

Outline  
of  
JICA Knowledge Co-Creation Program  
(Group and Region Focus)  
on  
**“Hydrography for  
Charting and Disaster Management  
(Internationally Accredited Category B)”**

# Program Objective and Outputs

## Objective

The course aims to improve the ability to collect, maintain, and manage the marine information as the basic technique of charting and disaster management.

## Outputs

- a) To acquire the hydrographic survey knowledge and techniques needed for preparing nautical charts, and to acquire Internationally Accredited **Category B for Hydrographic Survey** certification.
- b) To deepen the understandings of utilizing the bathymetric data from hydrographic survey for charting and disaster management (e.g. Tsunami).

This training course is recognized as a **Category B course for Hydrographic Survey** by **IBSC\***, one of the committees of the **International Hydrographic Organization (IHO)**.

\*IBSC . . . “FIG/IHO/ICA International Advisory Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers”

**IBSC** sets up a standard of competence for hydrographic surveyors, which is shown in the **IHO publication S-5**.

**S-5** indicates the minimum degree of knowledge and experience considered necessary for hydrographic surveyors, and provides a set of program outlines.

Participants will be given the certificate of Category B when you finish the course successfully.



**STANDARDS OF COMPETENCE  
FOR CATEGORY "B" HYDROGRAPHIC  
SURVEYORS**

**Publication S-5B  
First Edition  
Version 1.0.0 - January 2016**

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## A. INTRODUCTION

All components of the hydrographic surveying and nautical cartography professions face challenges as how best to ensure the continuance of high standards and how best to ensure the continuation of best practices based on minimum standards of competence world-wide. In order to achieve these objectives, three international organizations (FIG, IHO and ICA) have developed Standards of competence that institutions or professional bodies may adopt for their educational/training programmes and competency schemes.

Standards indicate the minimum competences considered necessary for hydrographic surveyors.

Standards recognize two levels of programme. Category A programmes introduces content and learning outcomes primarily from the underlying principles level. Category B programmes introduce them primarily from a practical level.

The intention is that a Category A qualified individual with appropriate experience, would be a senior professional in their chosen field (government, industry, academia). Category B qualified individuals with appropriate experience would be technical professionals preparing and delivering products and services to meet specifications and outcomes.



# Detailed syllabus

FIG/IHO INTERNATIONAL BOARD SYLLABUS – 11th EDITION				Course Cross-reference	
Item and Title	Level A B	Both Category B and A	Only for Category A	Hours	Volume & Page
<b>Essential 1: Bathymetry</b>					
<b>E1.1 Underwater acoustics</b>					
<b>(a) Acoustic Fundamentals</b>	F F	Distinguish between plane and spherical waves. Distinguish between sound speed and particle velocity. Describe the Active Sonar Equation. Define acoustic units, intensities and sound levels			
<b>(b) Generation of Acoustic Waves</b>	P F	Describe how acoustic waves are generated, define source level. Define frequency, wavelength, amplitude, pulse duration (pulse length), and pulse repetition rate.	Determine source level from typically available sonar specifications.		
<b>(c) Transmission of Acoustic Waves</b>	P F	Explain the causes of propagation loss and list the differences in water properties that affect propagation loss.	Explain how the acoustic medium affects the propagation of acoustic waves. Calculate propagation loss in practical situations, using water property observations and available tables.		
<b>(d) Sound Speed and Refraction</b>	P P	Describe effects of the physical properties of water on sound speed. Calculate sound speed from measurements of temperature, pressure (depth), and salinity (conductivity). Using available software tools, create a sound speed profile of the water column. Describe the effects of variation of sound speed in the water column on the path of sound rays through the water.	Explain the concept of a harmonic mean sound speed and determine the harmonic mean sound speed from water column observations. Describe the principles of refraction and ray path development and analysis. Determine the horizontal offset and travel distance for sound rays refracted through the water column.		
<b>(e) Reflection and Scattering of Acoustic Waves</b>	P F	Describe the characteristics of the seafloor and seafloor targets that affect the reflection of acoustic waves.	Define the characteristic impedance of an acoustic medium. Assess the effects of varying seafloor composition, texture, and slope on echo strength.		
<b>(f) Acoustic Noise and the Directivity Index</b>	P F	Identify the sources of noise in the environment and describe the effect of noise on echo sounding. Define the directivity index.	Calculate the effect on sonar range of a variety of noise conditions and sonar directivity circumstances.		

***Almost all the subjects in this course are arranged in accordance with the above detailed syllabus.***

# S-5 is available from IHO website. (<http://www.iho.int/srv1/>)



International Hydrographic Organization  
*Organisation Hydrographique Internationale*

ENGLISH FRANÇAIS

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 **IHO** welcome to the **International Hydrographic Organization**



**The Vision of the IHO** is to be the authoritative worldwide hydrographic body which actively engages all coastal and interested States to advance maritime safety and efficiency and which supports the protection and sustainable use of the marine environment.

**The Mission of the IHO** is to create a global environment in which States provide adequate and timely hydrographic data, products and services and ensure their widest possible use.

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## **In order to successfully finish the course...**

- **Participants are required to pass the examination, in principle, with a score over 60 points.**
- **and also required to keep a sincere and earnest attitude toward the course.**



# Course Closing Ceremony

Awarding the **certificate of Category B** by Director General of JHOD



Group Photo

Awarding the **certificate of course completion** by director of JICA Tokyo



**Pictures  
of  
the past training course**

**Lectures at JHOD office  
in Tokyo**





**Lectures at JHOD office  
in Tokyo**





# Onboard Training by JCG S/V “Meiyo”

**Group Photo in front of S/V “Meiyo”**



**Preparation for Bottom sediment survey using bottom sampler**



**Monitoring Survey data in the Survey data room on S/V “Meiyo”**



## Study tour

**Practice on up-to-date multi-beam survey system equipped with interferometric sonar.**



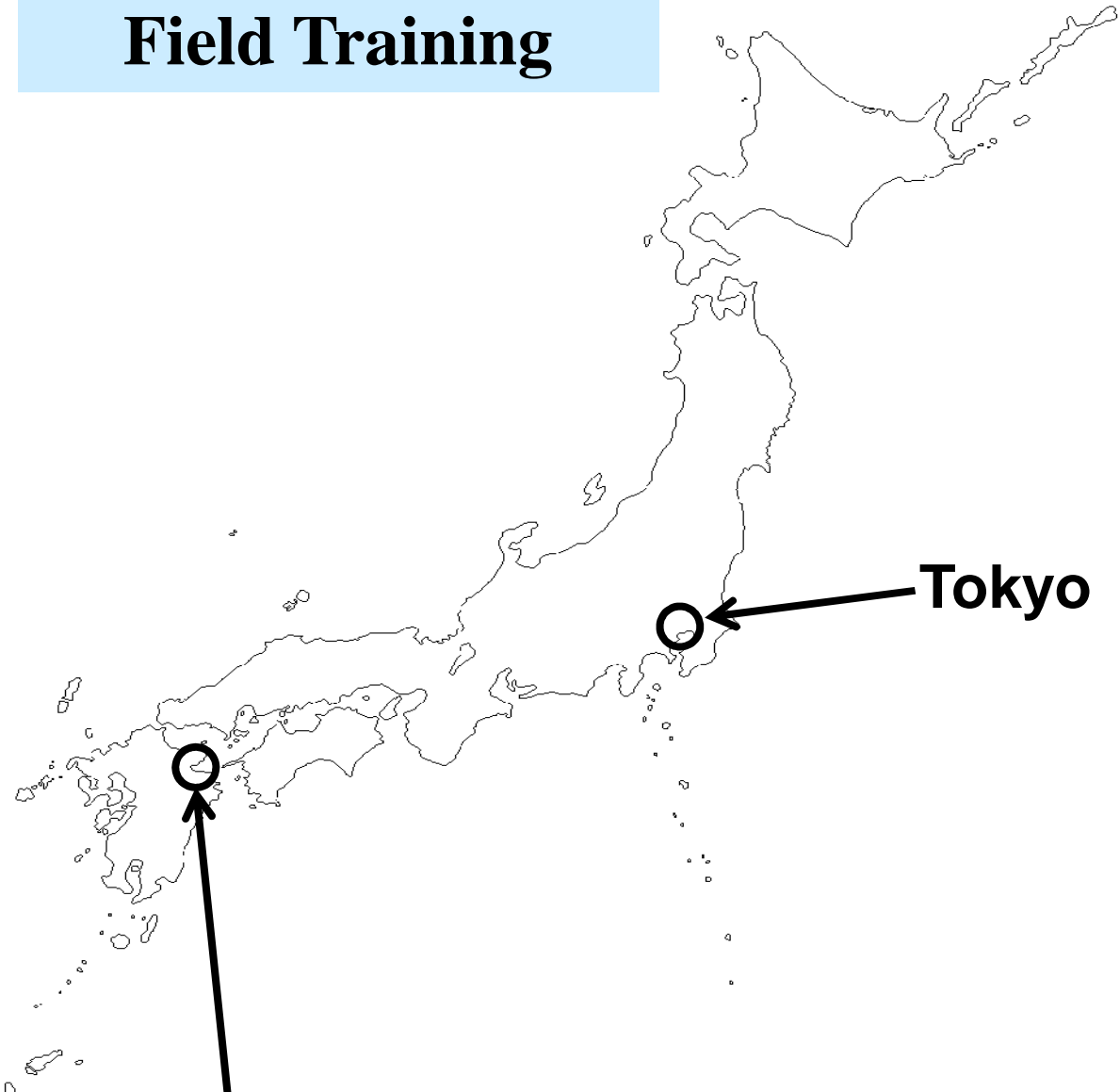
**Visit International Research Institute of Disaster Science (IRIDeS) of Tohoku University**



**Visit Onagawa Port in Tohoku Region, which was devastated by 2011 Great Earthquake and Tsunami.**



# Field Training



Tokyo

**Beppu**  
(Place for 2017 Field Training)

# 2016 Field Training in Beppu



**Courtesy call on Mayor of Beppu City**



**Courtesy call on Director of Oita CG Office**



**Establishment of Temporary Tide Station**



**Level Survey**



## 2016 Field Training in Beppu (cont.)



**Control Point (GNSS) Survey**



**Traverse Survey**



**Coastline Survey**



**Fixing Single-beam Sounding Equipment  
onto Chartered Boat**



## 2016 Field Training in Beppu (cont.)



**Single-beam Sounding by Chartered Boat**



**Guiding Chartered Boat**



**Side Scan Sonar Survey**



**Data Processing at Survey Site**

A photograph of a sunset over a large body of water. The sun is low on the horizon, creating a golden glow across the sky and reflecting on the water. In the foreground, the backs of several people wearing red life jackets and white caps are visible, suggesting they are on a boat or a pier. The text "Thank you for your attention!" is overlaid in white on the water.

**Thank you  
for your attention!**