

Research vessels as essential tools for ocean exploration and data acquisition

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What makes a research ship special?

- HMS *Endeavour* (1769-81) and HMS *Challenger* (1872-6) vessels refitted for purpose.
- 2nd half 20th century : oceanographic research disciplines became much more demanding and specific in their requirements.
- Some needs are unique to certain disciplines, others like collecting seawater samples & CTD profiling are more universal.
- Varied disciplines are nowadays often pursued on the same research cruise.
- Consequently the design of these vessels is a complex exercise in balancing conflicting discipline-specific functions.
- It is now potentially a much more costly and complex solution to convert an existing vessel than to build a new research ship.

Current and Future Ocean Science addresses major societal relevant issues

Pollution control

Declining fish stocks and development aquaculture

Climate change and the role oceans play in it

Ecosystem health and sustainability

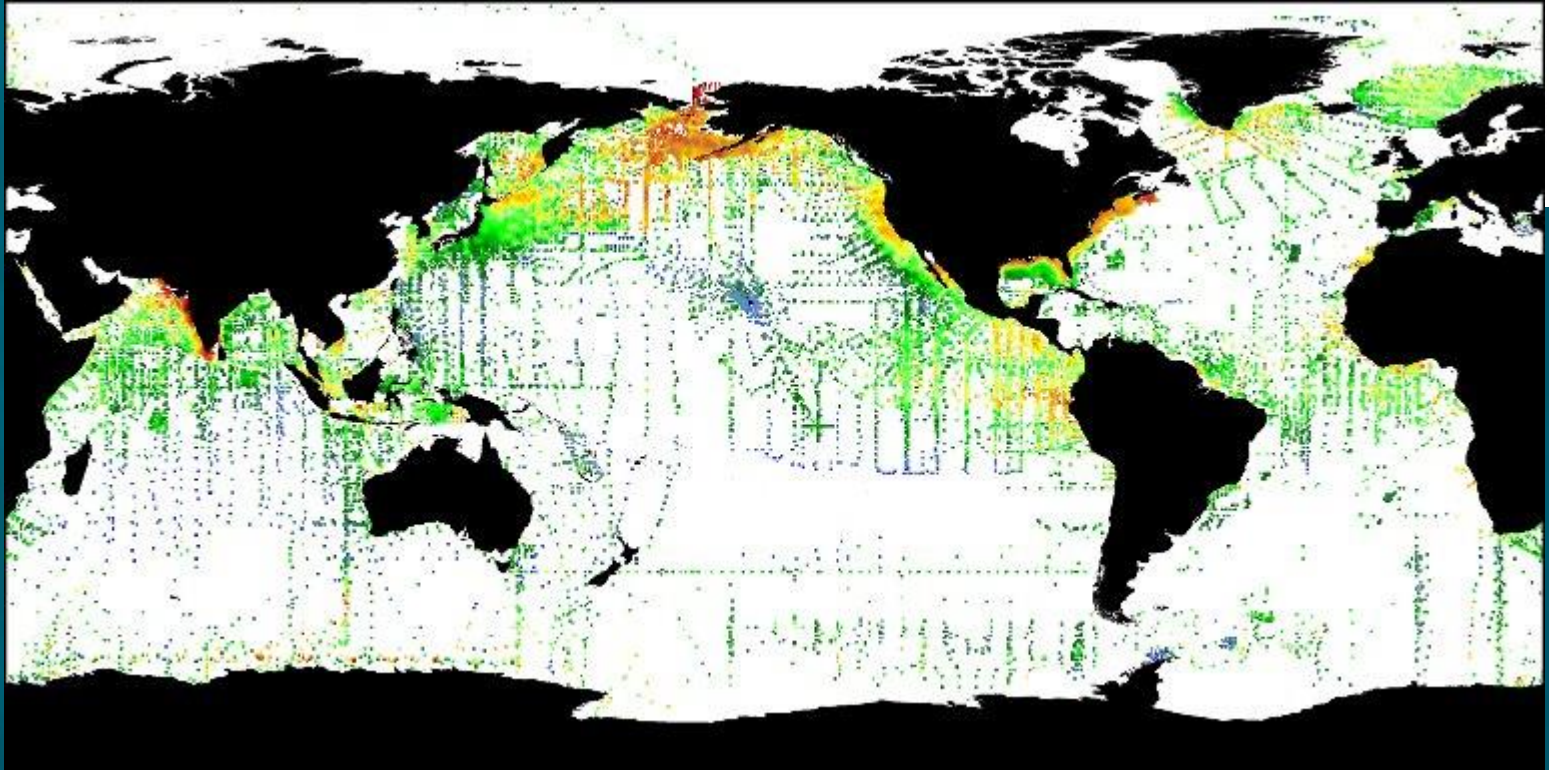
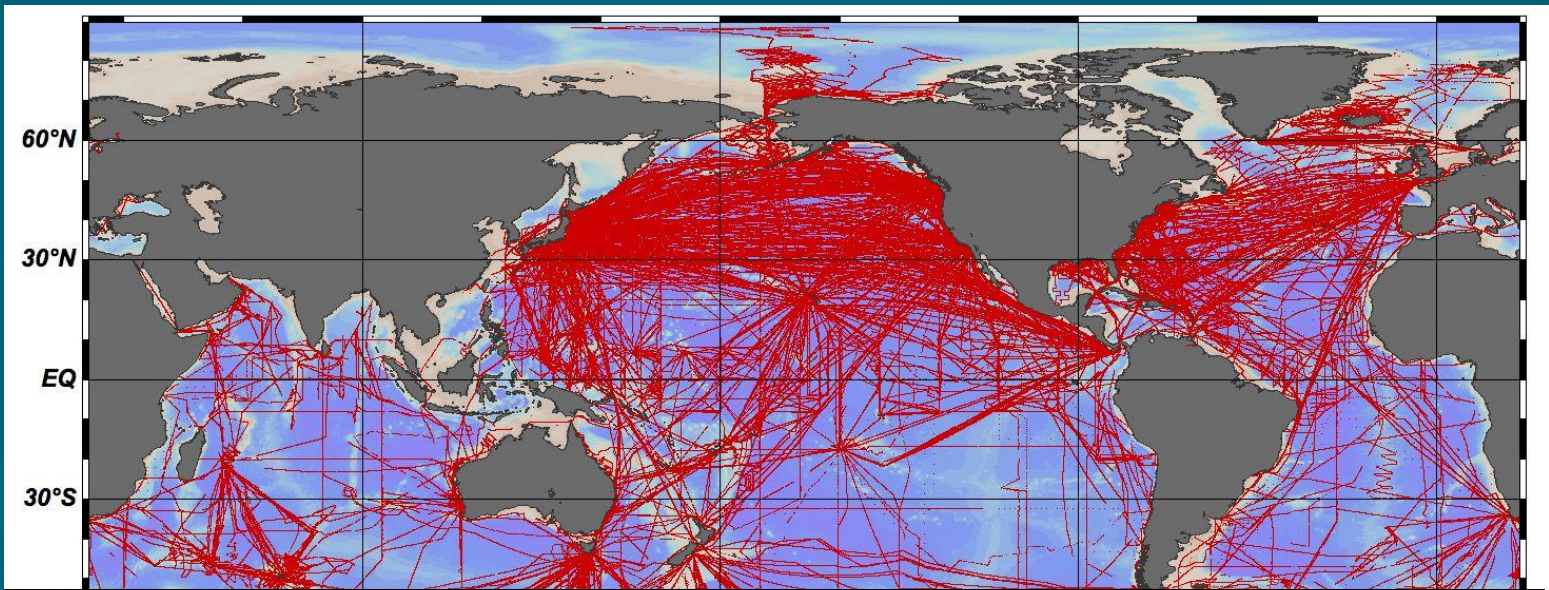
Management of natural resources

Marine impacts on human health (HAB)

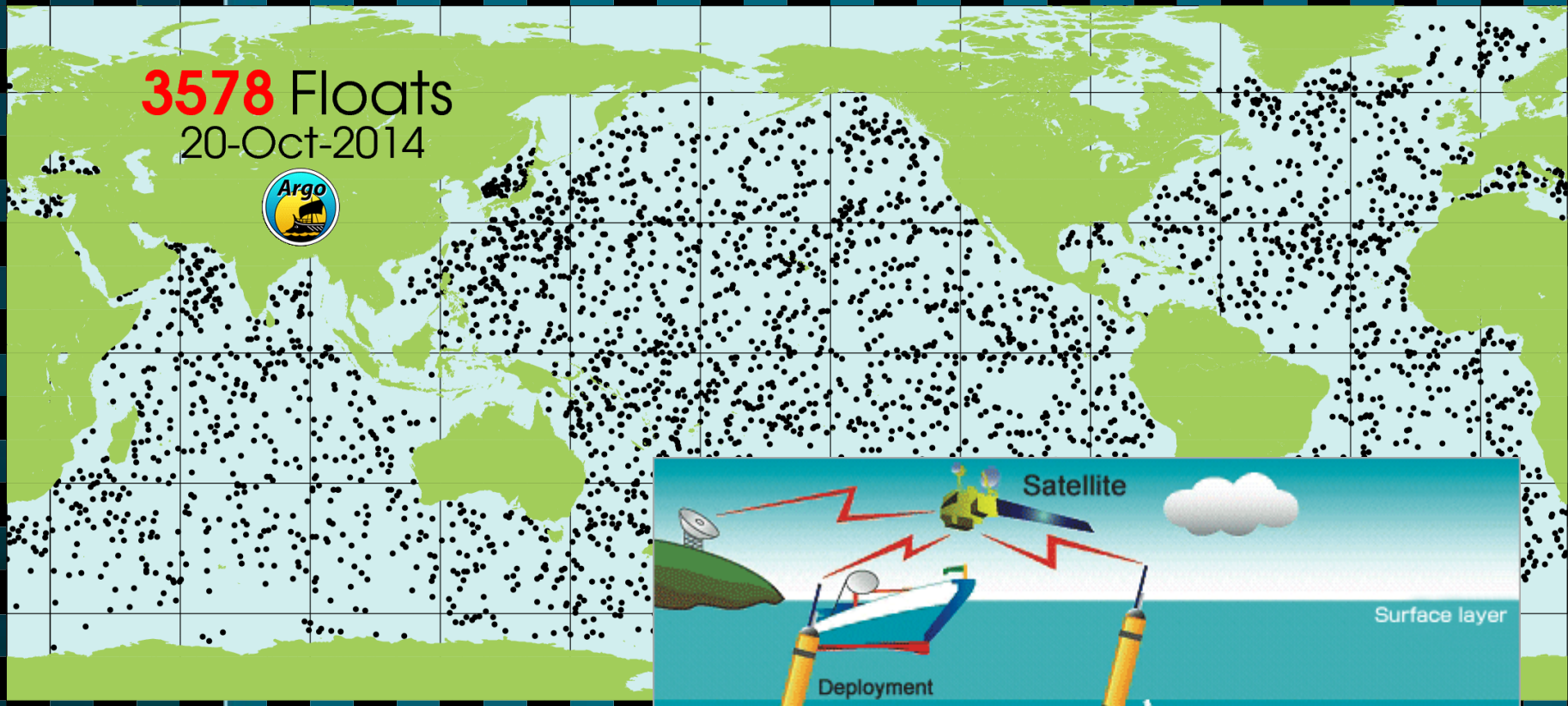
Predictability of marine hazards & maritime safety

Multi/Interdisciplinary challenges : biological, chemical, physical and geological disciplines plus air-sea interaction & atmospheric sciences

Basic and exploratory research is still needed, especially in areas like WIO.

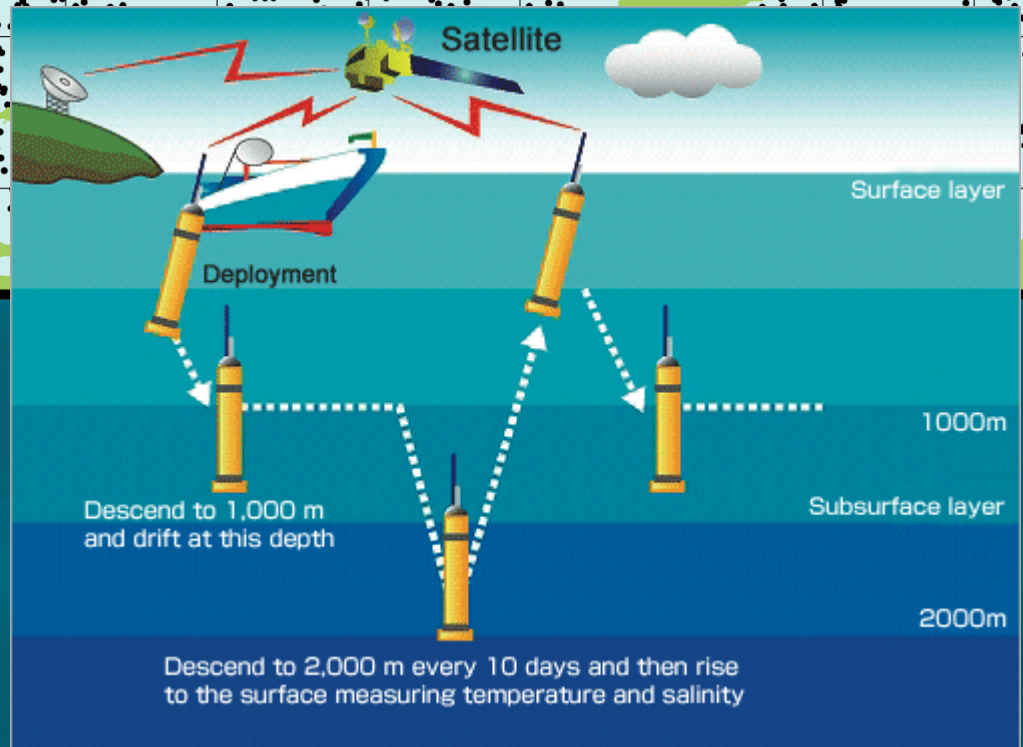


3578 Floats
20-Oct-2014



60°E

120°E



New & Innovative Technologies



ASV

Gliders

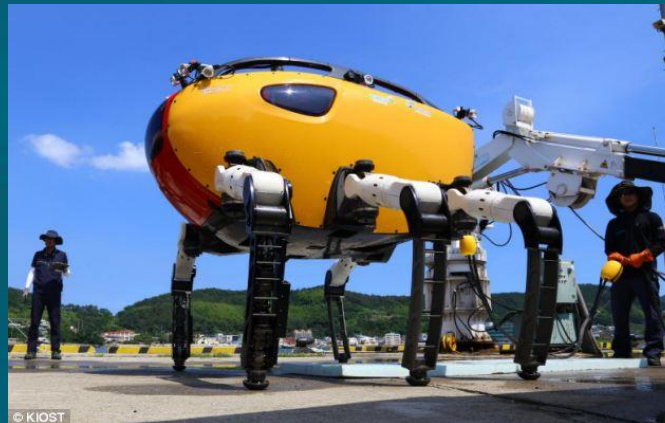


UAV

Wave Glider



AUV



Why do we still need ships?

- Other advanced technologies still require a ship as platform (flowcytometer, Video Plankton, ROV)
- Biological & Geophysical surveys & sampling
- Standard & complex chemical measurements
- Deployment & recovery of (large) autonomous vehicles
- Deep ocean variability <2000m
- Large scale & process studies (spatial & suite of parameters)
- Maintenance of moorings & ocean (floor) observatories
- Calibration & Ground truthing for autonomous technologies and remote sensing (satellite measurements)
- Continuation of established time series
- Field testing of new technologies
- Training students in ocean sciences

RV Mtafiti

**Underway water measurements of S & T
Meteo station**

Echosounder (200 & 33kHz)

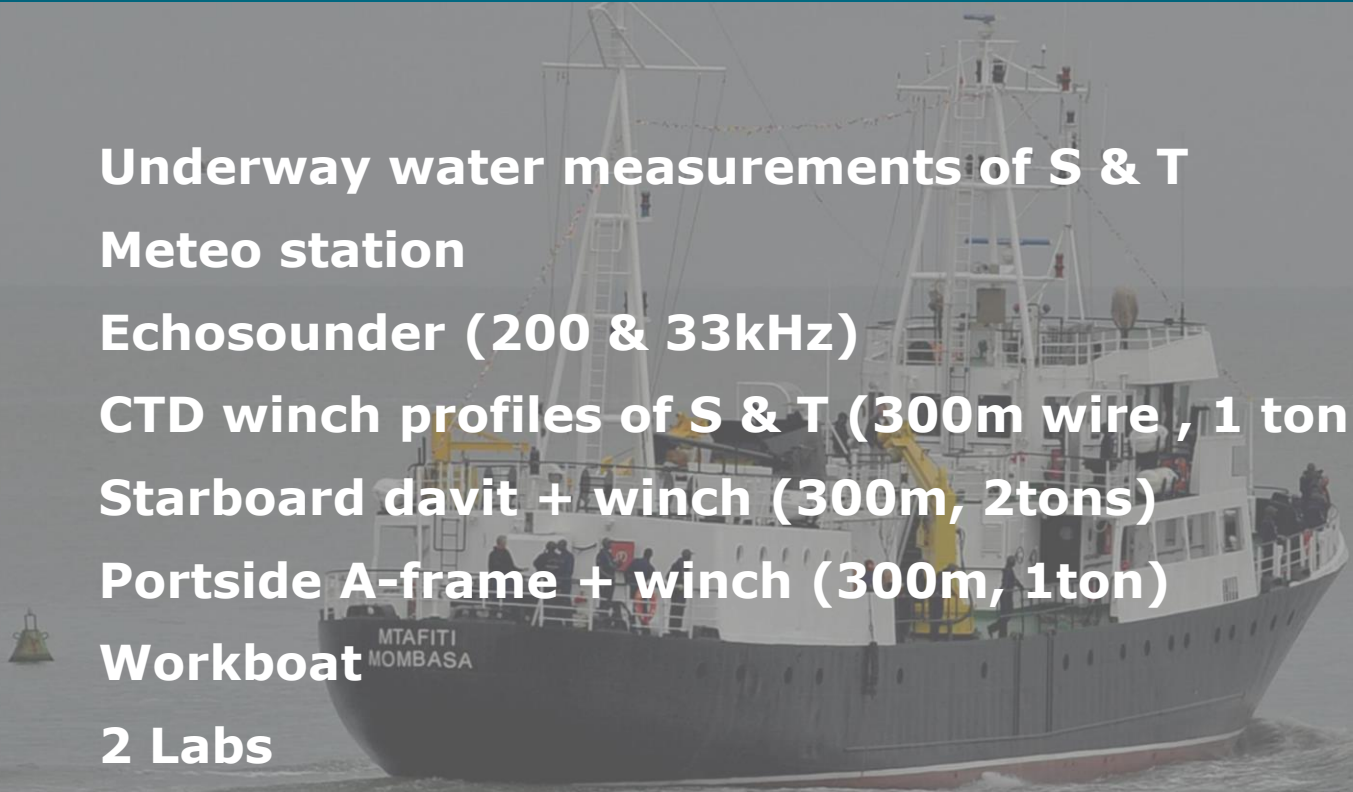
CTD winch profiles of S & T (300m wire , 1 ton)

Starboard davit + winch (300m, 2tons)

Portside A-frame + winch (300m, 1ton)

Workboat

2 Labs



RV Mtafiti

All standard small equipment

- Various planktonnets
- Bottom sampling (van veen & boxcorer)
- Water sampling (niskin bottle manual closure)
- CTD profiling
- 3m beamtrawl and ottertrawl (benthic fishfauna)
- Diving operations
- Bird & sea mammal counting

Limited to

Echosounder 200kHz – 200m / 33kHz – 1500m

“vertical” sampling : approx. 200-250m

“horizontal” sampling : 100m max.

Operating a Research Vessel

Know the costs

- Crewing (fixed)
- Fuel (variabel)
- Maintenance & Repair (fixed & variabel)
- Insurances, harbor&pilot taxes, certification/inspection, shore staff, food, shore power, telecommunication,.....

Calculate daily rate or a rate/cruise

- Marry scientific wishes & financial constraints

Operating a Research Vessel

Planning a science cruise

- **Good scientific question**
- **What & where**
 - determines time at sea
 - Transit times & fuel consumption
- **Know the science party**
- **Have technicians onboard**
- **Dedicated crew with ownership**
- **Technical failures, foul weather & unexpected observations**
- **Carefully select the PI (campaign leader icw Master)**

Operating a Research Vessel

Planning for a sailing schedule

- ask individual teams for time at sea and construct a schedule with different cruises
- Offer time at sea at certain locations and ask for participation
- Allow downtime for regular maintenance
- Look for partnership in using costly shiptime

Operating a Research Vessel

Be a member of a global community

International Research Ship Operators IRSO
International Marine Technicians InMarTech

