



# Crowd Sourced Bathymetry

**Solve Any Problem By  
Crowd Sourcing**

**MACHC  
Antigua  
November 2012**

New and Many Eyes on the Sea



# Change Comes Fast

*If you grew up with this ...*



*... then this is a great technology*



*...and if you grew up this...*

*... then this really hot  
(NOW)*



# The New Tempo to Life

Timeliness: not weeks or days - but within *seconds*

Connectedness: *always* connected,

Content: if it isn't online it doesn't exist

Choice: multiple ways to get what you want

Depth: links to ever increasing detail

Innovative: a connected search for better ways

Unlimited Workforce: anyone can add

Wikis: shared information from fellow travelers

Trust: technology works, large institutions don't

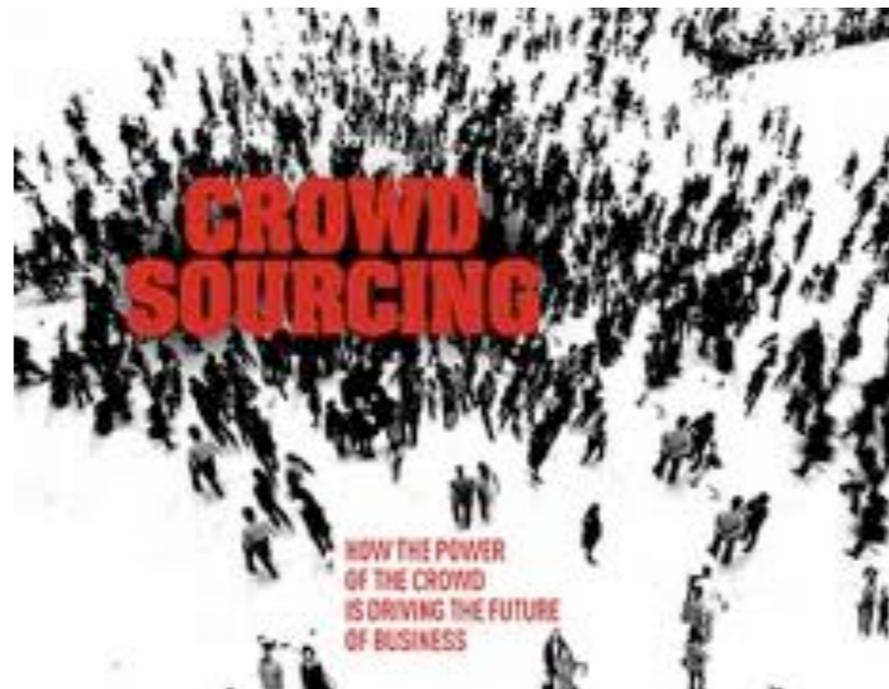
Free: as in virtually costless





# What is Crowdsourcing

- Sourcing tasks traditionally performed by specific individuals to a group of people or community (crowd) producing solutions from amateurs or volunteers working in their spare time, or from experts or small businesses which were unknown to the initiating organization.





# New and Many Eyes Every Boater Can Contribute



Responsibility



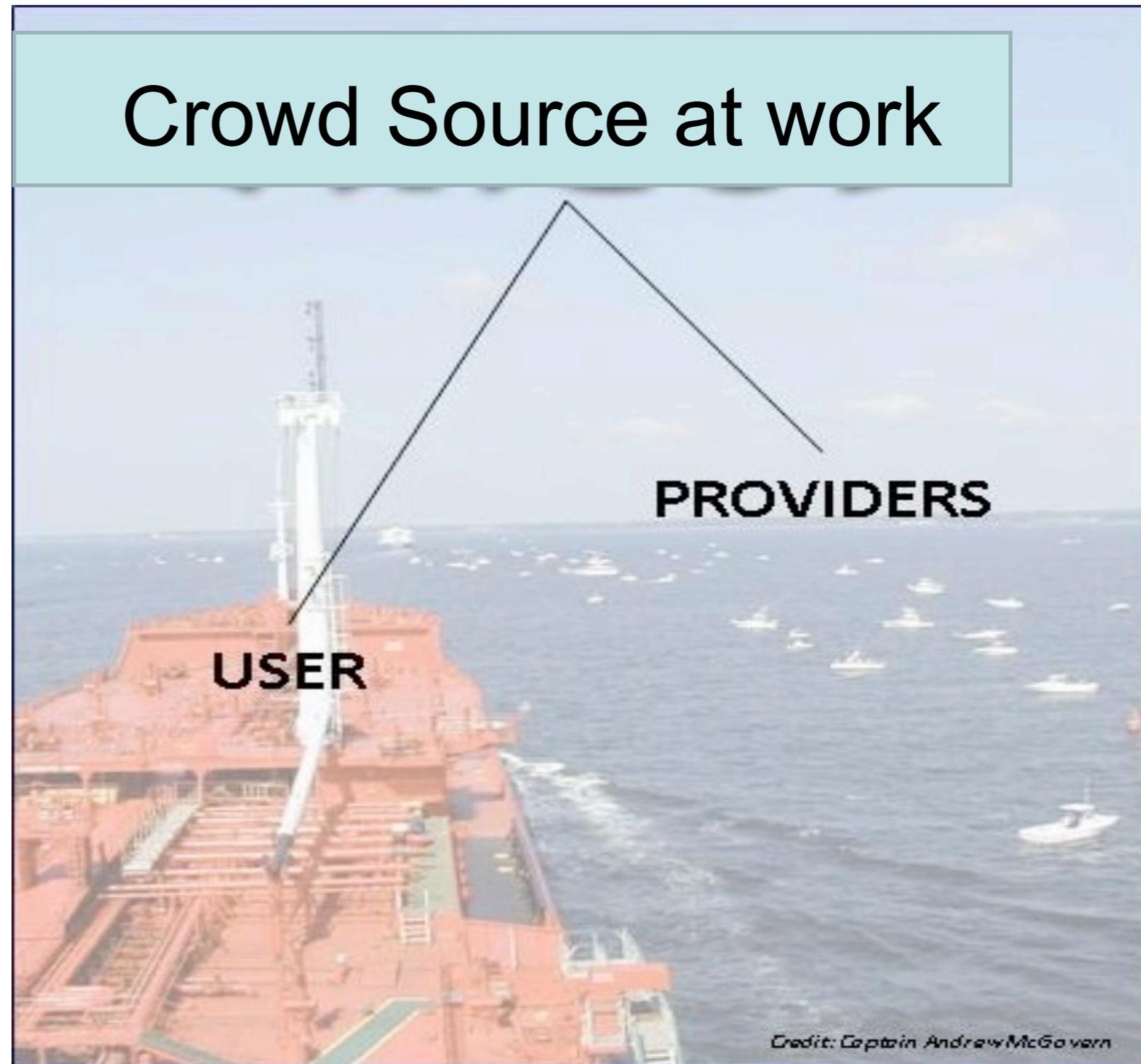
Involvement



Commitment

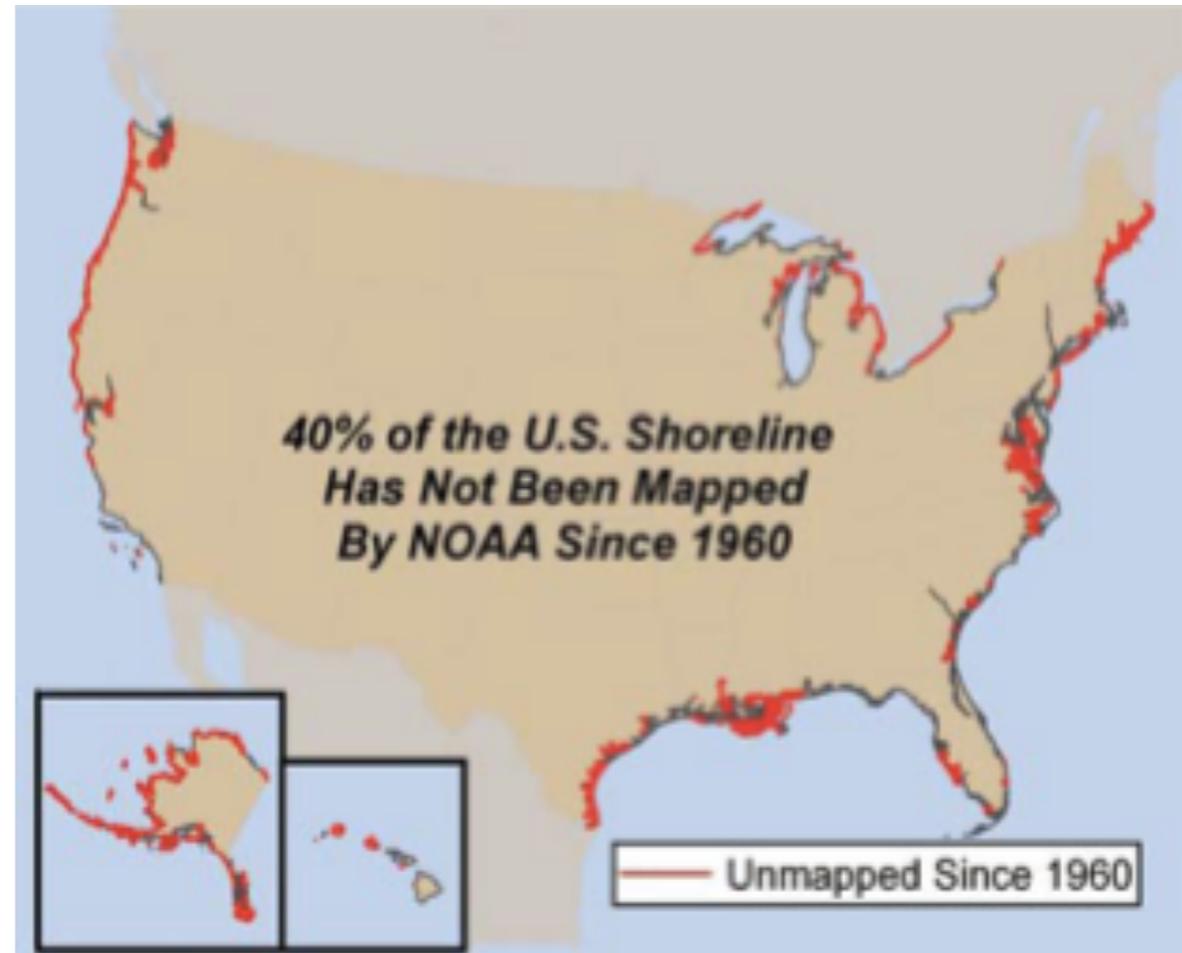
# Crowd Sourcing Oceano and Bathy Data

- Recreational Mariners help create better charts, products, and data in coastal waters by logging depth, position, SST, dissolved O<sub>2</sub>, acidification, and other data while at sea, and uploading the data to the web for processing and display.
- Coastal waters are inadequately surveyed the amount of coastal waters that are adequately surveyed is below 50%.
  - The high cost of ship surveying - about \$30,000 per square mile



# Why Crowd Sourced Bathymetry

- U.S. coastal waters have never been completely surveyed, and for the areas that have been surveyed, approximately **50% of the sounding data is pre-1940**,
- **It is expected to take NOAA 166 years to survey the 500,000 square nautical miles (SNM) of navigationally significant waters** (taken from NOAA HSRP Report 2007).



Obvious need for supplemental charting using a cost-effective approach

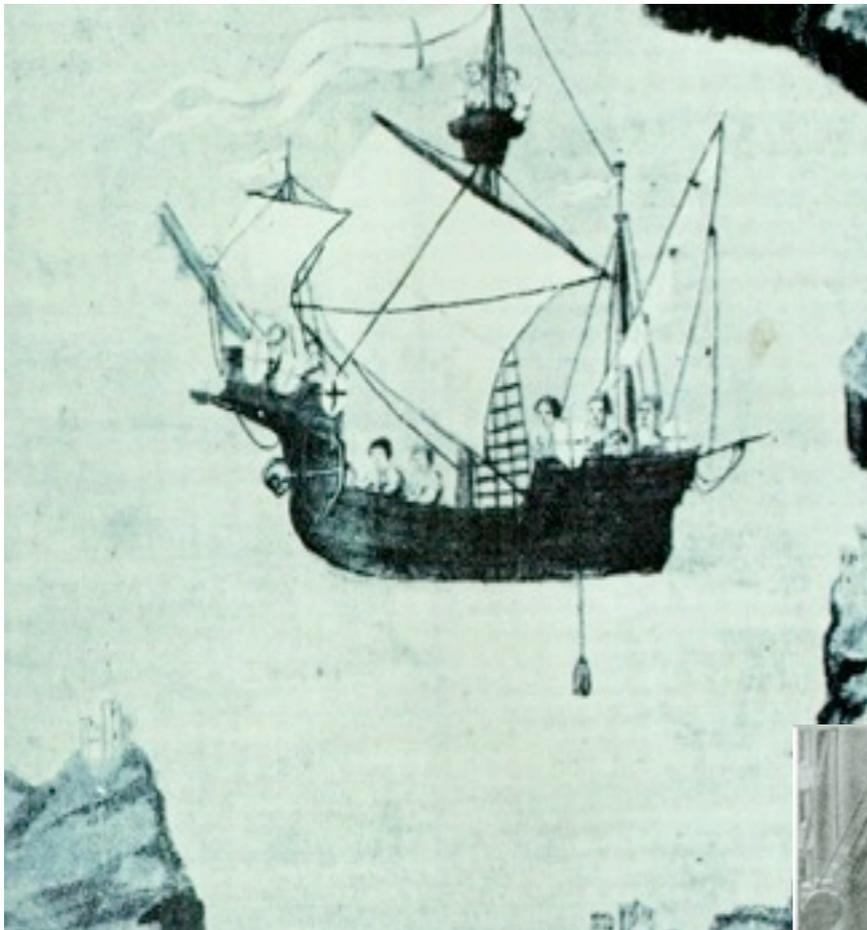


Dater Qwality?

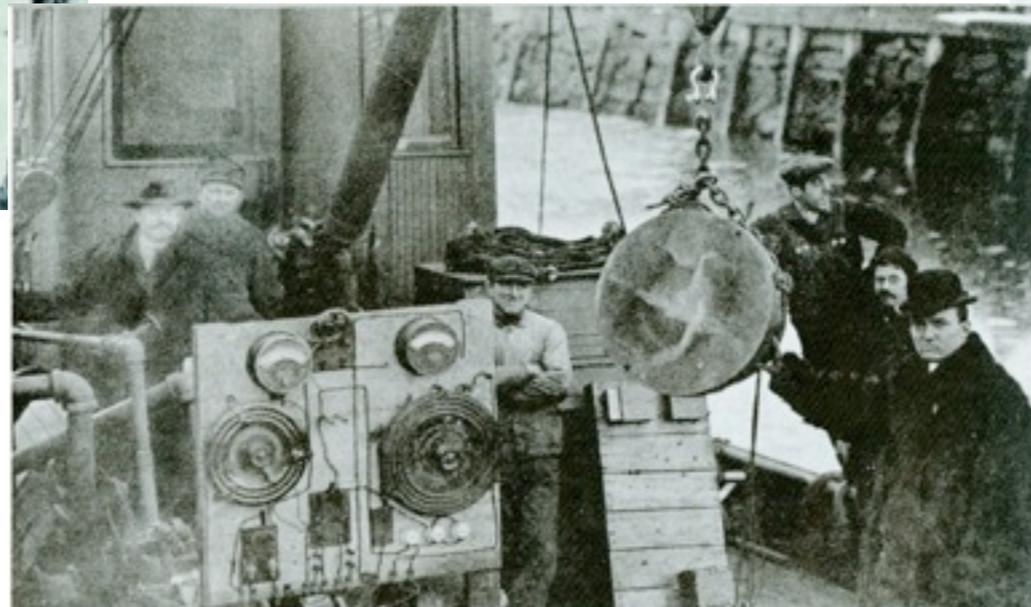
Whassat?



# Its OK to Challenge the Current Charts and Products



Current official charts have soundings from all these sources



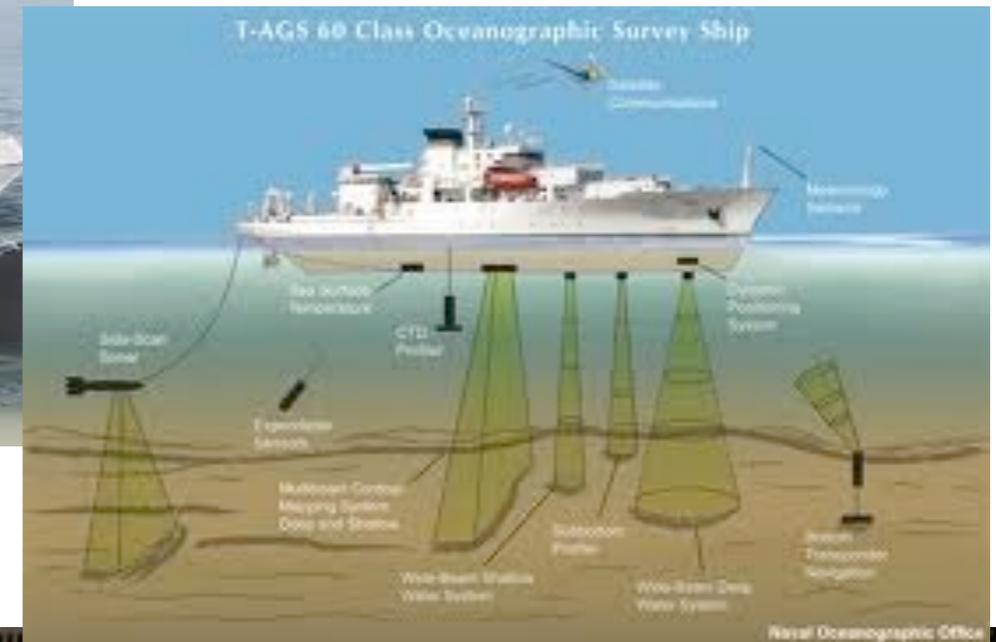
Robert Williams in the North Atlantic with the first Fessenden oscillator on the tug Susie D, 1914. They were looking for icebergs, but they also found the ocean bottom.

# CARIS 2012

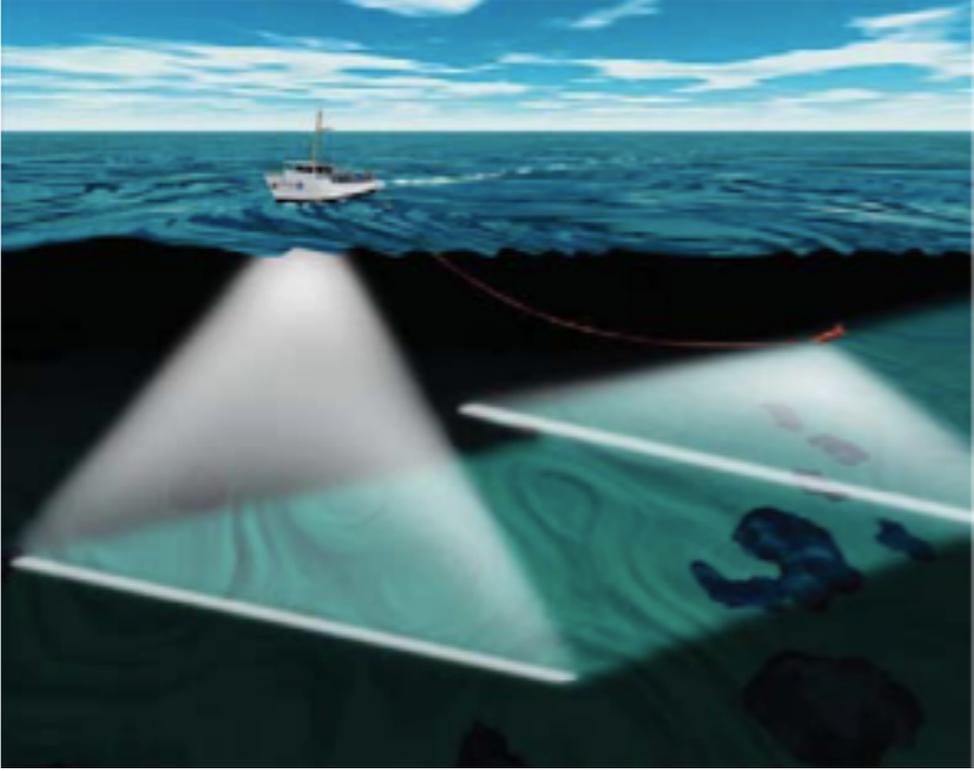
Exploration and Discovery



# So what's wrong with GPS and acoustics



# Plate of Spaghetti or Legitimate Data Collection



# Crowd Source Bathymetry Delaware River 2004



265,000 gallons of oil into the Delaware River

115 miles of shoreline affected

The Athos I collided with three **uncharted and undetected** submerged obstructions in the channel and anchorage.

The Athos I incident alone has cost the ship owner and his insurer over \$165 million.

The true value of wildlife lost and port commerce delayed or deferred cannot be calculated.





# Crowd Sourced Bathymetry



How many vessels passed over these before the Athos I did?



What one vessel passes over, without knowing, or caring for that matter, will potentially be of significance to any vessel with a deeper draft.



## CARIS/SURVICE/UKHO/IAATO MoU

- 2011 CARIS, SURVICE, UKHO, IAATO, and NG Explorer Sign MoU for CS in Antarctica
- 2012 Trial expanded under MoU to 5 ARGUS installations

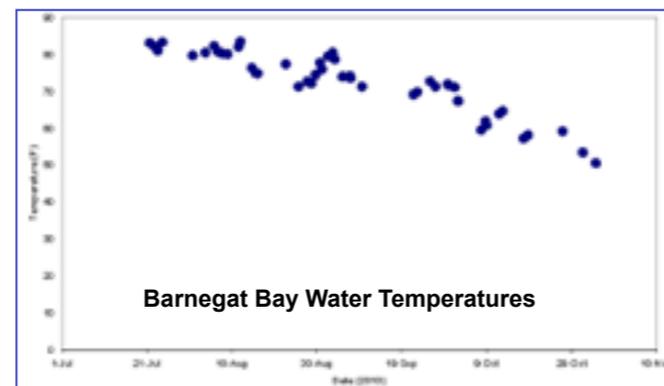
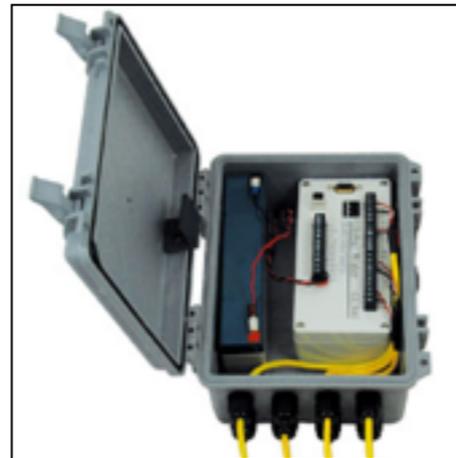


“I am delighted to report that the agreement is exceptionally good and most encouraging! There are very few instances of "spikes" and most of these are along the northern Antarctic Peninsula, which could be put down to ice interference ( eg. the data showed 11.1m in a surveyed depth of 600)” UKHO Cartographer, APRIL 2012



## Optional Weather & Environmental Monitoring

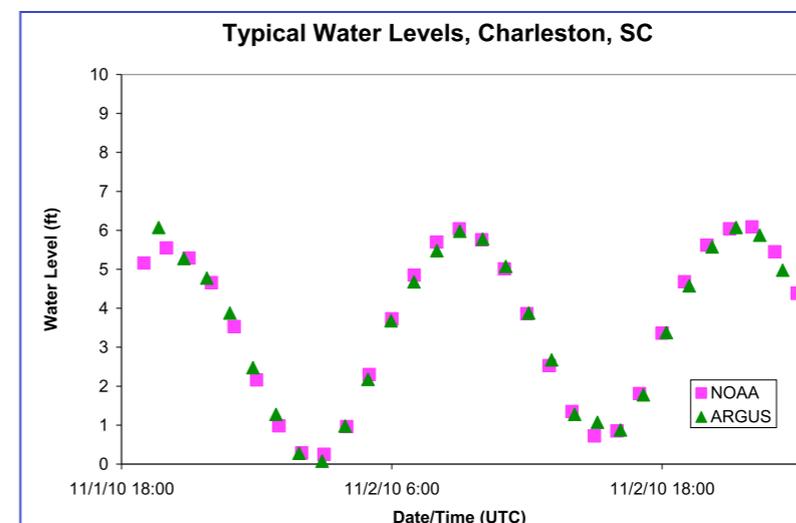
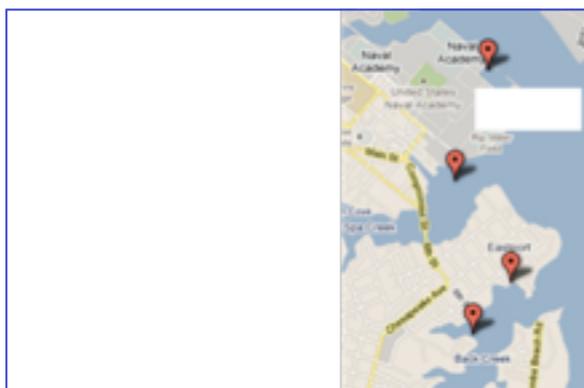
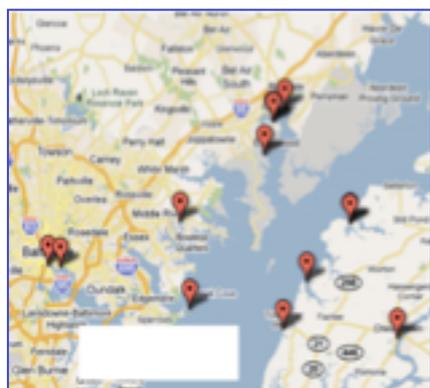
- Weather Data
  - True and apparent wind speed and direction
  - Barometric pressure
  - Relative humidity
  - Air and wind chill temperatures
- Water Quality
  - Water temperature
  - pH
  - Conductivity
  - Dissolved oxygen
  - Other possible metrics include: turbidity, oxidation-reduction potential (ORP)
- Pollution/oil spill applications





## Representative Tide Data

- Over 50% of soundings are from stationary vessels
- “Float” data not only provides depth measurements, but also contributes to tide corrections
- Float data snippets range from minutes to consecutive days, weeks

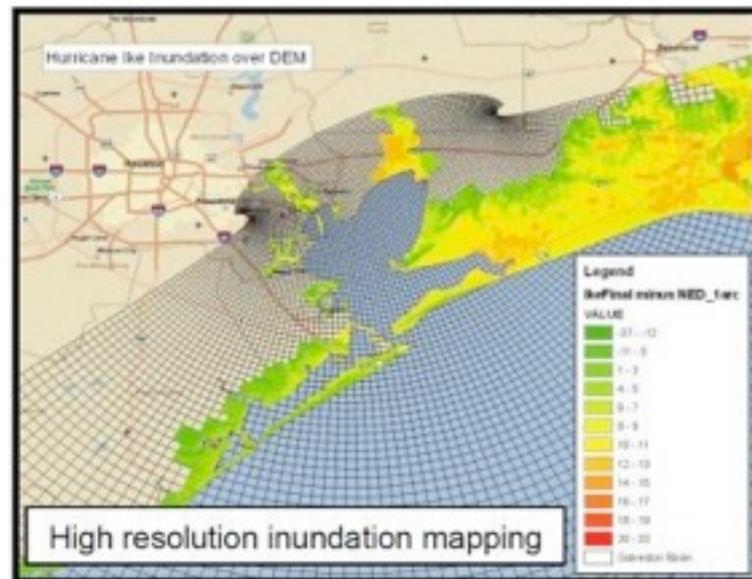


**Potential to extend and enhance NOAA's current fixed-tide-station network**

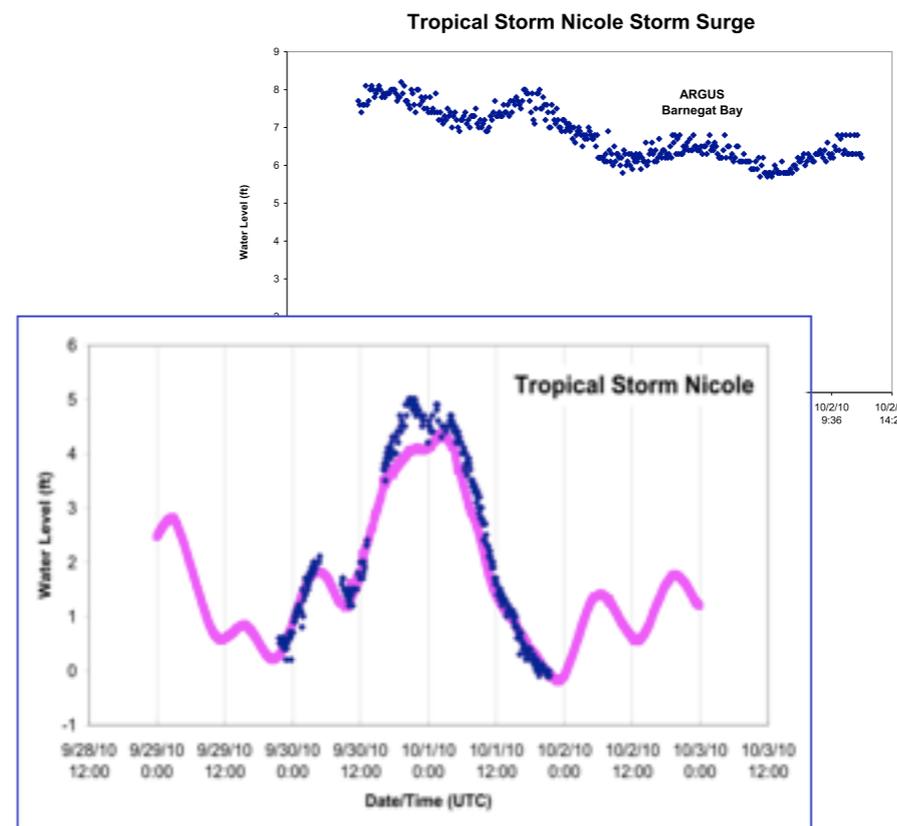


## Hi-Res Storm Surge Data for Modeling & Visualization

- Application: Obtain highly localized (space, time), very-fine-scale storm surge and met data – before, during, and after tropical storms
- Utility: *Selectable*-location data for cell-by-cell NOAA model validation



Source: NOAA Storm Surge Roadmap (21 JUL 2010)





# Yes We All Can

Pressure for change

Use Social Networking technology

Support technologies that give tools to the crowd

Encourage standards to keep specific layers open for direct user input

Free up as much supporting data as possible

Fast lane new information directly to mariners tagged with quality level ratings

Incorporate photo realism and 3D models

Encourage and respond to user ratings

Begin to employ crowdsourcing, initially on non- regulated publications



# Benefits

New Data

Chart Quality

Recon

Ground Truth

Human Geography

Faster/Cheaper and more fit to purpose

Persistent Cartography

**New Engagement**

Unlimited Workforce

Non Traditional Users

# Comments

- S10x layer that is CSB
- Not deconstruction or circumvention of charting institutions and empires
- CSB Complements traditional data collection and sources - does not compete.
- Legitimize CSB sooner rather than later

- **Hydro International** Oct 2012



- **GIM** August 2012





## Recommendation

- 
- IHO form WG to address Crowd Sourced Bathymetry. This is significant data that will be used whether or not it is official. Harmonizing and accepting CSB will prevent antagonism and opposition.