



ORGANIZACION HIDROGRAFICA INTERNACIONAL

Dossier del BHI N° TA-6-1

**CIRCULAR No. 87/2008
07 de Noviembre del 2008**

**CURSO SOBRE LOS SISTEMAS DE SONDAJES MULTIHAZ
ORGANIZADO CONJUNTAMENTE CON EL SERVICIO HIDROGRAFICO NORUEGO**

Estimado(a) Director(a),

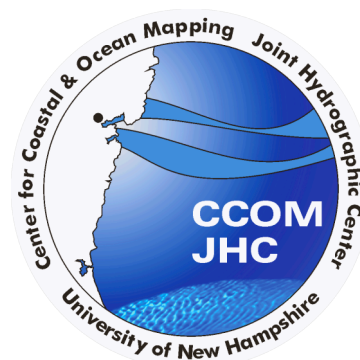
1. El BHI se complace en informarle que el Servicio Hidrográfico Noruego colaborará con la OHI en la organización del 50° Curso de Formación sobre Sondadores Acústicos Multihaz UNB-OMB / UNH-CCOM, que se celebrará en Stavanger, Noruega, del 16 al 21 de Marzo del 2009.
2. Se proporcionan los detalles del Curso (*en Inglés*) en el Anexo, y están disponibles también en la Sección de Creación de Capacidades del sitio Web de la OHI, en el apartado "Training Opportunities" (*Oportunidades de Formación*).

En nombre del Comité Directivo
Atentamente,

Capitán de Navío Hugo GORZIGLIA
Director

Anexo: Anuncio del 50° Curso de Formación sobre Sondadores Acústicos Multihaz UNB-OMB / UNH-CCOM.

**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	
	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
Saturday	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.
