

**INTERNATIONAL HYDROGRAPHIC
ORGANIZATION**



**ORGANISATION HYDROGRAPHIQUE
INTERNATIONALE**

IHB File No. TA-6-1

**CIRCULAR LETTER 87/2008
07 November 2008**

**MULTIBEAM COURSE
CO-HOSTED BY *THE NORWEGIAN HYDROGRAPHIC SERVICE***

Dear Hydrographer,

1 The IHB is pleased to inform you that the Norwegian Hydrographic Service will co-host the 50th UNB-OMB / UNH-CCOM Multibeam Sonar Training Course in Stavanger, Norway, from 16 to 21 March 2009.

2 Details of the course are provided in the enclosure and are also available from the Capacity Building section of the IHO Web site, under "Training Opportunities".

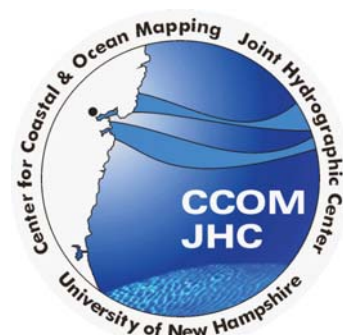
On behalf of the Directing Committee
Yours sincerely,

A handwritten signature in blue ink, appearing to be "H. Gorziglia", written in a cursive style. The signature is positioned above the printed name of the Director.

Captain Hugo GORZIGLIA
Director

Encl: 50th UNB-OMB / UNH-CCOM Multibeam Sonar Training Course Announcement.

**50th UNB-OMB / UNH-CCOM
Multibeam Sonar Training Course
Stavanger Norway, March 16 to 21, 2009**



**Co-hosted by
The Norwegian Hydrographic Service**

When: From 0800H Monday 16 March 2009
To 1630H Saturday 21 March 2009

Where: Victoria Hotel,
Skansegaten 1, 4006 Stavanger, Norway
<http://www.victoria-hotel.no/engelsk/index.cfm>
[58° 58' 23.34"N, 5° 43' 47.53"E]

Cost: The registration fee is USD 3,800 which includes course materials and lunch for 6 days, but not accommodation.

Accommodation: Is available at the Victoria Hotel
<http://www.victoria-hotel.no/engelsk/index.cfm>
from NOK1245 /night (single); NOK 1495 /night (double)
Breakfast is included.

For Bookings, contact hotel by 11 February 2009 at
<mailto:victoria@victoria-hotel.no>
Tel: +47 51 86 70 00
Fax: +47 51 86 70 10

For more details, do not hesitate to contact:

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Course Description

This six-day, 36-lecture course is designed to provide a theoretical and practical background in marine swath survey technology and techniques for hydrographic surveys, continental shelf boundary delimitation, offshore engineering, harbour dredging, fisheries habitat, route survey and scientific research, and provides overviews of:

- the technology and problems associated with shallow water multibeam surveys,
- processing and visualization techniques designed to address the complexities of swath mapping,
- constraints on using swath bathymetry to produce highest quality data.

Day	Lecture	Topic	Instructor	
Monday	INTRODUCTION AND REVIEW OF FUNDAMENTAL CONCEPTS			
	01	Historical Perspective and Course Overview	JHC	
	02	Fundamentals of Echo-Sounding	CdM	
	03	Oceanographic and Geologic Concepts	LM	
	04	Fundamentals of Sonar	CdM	
	05	Spatial Referencing Terms and Concepts	DW	
	06	Visualization Terms and Concepts	LM	
Tuesday	07	Hydrographic Performance Standards	DW	
	SWATH SONAR ISSUES			
	08	Sidescan Sonar Methods (Single & Multi-row)	CdM	
	09	Multibeam Sonar Methods	CdM	
	10	Bottom Detection Methods	CdM	
	11	Sidescan / Backscatter Imaging with Swath Sonars	JHC	
	ANCILLARY SENSOR ISSUES			
	12	Multisensor Integration for Swath Bathymetric Systems	JHC	
	Wednesday	13	Sound Refraction in the Water Column	CdM
		14	Refraction Operational Limitations due to Watermass Variability	JHC
		15	Horizontal, Vertical & Orientation Positioning Requirements	DW
16		Positioning Models and Methods I	DW	
17		Positioning Methods II	DW	
18		Error Estimation in Swath Methods	LM	
Thursday	SEABED ACOUSTIC BACKSCATTER			
	19	Acoustic Seabed Interaction Theory	CdM	
	20	Acoustic Backscatter Image Interpretation	JHC	
	21	Introduction to Seafloor Characterization	LM	
	22	Oblique Incidence Characterization Methods	CdM	
	SURVEY DESIGN AND QUALITY CONTROL			
	23	Survey Design and Planning	LM	
24	The Patch Test and Sensor to Ship Reference Frame Alignment	JHC		
Friday	25	Requirements for Decimetre Bathymetry	DW	
	26	Field Quality Control: Dynamic Error Recognition and Analysis	JHC	
	DATA PROCESSING			
Saturday	27	DTM Generation Methods & Pitfalls	CdM	
	28	Swath Bathymetry Data Cleaning – Interactive and Automated	JHC	
	29	Data Reduction for Chart Compilation Purposes	JHC	
	30	The Swath Processing Pipeline	LM	
	31	Impact and Management of Dense Digital Bathymetry	DW	
CURRENT & FUTURE TECHNOLOGY				
32	Alternative Approaches for High Density Bathymetric Data Collection	LM		
33	Characteristics of Available Swath Sonar Systems	CdM		
34	Operational Field Trials: Assessing Performance	JHC		
35	New Data Presentation Methods	LM		
36	Course Roundup and Discussion on Emerging Issues	ALL		

Advance preparation by attendees

This course is very intensive and fast-paced. Attendees come from various backgrounds and some have found they benefited from some pre-reading for the course. There is no mandatory preparation but we recommend the following resources be consulted by those feeling the need for such preparation:

Available at no cost:

International Hydrographic Organization Publication M-13 *Manual on Hydrography* (2005, corrected May 11, 2007), particularly chapters 2, 3, 4 and 7
http://www.iho.shom.fr/PUBLICATIONS/download_M13.htm

L3 Seabeam's *Multibeam Sonar Theory of Operations Manual* at
<http://www.mbari.org/data/mbsystem/formatdoc/>
(scroll down to "How Mapping Sonars Work" for 7 downloadable pdf files)

Chapter 11: "Acoustic multibeam survey systems for deep-draft navigation projects" in the US Army Corps of Engineers *Hydrographic Engineer Manual* (2002, corrected Apr 2004) free download at
<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em1110-2-1003/toc.htm>

Chapter 11 "Acoustic (single- and multibeam) and airborne sounding methods, sidescan and oblique sonars" de Jong, Lachapelle, Skone & Elema (2002) *Hydrography* 351 pp. ISBN 9040723591 Euro 29.50.
<http://www.vssd.nl/hlf/landmeet.html#hydro>

The MB-System Cookbook
<http://www.mbari.org/data/mbsystem/mb-cookbook/index.html>

Available for purchase:

Chapter 9: "Sonar" by Lloyd Huff and Guy Noll, in the book edited by David Maune (2007) *Digital Elevation Model Technologies and Applications: The DEM Users Guide, 2nd Edition* ASPRS publications, ISBN 1570830827 \$155
<https://eserv.asprs.org/eseries/source/Orders/index.cfm>

Chapter 8: "Underwater acoustic mapping systems" in Xavier Lurton (2002) *An Introduction to Underwater Acoustics: Principles and Applications* 347 pp. Springer Verlag ISBN 3540429670 \$159
<http://www.springer.com/west/home?SGWID=4-102-22-2225124-0&changeHeader=true>

R.J. Urick (1983) *Principles of underwater sound*, 3rd Ed. Peninsula Publishing, ISBN 0-932146-62-7 \$71 in the USA, \$76 international price.
<http://www.peninsulapublishing.com>

Registration Form
50th UNB-OMB / UNH-CCOM Multibeam Sonar Training Course
Stavanger Norway, March 16 to 21, 2009

Instructions:

Manual method - print this page, fill in, and **fax to +1-506-454-0352**.

Acrobat method - download free Acrobat Reader <<http://www.adobe.com/go/reader>>, open this document and fill in under Acrobat, save and **email to <dew@unb.ca>**

Name: _____

Company: _____

Address: _____

Phone: _____

Fax: _____

E-mail: _____

Briefly describe your past experience with Multibeam Sonar Systems; and/or

future plans for work with Multibeam Systems.

