

## **RV Sindhu Sadhana Cruise SSD 079**

(March 10, 2021 – June 6, 2021)



### **Project**

**Interactions between trace metals and marine biota in the Indian Ocean  
and its implications in nutrient cycling**

**TraceBioMe**

**MLP2018**

**CSIR - NATIONAL INSTITUTE OF OCEANOGRAPHY**

Dona Paula, Goa – 403 004

## Summary

The cruise SSD079 was organised as a part of the CSIR funded programme “**Interactions between trace metals and marine biota in the Indian Ocean and its implications in nutrient cycling**” TraceBioMe (2020-23). During this cruise, water and sediment samples were completed starting from Bay of Bengal, extending up to Southern Indian Ocean to Southern Arabian Sea, over a period of 89 days, amounting to around 9000 Nautical miles. The water samples were collected using CTD and specialised metal free CTD winch system, sediment samples were collected using spade corer and planktonic samples were collected multiplankton net and bongo net for surface planktons. Aerosol sampling was carried out through the cruise track for biological and geochemical parameters. Some microcosm experiments were also carried out on-board for understand the effect of elevated concentrations of trace metals on the microbial life in the water. The analysis of the samples collected from this cruise will give us first-hand information about the microbial life existing in the Indian Ocean and the effect of tare metals on these.

## Cruise Itinerary

March 14, 2021 – Sailed from Vishakhapatnam port

March 21, 2021 – Port Blair port

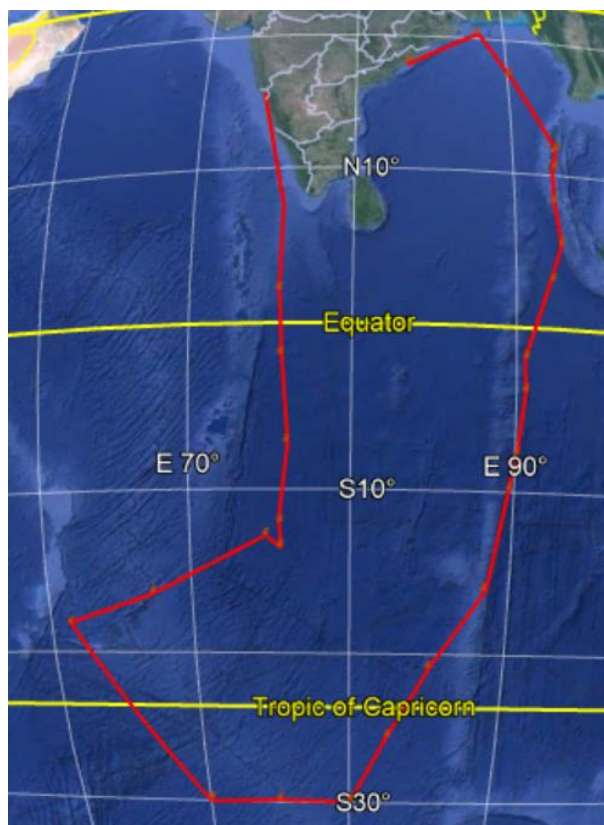
March 22 – Sailed from Port Blair port

April 28, 2021 – Outer anchorage of Port Louis, Mauritius

April 30, 2021 – Sailed from Outer anchorage of Port Louis, Mauritius

June 6, 2021 – Reached Mormugao Port

## Cruise track



### **Cruise participants (Scientific side)**

1. Dr. Samir R. Damare, Chief Scientist
2. Dr., Jagadish Patil Dy. Chief Scientist
3. Dr. Subha Anand
4. Dr. Krushna Vudamala
5. Mr. Babasaheb Thorat
6. Mr. Anthony D'souza
7. Mr. Milind Naik
8. Mr. Kuldeep Kumar
9. Mr. Kallathian
10. Dr. Srinivas Bikkina
11. Dr. Muruganathan
12. Dr. Vekatesh Chinni
13. Ms. Shruti Shah
14. Ms. Natasha Barnes
15. Ms. Komal Patil
16. Mr. Pranoy Paul
17. Mr. Sathish K
18. Mr. Akshay Naik
19. Mr. Conroy Alvares
20. Ms. Nirmallya Malla
21. Ms. Chhaya Yadav
22. Mr. Namandeep Singh
23. Mr. Tapas Chakraborty\*
24. Mr. T. K. Jena\*

\*DD staff. Disembarked at Port Blair.

**GEOTRACES Contact Person : Sunil Kumar Singh**

### **Introduction**

The importance of Trace Metals (TMs) in the oceanic processes is well acknowledged. However, not much is known about the role of TMs in the Indian Ocean, with the exception of their levels described in the Northern Indian Ocean under GeoTraces program. The effects of TMs have not been well-documented for the Indian Ocean. The current project envisages to fill the research gaps by quantifying TMs and characterising their interactions with the biotic life in the Indian Ocean. The effect of TMs on the kind of biota it supports or suppresses are being investigated under this project. The response of the biotic life with respect to the genes and proteins expressed by them is studied. Along with TMs, stable isotopic forms are also studied to understand the movement of water masses and thereby circulation in the Indian Ocean. The stable isotopes are also useful tools as tracers of biological, geochemical and ecosystem processes and food web analyses. The aerosol

contribution will give us idea about the potential effect it can have to the levels of Trace Metals and other abiotic as well as biotic factors in the oceans.

### **Cruise objectives**

The main objectives of the cruise were:

1. Trace metal and geochemical parameter measurements in the water column and the sediment.
2. Measurement of isotopes in the water and sediment
3. Microbial diversity assessment using modern molecular tools.
4. Phytoplankton physiology using Variable Fluorescence Fluorometry.
5. Aerosol measurements along the cruise track

### **Work done**

Water and sediment samples were collected across 23 stations combined during both the legs of the cruise starting from Bay of Bengal to Southern Indian Ocean to Arabian Sea via Central Indian Ocean Basin. The water samples were collected using Ship CTD and metal free Clean CTD system (GEOTRACES - India). The sediments were collected using the spade corer available on the vessel having a box size of 50 x 50 x 50 cm. The plankton samples were collected multiplankton and bongo net available on vessel. The aerosol collections was done along the whole cruise using the sir samplers carried with us and fitted on to the vessel. The pCO<sub>2</sub> was measured along the whole cruise using the pCO<sub>2</sub> system on the vessel. The details about the samplings are mentioned in the table below.

### **Weather during the cruise**

The weather was good in the first leg of the cruise, with intermittent roughness around the 90E ridge. But after May 10, rough weather was encountered. At one time, the vessel was sandwiched between extreme weather on the North of the vessel and at same time, severe low pressure was present on the South of the vessel

### **Station details**

<b>Station No.</b>	<b>Date of sampling</b>	<b>Latitude</b>	<b>Longitude</b>
<b>1</b>	16-03-2021	20.221960 ° N	88.041420 ° E
<b>2</b>	18-03-2021	17.000053 ° N	89.850143 ° E
<b>3</b>	23-03-2021	10.409575 ° N	92.647392 ° E
<b>4</b>	24-03-2021	7.999955 ° N	92.389938 ° E
<b>5</b>	27-03-2021	2.912536 ° N	92.156807 ° E

<b>7</b>	31-03-2021	4.000010 ° S	90.466652 ° E
<b>8</b>	02-04-2021	7.763914 ° S	90.028839 ° E
<b>9</b>	04-04-2021	9.999848 ° S	89.633202 ° E
<b>10</b>	08-04-2021	16.054068 ° S	88.295280 ° E
<b>12</b>	14-04-2021	25.500050 ° S	82.533234 ° E
<b>13</b>	17-04-2021	30.000233 ° S	80.000069 ° E
<b>14</b>	19-04-2021	30.000183 ° S	75.000198 ° E
<b>15</b>	22-04-2021	29.999458 ° S	70.000198 ° E
<b>16</b>	01-05-2021	18.274742 ° S	61.253899 ° E
<b>17</b>	05-05-2021	16.366720 ° S	67.274147 ° E
<b>18</b>	09-05-2021	12.935816 ° S	74.675713 ° E
<b>19</b>	13-05-2021	13.557499 ° S	75.557732 ° E
<b>20</b>	19-05-2021	13.557601 ° S	75.557564 ° E
<b>21</b>	21-05-2021	12.057520 ° S	75.557426 ° E
<b>22</b>	24-05-2021	7.324332 ° S	75.982498 ° E
<b>23</b>	27-05-2021	2.040900 ° S	75.565758 ° E