




Fisheries Sector



ASEAN & BIMSTEC WORKSHOP ON DEEP SEABED RESOURCES AND THE BLUE ECONOMY

Nay Pyi Taw, Myanmar
9-11 September 2019

With the support of the Korea Maritime Institute. 

**Strengthening national capacities for coastal and seabed mineral development-
the Myanmar experience**

- 1. Dr. Htun Thein (Fisheries Sector)**
- 2. Dr. Thet Tin Nyunt (Resources Sector)**
- 3. Mr. Zaw Min Aung (Oil and Gas Sector)**
- 4. Ms. Hla Hla Htay (Environmental Conservation Sector)**



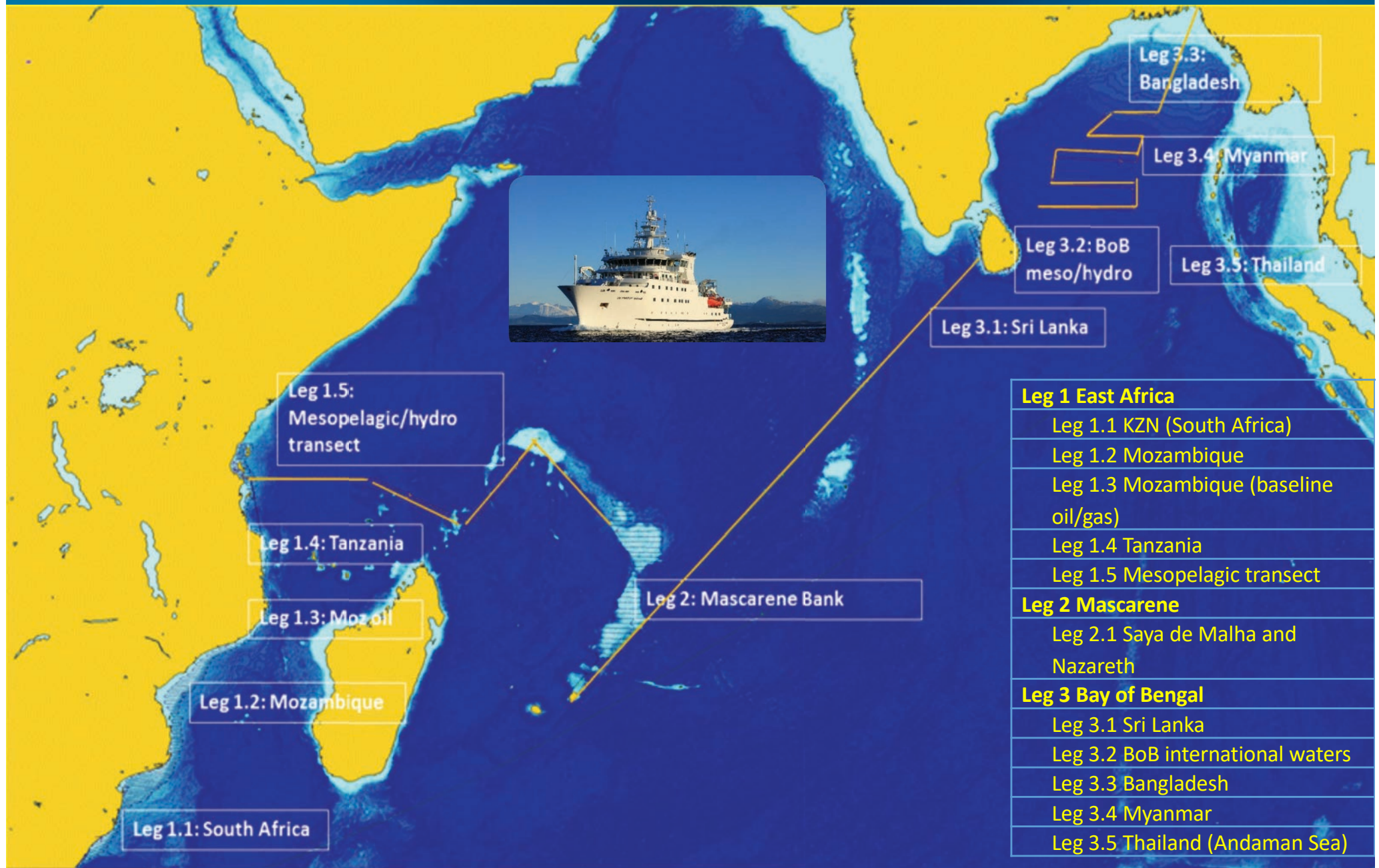
Marine Ecosystem Survey of Myanmar by Dr. Fridtjof Nansen Research Vessel

13 Nov – 17 Dec 2013
and
28 April – 30 May 2015

Summary of results

Dr. Htun Thein
(Fisheries Sector)

Survey programme for the RV *DR F.Nansen* in the Indian Ocean, 2018.



INTRODUCTION TO THE SURVEYS

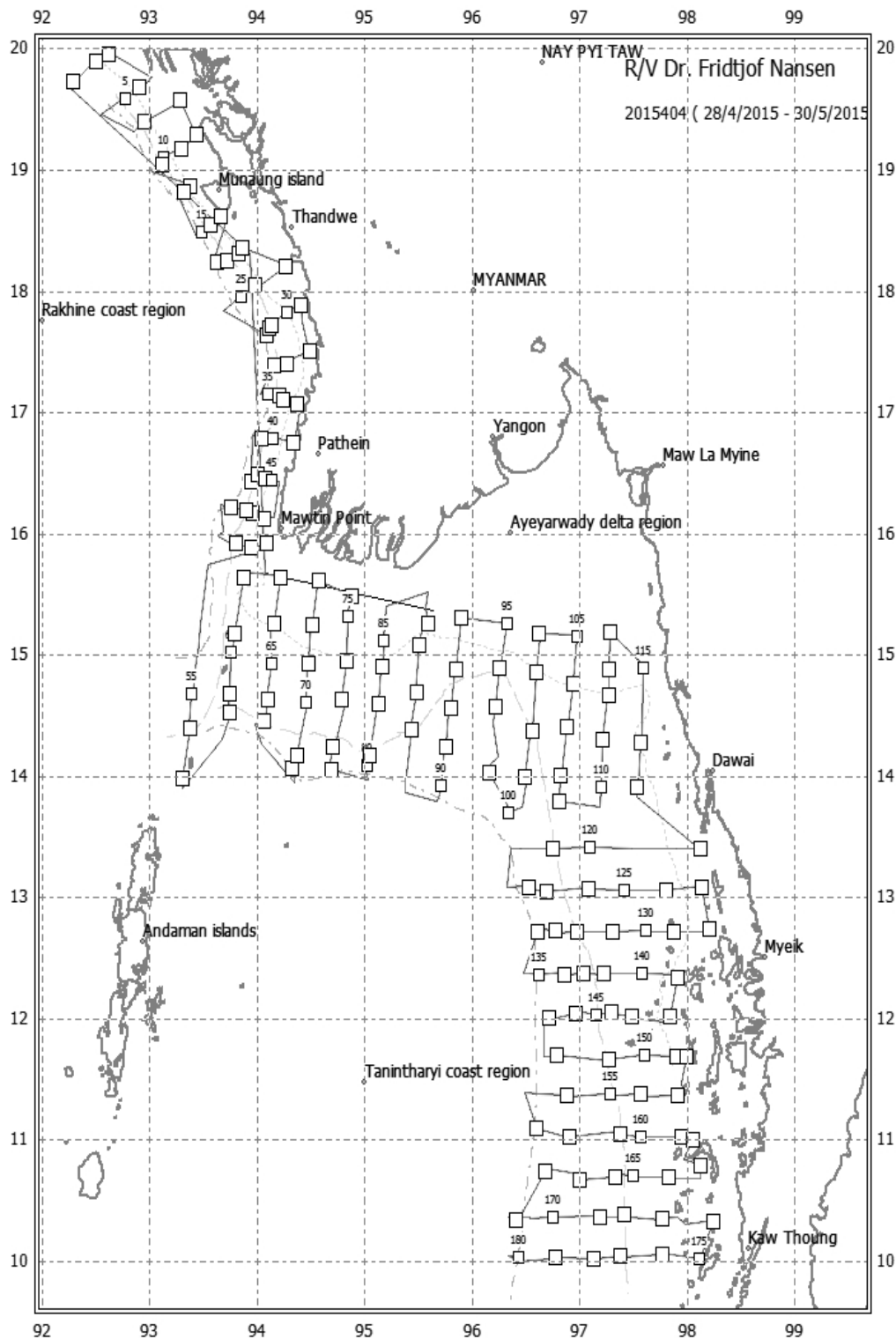
- 1st Survey requested by DoF, Myanmar, based on a dialog with BOBLME and Norad
- Cooperation Between IMR, FAO and Norad with DoF, Myanmar and BOBLME
- Research cooperation with Marine Science Department (Mawlamyine and Myeik universities, Pathein)
- 1st Survey carried out in post monsoon season
- As part of the recommendations from the first survey a second survey covering the pre-monsoon season was proposed



SURVEY OBJECTIVES

- To obtain information on demersal fish abundance and biodiversity by demersal trawling
- To determine the distribution and abundance of small pelagic fish resources using acoustic methods
- To collect data on size distribution, further biological information and genetic material from selected species
- To establish as far as possible the distribution, abundance and composition of other taxa at different trophic levels along the shelf (phyto- and zooplankton, fish eggs and larvae)
- To map the environmental conditions in the survey area (temperature, salinity, oxygen, chlorophyll, nutrients and sediments)
- To develop capacity of Myanmar trainees and young scientists



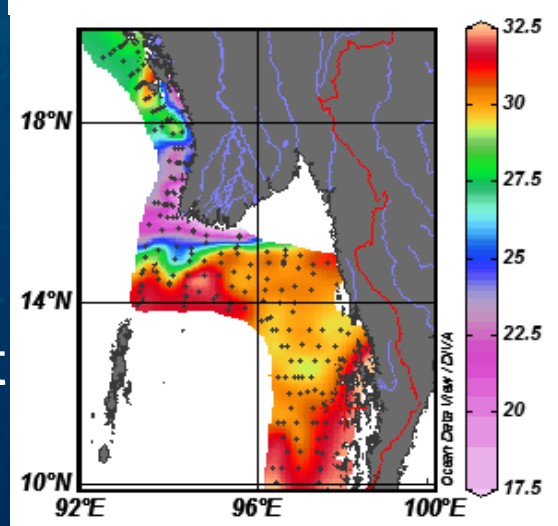
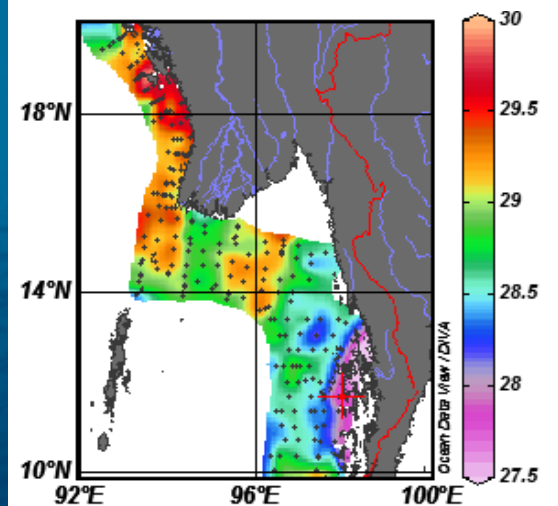
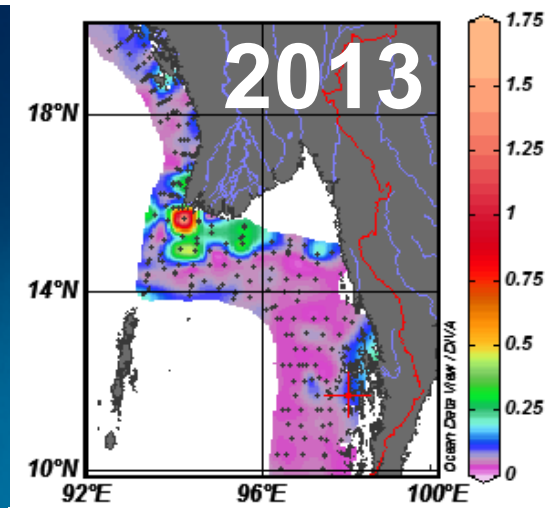
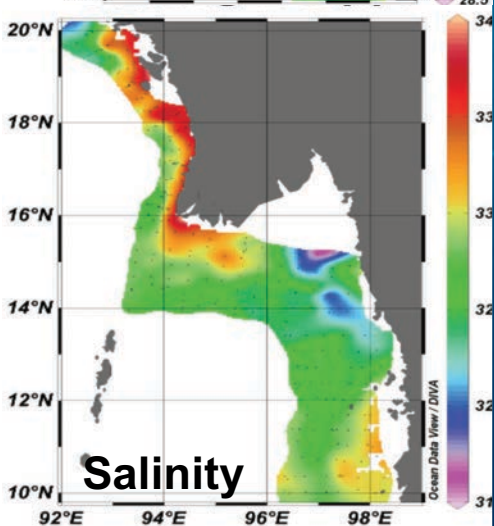
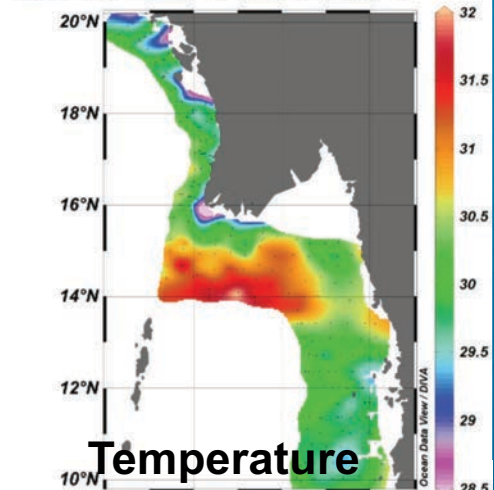
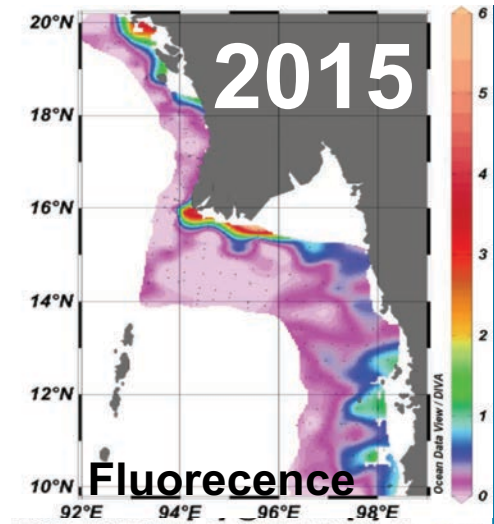


SURVEY DESIGN

- Coverage:
 - Entire EEZ between 20 m depth- 500 m depth
 - Transects cross shelf
 - 20 nautical miles apart
- Region and depth stratified
- “Ecosystem” sampling design
- Sampling physical and chemical oceanography
- Zoo- and phyto- plankton
- Fish biodiversity and abundance

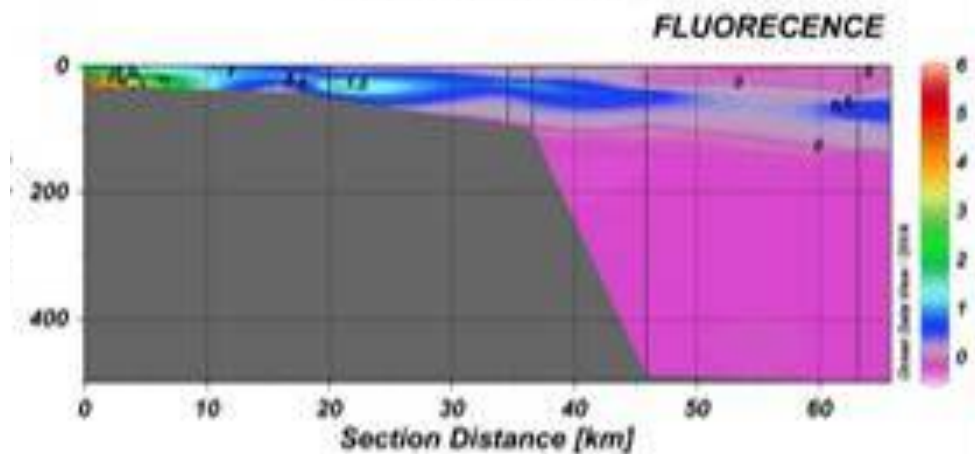
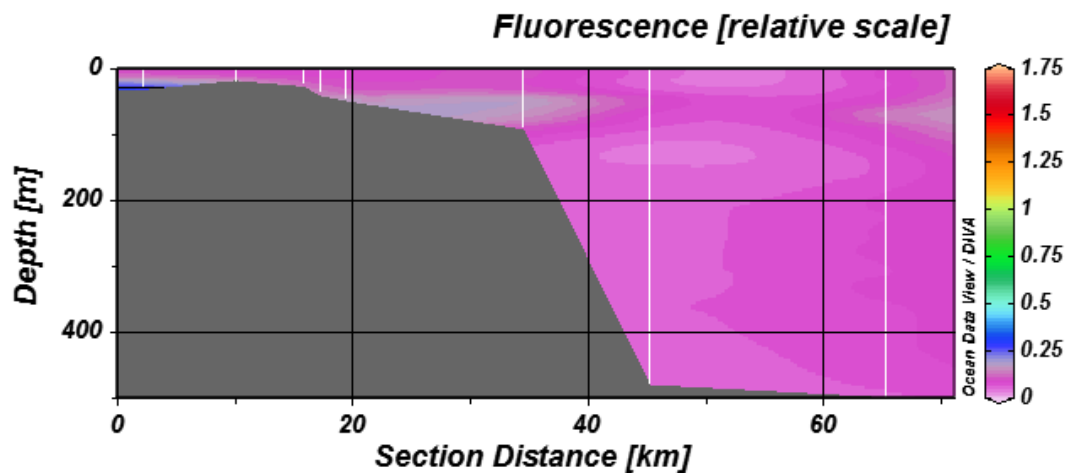
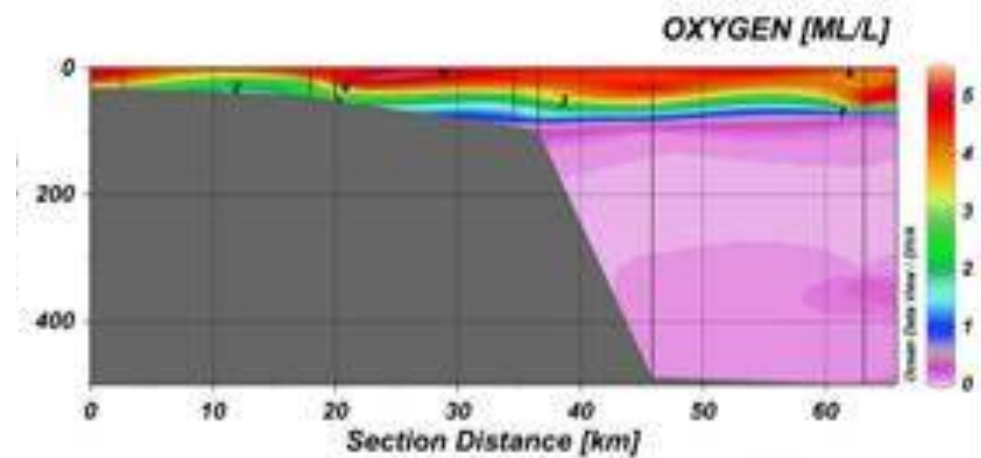
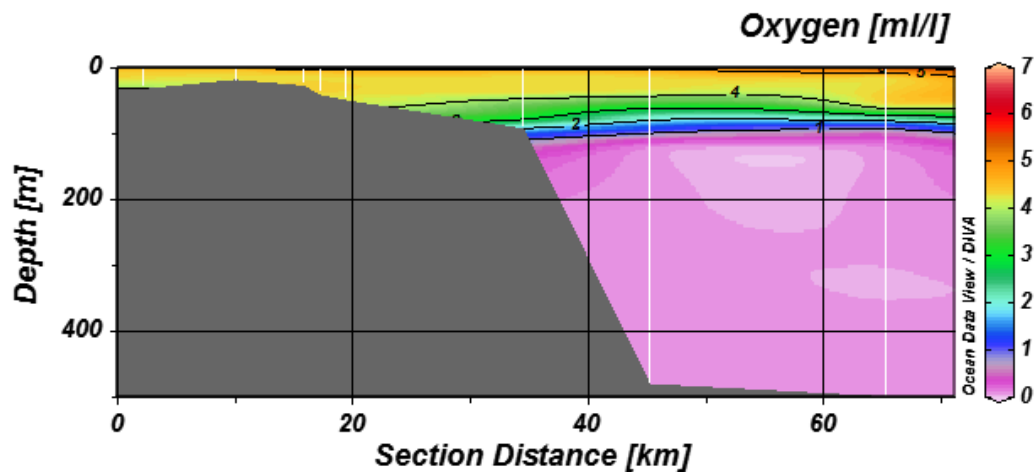
OCEANOGRAPHIC FINDINGS

- Clear separation in three regions, different oceanographic characteristics
- 2013: Stable water masses → Strong stratification → No upwelling → limits primary production
- 2015: Upwelling induced by internal waves and wind → More defined upwelling → higher primary production
- Low salinity surface waters in regions with rivers more dominant post-monsoon



2013 Post Monsoon

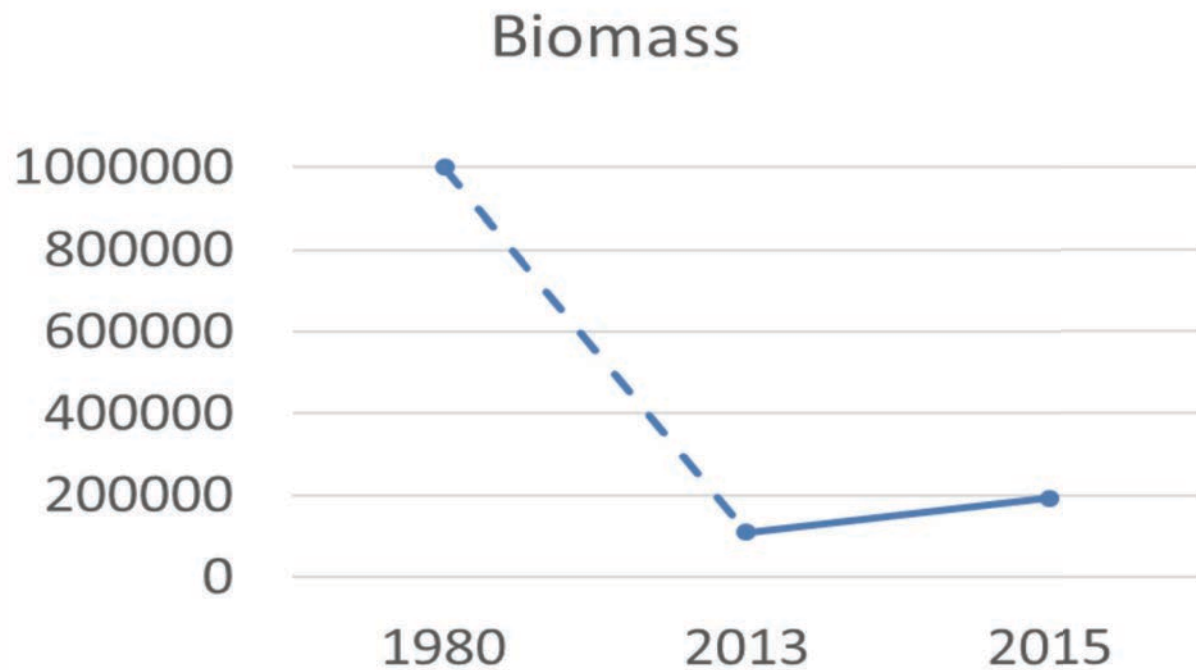
2015 Pre Monsoon



- Low oxygen water masses (<1 ml/l) found below stratified layer both years, especially in the northern region. Increase pre monsoon → poor fish biomass
- Low nutrient concentrations in surface waters. but high nutrients below 75 m depth
- Considerable more primary production during the pre-monsoon (2015) season than post-monsoon (2013)



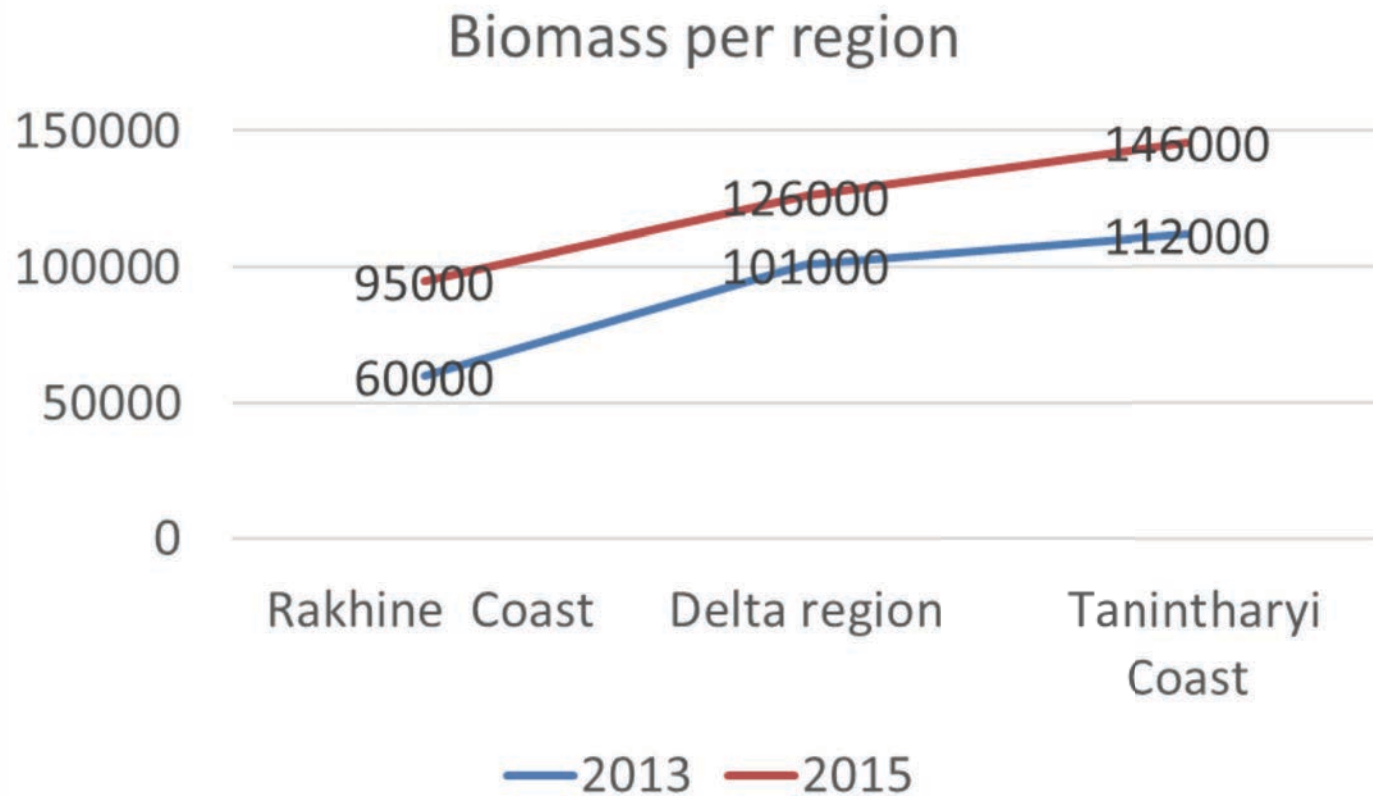
COMPARISONS OF PELAGIC FISH BIOMASS ESTIMATES 1979-80 vs 2013, 2015



- Standing stock in 2015 is about 20% of 1980 values



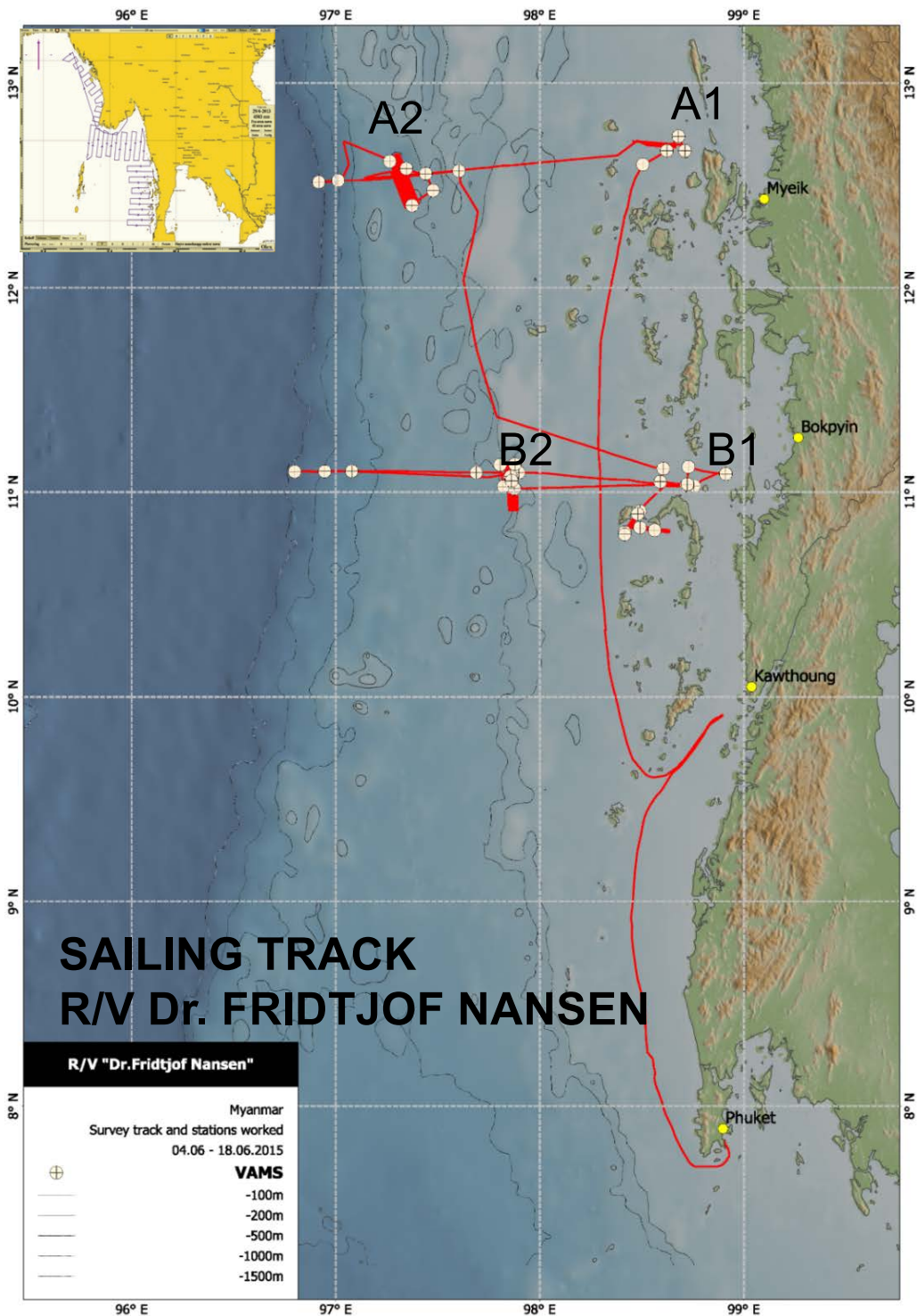
Demersal biomass estimates



Total biomass:
2013: 273 000
2015: 367 000

**Both years
highest biomass
was found
between 50 –
100 m depth**





Environmental baseline and benthic habitat studies

- **Bathymetric mapping using a multibeam echo sounder** to create detailed bathymetric profiles in the sampling areas.
- **Collect oceanographic data** (temperature, density, oxygen and chlorophyll along the route, to study biological productivity.
- **Benthic habitat mapping** with focus on four pre-selected areas, using a video assisted sampling device (VAMS) for video identification of benthic communities, infauna and macrofauna sampling and determination of sediment composition.
- **Collect samples for chemical analysis of sediments.** Heavy metals and hydrocarbons

VAMS- Video Assisted Multi Sampler

Location: B27

Alt: 5.15

Heading: 345

Depth: 0153.20 m

13.06.15

07:35:21



VAMS IN OPERATION

Observed from the free swimming
ROV

Sonar

Altimeter

CTD

Oxygen

Fluorescens

Current meter

HD camera

Van Veen Grabs (up to 8)

*Corer, sampler for surface layer, Manipulator arm etc.



EAF-Nansen

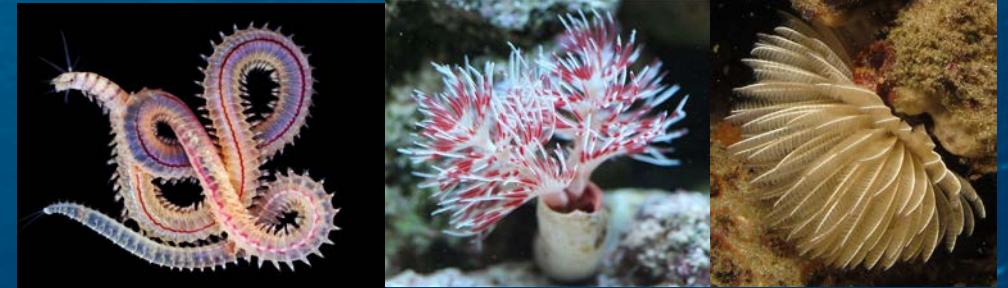
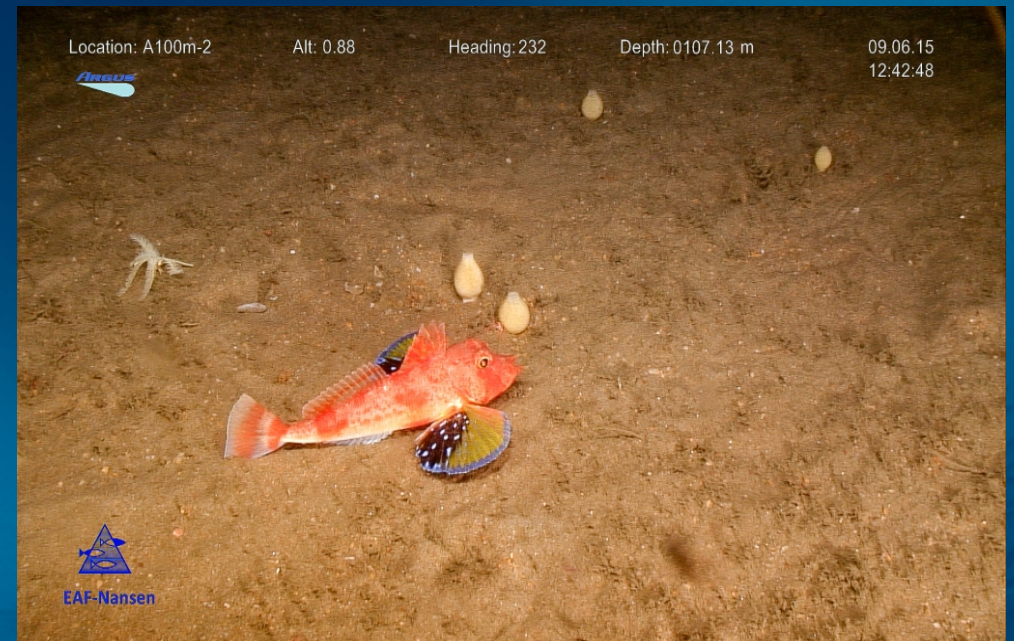




VAMS taking samples

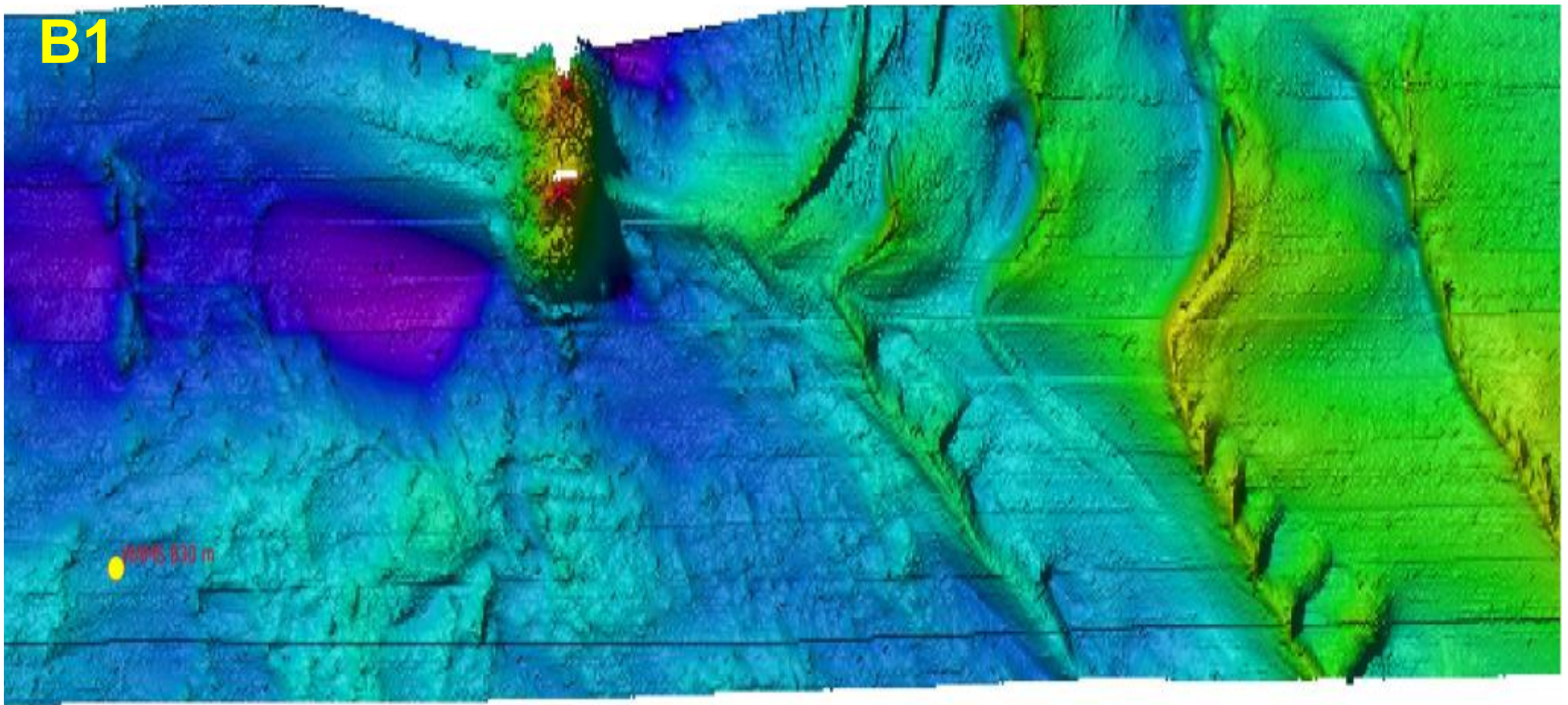


Benthic Fauna



Scientists from Myanmar preparing sediment samples



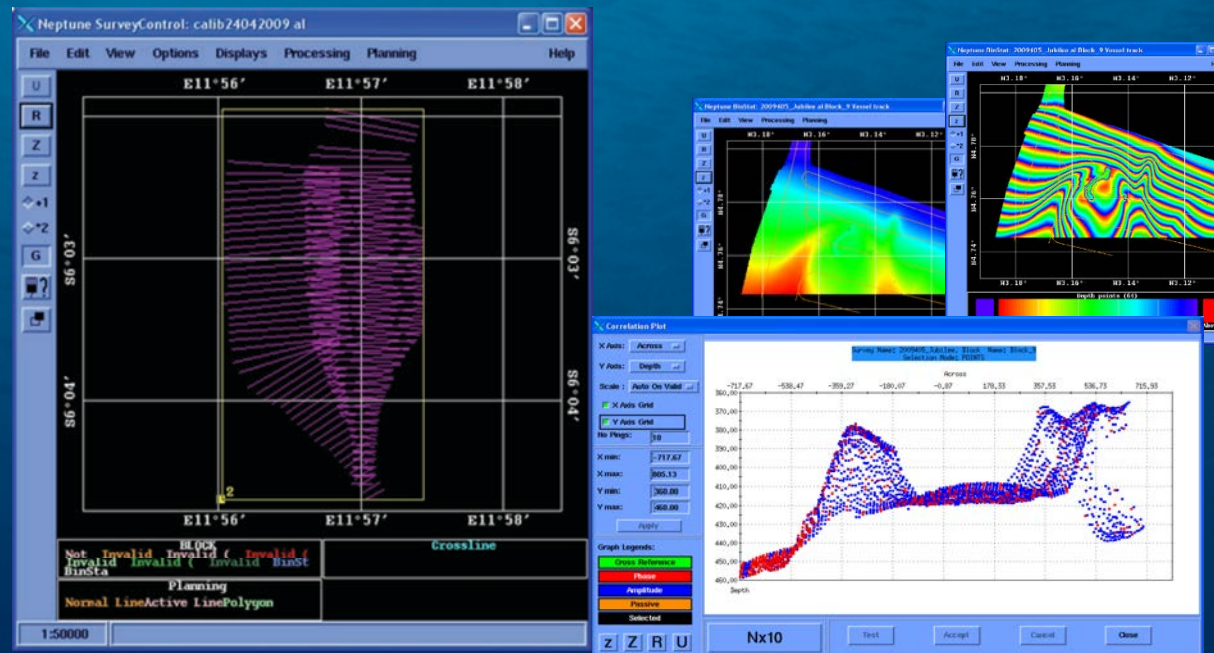
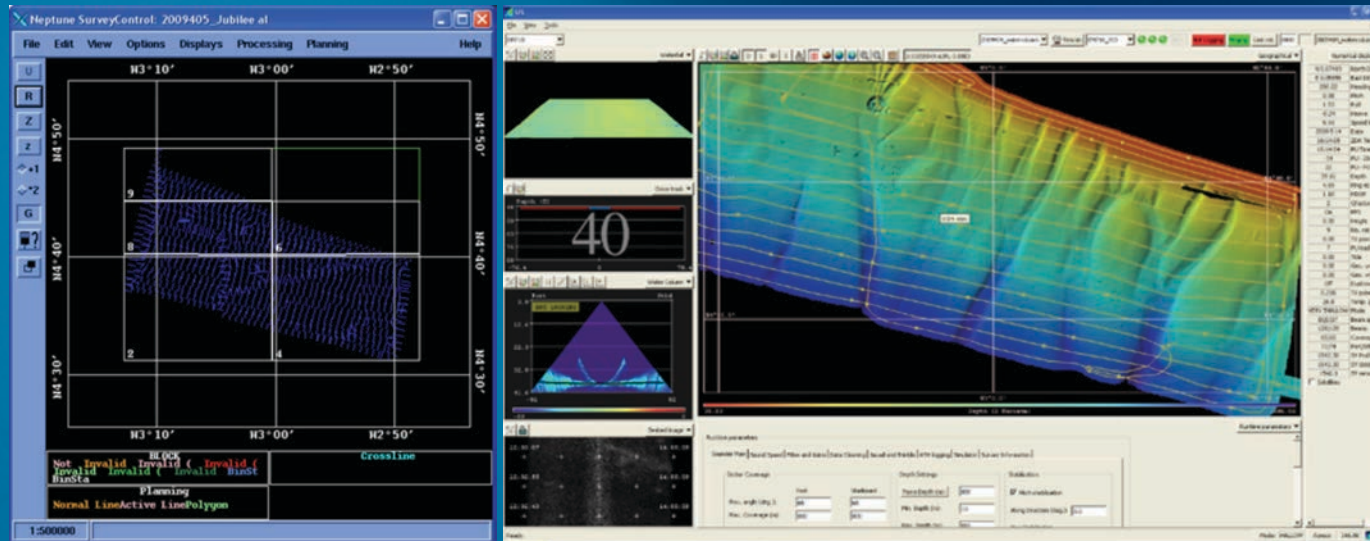


Multibeam mapping in area B1 covered approximately 15 km².

Many small structures probably coral reefs protruding from the bottom was shown in the mapped area.

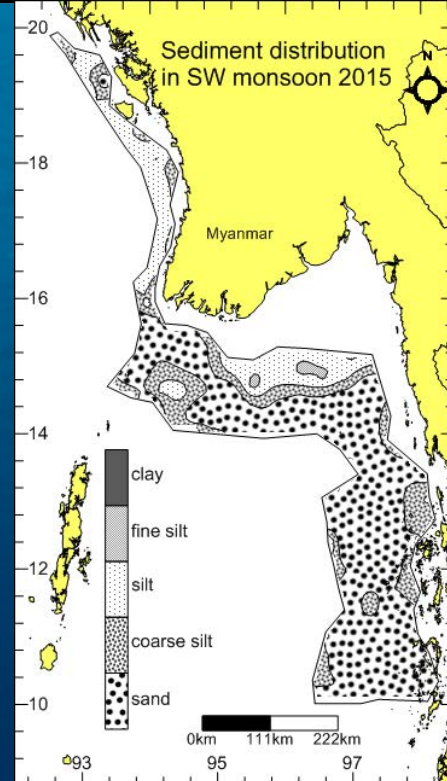
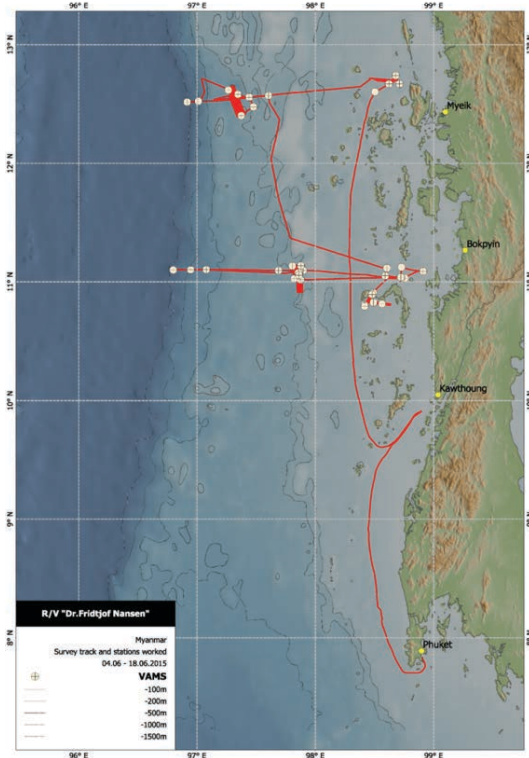
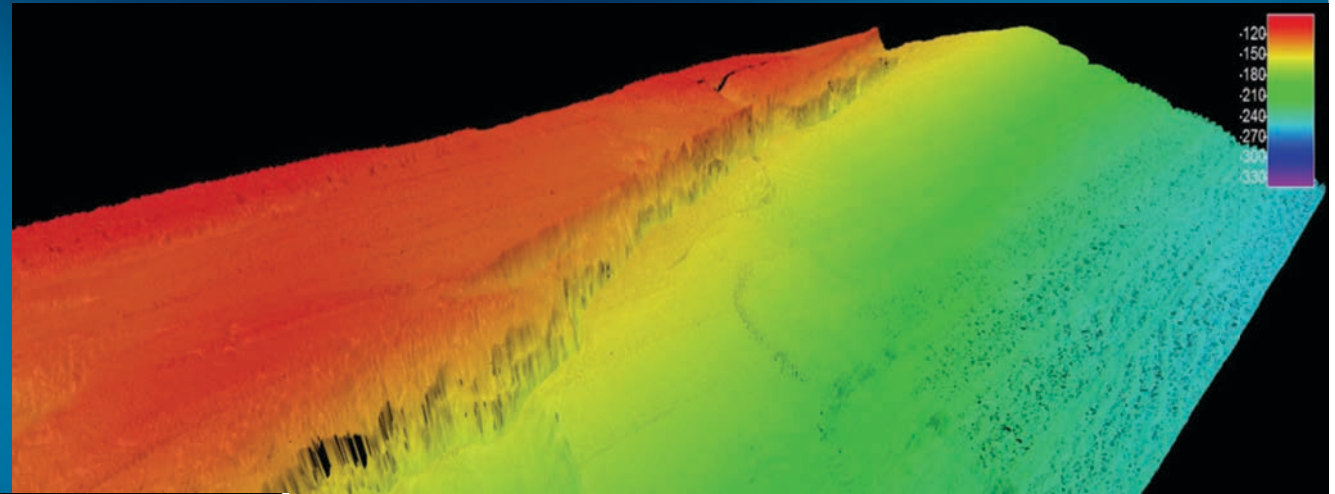
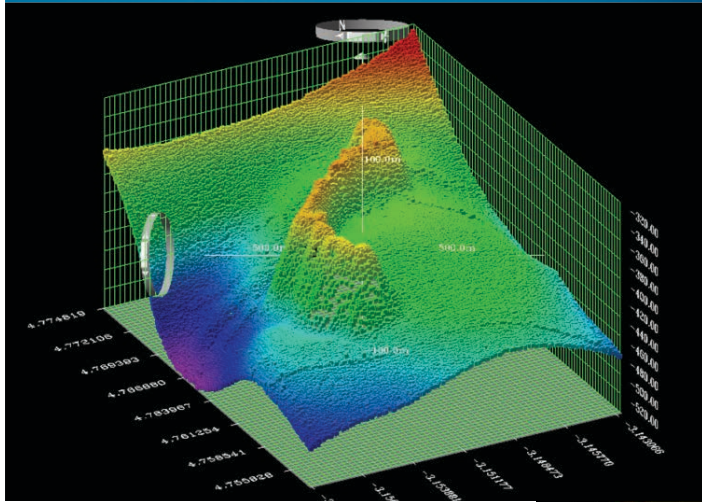
Seabed Information System-SIS

SIS is used for the online operation of Kongsberg Maritime multibeam echosounder systems. The application is used by the operator to control all settings and logging during the survey.



Prepared raw data from SIS are processed using Neptune post-processing software. All depths are corrected for tidal influence using post-processed GPS data and reduced to mean sea level.

Interesting topography in area B2, seen from North, corals in the slope and on the top, soft bottom in the deeper area. Visualization of details in benthic structure by use of the software Fledermause.



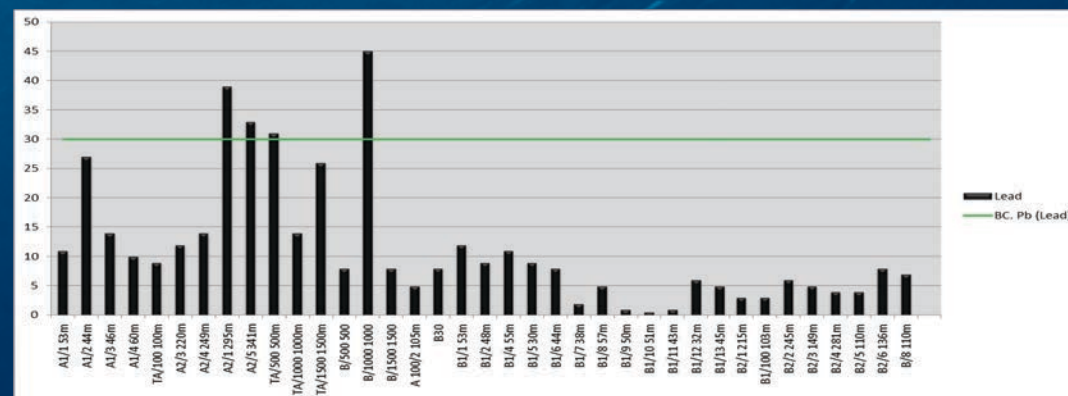
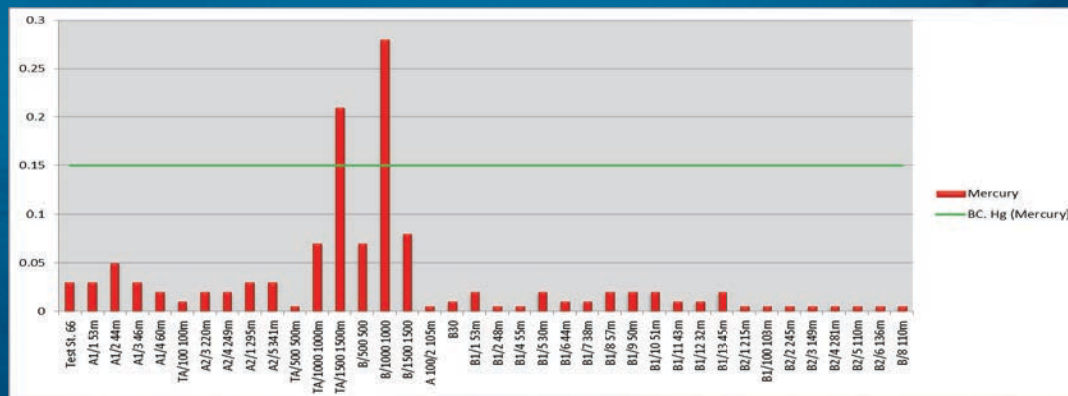
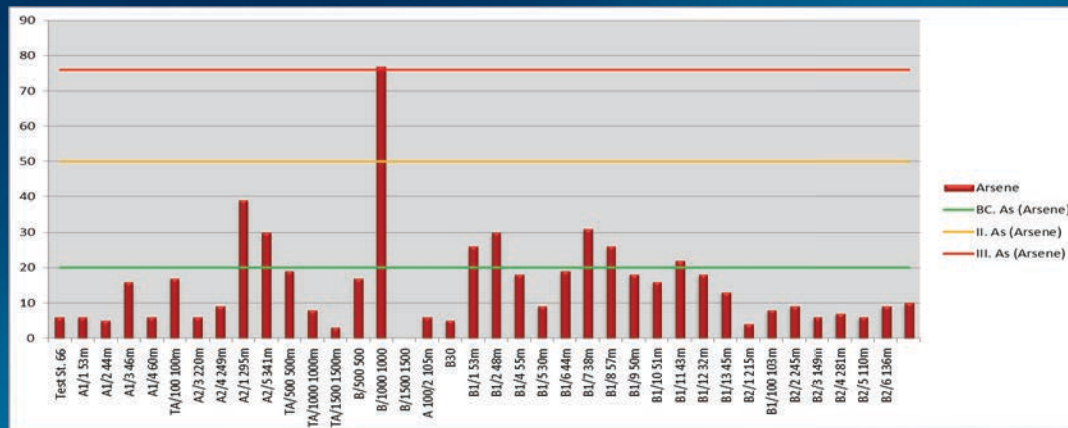
| Mesh size of the sieve (mm) | Phi class Φ | Rough description | Description |
|-----------------------------|------------------|-------------------|------------------|
| 16 | -4 | Gravel | Coarse gravel |
| >16-8 | -3 | | Medium gravel |
| >8-4 | -2 | | Fine gravel |
| >4-2 | -1 | | Very fine gravel |
| >2-1 | 0 | Sand | Very coarse sand |
| >1-0,5 | 1 | | Coarse sand |
| >0,5-0,25 | 2 | | Medium sand |
| >0,25-0,125 | 3 | | Fine sand |
| >0,126-0,063 | 4 | | Very fine sand |
| >0,062-0,031 | 5 | Silt | Very coarse silt |
| >0,030-0,016 | 6 | | Coarse silt |
| >0,015-0,008 | 7 | | Medium silt |
| >0,007-0,004 | 8 | | Fine silt |
| >0,003-0,002 | 9 | | Very fine silt |
| >0,002 | | Clay | Clay |

The general trend was finer sediments with increasing depth, shallow seems to be more fine graded. This could be due to the influence from the river outlets in the northern part of the area.

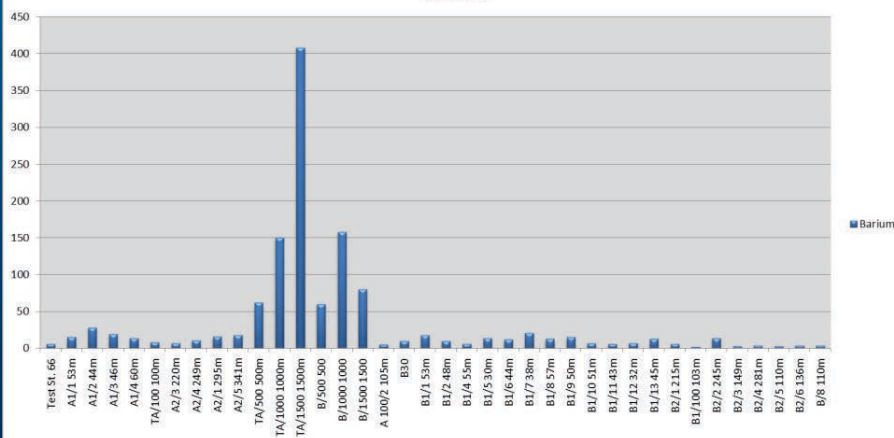
Chemical compounds (Metals)

Classification of state from content of metals (KLIF)

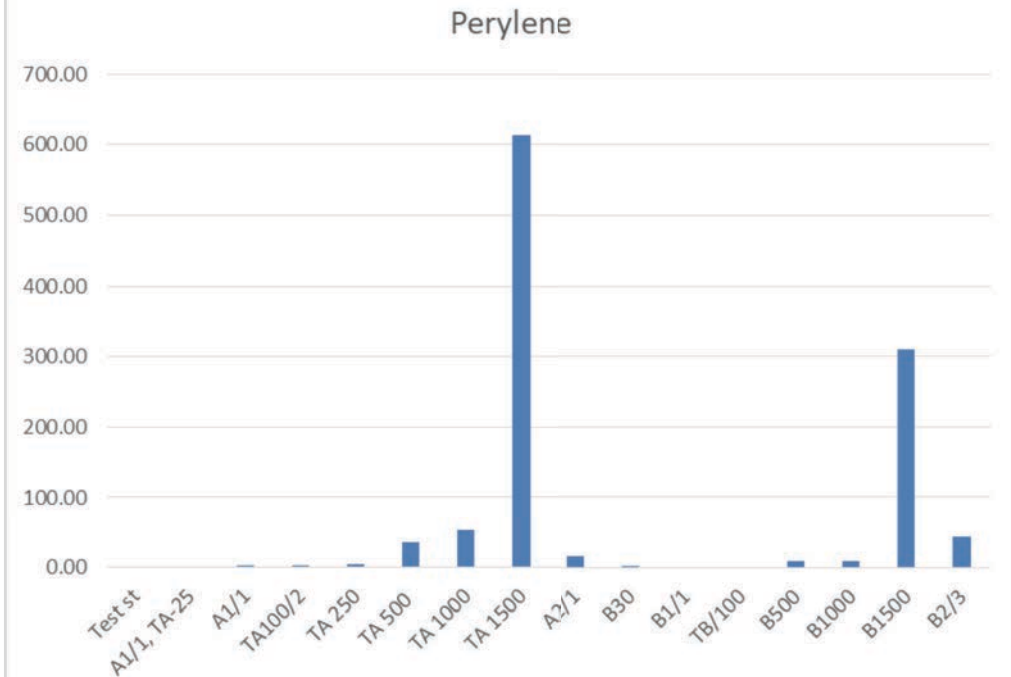
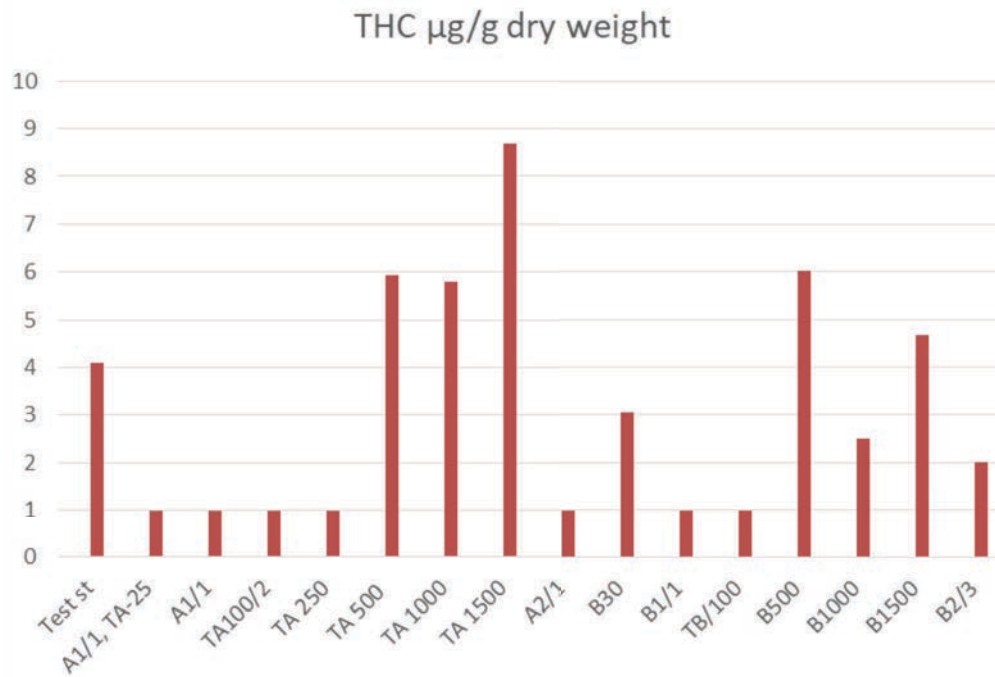
| | I | II | III | IV | V |
|--------------|------------|-----------|-----------|------------|---------------|
| | Background | Good | Moderate | Bad | Extremely bad |
| As (Arsene) | <20 | 20-52 | 52-76 | 76-580 | >580 |
| Pb (Lead) | <30 | 30-83 | 83-100 | 100-720 | >720 |
| Cd (Cadmium) | <0.25 | 0.25-2.6 | 2.6-15 | 15-140 | >140 |
| Cu (Copper) | <35 | 35-51 | 51-55 | 55-220 | >220 |
| Cr (Crome) | <70 | 70-560 | 560-5900 | 5900-59000 | >59000 |
| Hg (Mercury) | <0.15 | 0.15-0.63 | 0.63-0.86 | 0.86-1.6 | >1.6 |
| Ni (Nickel) | <30 | 30-46 | 46-120 | 120-840 | >840 |
| Zn (Zink) | <150 | 150-360 | 360-590 | 4500 | >4500 |
| Ba (Barium) | | | | | |



Barium



THC & Perylene



There is a slight increase in most of the PAH's at TA/1500 compared to background levels. All except Perylene ends up in class II, good conditions according to the Klif manual.

Perylene shows high levels on 5 stations. TA/500, 1000 and 1500 TB/1500 and B2/3. The value on TA/1500 was very high. At this time, we do not know if this compound is part of any industrial processes but it seems to be independent of the other parameters.



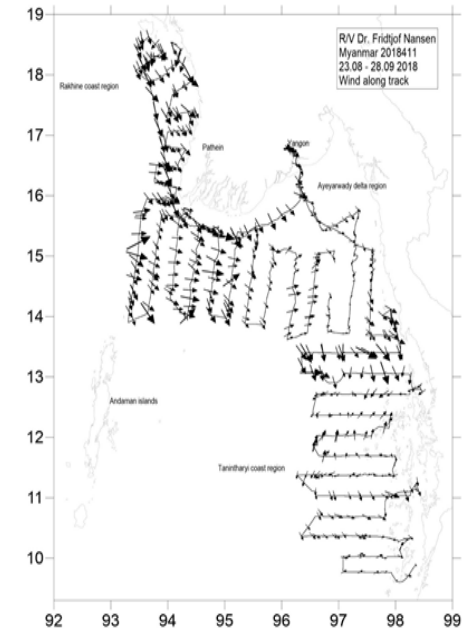
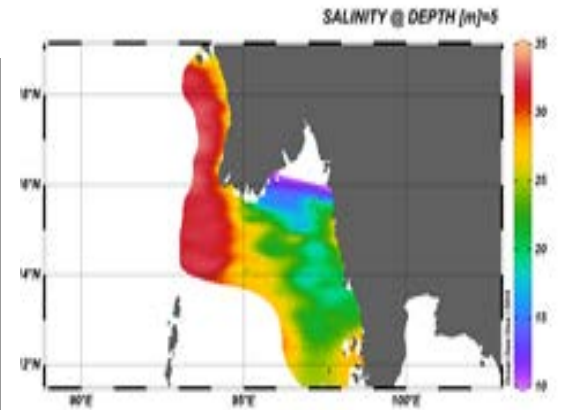
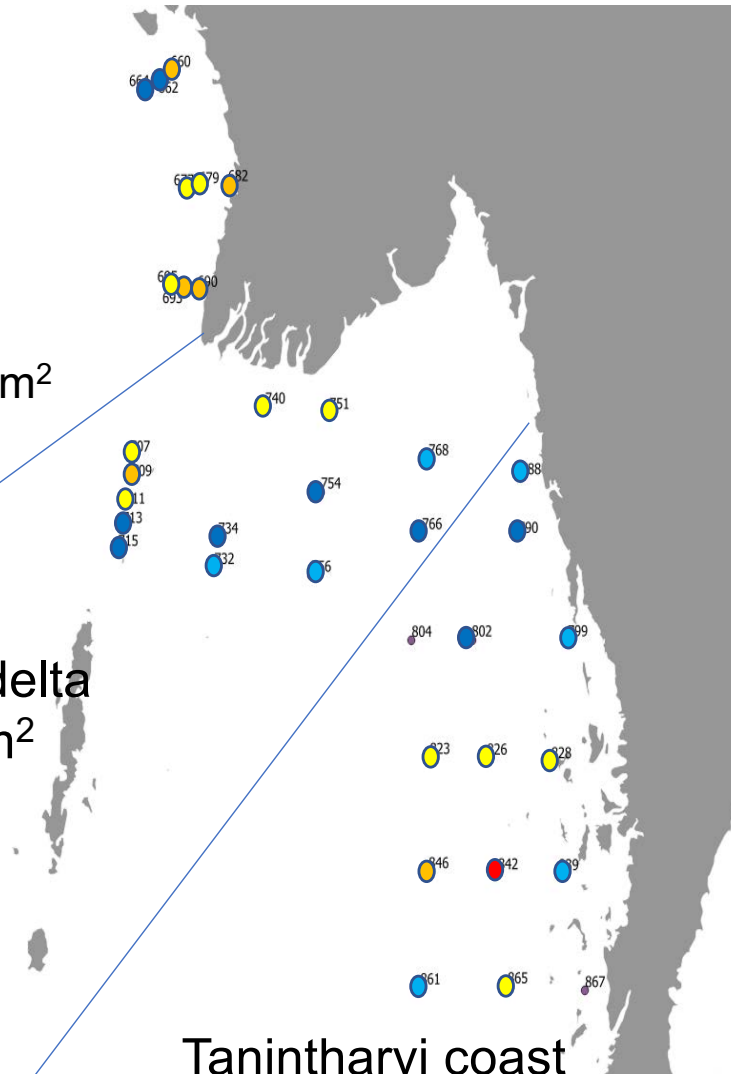
Mean density of microplastics in surface water

- $\leq 5\ 000$ particles/km²
- 5000-10 000 particles/km²
- 10 000-20 000 particles/km²
- 20 000-100 000 particles/km²
- $\geq 100\ 000$ particles/km²

Rakine coast
22 000 MPs/km²

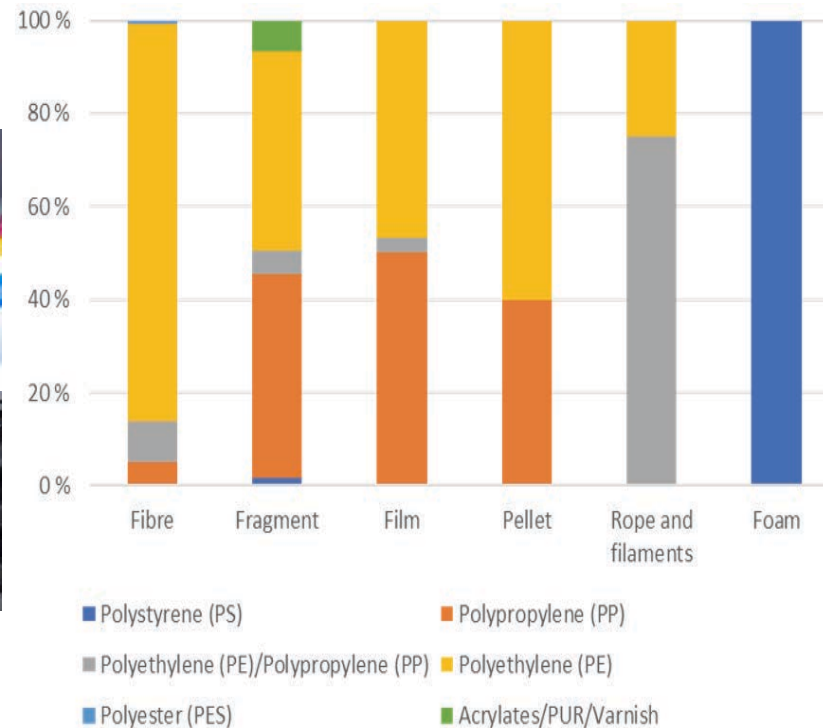
Ayeyarwady delta
8 000 MPs/km²

Tanintharyi coast
27 000 MPs/km²



Morphology and major polymer groups

❖ polypropylene PP (23 %)



❖ Polyethylene or Poythene PE (55%)



Many thanks to the plankton team of the survey!

- Leg Rakhine and Delta



- Leg Tanintharyi coast



Marine Spatial Planning *for Myanmar*

Strategic Advice for Securing
a Sustainable Ocean Economy

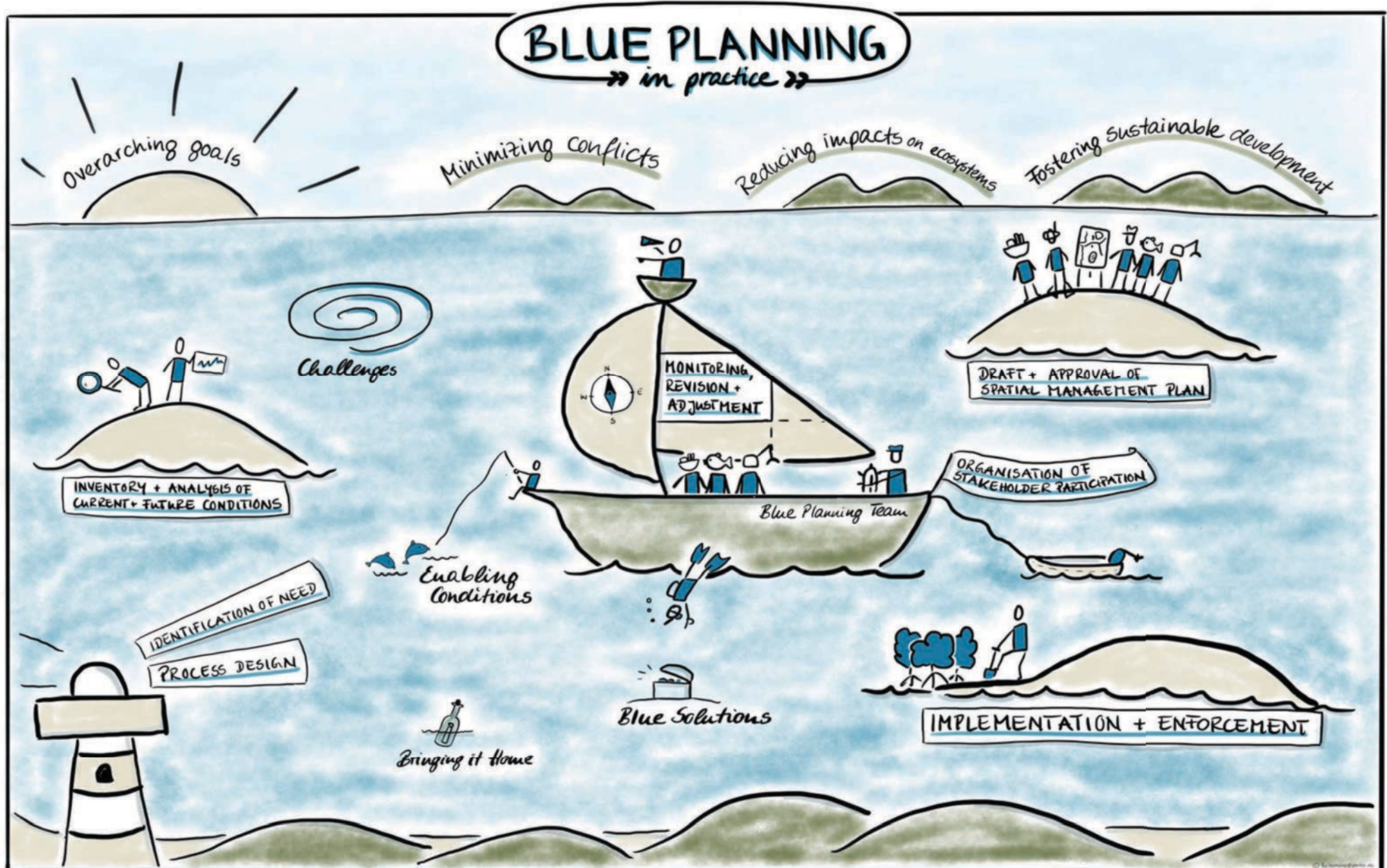


The main characteristics of MSP are:

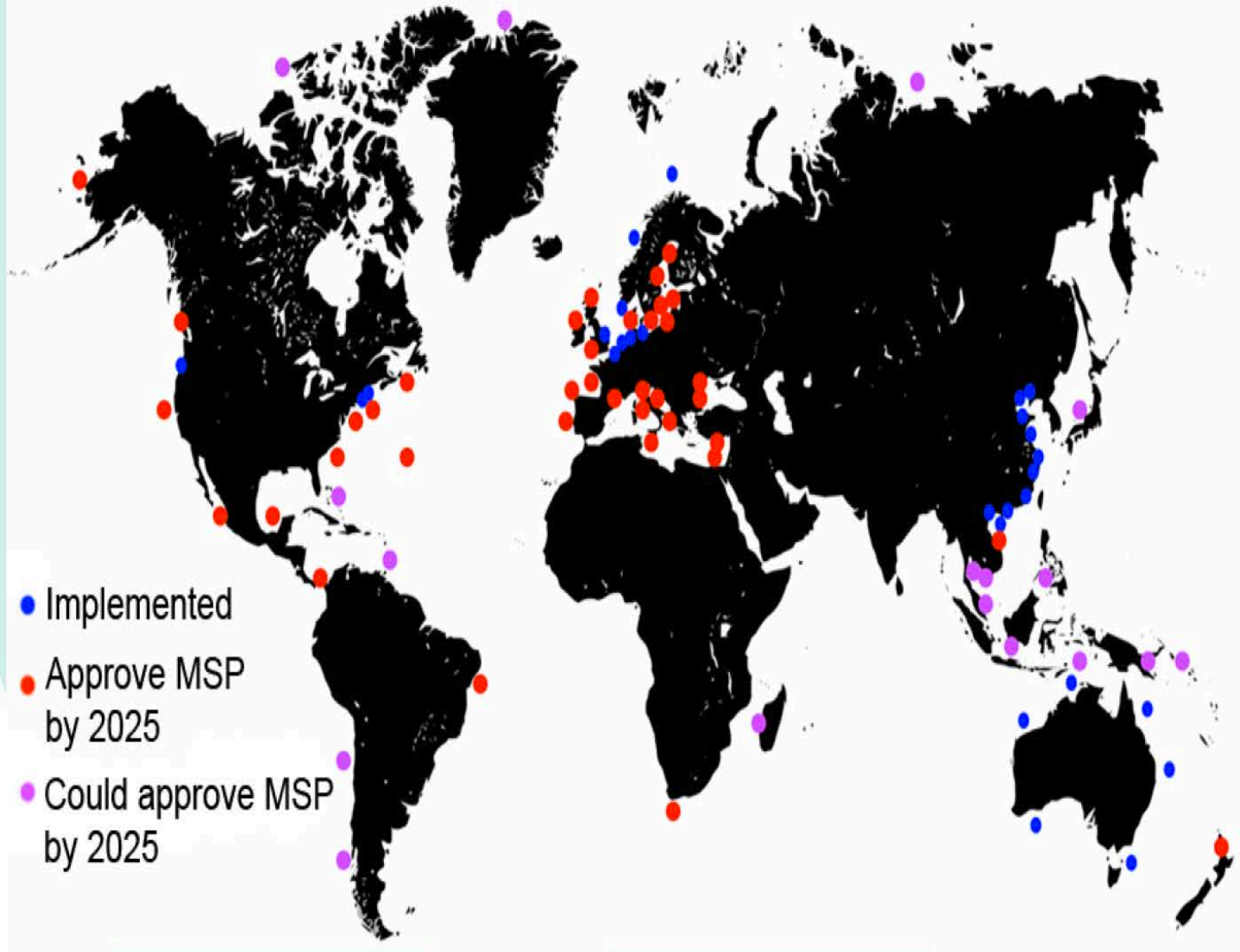
- **Integrated and multi-objective**
MSP works across sectors and across multiple levels of government; it aims to achieve the “triple-bottom line” of ecological, social and economic Objectives
- **Continuing and adaptive**
MSP learns from experience; it is a continuous activity of planning to generate information for the development of management strategies that respond to changing conditions
- **Strategic and anticipatory**
MSP is focused on the long-term
- **Participatory**
Stakeholders are actively and effectively



MSA and Blue Economy



MSP around the world



40 countries

In the region (by 2025)

- Thailand
- Cambodia
- Singapore
- Philippines
- Malaysia
- Indonesia
- Timor-Leste
- Solomon Islands
- Papua New Guinea

Marine Spatial Planning in Myanmar

High Level Conference “Our Ocean 2017” in Malta



The Government of Myanmar announced its commitment to develop a marine spatial plan by 2021; it should cover approximately 485,000 square kilometers of Myanmar's exclusive economic zone.

The plan foresees developing further the Myanmar's marine protected area network, providing support to sustainable fisheries, as well as ensuring the development of a sustainable blue economy for all marine stakeholders.

Welcome to Our Ocean 2019

OSLO 23-24 OCTOBER 2019

Learning
Sharing
Acting



Dashboard ⓘ

[New commitment](#)

Thein Htun of The Government of Myanmar ⚙️

Search...



Area of action

| Area | Title | Year | Progress | Status |
|------|----------------------------------|------|----------|-----------|
| | Management and Conservation Zone | 2019 | 0% | Submitted |

In shore Fisheries Co-management Area

Offshore Fish Conservation Zone



THANK YOU

