AIR-SEA INTERACTIONS IN THE BAY OF BENGAL FROM MONSOONS TO MIXING

National Aquatic Recourses Research and Development Agency (NARA)

Udeshika Wimalasiri

National Aquatic Recourses Research and Development Agency (NARA)

- Established in 1981

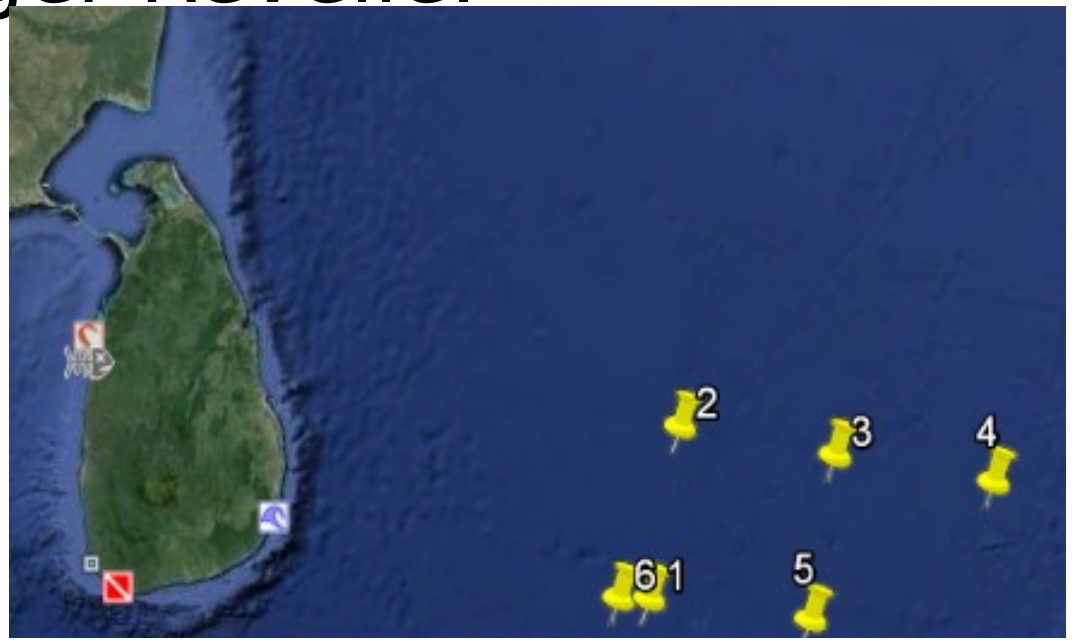
- Promote and conduct research activities directed towards the
  - Identification
  - Assessment
  - Management
  - Conservation
  - Development, of aquatic resources and in various fields.

Introduction

- Bioluminescence is interdependent phenomenon associated with physical and chemical oceanography.
- Ocean frontal regions are always associated with enhanced bioluminescence.
- Bioluminescence spectral content and signal kinetic often indicate the type of the organisms.
- Information on vital activities of marine ecosystem, special structure and man’s influence upon plankton

R/V Roger Revelle

- Southern Bay of Bengal (5- 8N, 85.5-88.5E)
- Duration : 4th to 16th August 2015
- On board R/V Roger Revelle.

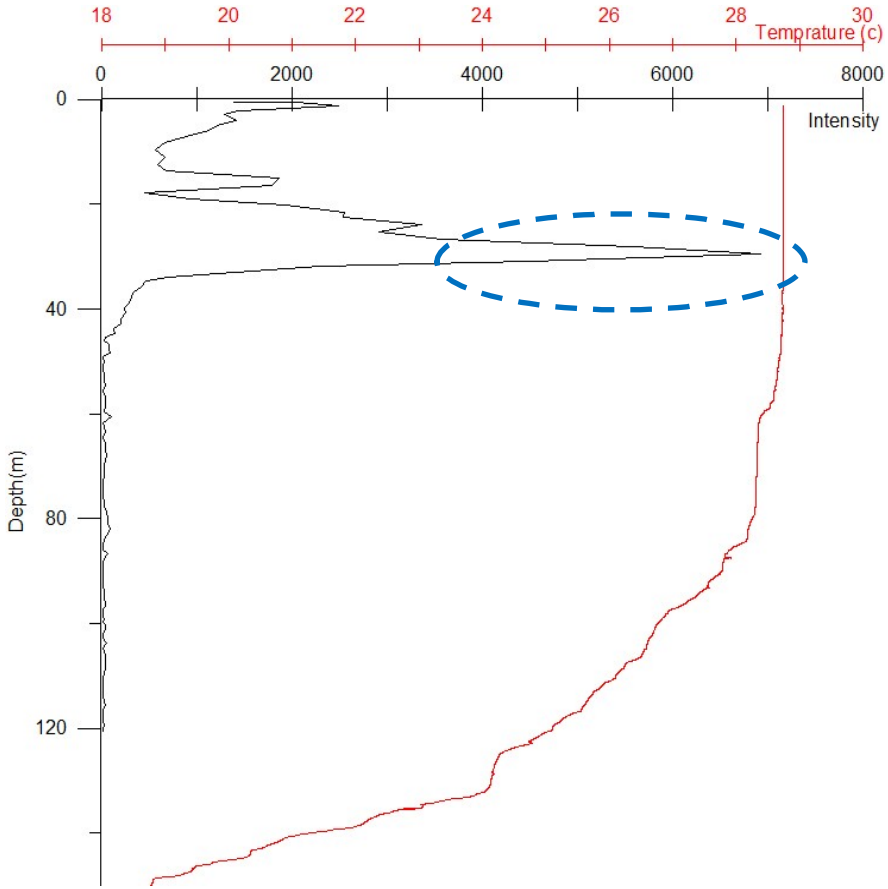


Recoverable Bathyphotometer

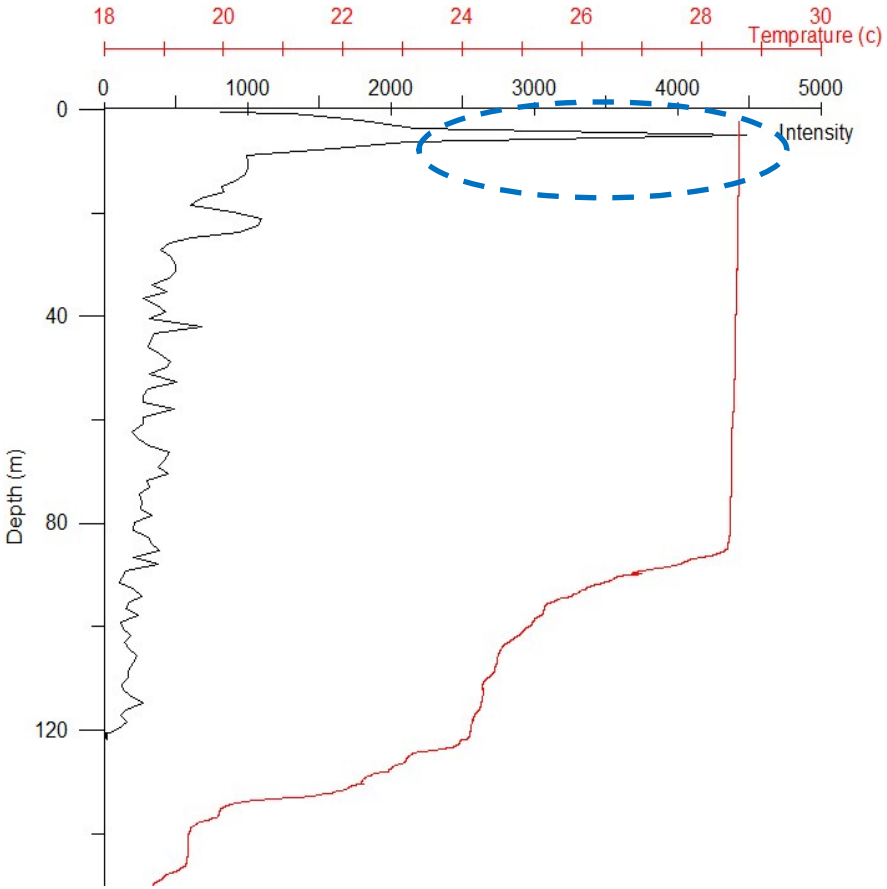
- Bioluminescence intensity was measured vertically using Recoverable bathyphotometer.
- Free falling method was used to gather data.
- All the Sampling was done at night

- Conductivity Temperature Depth (CTD) measurements were taken at each sampling point
- Surface Zooplankton samples were collected using 150 µm mesh size plankton net

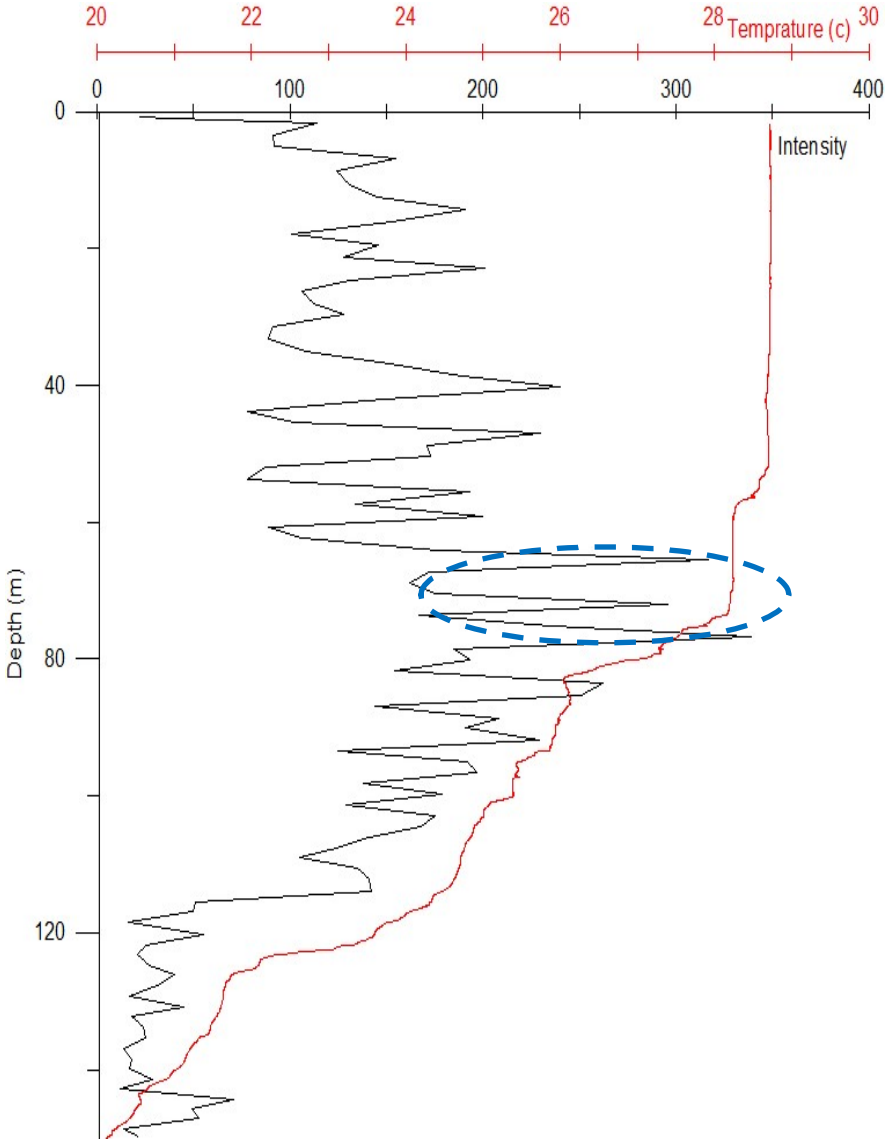
Vertical profile of bioluminescence intensity



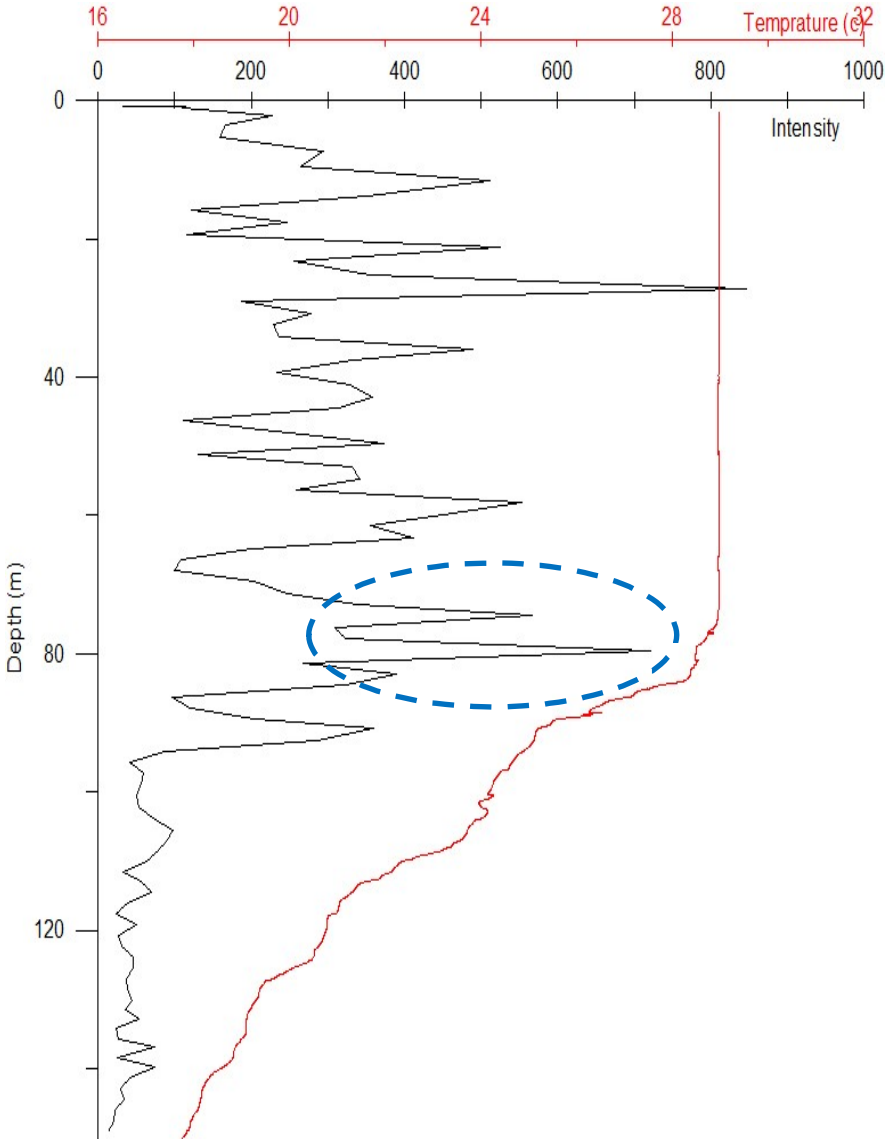
Vertical profile of bioluminescence intensity at first sampling point



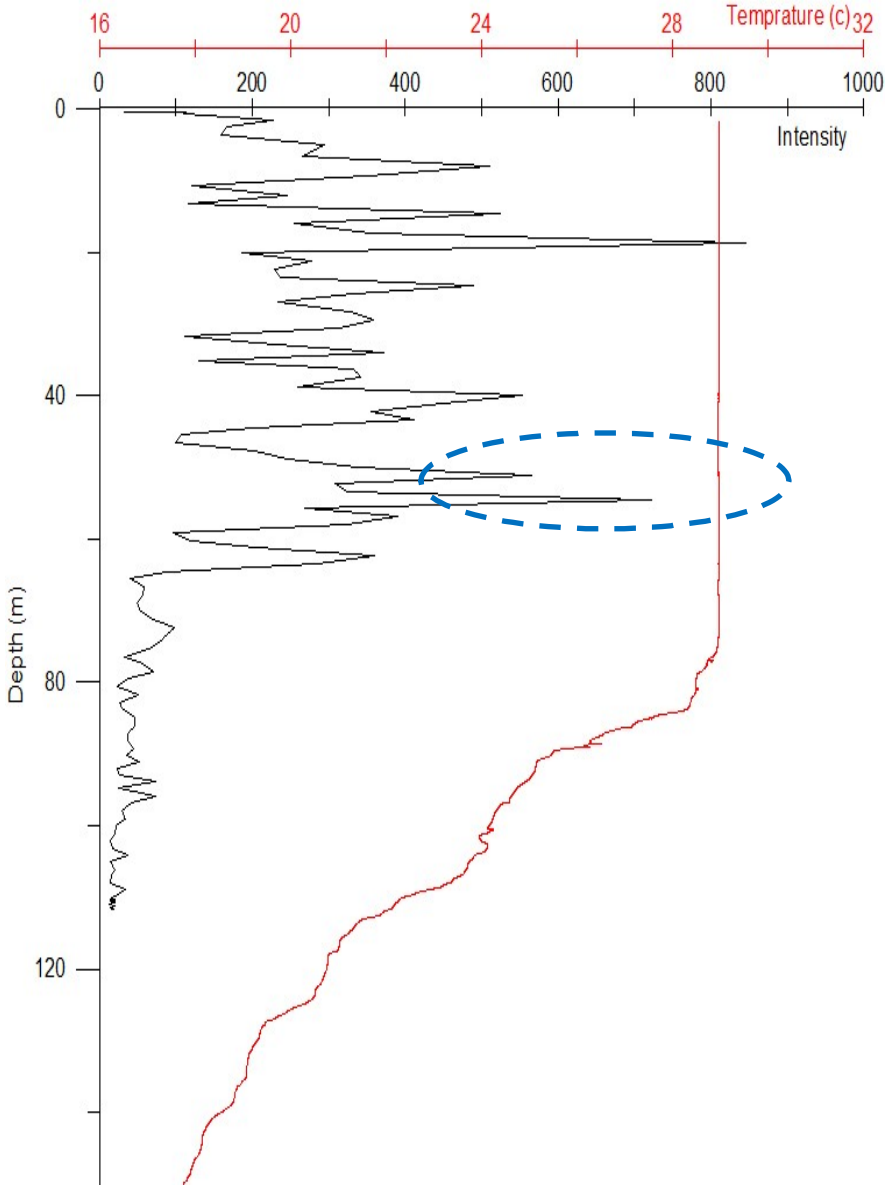
Vertical profile of bioluminescence intensity at second sampling point



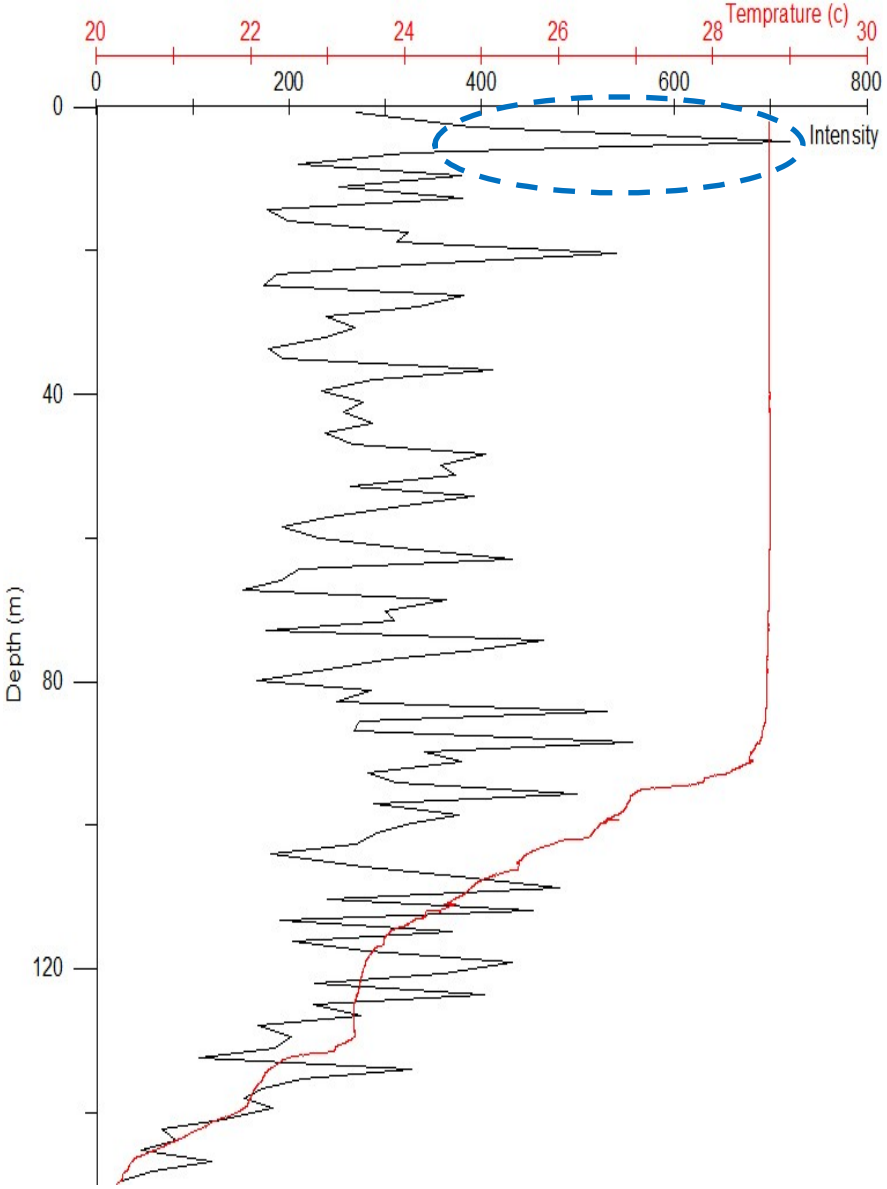
Vertical profile of bioluminescence intensity at third sampling point



Vertical profile of bioluminescence intensity at forth sampling point



Vertical profile of bioluminescence intensity at fifth sampling point

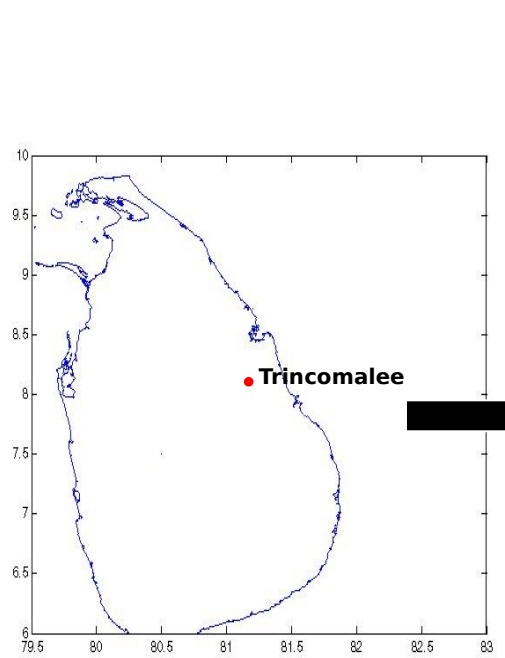


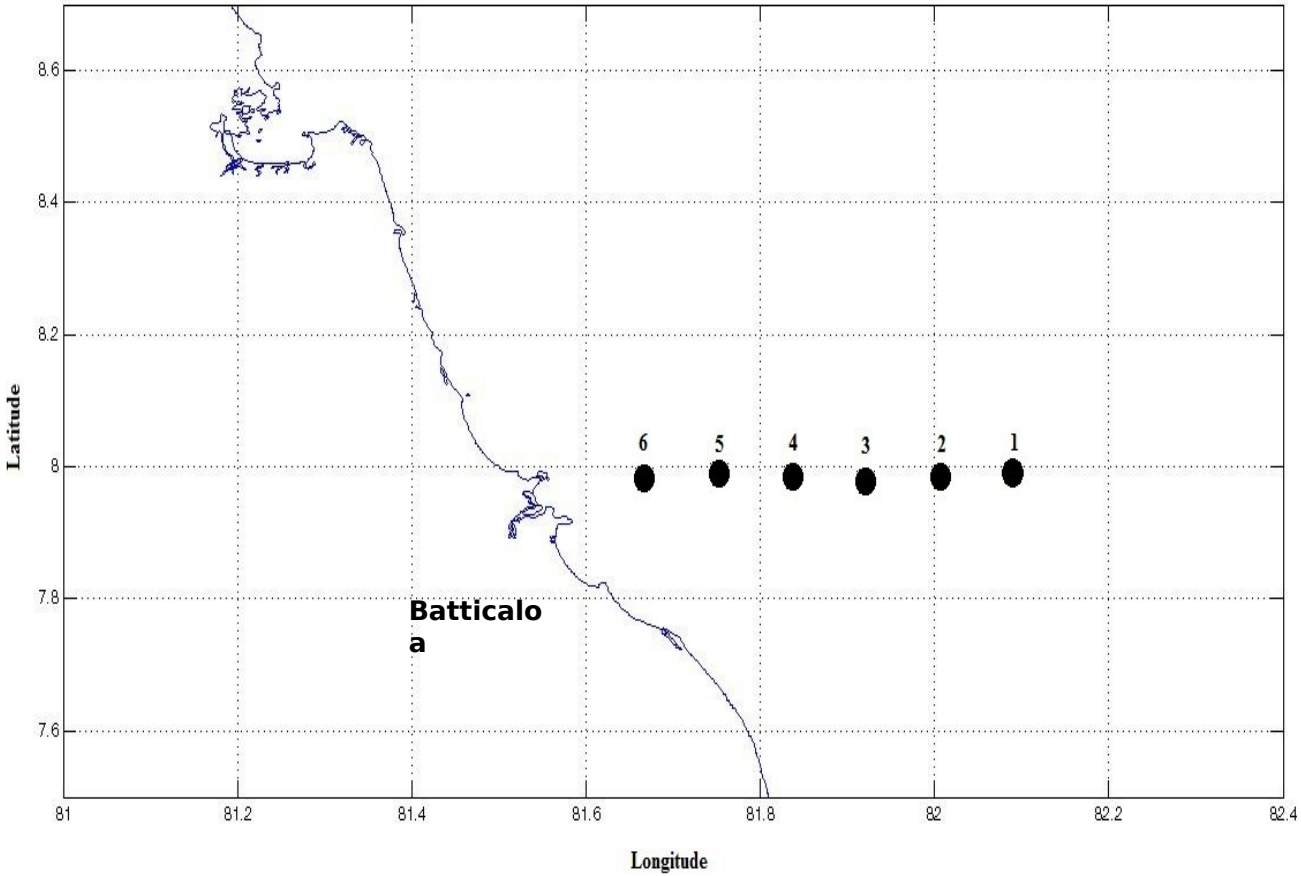
Vertical profile of bioluminescence intensity at sixth sampling point

- Bioluminescence intensity varied from site to site
- Bioluminescence was mainly observed from surface to 140 m depth
- Bioluminescence intensity was peaked in different depths mainly above the thermocline.
- Bioluminescence can be observed in mix-layer
- Observed bioluminescence could be mainly due to planktons

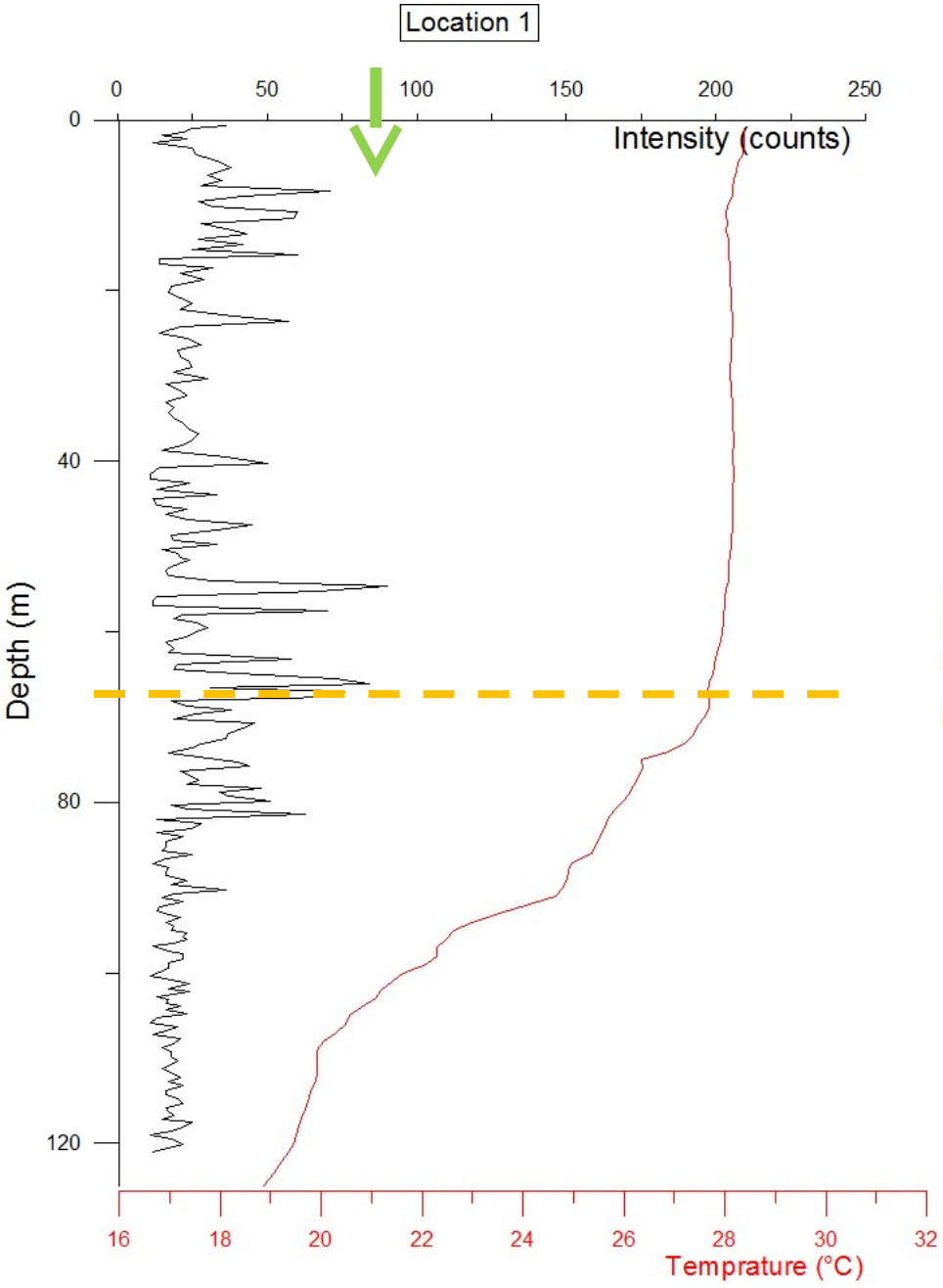
R/V Samuddrika

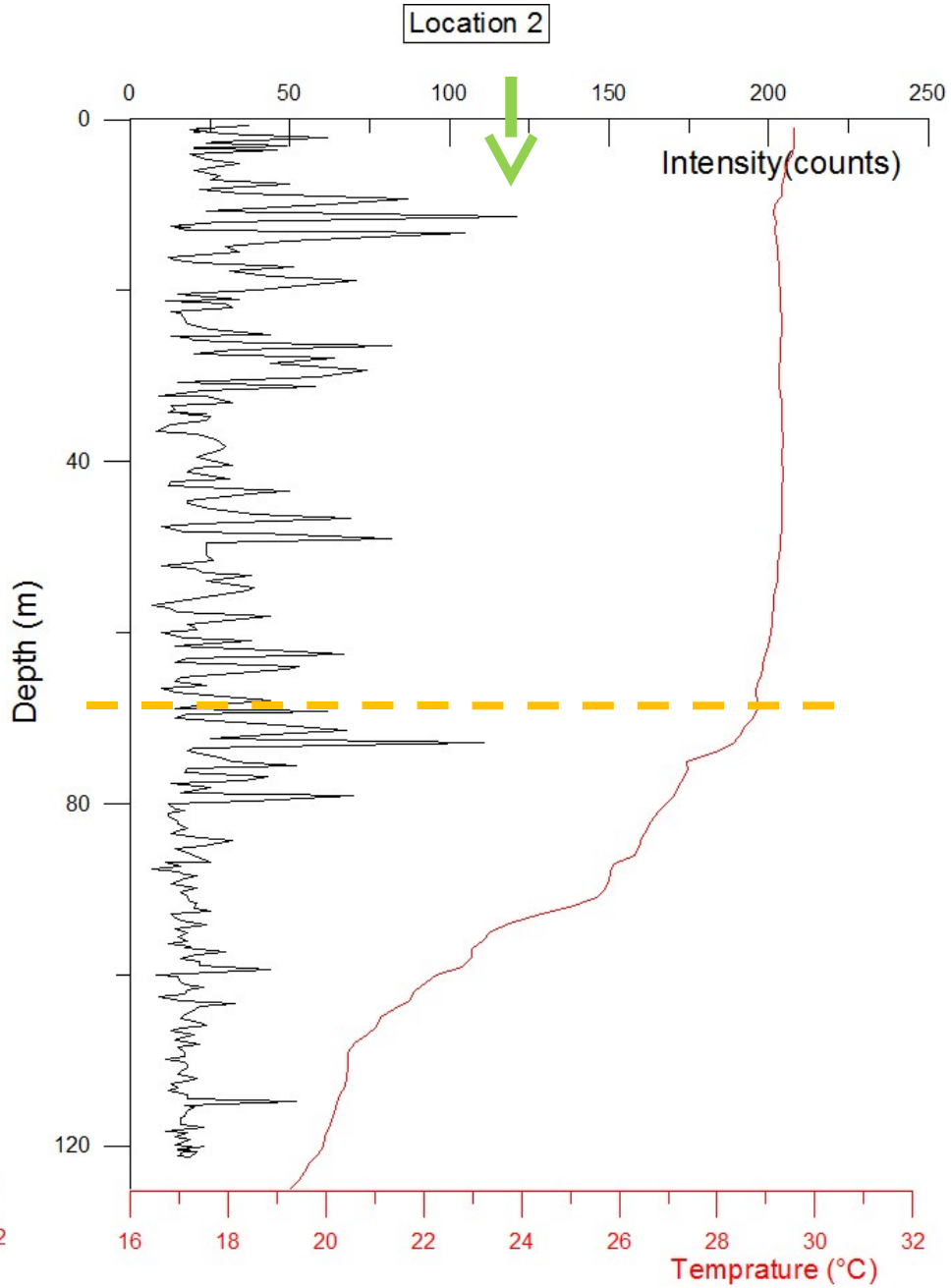
Data were collected 9th to 11th November 2015 using R/V Samuddrika.

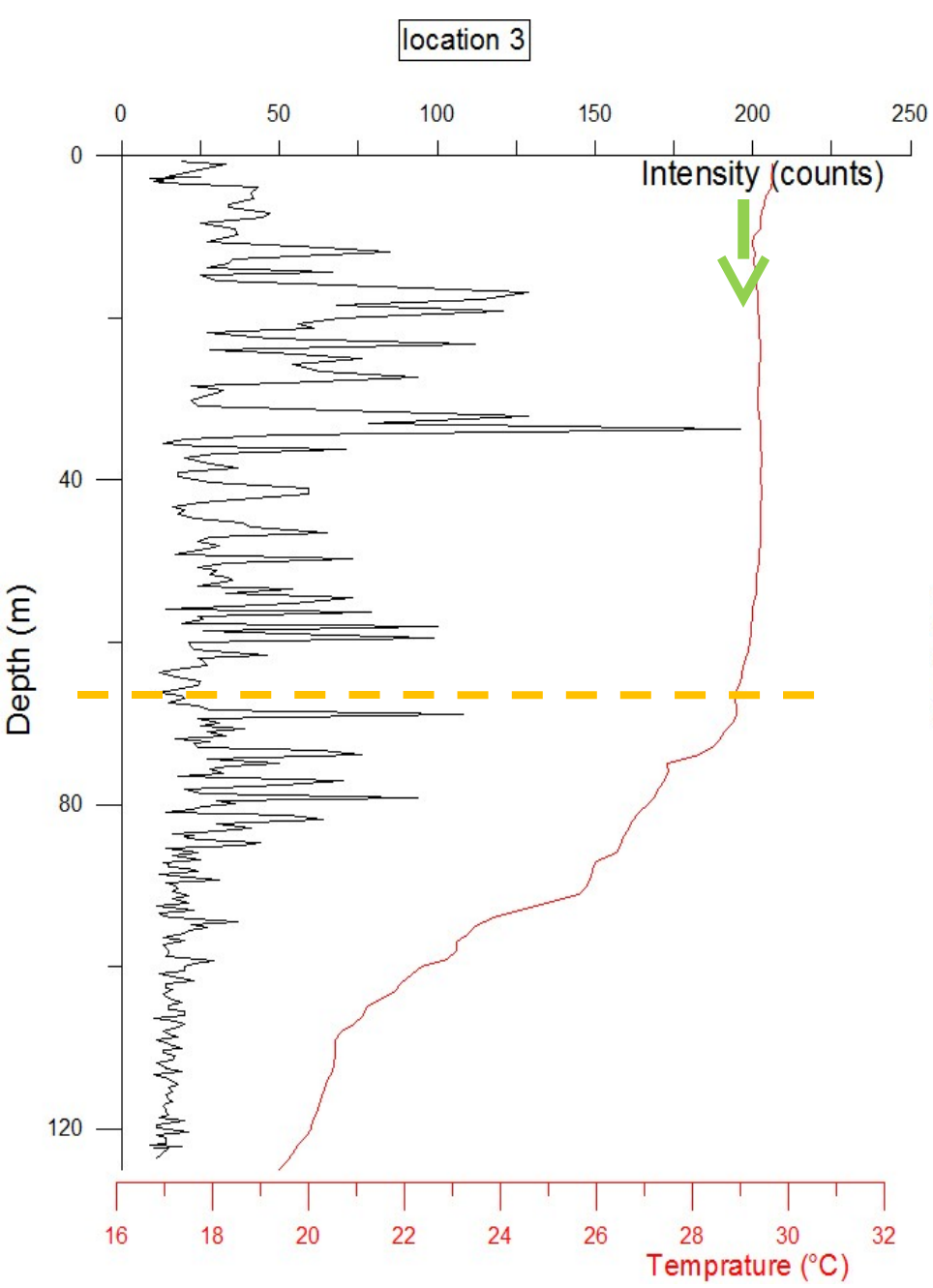


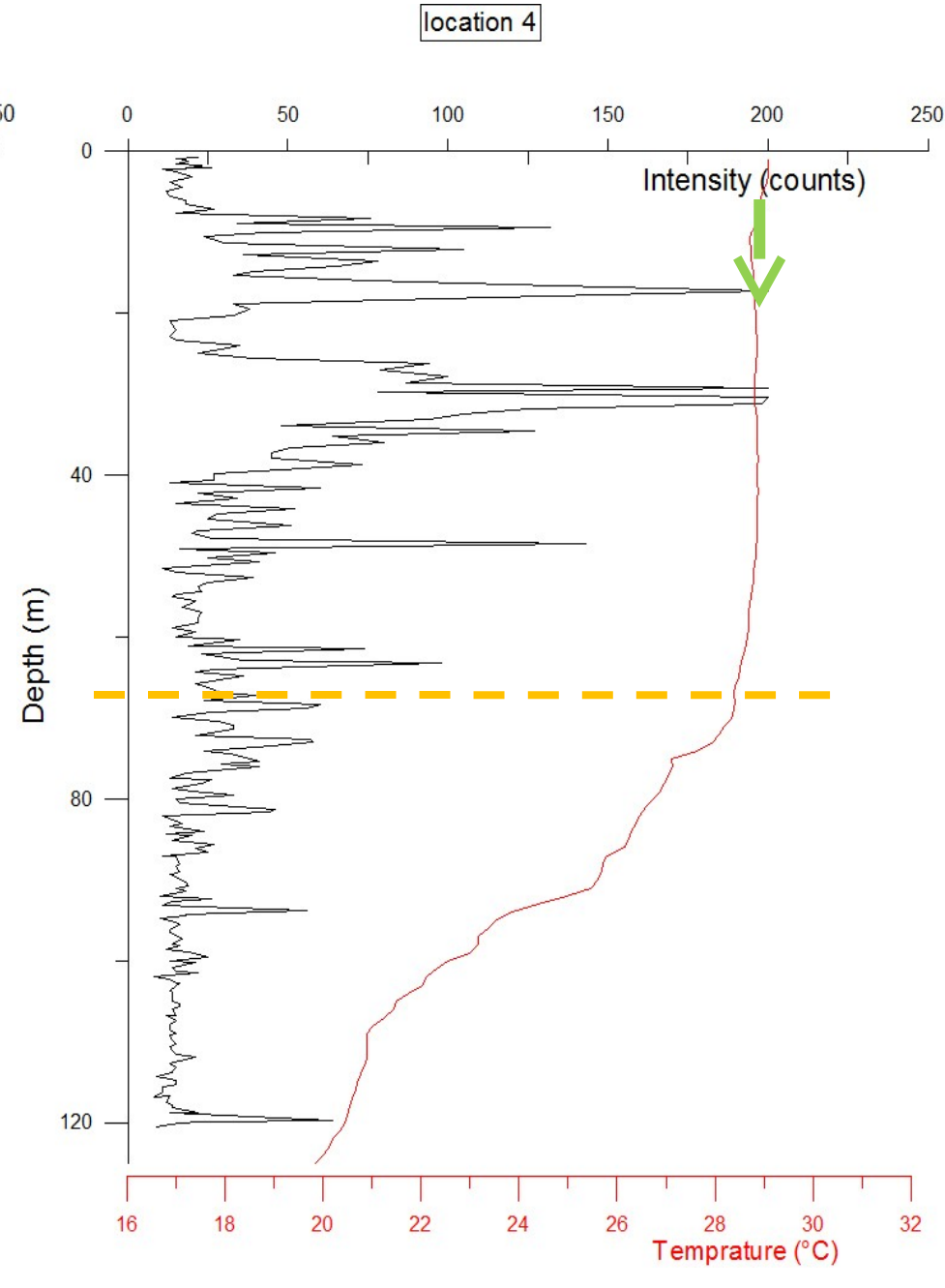


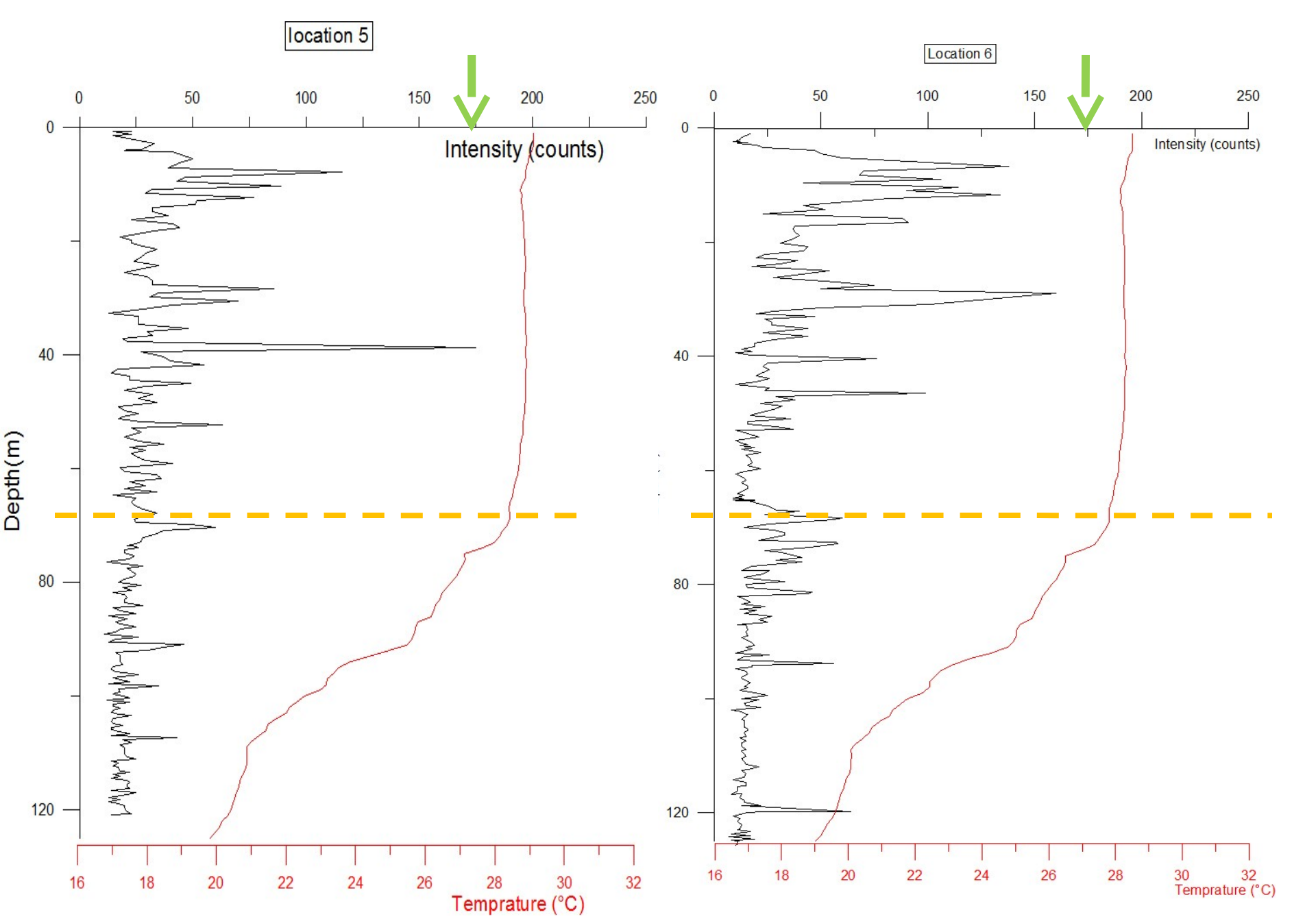
Six different sites encompassing 07º56’N ,81º38’E and 82º02’E,08º00’N


Location 1
0
50
100
150
200
250
Intensity (counts)
0
40
80
120
Depth (m)
16
18
20
22
24
26
28
30
32
Temprature (°C)


Location 2
0
50
100
150
200
250
Intensity(counts)
0
40
80
120
Depth (m)
16
18
20
22
24
26
28
30
32
Temprature (°C)

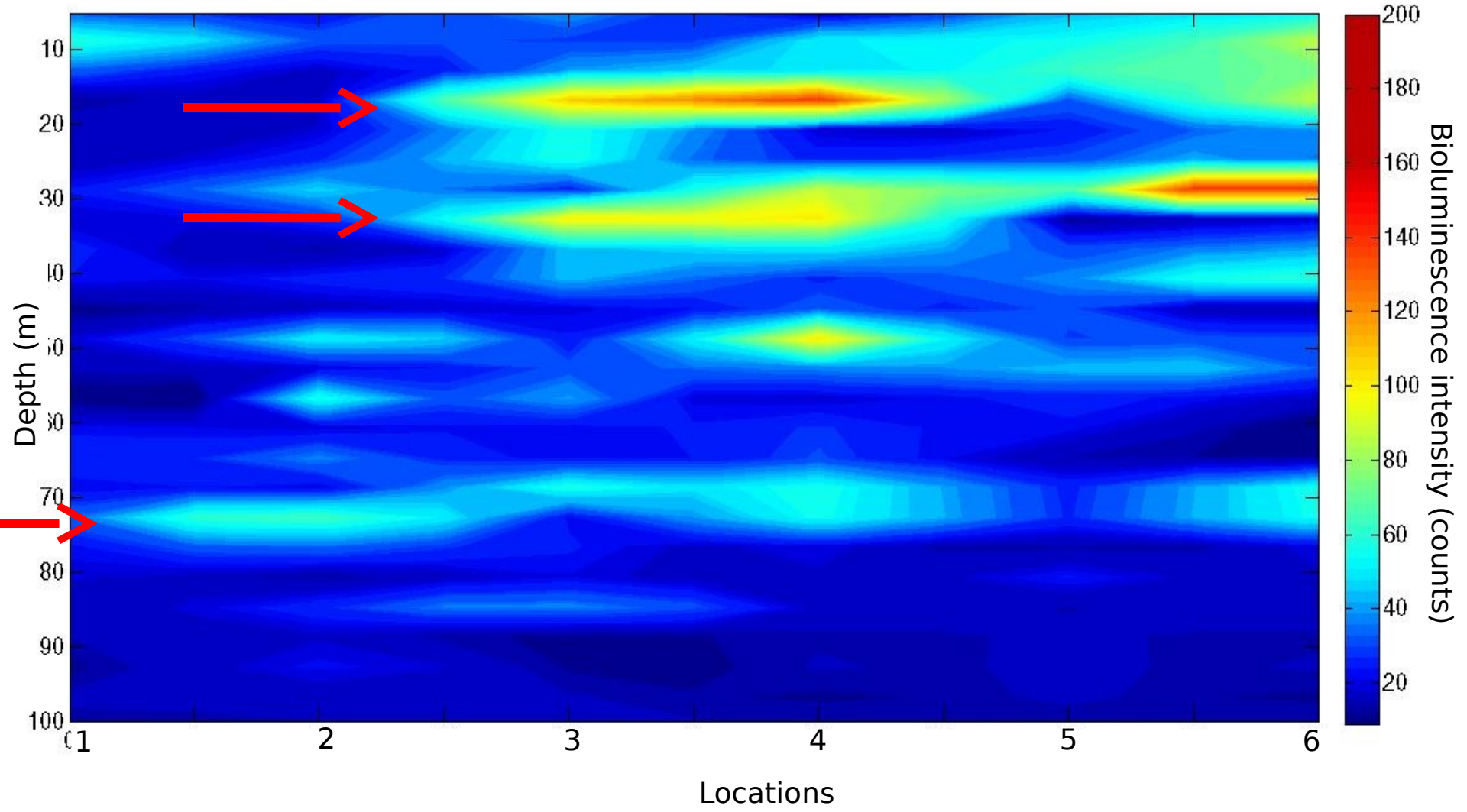

location 3
0
50
100
150
200
250
Intensity (counts)
0
40
80
120
Depth (m)
16
18
20
22
24
26
28
30
32
Temprature (°C)


location 4
0
50
100
150
200
250
Intensity (counts)
0
40
80
120
Depth (m)
16
18
20
22
24
26
28
30
32
Temprature (°C)


location 5
Intensity (counts)
0
50
100
150
200
250
0
40
80
120
Depth(m)
16
18
20
22
24
26
28
30
32
Temprature (°C)
Location 6
Intensity (counts)
0
50
100
150
200
250
0
40
80
120
16
18
20
22
24
26
28
30
32
Temprature (°C)

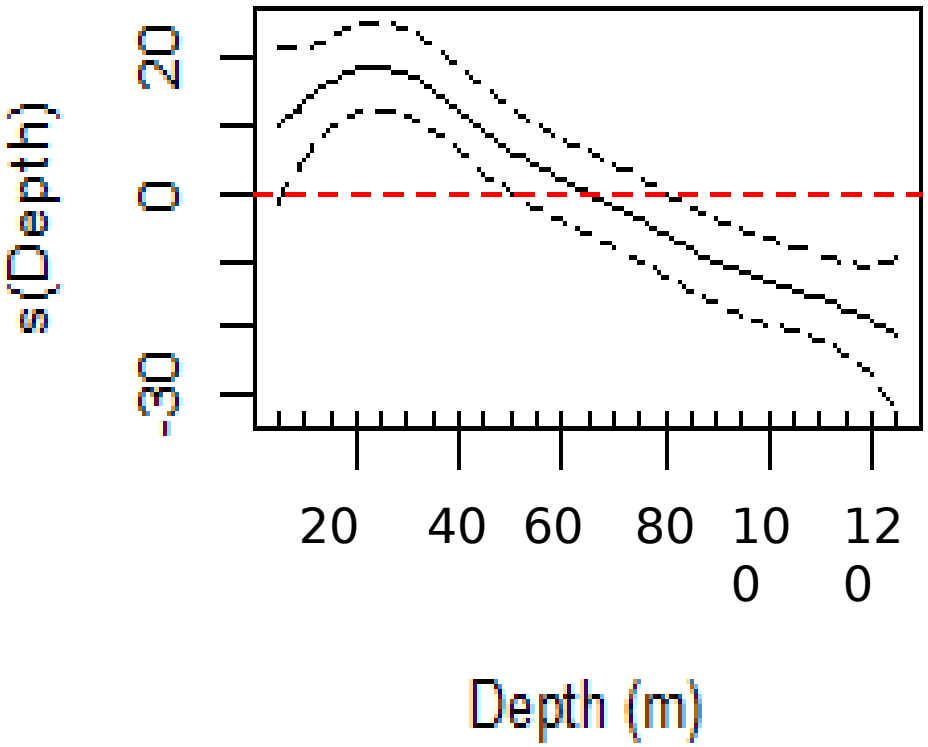
- Bioluminescence was in all the sampling sites with varied intensity
- Intensity ranged from 9 to 200 intensity counts.
- High bioluminescence observed from surface up to 70m.
- Below this layer up to 100m only few flashes of low intensity are generally recorded.
- High bioluminescence was observed above the thermocline.

Bioluminescence intensity distribution with depth



Depth VS Bioluminescence Intensity

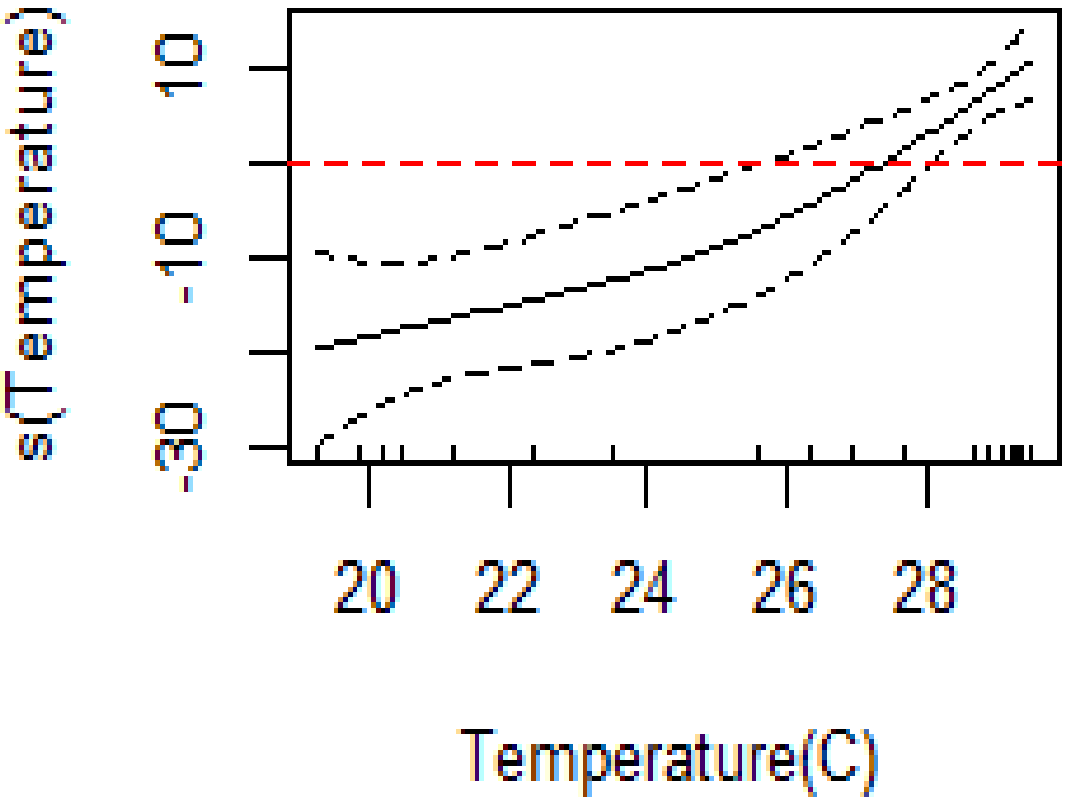
Generalized Additive Model (GAM) was used to identify the relationship



Bioluminescence intensity decreased with increasing depth

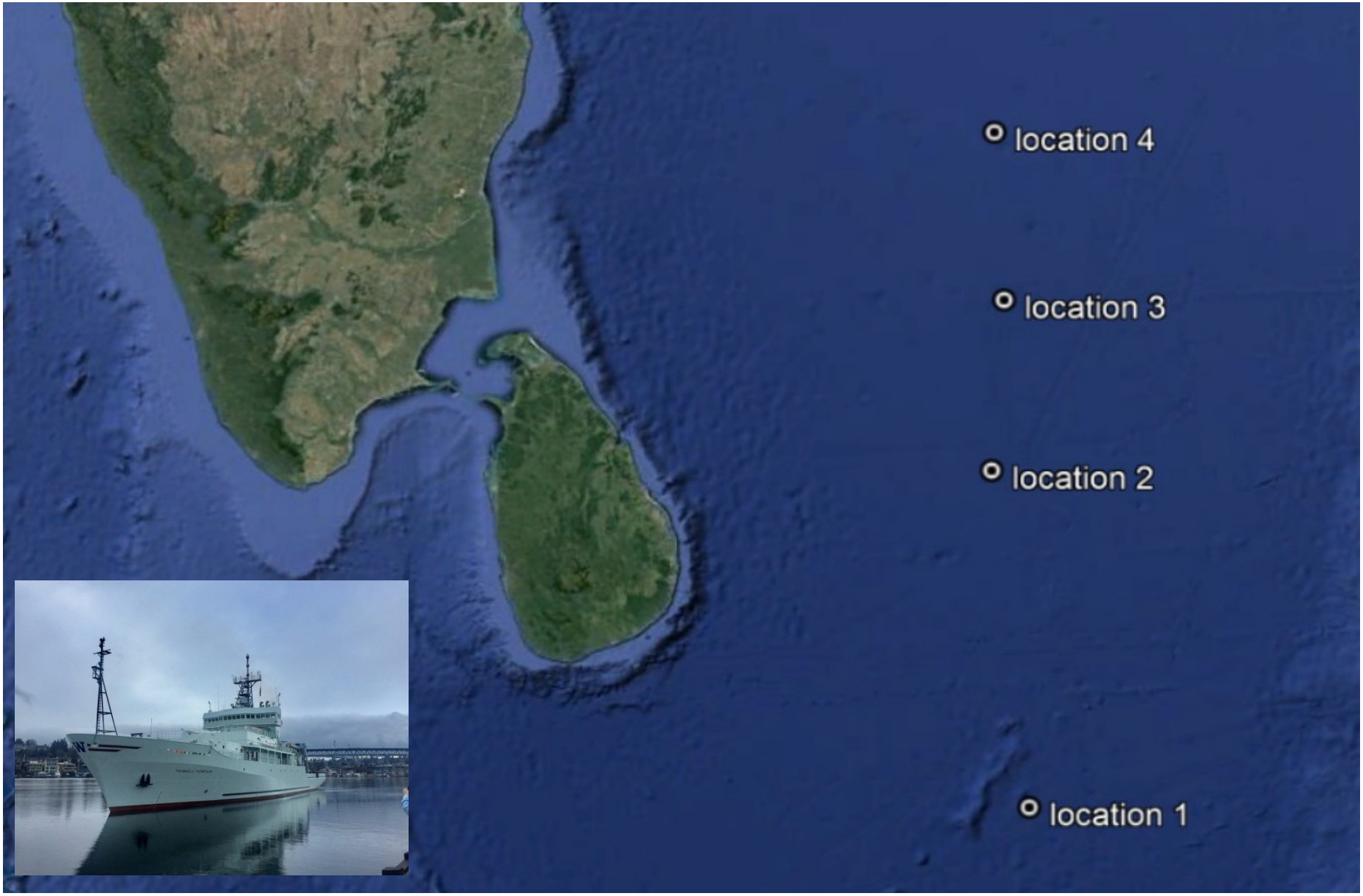
The highest intensity was in the shallow depths range from 20 - 40 m

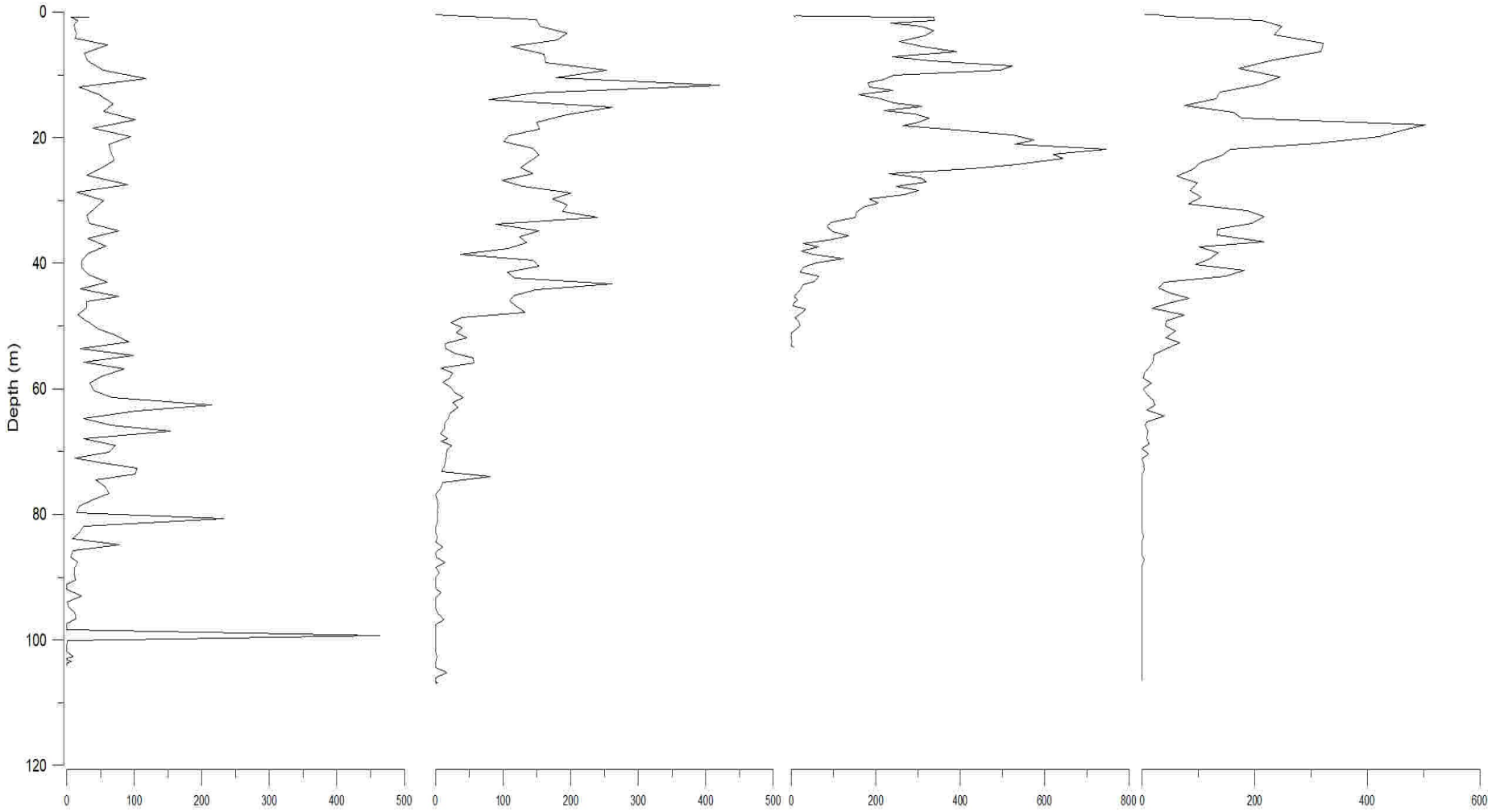
Vertical Temperature Profile vs Bioluminescence Intensity



Bioluminescence intensity increased with increasing Temperature

RV Thomas G. Thompson





Location 1

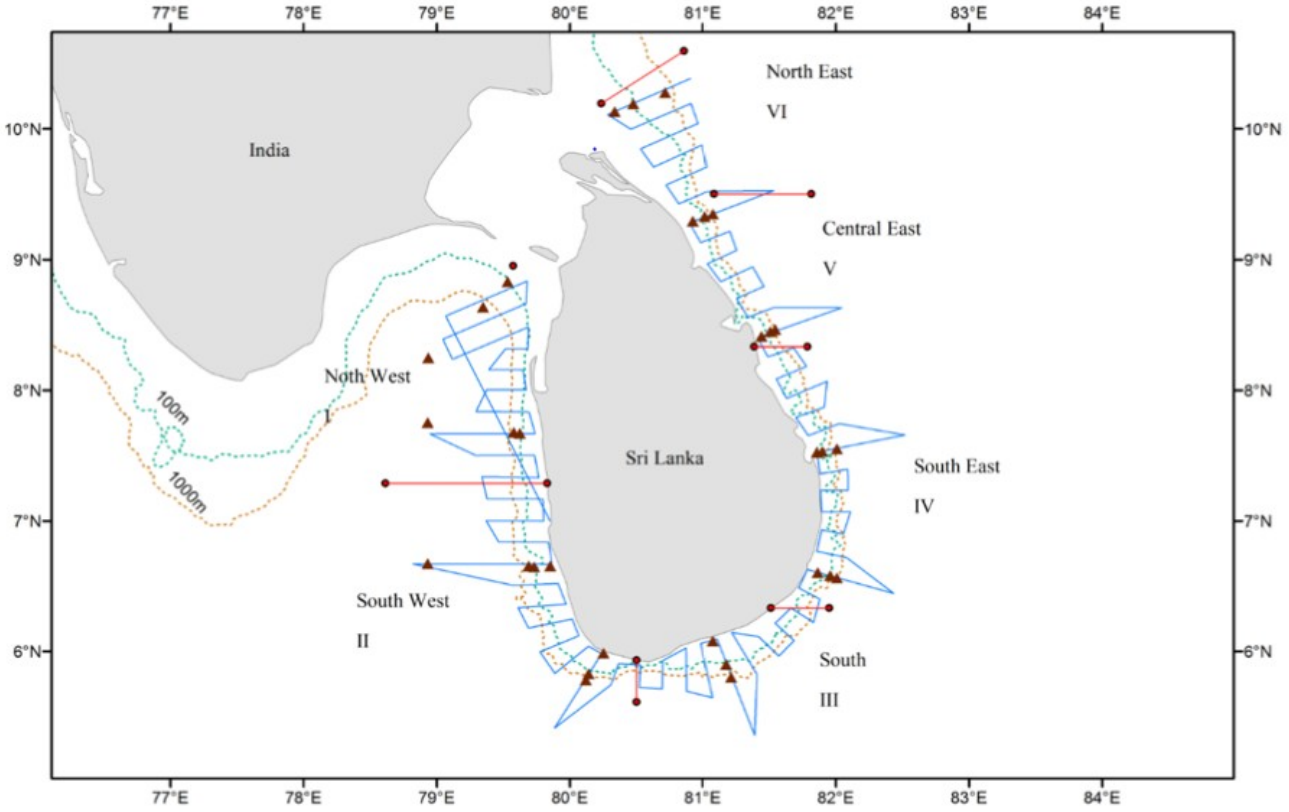
Location 2

Location 3

Location 4

RV Dr Fridtjof Nansen

Duration – 23rd June – 16th July 2018



Future Plans

- Microstructure measurements - Identify bioluminescent intensity variations with turbulence in the Sri Lankan dome
- Collect CTD data, water samples, zooplankton in same locations
- Conduct fixed station to observe bioluminescence intensity variations, every hour for 12 hours (from 6 pm to 6 am)

Acknowledgements

- ICTS members
- “Air-sea interactions in the Bay of Bengal from monsoons to mixing” workshop organizers.
- Prof. Harindra Fenando, University of Notre Dame for providing necessary facilities Under the project on Airsea interaction in the Northern Indian Ocean.
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- NARA, Sri Lanka

THANK YOU