Regional Training Course on an Introduction to Hydrographic Surveying

Suva, Fiji
24th September
To
05th October 2012
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INTERNATIONAL MARITIME ORGANIZATION

SUMMARY SHEET

Title of the seminar/course/workshop: Regional training course on an Introduction to Hydrographic Surveying

Host: Secretariat of the Pacific Community (SPC) and Republic of Fiji Navy (RFN)

Venue and date: Suva, Fiji – 24\textsuperscript{th} September to 05\textsuperscript{th} October 2012

Type: Regional

Organized by: SPC  Supported by: IHO, RFN and UKHO

No. of participants and no. of countries: 15 Participants from 12 Countries

Summary:

A regional training course to benefit countries in the area of influence of the South West Pacific and North Indian Ocean Hydrographic Regions on basic techniques of hydrographic surveying was held in Suva, Fiji, between the 24\textsuperscript{th} September and 5\textsuperscript{th} October 2012.

The principle aim of the course was to train a group of professionals in the basic techniques of hydrographic surveying with the objective of improving hydrographic capacity, so that beneficiary maritime authorities can provide IHO standard surveys to fulfil the basic requirements for SOLAS in their regions.

The course had an extensive practical element and embraced the principle of ‘learning by doing’. Assessment was conducted on a rolling, informal basis with the focus put upon allowing students to learn from their mistakes. An oral group assessment was conducted at the end of the course.

Whilst the course was successful it is obvious that without sustained, targeted follow up action and investment, it will be difficult to build meaningful capacity in hydrographic surveying in the region.

Key words: Hydrography, Survey, UKHO (United Kingdom Hydrographic Office)

Report ref.:
Programme No.TC/1202: Support to Small Islands Developing States (SIDS) and least developed countries (LDCs) for their shipping needs.
Global Activity No.02: Regional training course on an Introduction to Hydrographic Surveying.
WBS Element No. TC/1202-02-2000

Co-ordinator:
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1 Introduction

A regional training course to benefit countries in the area of influence of the South West Pacific and North Indian Ocean Hydrographic Regions on basic techniques of hydrographic surveying was held in Suva, Fiji, between the 24th September and 5th October 2012. The course was hosted by the Republic of Fiji Navy at the Walu Bay Naval Base. It was funded by IMO under the Support to Small Islands Developing States (SIDS) and least developed countries (LDCs) programme and organized in conjunction with the International Hydrographic Organization (IHO), the Secretariat of the Pacific Community (SPC), the Republic of Fiji Navy (RFN) and the United Kingdom Hydrographic Office (UKHO).

Much of the nautical chart coverage of the Pacific region is based upon old or incomplete survey data. Many of the SIDS in the region rely upon the larger Hydrographic Agencies around the world to conduct modern surveys and produce their charts. As the amount of commercial marine traffic increases, and more and more cruise liners visit remote areas of the region, the need to uphold the principles of the Safety of Life at Sea Convention (SOLAS) becomes ever more important.

The principle aim of the course was to train a group of professionals in basic techniques of hydrographic surveying with the objective of improving capacity, so that beneficiary maritime authorities can provide IHO standard surveys to fulfil the basic requirements for SOLAS in their regions.

The course was designed to have an extensive practical element and to embrace the principle of ‘learning by doing’. Lectures were designed to lead students through the first principles of surveying at sea and on to the processing and quality control of high resolution swathe bathymetry. A heavy emphasis was put on recognising potential sources of error and uncertainty as this is seen by the UKHO as the key consideration when conducting high order IHO S-44 surveys.

The participants were representatives from national maritime administrations. The training course was conducted in English and no interpretation was required.

2 Objective

The objective of the course as stipulated by IMO is;

*This course will have trained nationals from participating countries with some understanding of hydrographic surveying on the concepts associated with conducting hydrographic surveys to IHO standards.*
3 Venue, Dates, Roles and Participants

The two week course was held at the Walu Bay Navy base in Suva, Fiji, between the 24th September and 5th October 2012.

Detailed below is a summary of the organisations involved and their respective roles and contributions:

**IMO** – Principle organiser and funding agency.

**Secretariat of the Pacific Community (SPC)** – IMO regional representatives and course administrators.

**Applied Science Division of SPC (SOPAC)** – Technical administration/support. SOPAC co-ordinated the charter of the vessel and supplied their R2Sonic MBES system (and ancillary equipment), optical levelling equipment and the use of a minibus in support of the practical elements of the course.

**Republic of Fiji Navy (RFN) Hydrographic Service** – Provided a classroom (and audio visual equipment) at Walu Bay Navy Base for all theory and data processing elements, a survey vessel (FNS Lautoka), SBES system (and ancillary equipment) and a minibus to transfer students between the hotel and the Navy base.

**United Kingdom Hydrographic Office** – Provision and partial funding of two trainers (Mr Sam Harper and Mr David Parker).

**Hypack Inc.** – Supply of fourteen software licenses and a dedicated technician/trainer (Mr Jerry Knisley), in support of the data processing elements of the course.

In addition to the audio visual equipment supplied by RFN, SPC were advised by the UKHO to hire a number of high specification PCs to facilitate the processing of high resolution bathymetric data sets. In total six laptops were made available to students who did not have access to a suitable PC/laptop of their own.

The course was attended by fifteen participants from twelve countries with, Fiji, Cook Islands, Federated States of Micronesia, Kiribati, Myanmar, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu represented. A full list of participants can be found at Annex A.

Overall the trainers were impressed by the enthusiasm and interest that the students showed for the subject matter; however, the extremely broad range of prior hydrographic experience made teaching such a technical subject challenging.

Whilst the trainers noted that the Pacific region was well represented, it was felt that some students were not suitably qualified to fully benefit from the course. For example, some students did not possess sufficient computer literacy whilst others were from unrelated professions, such as maritime auditors or ship surveyors.
4 Cost
To be supplied by SPC

5 Activities and Proceedings

5.1 Pre-course Assignment
None supplied

5.2 Opening Ceremony
The course was opened by Dr Russell Howorth, Director of SPC Applied Geoscience and Technology Division. Dr Howorth stressed the importance of adequate nautical charting to the new and emerging economies of the region and acknowledged that currently, many of these charts are based on very old or incomplete survey data. Dr Howorth went on to say that “it is imperative that this inadequacy be addressed, if larger vessels, demanding stricter safety standards, are to service our region. Without these vessels, which are vital for trade and, increasingly, cruise tourism, development of the island economies of our region is at risk”. Dr Howorth also made the point that “the only way to manage and reduce the risks at sea is to be compliant with international standards” and that “campaigns to raise awareness of the safety and economic importance of hydrographic surveying and nautical charting services in the region” must be supported.

5.3 Course Proceedings
The course commenced with a session in which the students and instructors introduced themselves, and the structure of the following two weeks discussed. The students were encouraged to indicate what their background was with regard to hydrographic surveying, and asked to state what they hoped to get out of the course.

As it was evident that a very broad spectrum of skill levels was represented by the student body, the instructors emphasised that whilst there were core lectures and activities that had to be completed, they were flexible and willing to elaborate on any of the course material.

The course structure was designed to be heavily weighted in favour of practical exercises; whilst some theory in the form of formal lectures was required, this was structured in a logical way, with each lecture building upon the previous one, and interspersed with practical exercises where possible.

A brief outline of the course structure is detailed below (A full course outline can be found at Annex B):

N.B. Lecturers are indicated by their initials – Sam Harper (SH) and David Parker (DP)

Day 1 - Theory
Location: Classroom

Lecture 1  Introduction to Hydrographic Surveying (SH)
Lecture 2  Errors and Uncertainty (DP)
Lecture 3  Geodesy (SH)
Lecture 4  Horizontal Positioning and GNSS (DP)
Regional Training Course in Hydrographic Surveying  
Fiji, 2012

Lecture 5  Tidal Theory (SH)  
Lecture 6  Measuring Tides and Vertical Datums (SH)  
Lecture 7  Survey Control and Tide Gauge Calibration (DP)

**Day 2 – Fieldwork**  
Location: Downtown Suva

**Exercise**  
Optical levelling to establish vertical control and ‘pole to gauge’ tide gauge calibration (SH and DP)

**Day 3 – Theory**  
Location: Classroom

Lecture 8  Acoustic Theory (SH)  
Lecture 9  SBES Surveying Principles (SH)  
Lecture 10  SBES Calibration (SH)  
Lecture 11  MBES Basic Principles (DP)  
Lecture 12  Vessel Motion (DP)  
Lecture 13  MBES Calibration (DP)  
Lecture 14  Standards and Specifications (DP)  
Lecture 15  Survey Planning (SH)

**Day 4, 5 and 6 – Boat Based Fieldwork**  
Location: Suva Harbour

The students were split into two groups with each group spending 1.5 days calibrating and conducting a SBES survey and 1.5 days calibrating and conducting a MBES survey.

SBES operations supported by SH  
MBES operations supported by DP

**Day 7 – Data Processing**  
Location: Classroom

**AM**  
Processing levelling and tide gauge calibration results (SH and DP)  
Hypack processing software introduction (JK)

**PM**  
SBES survey data processing tuition (JK, SH and DP)

**Day 8 – Data Processing**  
Location: Classroom

**AM**  
SBES survey data processing ‘free time’ and consolidation (SH, DP and JK)

**PM**  
MBES survey data processing tuition (JK, SH and DP)
Day 9 – Data Processing and Quality Control
Location: Classroom

AM       MBES survey data processing ‘free time’ and consolidation (SH, DP and JK)

- *DP leaves at lunch*

PM       MBES survey data processing ‘free time’ and consolidation (SH and JK)
          Survey data QC (SH)

Day 10 – Quality Control
Location: Classroom

AM       Survey data QC (SH)

PM       Oral group summary/assessment (SH)
          Closing ceremony

5.4 Closing Ceremony
The course was formally closed on Friday 5\textsuperscript{th} October 2012 by Commander of the Republic of Fiji Navy, Cdr John Fox. Cdr Fox reiterated the sentiments of the opening ceremony and expressed his thanks to the trainers, SPC and IMO for delivering “one of the best courses” held in the region.

Certificates were presented to students by Cdr Fox and Sam Harper. Parting speeches were made by Sam Harper, Captain Johns Rounds (SPC) and Lt Cdr Gerrard Rokoua. Lt Cdr Rokoua asked the students to use the skills that they had learned to look after their respective country’s economic and environmental futures.

Finally Mr Vaipo Mataora, of the Cook Islands Ministry of Infrastructure and Planning, spoke on behalf of the student body and expressed his thanks to all involved in organising the course. Mr Mataora said that all of the students recognised the value of such a course and respectfully asked that it was held on a regular basis, so as to allow more professionals from the region to attend.

6 Assessment and Anticipated Outcome
The assessment of the students against the learning objectives was done on an informal, rolling basis. The high practical content of the course meant that formal progress testing would have been impractical. In addition a group summary and assessment session was held on Day 10. The IMO standard feedback questionnaire was distributed by SPC representatives with completed forms collected at the end of the course.

6.1 Assessment Results
The course was designed in such a way as to allow time for a subject or technique to be taught or demonstrated, and the students then given time to put into practice what they had learnt. This ‘learning by doing’ technique was a very effective means of both transferring knowledge and assessing the understanding of the subject matter.
In summary, it was judged by the instructors that all students reached an acceptable level competence in the basic principles of hydrographic surveying. However, due to the varied backgrounds and varied skill sets of the students, some students clearly showed a greater aptitude for the subject matter.

6.2  IMO Course Feedback Questionnaire Results
The full collated results table can be found at Annex C.

6.2.1  Arrangements Prior to the Activity
In general the administrative arrangements prior to the course start seem to have been fairly well received; however, concern was expressed by four delegates who indicated that they had not received their invitations in good time. One student even suggested that they received their invitation 1.5 days before the start of the course.

Six students indicated that they were given a pre-event assignment, even though one had not been set, and furthermore, indicated that it was useful! It is likely that these were either not concentrating on filling in the questionnaire or did not fully understand the question.

6.2.2  During the Activity
The students were divided as to the length of the course, with nine indicating it was ‘just right’ in length and six indicating that it was ‘too short’. Having discussed this with the students it was evident that those who felt it was too short either had significant prior survey experience and thus wanted to go into more detail, or those who had no prior experience and therefore wanted to go at a slower pace.

The venue, facilities and equipment supplied for the course were generally regarded as being excellent or good, however some comments were received indicating that the classroom was a little small for such a large group and that data processing would have been easier with more PCs.

The quality of written documentation, presentations and course activities were well received and judged to be either excellent or good. One student did not respond to the last question relating to the quality of ‘excursions’; the reason for this is unknown.

6.2.3  At the end of the Activity
The students were asked to grade both the lecturers on the content of their lectures, presentation, ability to transfer knowledge and effectiveness in answering questions and suggesting solutions to problems. The vast majority of students graded Sam Harper and David Parker as excellent or good for all aspects of their tuition.

Among the student’s favourite elements of the course were the survey practical, data processing and levelling exercises, whilst very few students identified any elements that were not of interest to them.

All students except one indicated that the course objective was met; this student indicated that he was a ship surveyor/auditor and had no prior experience of hydrography or hydrographic surveying whatsoever. It is, therefore, likely that he didn’t fully understand the objective of the course.
6.2.4 Further Comments

Students were given the opportunity to make further comments and a representative sample of the themes that arose is given below:

- Course could have been longer.
- A very good course.
- We hope to attend a lot of courses like this in the future.
- The course objective was met but non-surveyors need more time on data processing.
- The two weeks has put me in a position to develop further my understanding of the requirements and changes these days in hydrography development.
- Thank you. This is really helpful to my country.

7 Achievements and Conclusions

The instructors would like to recognise the quality of the on-site organisation provided by the representatives of SPC and to express their gratitude for the hospitality shown by SPC and RFN. The venue, vessels and equipment provided meant that the amount of time the students spent learning was maximised.

The commitment the students showed to such a challenging course is also noteworthy, and the resulting success is in no small way due to their enthusiasm for the subject matter.

As an introduction to basic hydrographic surveying principles the course was a great success and the student feedback was excellent. It can be considered that the course has gone a long way to building much needed hydrographic surveying capacity in this region. However, whilst this objective was met, the range of backgrounds and skill sets represented in the student body made it impossible to bring all delegates up to a level where their respective maritime organisations could be expected to deliver medium to high order IHO S-44 surveys. This is not solely because of the students’ prior knowledge of hydrography but also the lack of computer literacy. It is the opinion of the instructors that the vetting and selection of appropriate students was a major short coming of the event.

A number of students clearly possessed the ability to develop their skills further, and their desire to do so was indicated in the results of the IMO feedback questionnaire. In order to fulfil this desire an extra week focused on the processing and QC of high order IHO S-44 surveys would be needed.

Whilst the subject matter was clearly of use to the students, it was evident from discussions with them that without sustained, targeted follow up action and investment, it will be difficult to build meaningful capacity in hydrographic surveying in the region. Many asked when the next course would be and expressed a desire for it to be run on a regular one to two year basis.

The instructors would also like to thank SOPAC for funding the use of a dedicated Hypack technician. As the UKHO does not use Hypack to process bathymetric data, it was extremely useful to be able to draw upon Mr Jerry Knisley’s experience and
allowed the UKHO instructors to focus on teaching the fundamental principles of data processing and QC.

7.1 Recommendations
IMO should seek to vet potential students more rigorously; potentially delegating this responsibility to subject matter experts. A computer literacy pre-event assessment could also be mandated.

A further week could be offered as a complementary course, perhaps run contiguously, that goes further into data processing and QC, with a view to allowing students to fully appreciate the necessary requirements of high order IHO S-44 standard surveys.

Another important element of hydrography is the onward production of navigational products for mariners. Several of the students commented that they would have liked to have included this within the course, to allow them to go all the way through from survey to creating the final navigational chart. This could have been supplied by UKHO, but would have required a further 1-2 weeks (for a basic introduction) and supplementary cartographic trainers.

It should be noted that whilst courses such as this are useful, without follow up action very little long term capacity will be built. IMO and IHO should consider how a course such as this, and appropriate further development, could be run in the region on a semi-regular basis.

Where specialist software is to be used in a course such as this, reasonable provision should be made to fund the services of a dedicated technician from the software producing company.
8 Annexure

Annex A List of participants and their contacting addresses

To be supplied by SPC
Annex B  Full Course Outline and Structure

IMO / IHO SW Pacific Regional Workshop
Hydrographic Surveying
Suva, Fiji - 24th September to 5th October 2012

Produced and delivered by Sam Harper [SH] and David Parker [DP] of the UKHO

Workshop Outline

Start / Finish Times ~ 0830h to 1730h
Monday 24th September

1. **Introduction to Basics of Hydrographic Surveying Course**
   - History of hydrography
   - Hydrography today
   - International hydrography
   - Essential elements of a hydrographic survey
   - Multibeam introductory video

2. **Errors and Uncertainty [DP]**
   - Types of errors
   - Precision and accuracy
   - Normal distribution
   - Standard deviation
   - Confidence levels
   - Uncertainty
   - Practical exercise

3. **Geodesy [SH]**
   - What is geodesy
   - Coordinate systems
   - Shape of the Earth
   - Spheroids/ellipsoids
   - Reference frames
   - WGS84
   - Datum shifts
   - Projections
   - UTM

4. **Horizontal positioning and GNSS [DP]**
   - Determination of position
   - Types of GNSS
   - GPS basics
   - GNSS augmentation (DGPS)
   - Carrier phase techniques
   - Vertical datum separation models

5. **Tidal Theory [SH]**
   - What are tides
   - Fundamental Principles
   - Newtonian laws of gravity and motion
   - Equilibrium tide
   - Lunar tides
   - Solar tides
   - Spring/neap tides
   - Tidal regimes
   - Real tides
   - Amphidromic points
   - Met effects

6. **Measuring Tides and Vertical Datums [SH]**
   - Why measure tides
   - Predicting tides
   - Types of tide gauge
   - GPS tides
- Considerations for tide gauge location
- Sources of error in measuring tides
- Reducing soundings
- Vertical datums
- Admiralty Chart Datum
- Vertical control networks
- Transfer of datum using co-tidal charts

7. Survey Control and Tide Gauge Calibration [DP]
   - 3D Control
   - The need for survey control
   - Establishing Control Points
   - Extending the Vertical
   - Calibration of Tide Gauge
   - Levelling

Finish for Day

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Tuesday 25th September

- Practical Exercise - Calibration of tide gauge and levelling

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Wednesday 26th September

8. Acoustic Theory [SH]
   - Physics of underwater acoustics
   - Using acoustics to measure distance
   - Sound velocity/CELERITY
   - Measuring sound speed
   - Frequencies

9. SBES Surveying Principles [SH]
   - SBES transducers
   - Beam Characteristics
   - SBES limitations
   - Operational considerations

10. SBES Calibration [SH]
   - Calibrating for sound speed
   - Performing a ‘bar check’

11. MBES Basic Principles [DP]
   - Types of Swath systems
   - Beam forming and steering
   - Amplitude and phase bottom detection
   - MBES requirements and characteristics
   - MBES Common Errors

12. Vessel Motion [DP]
   - Inertial Navigation Technology
- Heave
- Timing Integration with sonar
- Operational considerations and errors
- Conclusions from motion sensor comparison experiment

13. MBES Calibration [DP]
- Dimensional Control
- Patch Test Procedure
- Post Calibration

14. Standards and Specifications [DP]
- The need for standards and specifications
- IHO S-44
- Case study – UK CHP Survey specification
- Planning to meet the specification
- Communicating the uncertainty to the user
- Survey error model

15. Survey Planning
- Reconnaissance
- Environmental considerations
- Safety and disaster planning
- Tidal data
- Mobilisation and
- Calibration site location
- Data quality
- Line planning
- Data management and quality assurance

Finish for Day

Therman 27th September

<table>
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<th>Group 1</th>
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<td>SBES Survey 1 (Calibration)</td>
<td>SH</td>
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<td>SBES Survey 2</td>
<td>SH</td>
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## Friday 27th September

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<td>Lunch</td>
<td>Lunch</td>
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<tr>
<td>MBES Survey 1 (Calibration)</td>
<td>SH</td>
</tr>
<tr>
<td></td>
<td>SBES Survey 1 (Calibration)</td>
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## Monday 1st October

<table>
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<td>MBES Survey 2</td>
<td>SH</td>
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<td>Lunch</td>
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<td>MBES Survey 3</td>
<td>SH</td>
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<tr>
<td></td>
<td>SBES Survey 3</td>
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</tbody>
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## Tuesday 2nd October

AM - SBES Data Processing  
PM - Hypack Basics

## Wednesday 3rd October

AM - Hypack Basics  
PM - MBES Data Processing

## Thursday 4th October

PM - MBES Data Processing
Friday 5th October

PM - MBES Data Processing and QA

Workshop Ends
### Annex C  Summary table of IMO feedback Questionnaires

#### Arrangements Prior to the Activity

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<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>1- Was the invitation received in good time?</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>2 - Did you receive information on the objective, scope and subject areas and programme of the activity before your participation.</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>3 - Were the instructions for completing the nomination form and the profile required for the activity clear and easily understood?</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>4 - Did you receive logistical information on venue, travel arrangements, DSA payments and accommodation?</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>5 - Were you given any pre-event assignment?</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>6 - If yes, was the pre-event assignment practical?</td>
<td>6</td>
<td>9</td>
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</table>

#### During the Activity

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<th>Question 7</th>
<th>Too Long</th>
<th>Just Right</th>
<th>Too Short</th>
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<td>Was the event:</td>
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<tr>
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<td>0</td>
<td>9</td>
<td>6</td>
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<table>
<thead>
<tr>
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<th>Excellent</th>
<th>Good</th>
<th>Satisfactory</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you rate the event as regards to the following?</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>8-a: Venue</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>8-b: Facilities</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8-c: Equipment</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Quality of written documentation provided?</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>9-a: Clarity</td>
<td>5</td>
<td>10</td>
<td>0</td>
<td>0</td>
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<tr>
<td>9-b: Technical</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9-c: Relevance</td>
<td>7</td>
<td>8</td>
<td>0</td>
<td>0</td>
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<td>9-d: Comprehensiveness</td>
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<td>0</td>
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<tr>
<td>Quality of presentations</td>
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<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>10-a: Clarity</td>
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<td>7</td>
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<td>0</td>
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<tr>
<td>10-b: Technical content</td>
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<td>Quality and use of</td>
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<td>11-c: Other resource materials</td>
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<tr>
<td>11-d: Group or practical activities</td>
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<td>11-e: Excursions</td>
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After the Activity

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<th>Excellent</th>
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<th>Satisfactory</th>
<th>Poor</th>
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<tr>
<td><strong>David Parker</strong></td>
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<td>a- Content of lecture</td>
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<td>b- Presentation</td>
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<td>c- Ability to transfer knowledge</td>
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<td>1</td>
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<tr>
<td>d- Effectiveness in answering questions and suggesting solutions to problems</td>
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<tr>
<td><strong>Sam Harper</strong></td>
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<td>b- Presentation</td>
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<tr>
<td>d- Effectiveness in answering questions and suggesting solutions to problems</td>
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**Question 13**

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<th>Themes</th>
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<tr>
<td>13.1- What was of most interest to you?</td>
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<tr>
<td>Tide gauge</td>
<td>2</td>
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<tr>
<td>Tide Theory</td>
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<td>HYPACK</td>
<td>2</td>
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<tr>
<td>MBES</td>
<td>8</td>
</tr>
<tr>
<td>SBES</td>
<td>6</td>
</tr>
<tr>
<td>Practical</td>
<td>5</td>
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<tr>
<td>Calibration</td>
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</tr>
<tr>
<td>Data processing</td>
<td>8</td>
</tr>
<tr>
<td>IHO&amp;UKHO spec &amp; standards</td>
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<tr>
<td>Everything</td>
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**13.2- What was of least interest to you?**

<table>
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<th>Themes</th>
<th>Frequency</th>
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<tbody>
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<td>Nil</td>
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**Question 14**

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<tr>
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<th>Yes</th>
<th>No</th>
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<tr>
<td>Are there any topics which should be added?</td>
<td>3</td>
<td>12</td>
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<tr>
<td>Yes comments included: Should have been a longer course, Use of GPS and auto levelling, creation, Introduction to ENCs and their creation, More practical exercises.</td>
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**Question 15**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>Do you consider that the objective of the event was met?</td>
<td>14</td>
<td>1</td>
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## Annex D List of Acronyms used in the Report

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>CHP</td>
<td>Civil Hydrography Programme</td>
</tr>
<tr>
<td>DGPS</td>
<td>Differential Global Positioning System</td>
</tr>
<tr>
<td>FNS</td>
<td>Fiji Navy Ship</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
</tr>
<tr>
<td>RFN</td>
<td>Republic of Fiji Navy</td>
</tr>
<tr>
<td>IHO</td>
<td>International Hydrographic Organisation</td>
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<tr>
<td>IMO</td>
<td>International Maritime Organisation</td>
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<td>LDC</td>
<td>Least Developed Countries</td>
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<td>MBES</td>
<td>Multi-Beam Echo Sounder</td>
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<td>QC</td>
<td>Quality Control</td>
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<tr>
<td>SBES</td>
<td>Single-Beam Echo Sounder</td>
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<tr>
<td>SIDS</td>
<td>Small Island Developing States</td>
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<tr>
<td>SOLAS</td>
<td>Safety Of Life At Sea</td>
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<td>SOPAC</td>
<td>Applied Geoscience and Technology Division of SPC</td>
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<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
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<tr>
<td>UKHO</td>
<td>United Kingdom Hydrographic Office</td>
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<tr>
<td>UTM</td>
<td>Universal Transverse Mercator</td>
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