INTERNATIONAL HYDROGRAPHY ORGANIZATION

DIRECTORATE OF HYDROGRAPHY AND NAVIGATION (DHN)

BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY SUMMARY REPORT

Date of report: 06 NOVEMBER 2017

Course: BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY

Date: 02 to 06 October, 2017

Venue: Directorate of Hydrography and Navigation (DHN), Niterói, Rio de Janeiro, Brazil.

Instructors: Mr. Kenneth Cormier (Regional Manager Survey and Positioning Solutions of Oceaneering International, Inc.) and Mr. Luiz Azevedo (Technician of Oceaneering).

Instructional Support: Captain (Ret.) Helber Carvalho Macedo (Capacity Building Adviser - DHN) and Commander Mario Orlando de Carvalho Júnior (DHN - Officer in charge of Brazilian Navy Hydrographic School).

Opening Address: Captain (Ret.) Helber Carvalho Macedo (DHN)

Administrative Support: Captain (Ret.) Helber Carvalho Macedo (DHN) and Lieutenant Fábio Henrique da Silva (DHN).

Participants (17): Argentina (2), Brazil (11), Colombia (1), Mexico (1) and Uruguay (2)**(Annex A)**

Introduction

On 02-06 October, the Bathymetry Training Course using RTK Technology benefited countries in the area of the South West Atlantic Hydrographic Commission (SWAtHC). This course was held on behalf of the International Hydrographic Organization (IHO), Capacity Building Sub-Committee (CBSC). The SWAtHC invited representatives from two others Latin American Hydrographic Commissions, MACHC and SEPRHC.

This Training provided the opportunity to the Regional Hydrographic Community to discuss issues like as: positioning using RTK technology, installation of ground reference stations, datum to be used, calibration, RTK equipment configuration and operation, improving results and quality analysis in order to acquire a better bathymetry data that will lead the region to have a more reliable database, which will give consistency, quality and velocity to ENC and paper chart products. In addition, this training showed an overview about positioning using RTG technology.

Objective

The objective of this course was to increase the capacity of Latin American hydrographers to perform bathymetry using RTK technology.

Content

The Course content **(Annex B)** included all aspects of the positioning using RTK technology. The participants received lectures, instructional overviews, didactic material, and digital media covering: geodesy basic concepts, datum, GPS and DGPS theory, satellite navigation systems, RTK and RTG positioning, signal correction, accuracy verification, sources of errors, ground reference stations, Real Time Kinematic Surveying, results and quality analysis, planning of hydrographic survey and IHO guidelines.

The course was presented during a period of 5 days, which included practical exercises.

Instruction

Lectures was carried out by Mr. Kenneth Cormier and Mr. Luiz Azevedo, who shared the presentation duties. The instructors showed a great technical knowledge and they told to students their experience in hydrographic surveying.

A high level of interaction between the instructors and the participants was encouraged and achieved. All the participants were actively encouraged to discuss the course content and to resolve any doubt. They were invited to tell their experience in bathymetry positioning and the methods used in their Hydrographic Service.

During the course, all of the participants were provided with digital media containing copies of the class presentations. It is now their responsibility to share their knowledge and we are expected that they will become the instructors for the personnel in their Hydrographic Services.

Participants / Language

The language used during the course was Portuguese. However, the instructors endeavored to use the Spanish language to attend to specific requests made by Argentine, Uruguay, Colombia and Mexico representatives. The digital media of lectures was presented in Spanish. Thus this effort ensured that they achieved all teaching goals.

Facilities / Support

The instruction took place in a well-equipped room at the DHN. Accommodation, breakfasts and dinners for the students were at the HNiterói Hotel, a high quality hotel close to DHN. The DHN's support team performed local transportation, printed all the required documents and provided all the necessary support for the instructors and students. The instructors from Oceaneering provided the necessary equipment to perform the practical exercises. For future courses, the DHN shows up able to hold similar events.

During the course, students visited the newest hydrographic vessel of DHN (NPqHo Vital de Oliveira) and the IC-ENC Regional Office (International Centre for Electronic Navigational Charts - Latin America), based in DHN.

Acknowledgements

To the IHO/CBSC that funded the costs related to lectures, accommodation and flight tickets for foreign students. To the DHN that provided meeting room, didactic material, meals and local transportation.

Conclusion

This Training provided the opportunity to the Regional Hydrographic Community to learn issues related to bathymetry using RTK and RTG positioning technology, contributing to improve the consistency and quality of ENC and paper nautical chart. All the objectives were met and the overall assessment of the course, made by the analysis of the participants' feedback **(Annex C)**, recorded the score of 100% of answers rated at Very Good or Excellent.

Course photos

Official photo. DHN Director (VA Marcos Sampaio Olsen), Admiral Luiz Fernando Palmer Fonseca, Students, Instructors and the Support Team

Course closing ceremony

Students in the classroom

ANNEX A

LIST OF PARTICIPANTS, BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY, DHN, NITERÓI, RJ, BRAZIL

Instructors:

	Surname	**First Name**	**Country**	**Org.**	**Rank/ Title**	**E-mail:**	**Telephone**
1	Cormier	Kenneth	BRAZIL	Oceaneering	Mr.	kcormier2@oceaneering.com	+55 21 97631-0280
2	Azevedo	Luiz	BRAZIL	Oceaneering	Mr.	lazevedo@oceaneering.com	+55 21 97629-9606

Participants:

	Surname	**First Name**	**Country Organisation**	**Rank/ Title**	**E-mail:**	**Telephone**
1	Andrade Torres	Fernando Daniel	Uruguay SOHMA	Lt.	sohma_hid@armada.mil.uy	+00 598 94928726
2	Gonzalez da Roza	Lorena Natalia	Uruguay SOHMA	Lt.	lgonzales@armada.mil.uy	+00 598 99678502
3	Lucas Caballero	Mario	Argentina SHN	Lt.	mcaballero@hidro.gov.ar	+54 9 11 3083 2110
4	Anahi Rodriguez	Rocio	Argentina SHN	Sgnt.	rarodriguez@hidro.gov.ar	+54 9 11 539495645

5	Orozco Gonzalez	Rafael David	Colombia DIMAR - CIOH	P.O.	rorozco@dimar.mil.co	+57 3213014979
6	Loyo Illescas	Carlos David	MEXICO DIGAOHM-SEMAR	Lt.	velkancd@hotmail.com	+52 1 5517553245
7	Oliveira Toledo	Adilson	Brazil DHN - GNHo	Lt.	a.toledo@marinha.mil.br	+55 21 2189-1254
8	Pereira Lodi	Almir Freire	Brazil DHN - GNHo	Lt.	almir.freire@marinha.mil.br	+55 21 99374-1502
9	Saraiva Leontsinis	Daniel Martins	Brazil DHN - GNHo	Lt.	leontsinis@marinha.mil.br	+55 21 2189-3348
10	Rocha Lima	Fabio	Brazil DHN	Mr.	fabio.rocha@marinha.mil.br	+55 21 21893580
11	Monteiro Passamani	Fernanda	Brazil DHN - CHM	Lt.	passamani@marinha.mil.br	+55 21 2189-3253
12	Amaral Araújo	João	Brazil DHN - GNHo	Lt.	joaoamaralaraujo@gmail.com	+55 21 98206-7773
13	Martins Camelo	João Paulo	Brazil DHN - GNHo	Lt.	joao.camelo@marinha.mil.br	+55 21 2189-3058
14	Costa Medeiros	Lucas	Brazil DHN - GNHo	Lt.	costa.medeiros@marinha.mil.br	+55 21 2189-3584

15	Queiroz dos Santos	Maisa	Brazil DHN - CHM	Lt.	maisa@marinha.mil.br	+55 21 2189-3230
16	Campos Leite	Jorgio Almeida	Brazil DHN - CHM	Sgnt.	campos.leite@marinha.mil.br	+55 21 2189-3230
17	Soriano Quarenta	Thiago	Brazil DHN - CHM	Lt.	soriano@marinha.mil.br	+55 21 2189-3253

ANNEX B

SYLLABUS AND TIMETABLE

IHO - BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY				
SYLLABUS AND TIMETABLE – DHN 02-04 OCTOBER 2017				
Time	**Session**	**02 October**	**03 October**	**04 October**
0900-1000	**First session**	Welcome Administration Introduction of participants	Satellite Navigation Systems	Signal correction
1000-1015	Coffee			
1015-1230	**Second session**	Introduction Geodesy basic concepts	RTK positioning	Equipment configuration and operation
1230-1400	Lunch			
1400-1530	**Third session**	Geodesy basic concepts Datum to be used	RTK positioning	Accuracy verification Sources of errors
1530-1545	Coffee			
1545-1700	**Fourth session**	GPS Theory DGPS Theory	RTG positioning	Ground reference stations

IHO - BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY			
SYLLABUS AND TIMETABLE – DHN 05-06 OCTOBER 2017			
Time	**Session**	**05 October**	**06 October**
0900-1000	**First session**	Real Time Kinematic Surveying	Practical Exercise: RTK positioning
1000-1015	Coffee		
1015-1230	**Second session**	Real Time Kinematic Surveying	Practical Exercise: RTK and RTG positioning
		Results and quality analysis	
1230-1400	Lunch		
1400-1530	**Third session**	Planning of hydrographic survey	Practical Exercise Review
1530-1545	Coffee		
1545-1700	**Fourth session**	IHO guidelines	Lessons Learned
			Closing Remarks

ANNEX C

BATHYMETRY TRAINING COURSE USING RTK TECHNOLOGY – THE STUDENTS' FEEDBACK

Question	Bad	Regular	Good	Very good	Excellent	Total
The overall assessment of the course				5	12	17
The objectives were achieved			1	4	12	17
The instructors assessment, related to teaching techniques			1	4	12	17
The instructors assessment, related to positioning knowledge				4	13	17
The general organization of the course				5	12	17
The assessment of course support infrastructure			2	1	14	17
The assessment of the didactic material			1	5	11	17
Future perspectives - impact on future development			1	2	13	16

CAPACITY BUILDING SUB-COMMITTEE

PROCEDURE 8
Part 2

PROJECT FINANCE REPORT

(to be sent to mfa@iho.int, copy to adcc@iho.int)

IDENTIFICATION		IHB Use
Project Number (CBWP):	P-16 CBWP2017	
Project Name:	Bathymetry training course using RTK technology	
Project Leader:	Capitan (Ret.) HELBER CARVALHO MACEDO	
Contact Officer:	Capitan (Ret.) HELBER CARVALHO MACEDO	
Contact Officer's email/telephone:	helber.carvalho@marinha.mil.br / + 55 21 21893512 / + 55 21 995306758	
Organizing institution:	DIRECTORATE OF HYDROGRAPHY AND NAVIGATION DHN	

PROJECT DETAILS		IHB Use
Project commencement date:	02OCTOBER2017	
Project completion date:	06OCTOBER2017	
Venue:	DIRECTORATE OF HYDROGRAPHY AND NAVIGATION	
Scope of project:	The objective of this course was to increase the capacity of Latin American hydrographers to perform bathymetry using RTK technology.	
Number of participants:	17	

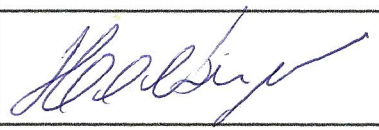
FINANCIAL DETAILS

Resources	Request	Allocated	Spent	Comments	IHB Use
Contribution by countries involved	xxx	xxx	xxx	DHN supports this Training with meeting room, meals (lunch and coffee break), local transportation and didactic material.	
Contribution from other parties	xxx	xxx	xxx	xxx	
Contribution from CBSC Fund (EUR)	18.000,00	14.400,00	12.670,50	xxx	

BREAKDOWN OF EXPENDITURES

Item description	Amount	Initially paid by	Charged to CBSC/IHB	IHB Use
Flights (EUR)	5.500,00	xxx	5.155,00	
Accommodation and dinner (EUR) **Conversion rate 1 EUR = 1,16 USD**	5.800,00	xxx	5.297,00	
Lecturers (EUR)	3.100,00	xxx	2.218,50	
Per diem	xxx	xxx	xxx	
Training	xxx	xxx	xxx	
Miscellaneous	xxx	xxx	xxx	

Annex A - List of foreign participants	(use template)			
Annex B - List of all participants	(use template 3)			
Annex C - Breakdown of Flights Tickets	xxx			

Annex D - Invoice of HNiterói Hotel	xxx				
Annex E - Invoice of Oceaneering - Lecturers	xxx				
(Copy of invoices, air tickets, and other justification necessary to justify the expenditures)					
(this template is available in Excel format)					
			Date:	16/NOVEMBER/2017	
			Signature:		
			Name:	HELBER CARVALHO MACEDO	
