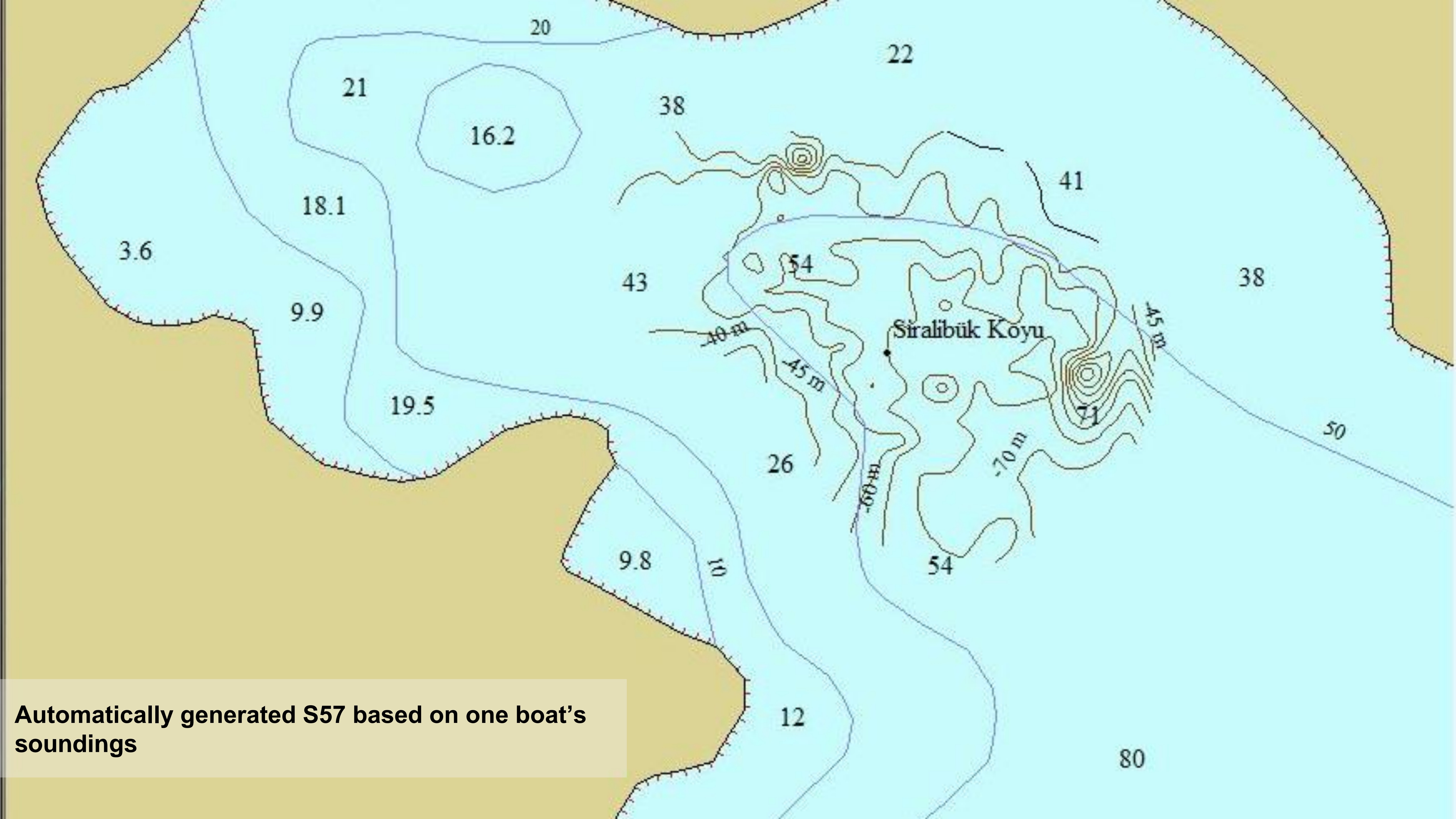
Example of collected data  
Tomb Bay, Turkey





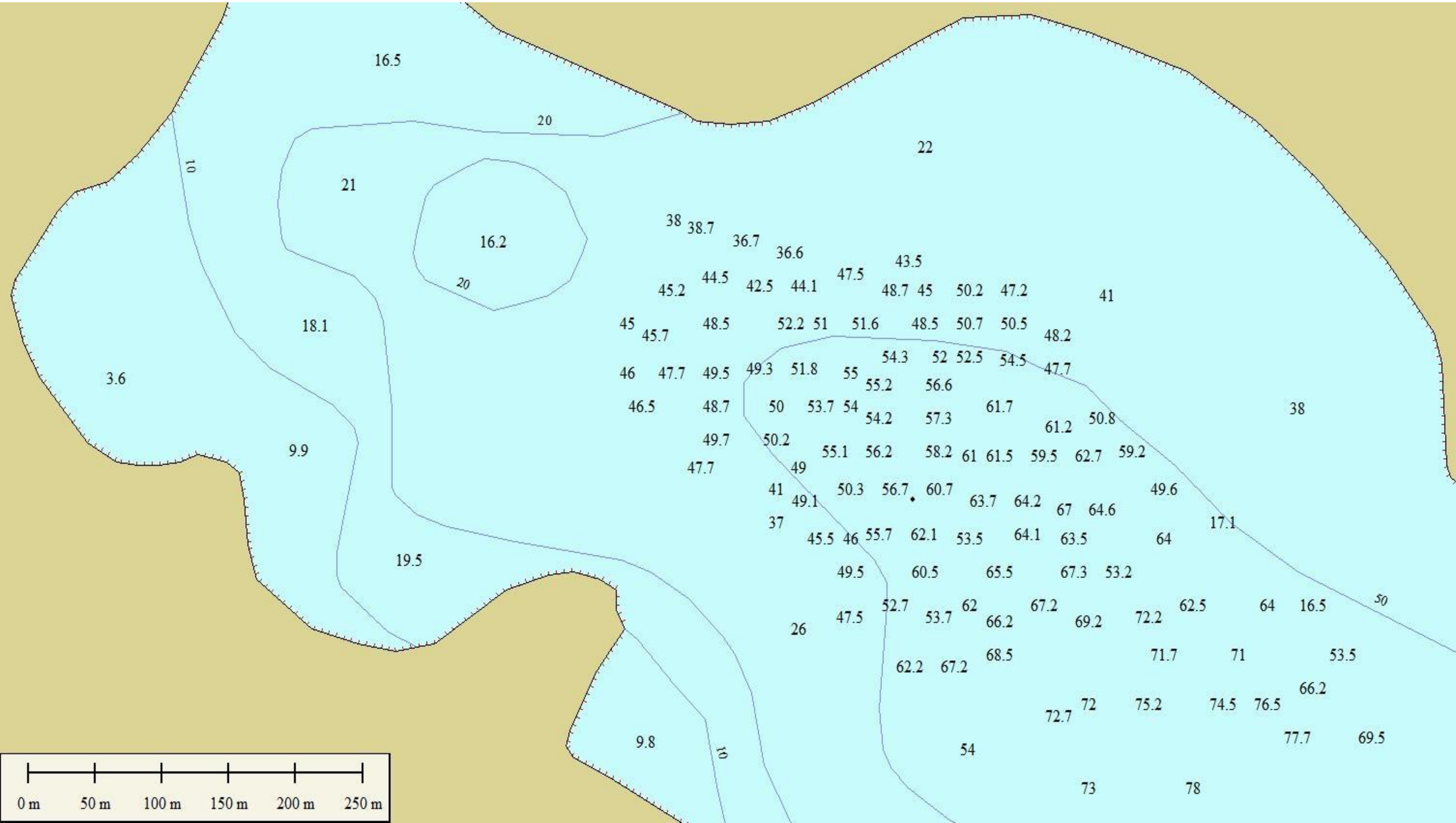
When scaled, and after curation, this is what we can accomplish



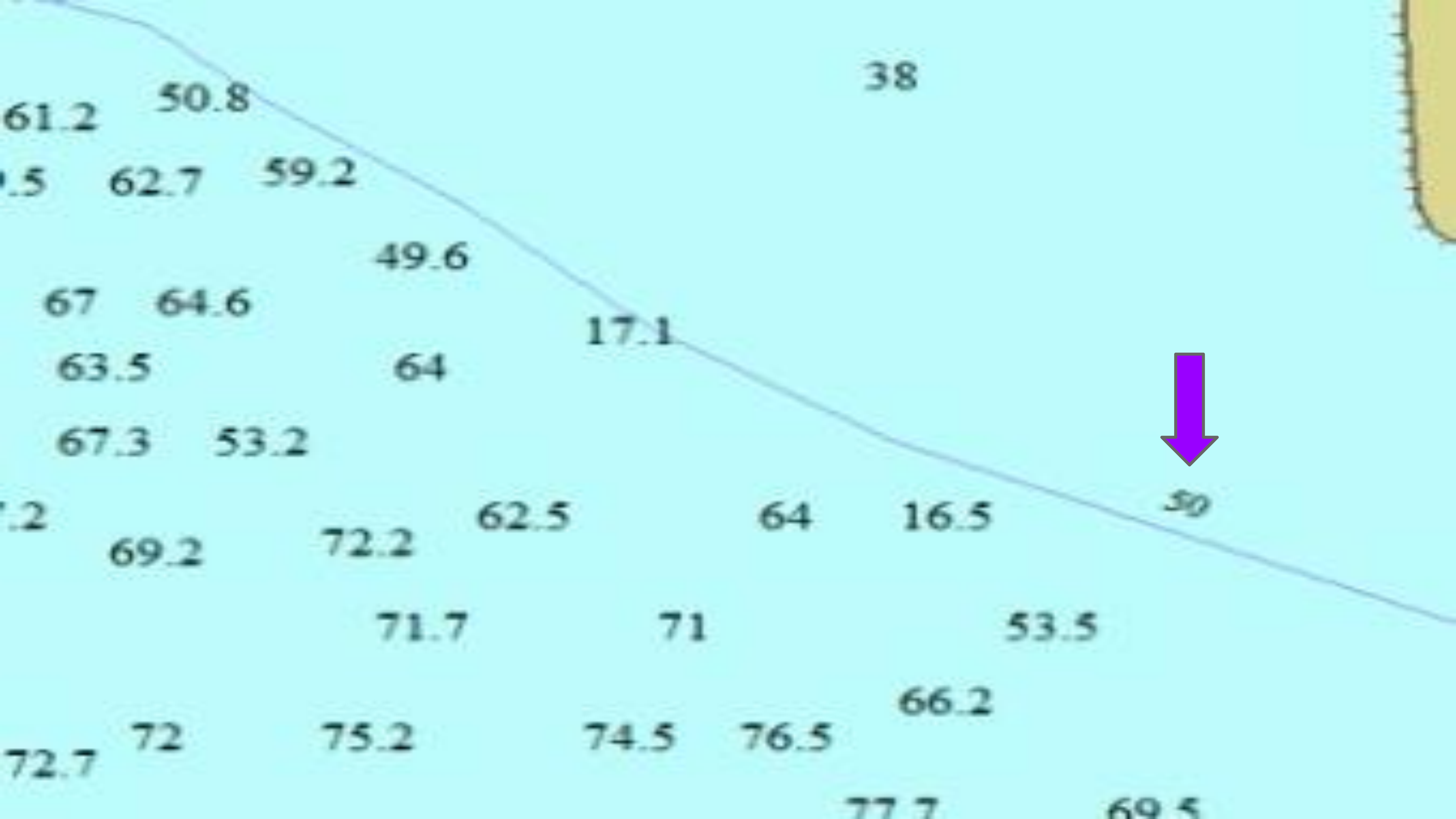


Automatically generated S57 based on one boat's soundings

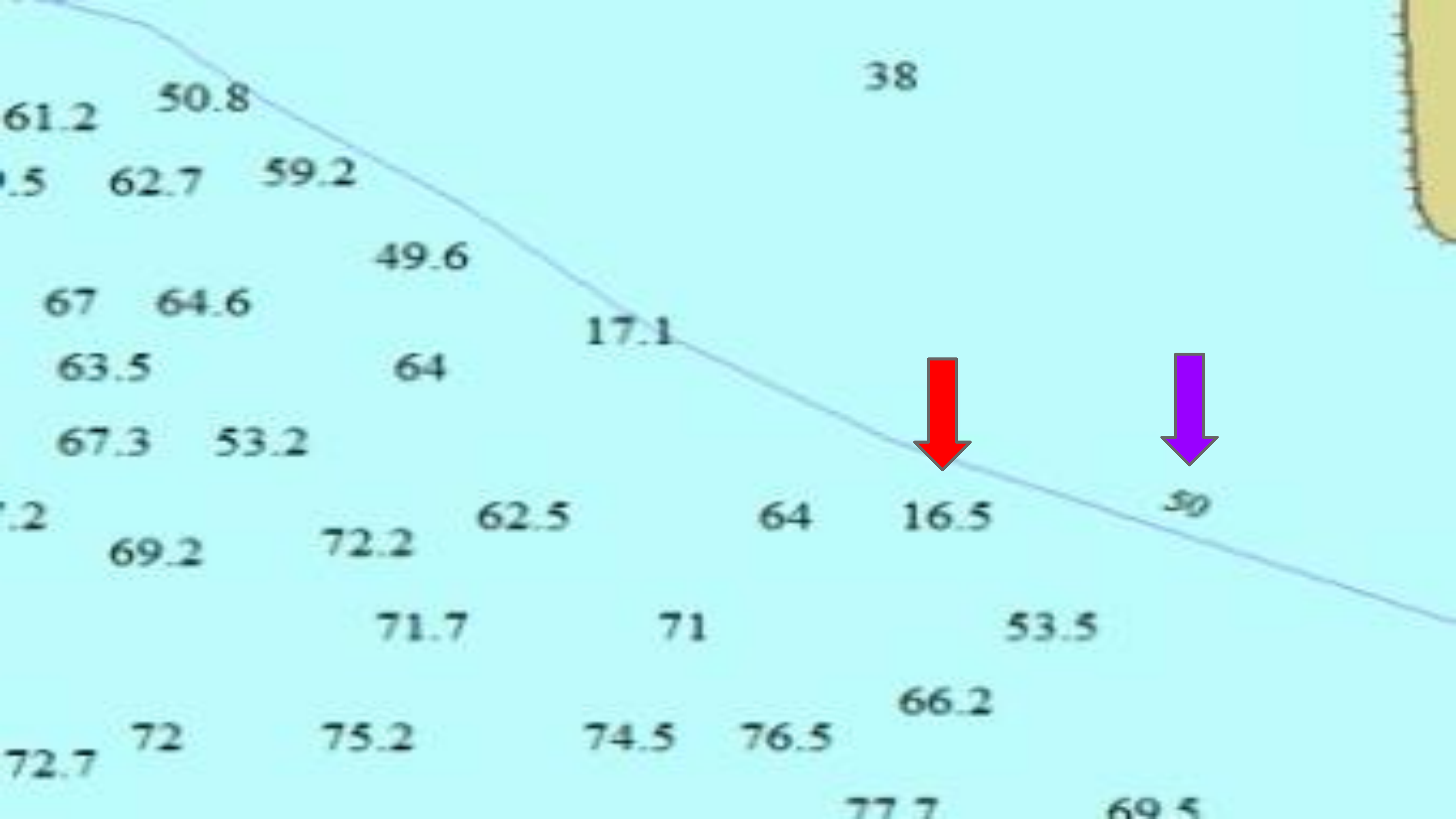




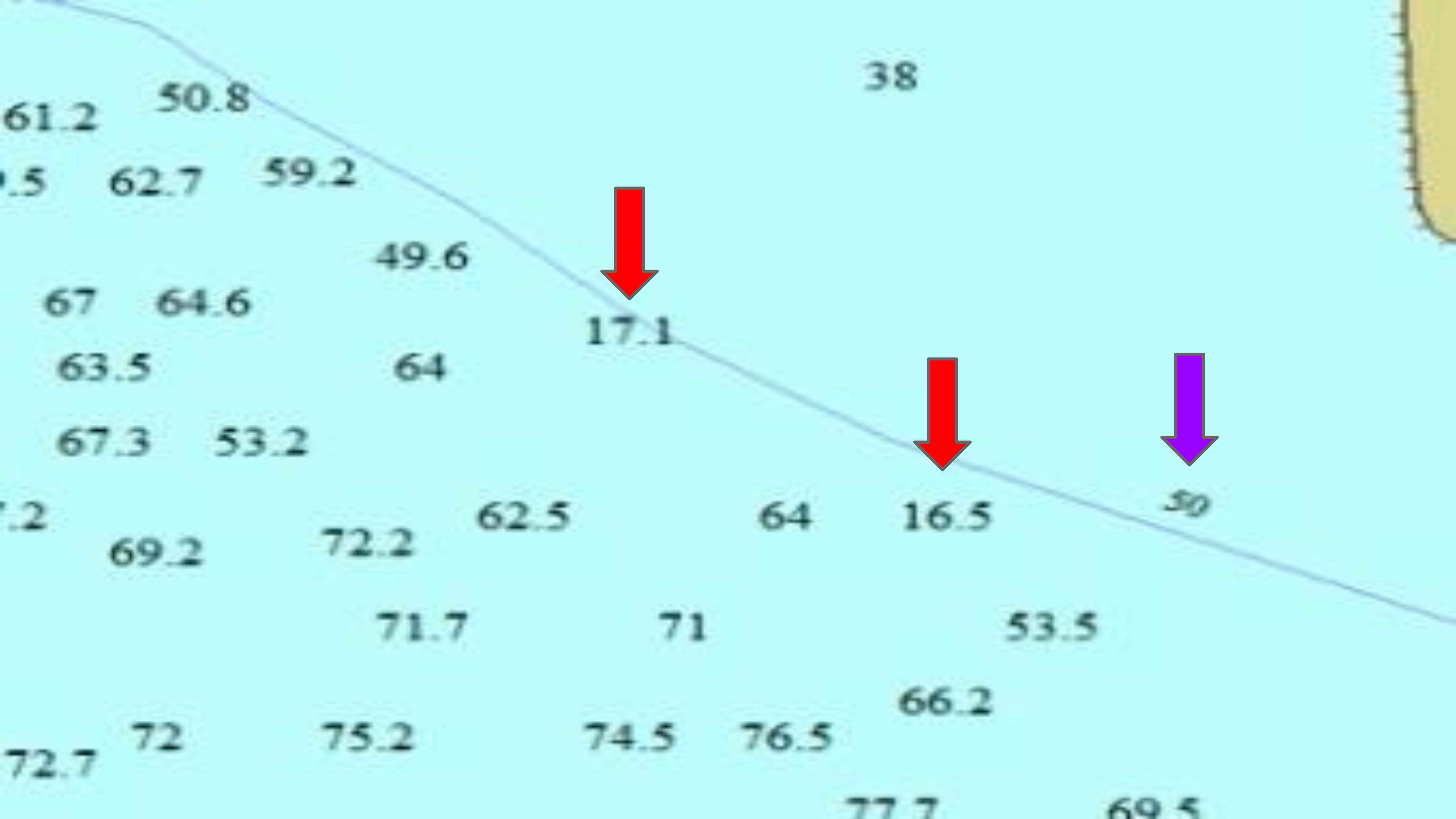




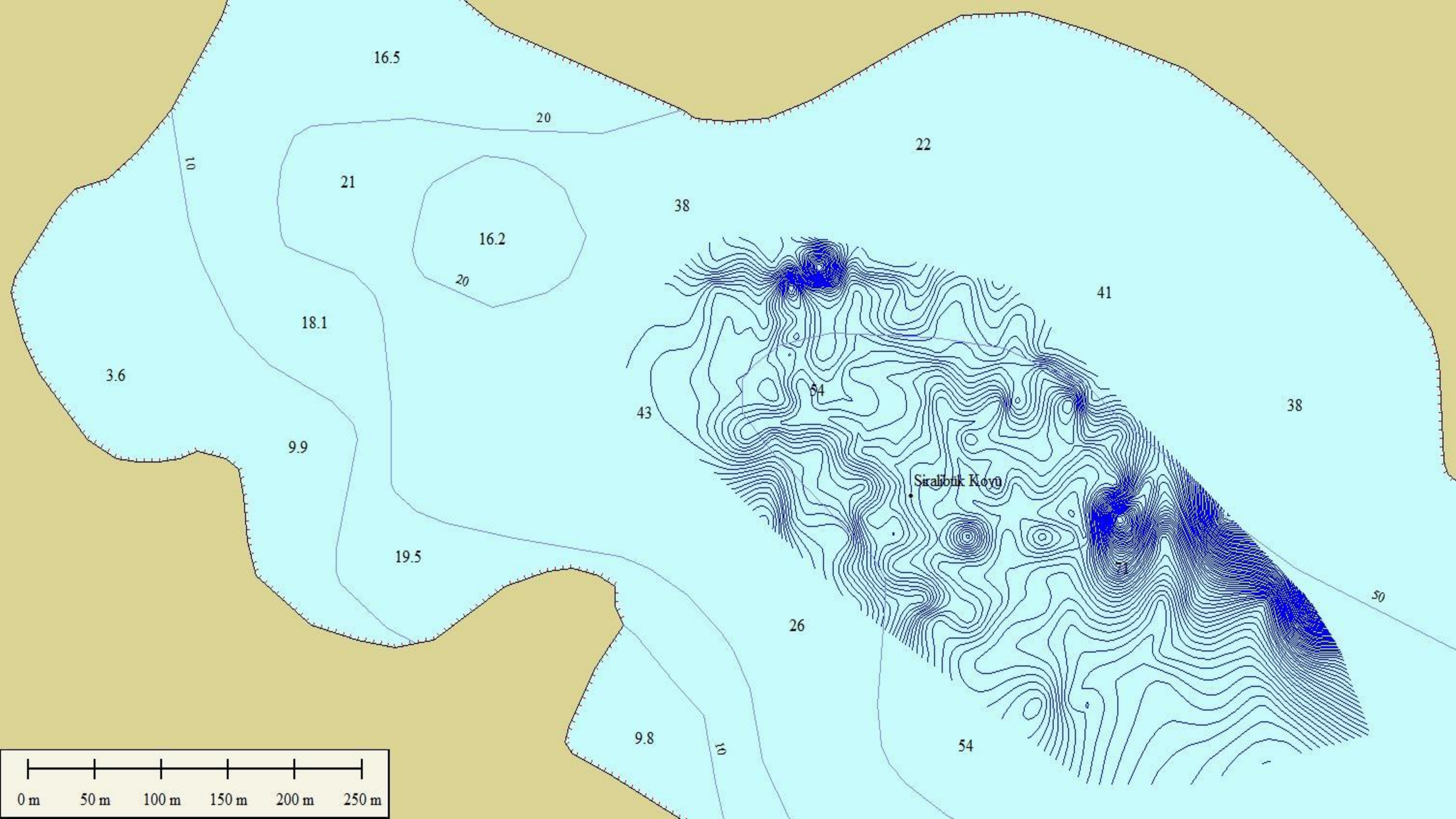














**6 Yachts**

**34 million soundings**

**26000 nautical miles traveled**

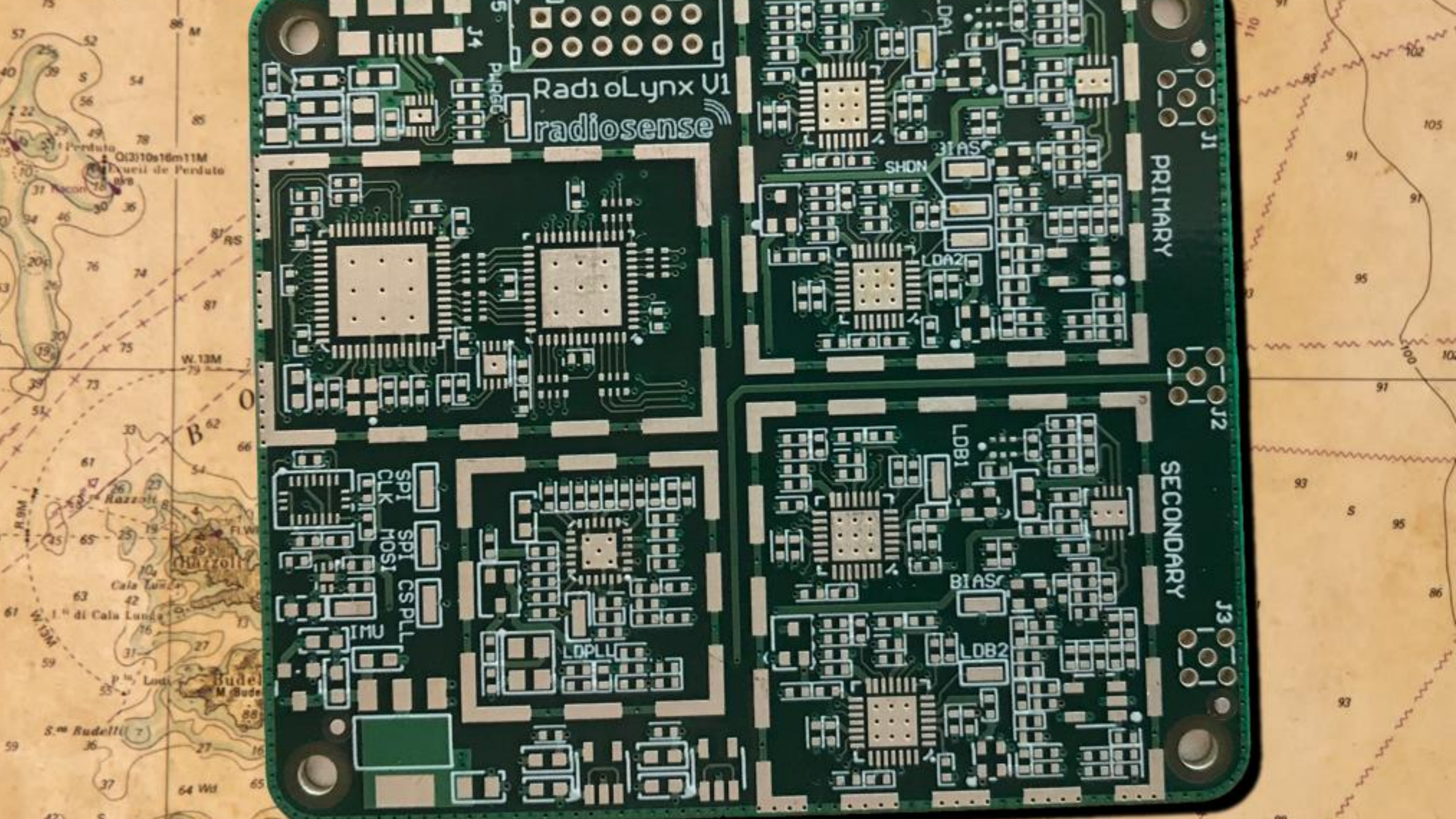


The Next Step



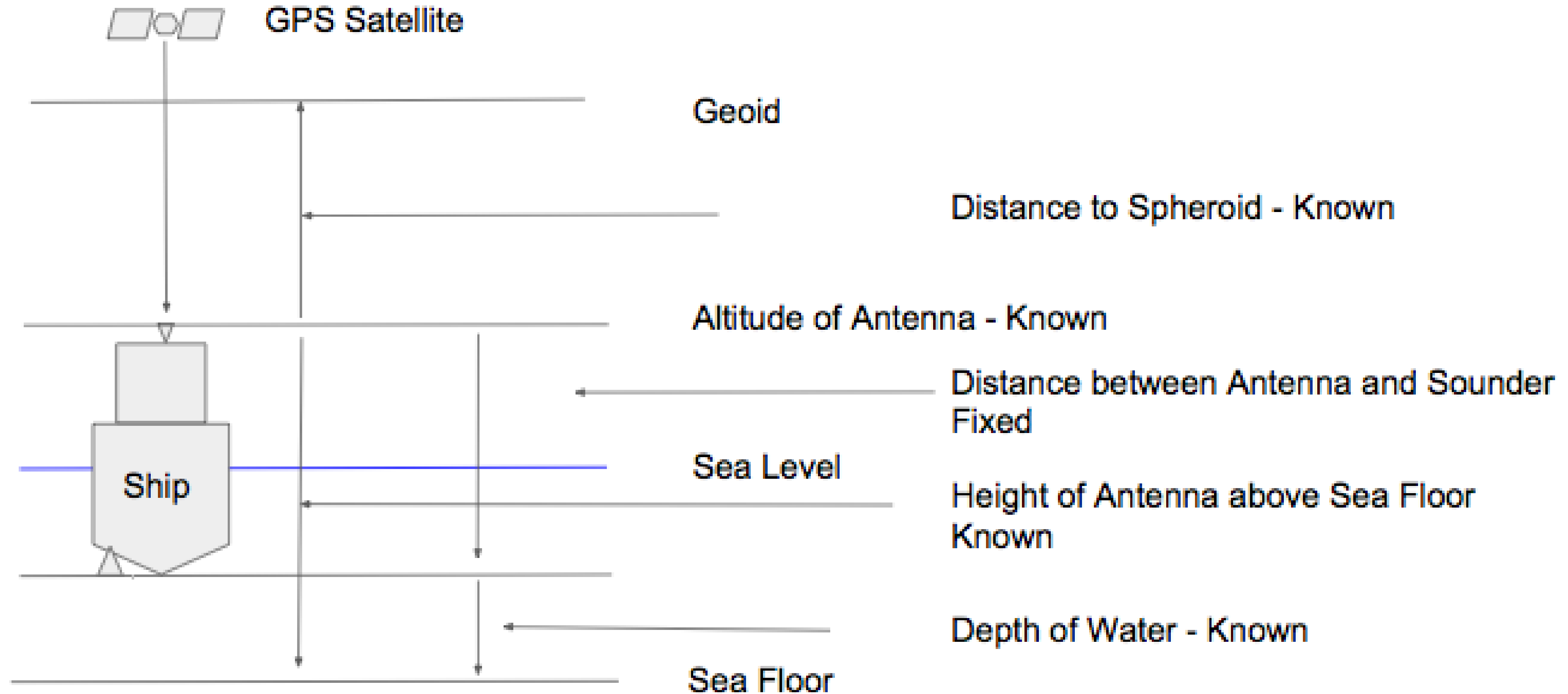
# Precise Point Positioning







# Precise Point Positioning





# Get one of these!





# Crowd Sourced Survey





# 2004 Tsunami striking East coast Sri Lanka

## Bathymetric effects of near coastal sea bed topography





**2004 Tsunami striking East coast Sri Lanka**  
**Bathymetric effects of near coastal**  
**sea bed topography**





**2004 Tsunami striking East coast Sri Lanka**  
**Bathymetric effects of near coastal**  
**sea bed topography**





Navigationa! Note

or

Illegal Survey?



# Crowd Sourced Bathymetry



**Environmental  
Ocean Resource Management  
Blue Economy  
Moral Imperative**



