



GEO-SCIENTIFIC STUDIES OF THE EXCLUSIVE ECONOMIC ZONE (SK -366)

INTRODUCTION

In view of the inability of users to take up the planned cruise due to nationwide lockdown owing to COVID-19 pandemic, a new cruise SK 366 was taken up by NCPOR to complete the balance survey areas in Arabian Sea under a major national project Geo-scientific studies of the Exclusive Economic Zone (EEZ Programme). A detailed work plan for the cruise as submitted by DSEM group was duly approved by Director and the cruise SK 366 was taken up.

OBJECTIVES OF THE CRUISE

The primary objective of the SK-366 cruise was to undertake multibeam bathymetry in Arabian Sea in within the EEZ of India and to conduct CTD/SVP cast at different locations within survey area. Bathymetry survey of the track line of total length 3315km, covering total area of approx. 15,585 sq. km. was completed during the current cruise.

During the cruise, Side Scan Sonar system was also operated to check the data quality of the equipment.

The cruise started on 1st April, 2020 from Dubai port and reached Mormugao Port on 21th April, 2020 after successfully completing the planned objectives.

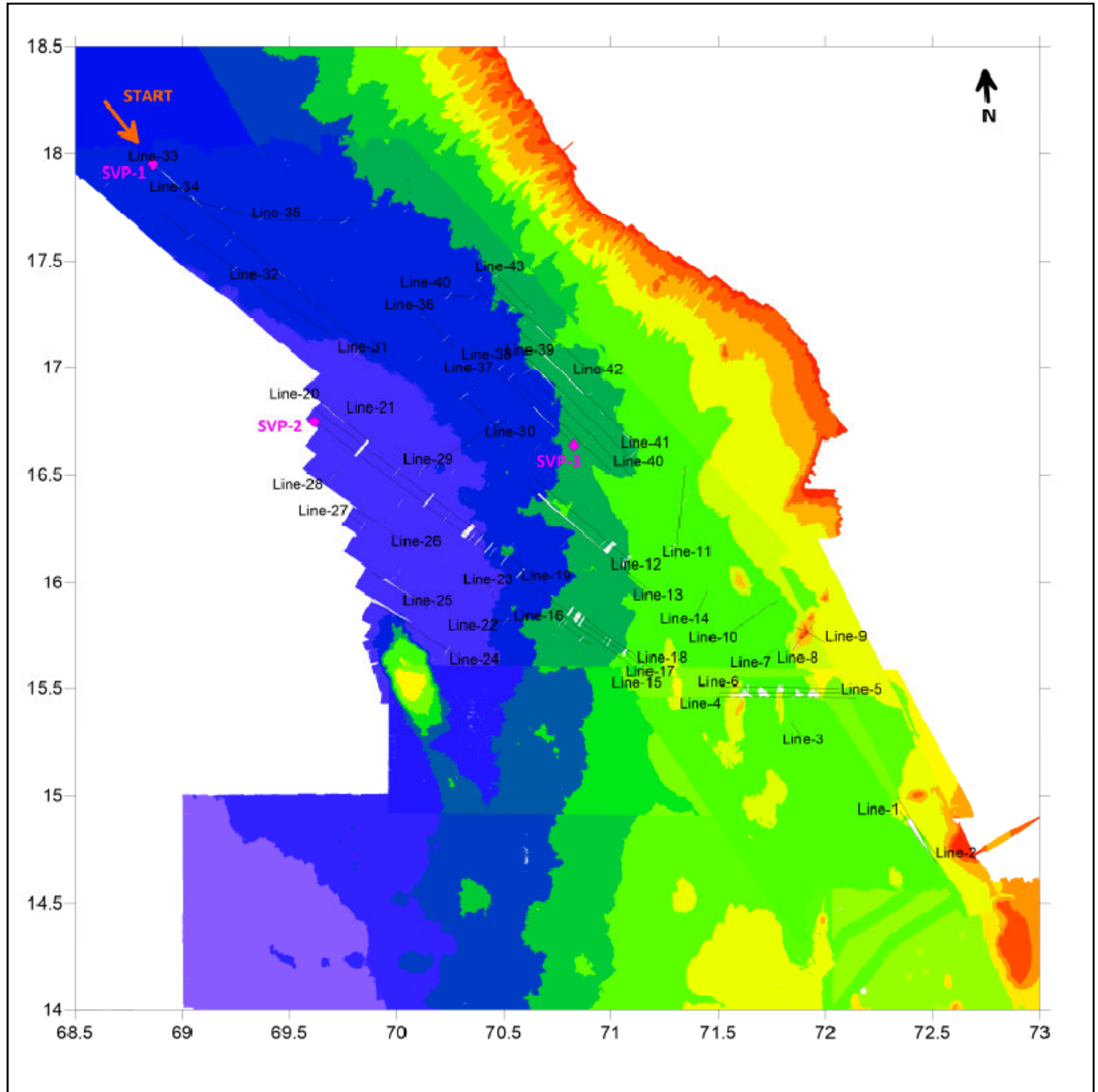
CRUISE TEAM

क्रम सं. / S. No.	नाम / Name	संगठन / Organization	Designation
1.	Mr. Bala Laxman Mhadgut	NCPOR, Goa	Chief Scientist
2.	Mr. Rahul Mavi	NCPOR, Goa	Shipboard Assistant
3.	Mr. V C Sarathchandran	M/s NorincoPvt. Ltd.	AMC Service Engineer
4.	Mr. Avertano Callistus Luis	M/s NorincoPvt. Ltd.	AMC Service Engineer
5.	Mr. Prakash Rajendran	M/s NorincoPvt. Ltd.	AMC Service Engineer



CRUISE TRACK

Name of the Vessel	ORV SAGAR KANYA
Cruise allotted days	21 days
Cruise commencing from & to	01 st April to 21 st April, 2020.
Purpose	Geo-scientific studies of the Exclusive Economic Zone in Arabian Sea
Port of Embarkation & Disembarkation	Dubai & Goa
Total track distance covered	3315km



Note: Distance, Cruise track are indicative and not as per navigational route. Station points are indicative and not to scale.

OBJECTIVEWISE DETAILS OF ACTIVITIES

Multibeam Bathymetry Survey in Arabian Sea.

The Multibeam survey was carried out using standard survey practices. Speed of the vessel was kept between 5 to 6 Knots during the survey. Navigational altitude information is provided by C-NAV DGPS system. Ship track was maintained within ±30 m. Following are the details of multibeam survey carried out during the current cruise.

Line No.	Start of the Line Location (Lat. N, Long. E)	End of Line Location (Lat. N, Long. E)	Start of the Line Date & Time (UTC)	Line Completion Date & Time (UTC)
Line 1	72.345829528965, 14.931670593495	72.51815139438, 14.685198107205	20.04.2020, 15.03	20.04.2020, 18.16
Line 2	72.510318582315, 14.733239354533	72.33225265472, 14.992766527596	20.04.2020, 18.45	20.04.2020, 22.05
Line 3	71.89189043113, 15.275187769801	71.841424961486, 15.344312740826	20.04.2020, 09.22	20.04.2020, 10.26
Line 4	71.497072345093, 15.457966067419	72.143793699773, 15.454573430804	20.04.2020, 00.26	20.04.2020, 07.20
Line 5	72.072124251287, 15.477473727954	71.503857618323, 15.481290444145	19.04.2020, 17.24	20.04.2020, 00.05
Line 6	71.512339209859, 15.503766661718	72.061946341443, 15.499101786372	19.04.2020, 11.13	19.04.2020, 17.06
Line 7	71.669907008467, 15.593940628217	71.770573293298, 15.688975232778	19.04.2020, 08.20	19.04.2020, 09.52
Line 8	71.842025236727, 15.671024251917	71.949379141879, 15.819559819045	19.04.2020, 05.42	19.04.2020, 07.40
Line 9	71.999360304278, 15.718541554197	71.863496017758, 15.79527319788	19.04.2020, 03.09	19.04.2020, 04.14
Line 10	71.493197791771, 15.725204455798	71.777889903626, 15.917395595282	18.04.2020, 21.45	18.04.2020, 01.23
Line 11	71.301719605661, 16.107790813285	71.344360110446, 16.537653199367	18.04.2020, 10.17	18.04.2020, 15.00
Line 12	71.116846918826, 16.075153113594	70.633038030217, 16.490782971829	17.04.2020, 23.34	18.04.2020, 06.20
Line 13	71.228470327248, 15.920070982381	70.602553462291, 16.450573691095	17.04.2020, 14.20	17.04.2020, 23.00
Line 14	71.375789784488, 15.807100621389	71.452121109483, 15.958999958128	18.04.2020, 18.48	18.04.2020, 20.37
Line 15	71.148194192358, 15.566577691398	70.729158793089, 15.88085424085	17.04.2020, 05.23	17.04.2020, 11.04
Line 16	70.730119883454, 15.840488445507	70.91080487213, 15.70305252327	17.04.2020, 0059	17.04.2020, 03.18
Line 17	71.191443258796, 15.570422052859	69.61551300491, 16.748211751603	14.04.2020, 17.30	15.04.2020, 13.57
Line 18	71.203910408317, 15.581943343933	70.806726829845, 15.888254586971	14.04.2020, 12.00	14.04.2020, 17.11
Line 19	70.698749562461, 15.993324121184	69.609403206357, 16.811058830381	13.04.2020, 18.42	14.04.2020, 10.31
Line 20	69.645167017515, 16.836190157141	69.881014853265, 16.649638385421	13.04.2020, 12.10	13.04.2020, 15.15
Line 21	69.754391629973, 16.781094556167	69.79982133604, 16.82265790427	13.04.2020, 16.44	13.04.2020, 17.23
Line 22	70.543703688764, 15.819188669386	70.420236250918, 15.829145720826	16.04.2020, 21.46	16.04.2020, 22.20
Line 23	70.438158943508, 15.983480018133	70.458073046387, 15.92672482493	16.04.2020, 19.11	16.04.2020, 20.33
Line 24	70.364144861143, 15.595265645909	69.877355679671, 15.923848343403	16.04.2020, 10.37	16.04.2020, 16.50
Line 25	70.146034038498, 15.87779234113	69.888508023252, 16.04925567776	16.04.2020, 06.15	16.04.2020, 09.28
Line 26	70.029292101488, 16.194444107953	69.793033809035, 16.353607589184	16.04.2020, 00.40	16.04.2020, 03.42
Line 27	69.776115226981, 16.314166700666	69.858098108997, 16.24782528956	15.04.2020, 22.11	15.04.2020, 23.17
Line 28	69.665999641155, 16.449756225987	69.726968762292, 16.519381456915	15.04.2020, 19.31	15.04.2020, 20.36
Line 29	70.090639301521, 16.503212708666	70.508977529625, 16.760087059256	13.04.2020, 04.51	13.04.2020,10.00
Line 30	70.517540007978, 16.691587232432	70.264335290967, 16.893417079324	12.04.2020, 23.13	13.04.2020, 02.41
Line 31	69.844720442464, 17.054842799595	69.348595840597, 17.384904904788	08.04.2020, 10.07	08.04.2020, 16.53
Line 32	69.336218511653, 17.396250789654	68.888571781486, 17.731470115239	08.04.2020, 17.05	08.04.2020, 23.15
Line 33	68.866911455833, 17.946010483614	69.896292646401, 17.056905687753	07.04.2020, 17.47	08.04.2020, 09.26
Line 34	68.964898643312, 17.805734088908	69.425954146502, 17.688149463933	09.04.2020, 00.35	09.04.2020, 05.53
Line 35	69.438331475447, 17.685055131697	69.819965784575, 17.691243796169	09.04.2020, 06.03	09.04.2020, 10.15
Line 36	70.097184553729, 17.296118331372	70.266727692601, 17.090170224031	12.04.2020, 07.55	12.04.2020, 10.49
Line 37	70.45186266371, 16.992949232961	70.82514910445, 16.637676615098	12.04.2020, 12.17	12.04.2020, 17.44
Line 38	70.473879558338, 17.009962287901	71.024301924041, 16.496568335891	11.04.2020, 19.42	12.04.2020, 03.34
Line 39	70.55600304252, 17.030555226907	71.101312064002, 16.489403331862	11.04.2020, 10.42	11.04.2020, 18.50
Line 40	71.127192350347, 16.544219736191	70.607128248347, 17.044087174036	11.04.2020, 01.47	11.04.2020, 10.09
Line 41	71.146792172675, 16.613559836753	70.324781034072, 17.423809289748	10.04.2020, 11.43	11.04.2020, 00.40
Line 42	70.911558460515, 16.975558382688	70.369214068591, 17.452560076789	09.04.2020, 21.57	10.04.2020, 06.15
Line 43	70.450239013891, 17.449946368876	70.646267107357, 17.256531983323	09.04.2020, 14.58	09.04.2020, 18.17
Line 44	70.195832491138, 17.345868187737	70.38576854033, 17.329929498294	10.04.2020, 08.08	10.04.2020, 10.11

Note - Prior to multibeam survey, multibeam system was calibrated by onboard Norinco Team and newly derived offsets values for Roll, Pitch and Yaw are 0.14, 0.97 & 1.0 respectively.

CTD/ SVP Data Collection

The vertical structure of sound velocity was obtained using SVP and CTD Cast and details for CTD/SVP operations are as follows:

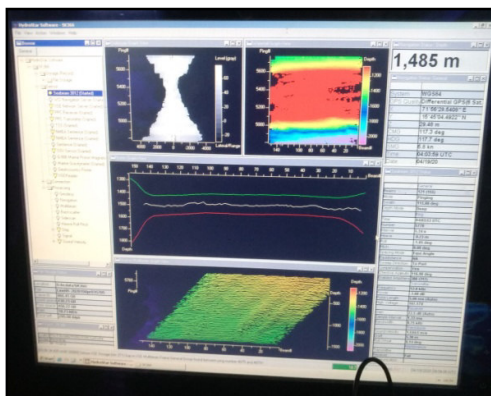
SVP/CTD No.	Date	Time (hrs)	Latitude (N)	Longitude (E)	Location Depth (mtrs)	Deployed Depth (mtrs)
Calibration	06.04.2020	16.10	21° 09.475	67° 49.152	2057	1800
SVP/CTD 1	07.04.2020	20.46	17° 56.416	68° 52.024	3401	3300
SVP/CTD 2	15.04.2020	22.24	16° 45.014	69° 36.887	3525	3500
SVP/CTD 3	13.04.2020	00.00	16° 38.101	70° 49.763	2750	2600

Side Scan Sonar Operation

Side Scan Sonar system was also operated during the cruise for testing purpose and details are as follows:

Date	Starting				Ending				Speed (Knots)
	Time (hrs)	Latitude (N)	Longitude (E)	Depth (mtrs)	Time (hrs)	Latitude (N)	Longitude (E)	Depth (mtrs)	
21.04.2020	10.00	15°10.10'	073°10.82'	93	13.40	15°10.10'	072°58.53'	185	3-4

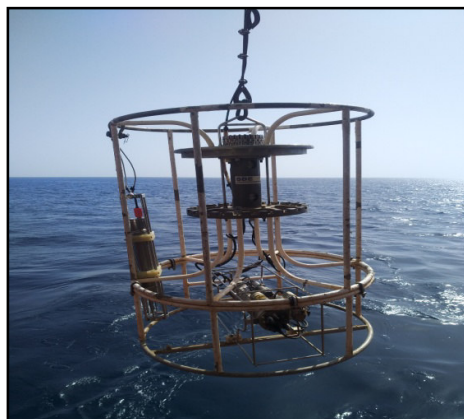
PHOTO GALLERY



Multibeam Echo-sounder Survey



Side Scan Sonar Operation



SVP/CTD operation

ACKNOWLEDGEMENTS

We express our sincere thanks to our Director, NCPOR for providing ORV Sagar Kanya ship for the successful completion of cruise.

We are thankful to Sh. M. M. Subramaniam, SIC-VOM and Vessel Operations and Management-NCPOR shore team for all the arrangements made during the cruise and the guidance & support of Dr. John Kurian, GD - DSEM and team for executing the survey successfully.

Our sincere thanks to Capt. Raja Ram Roy, Officers and Crew of ORV Sagar Kanya for their valuable cooperation throughout the cruise and for their help and support extended to complete the task.

We are also thankful to NORINCO team members for helping us at various stages for successful completion of the cruise.

DETAILS OF DAY BY DAY ACTIVITIES

04 - APRIL - 2020

- Shifting of computers and other scientific equipment to their respective locations
- Arrangements of scientific labs and cabins.
- Preparations for forthcoming Multibeam survey.

05 - APRIL - 2020

- Multibeam UPS battery charged. UPS is ready. Multibeam tested and working fine.
- CTD system assembled and kept ready.
- 2 fridges (Chemical lab/Multipurpose lab) placed in their location and working satisfactorily.
- CCTV cameras fixing is in progress.
- Testing of deck cranes.

06 - APRIL - 2020

- Preparation for calibration of Multibeam system.
- Shifting of Scientific equipment to their respective locations.
- CCTV cameras fixing is in progress.
- DSW testing is in progress.

07 - APRIL - 2020

- Multibeam calibration is in progress.
- Shifting of Scientific equipment to their respective locations.
- CCTV cameras fixing is in progress.
- Testing of deck cranes completed. ATLAS cranes working satisfactorily. Leakage was observed near N Oilwell crane hydraulic cooling fan. Engine staff are trying to rectify the issue.

08 - APRIL - 2020

- Multibeam calibration completed.
- SVP/CTD at Location SVP-1 completed.
- Multibeam bathymetry survey of Line 33 is in progress.

- Shifting of Scientific equipment to their respective locations.
- Pall Water Purification System shifted back to its original location and working satisfactorily.
- CCTV cameras fixing is in progress.
- Gallow Winch/ Jib Boom tested and working satisfactorily.

09 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 33, 32 & 31 completed and Line no. 34 is in progress.
- Shifting of Scientific equipment to their respective locations.
- CCTV cameras fixing almost completed. One camera to be fixed near CTD winch and it will be fixed after vessel reaches the port.

10 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 34, 35 & 43 completed and Line no. 42 is in progress.
- Shifting of Scientific equipment to their respective locations.

11 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 41, 42 & 44 completed and Line no. 40 is in progress.
- Shifting of Scientific equipment to their respective locations.

12 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 40, 39 & 38 completed and we are heading towards Line no. 36.
- Shifting of Scientific equipment to their respective locations.

13 - APRIL – 2020

- SVP/CTD at Location SVP-3 completed
- Multibeam bathymetry survey of Line no. 36, 37 & 30 completed and we are heading towards Line no. 29.
- Shifting of Scientific equipment to their respective locations.

14 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 29, 20 & 21 completed and Line no. 19 is in progress.
- Shifting of Scientific equipment to their respective locations.

15 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 19 & 18 completed and Line no. 17 is in progress.
- Shifting of Scientific equipment to their respective locations.

16 - APRIL – 2020

- SVP/CTD at Location SVP-2 completed
- Multibeam bathymetry survey of Line no. 17, 28, 27, 26 completed and we are heading towards Line no. 25.
- Shifting of Scientific equipment to their respective locations.

17 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 16, 22, 23, 24 & 25 completed and we are heading towards Line no. 15.
- Shifting of Scientific equipment to their respective locations.

18 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 13 & 15 completed and Line no. 12 is in progress.
- Shifting of Scientific equipment to their respective locations.

19 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 09,10,11,12 & 14 completed and we are heading towards Line no. 08.
- For Multibeam data quality improvement, change in OAR Boards was done as per OEM instructions. No improvement was observed. Results sent to OEM for further guidelines.
- Shifting of Scientific equipment to their respective locations.

20 - APRIL – 2020

- Multibeam bathymetry survey of Line no. 08, 07, 06 & 05 completed and Line No. 4 is in progress.
- Shifting of Scientific equipment to their respective locations.

21 - APRIL - 2020

- Multibeam bathymetry survey of all the lines planned for this cruise completed
- Side Scan Sonar was operated for testing purpose.
- Shifting of Scientific equipment to their respective locations.
- Vessel reached Mormugao Port at 22.39hrs.

