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Sub-Committee on Digital Bathymetry XXI
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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

General Bathymetric Chart of the Oceans (GEBCO)

Twenty-first Meeting of the GEBCO Guiding Committee

11-12 July, 2005

and

Twenty-first Meeting of the Sub-Committee on Digital Bathymetry

7-8 July, 2005

at

Instituto Nacional de Estadística, Geografía e Informática, Aguascalientes, Mexico

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1. OPENING OF THE MEETING

1. The Twenty-first Meeting of the joint IOC-IHO General Bathymetric Chart of the Oceans Guiding Committee (GC XXI) was held at the Instituto Nacional de Estadística, Geografía e Informática**,** Aguascalientes, Mexico on 11th and 12th July 2005.

2. Those present, in addition to Dave Monahan, the Chairman, were Etienne Cailliau, Mike Carron, Norman Cherkis, Robin Falconer, Chris Fox, José Frias, Andrew Goodwillie, John Hall, Mike Loughridge, Ron Macnab, Tony Pharaoh, John von Rosenberg, Hans-Werner Schenke, George Sharman, Steve Shipman, Shin Tani, Pauline Weatherall and Bob Whitmarsh (Permanent Secretary). In addition the session was attended by Mario A. Reyes, General Director of Geography, INEGI, Francisco Jiménez Nava, INEGI, Francisco Takaki T. INEGI, Jorge L. Heredia (Mexican Navy and Hydrographic Office) and Harry Yeh, an invited guest from Oregon State University, USA. Walter Smith was indisposed and absent.

3. Dr Reyes reiterated INEGI's welcome to GEBCO. He emphasised the importance of information technology in the role of assisting data exchange both nationally and internationally and noted that large databases had been built to common standards in many countries. He continued that INEGI, on behalf of the Mexican government, is in the business of collecting information and exchanging data. He hoped that the Guiding Committee's deliberations would lead to a positive impact on the environment and the quality of life in all countries.

4. The Chairman began the meeting at 09.08.

2. CONDUCT OF THE MEETING

2.1 Adoption of the Agenda

5. The Chairman presented an Agenda which was adopted (Annex 1).

3. WHAT HAVE WE BEEN DOING? (ONGOING PROJECTS)

3.1 Sub-Committee on Digital Bathymetry (SCDB)

6. No report was received from the SCDB as Dr Smith was indisposed.

3.2 Sub-Committee on Undersea Feature Names (SCUFN)

7. Dr. Schenke reported on the XVIIth meeting of SCUFN which had been help in the Head Department of Navigation and Oceanography (HDNO), St Petersburg from 8th-11th June 2004. Five out of eight members had attended plus eight guests (Annex 2). Several issues were of interest to the Guiding Committee. IHO Circular Letter CL90 (2004) had requested nominations for more members of SCUFN and in CL56 (2005) three new members had been proposed. They were L Cdr Harvinder AVTAR (India), Capt. Albert E. THEBERGE (USA) and L. Cdr. Rafael PONCE Urbina (Mexico). <u>All three nominations were accepted by the Guiding Committee.</u>

8. Dr. Schenke noted that some proposals considered in 2004 had not been well prepared and had been rejected or held in abeyance. He said that a mechanism was required to ensure that in future proposals were correctly formulated and well in advance of SCUFN meetings. He hoped that an electronic form, which could be made available on research ships and in laboratories and hydrographic offices etc., would be developed. Between SCUFN meetings it was planned to harmonize the SCUFN and GEBCO Gazetteers and to standardize the use of undersea feature names which would lead eventually to proposals to alter the IHO document B-6. The latter document was currently being translated into

Japanese, Russian and Spanish. It was also planned to make the Gazetteer accessible over the internet. Dr. Schenke concluded by announcing that SCUFN XVIII would be held in Monaco from 3rd-6th October 2005. In 2006 SCUFN might meet at the same time as the SCDB and the Guiding Committee.

9. In answer to questions Dr. Schenke noted that some proposals failed initially because of insufficient accompanying data but eventually very few were rejected. He added that the Gazetteer could be downloaded from http://www.ngdc.noaa.gov/mgg/gebco/underseafeatures.html. Dr Falconer informed the Committee that the New Zealand government planned shortly to introduce a bill on geographical names that mentioned SCUFN. He said that he was in favour of allocating temporary names in advance of formal approval by SCUFN.

3.3 Nippon Foundation/GEBCO Training Project

10. Dr Falconer, Chairman of the NF/GEBCO Training Project Management Committee introduced the agenda item and summarised the history and development of the project. In 2004 seven students had been chosen from over 50 applicants whereas in the last few months only five students had been selected for the class of 2005 starting in September. The first batch of students had been exposed to a very wide range of experiences and skills and were currently either at sea or conducting laboratory visits which is why they were not present at the meeting.

11. Dr Falconer continued that the NF/GEBCO Training Project was overseen by a Project Management Committee which had met the previous day. Funds for Year 2 had already been received and those for Year 3 would be bid for in late 2005. Some changes were envisaged in Year 2 (2005-2006), regarding time spent at sea and on laboratory visits, to reflect a reduction in budget and to include student reunions to build and reinforce a network of graduates from the Training Project. In Years 4 and 5 it might be possible to include longer working reunion meetings involving the new generation of GEBCO members. The key for continuing success of the Project was networking by those present particularly in order to increase the number of applicants in 2006 and to set up worthwhile laboratory visits and sea-time opportunities.

12. Cdr. Shipman congratulated the project and the students on their achievements and asked about the reason for the reduction in the number of students in Year 2. Dr Falconer explained that reduced funding in 2005 had meant that only six students could be sought this year but at the last moment one accepted student had had to withdraw as did the student on the shortlist. Dr Goodwillie noted that the Year 1 students had worked on bathymetry local to their home country but he wondered whether the Year 2 students might be given tasks more relevant to GEBCO's needs. Dr Falconer replied that this raised several issues; some students wished to work on 'local' charts to gain particular skills but agreed that Year 2 students might be encouraged to work on particular areas with help from GEBCO people. In appropriate circumstances the results of a student's work could be passed on to the relevant IBC. Ing. Gen. Cailliau said that the standard of students in Year 1 appeared high and asked if this was true of the Year 2 students. Dr Falconer explained that although the Nippon Foundation had wanted the Year 2 students to come from a wide geographical spread of less developed countries in Year 3 GEBCO was expected to be free to choose the very best students irrespective of their home country.

13. Dr Falconer next addressed the proposed membership of the Project Management Committee which consisted of himself, as Chairman, Bob Anderson, José Frias, Martin Jakobsson, Mike Loughridge, Hans-Werner Schenke, Walter Smith, Shin Tani and Bob Whitmarsh, as Secretary. He asked the Guiding Committee to ratify this membership. He noted that the Committee had no Terms of Reference. He added that Dave Monahan was the Project Manager and an employee of the University of New Hampshire but he also reported to the Project Management Committee. He said that the current project consisted of only part of what GEBCO wished to achieve. <u>The Guiding Committee approved the membership as proposed.</u>

3.4 Finance Working Group

14. The Permanent Secretary, in the absence of the Chairman of the Working Group, Sir Anthony

Laughton, presented a report (Annex 3) on the finances of GEBCO's three accounts (the Southampton University main account, the Nippon Foundation/GEBCO Training Project account and the funds held by the IHB in Monaco).

15. Cdr. Shipman noted that the over-expenditure forecast for the IHB account was imprecise because of variable exchange rates but in any event would be absorbed by the IHB. The Secretary asked what would happen to income generated by selling more of the 'History of GEBCO' books. Cdr. Shipman replied that a special GEBCO account would be set up for those funds [Action Cdr Shipman] and IHB would report to the Guiding Committee annually on income received which would be spent according to the wishes of the Guiding Committee. Shin Tani asked whether the IHB funds could be spent on the GEBCO Work Programme; Cdr. Shipman replied that that would depend on prior approval by IHO Member States.

16. Dr Falconer concluded by saying that Sir Anthony Laughton wished to retire as Chairman of the Finance Working Group and that this would finally completely sever his connection with GEBCO after many years as its Chairman. The Guiding Committee unanimously recorded its debt to Sir Anthony and thanked him for his efforts over many decades.

3.5 Educational Working Group

17. No report was received from the Educational Working Group.

3.6 Report of the Bathymetric Editor

18. The Committee was informed that the Bathymetric Editor, who was absent, had tendered his resignation. The Chairman indicated that the Guiding Committee did not wish to accept or decline this resignation and noted that the impact of this event would be discussed later.

3.7 Report of the Digital Atlas Manager

19. The Chairman noted that this report had already been presented to the Sub-Committee on Digital Bathymetry. Ms Weatherall briefly summarised her report. When she was asked whether any actions were required by the Guiding Committee she responded that such matters would arise later in the meeting.

3.8 The SSPARR Project

20. Dr Hall reported in place of Bob Anderson, who was at sea. He stated that he had recently received an email from Dale Chayes, who was conducting trials of the SSPARR buoys on board the USCGC *Healy*, which stated that operation had been achieved at low power. High power operation appeared to require some redesign. There were plans to ask the National Science Foundation for a further two-years of funding. Dr Hall stated that he was investigating the feasibility of deploying 100 SSPARR buoys through the ice in the Arctic Ocean.

3.9 Regional Issues Working Group

21. Mr Macnab reported that he was the sole member of the Working Group and that he wished to defer his report to later in the meeting.

3.10 Other Achievements

22. 3.10.1 A GEBCO Archive. The Secretary reported that Sir Anthony Laughton, who had been sorting

through his personal GEBCO papers, had proposed the setting up of a GEBCO Archive in the UK's National Oceanographic Library. This had been enthusiastically endorsed by the Librarian and papers belonging to both Sir Anthony and those inherited by the Secretary from his predecessor had been sorted and deposited in the NOL. Dr Sharman noted that he had also been passed the papers of Mike Loughridge and offered to share and exchange listings of the holdings with the Secretary [Action Secretary, Dr Sharman]. Dr Goodwillie expressed the view that eventually Dr Fisher's papers would most likely be donated to the library archive at Scripps Institution of Oceanography. Dr Hall suggested that eventually all these papers might be digitised.

23. 3.10.2 Mail Lists. Dr Fox briefly explained the function of a List Server and noted that List Servers had been set up by NGDC for use by members of the main GEBCO (Sub)-Committees to ensure that emails reached all members.

24. 3.10.3 The IHO Hydrographic Committee on Antarctica (HCA). Dr Schenke reported that he had attended a meeting of the HCA on behalf of GEBCO from 6th-8th September 2004 in Kythnos, Greece. He said that he had reported on GEBCO's Porto Venere meeting and on the Nippon Foundation/GEBCO Training Project. He noted that there are 16,000 named features in Antarctica of which only 130 lie offshore. He informed the HCA about the plans for the IBCSO, which were welcomed, and offered to supply countries working in Antarctica with bathymetric charts. The plan for a set of nautical charts around Antarctic can be seen on the IHB web site together with Dr. Schenke's presentation to the HCA (http://www.iho.shom.fr/ see Regional Hydrographic Commissions>HCA>HCA4docs_list). It was noted that a precise shoreline was badly needed around Antarctica. He concluded by noting that the next meeting of the HCA would take place from 2nd-4th November 2005 in Christchurch, New Zealand.

4. WHERE ARE WE GOING? (GUT ISSUES)

4.1 Strategic Plan

25. The Chairman presented the latest version of GEBCO's Strategic Plan (Annex 4) and reminded the committee of its aims and main components. He noted that it originated in 2001. There was little discussion of substance. It was felt that many items were being covered elsewhere in the Agenda.

4.2 What is the point of GEBCO?

26. Dr Goodwillie presented his paper entitled 'What is the point of GEBCO?' (Annex 5). He began by stating that five to six years ago he considered there had been a lack of vision as to what the era after the GEBCO manual contourers would look like. Since 1999 he had also been involved in outreach activities for GEBCO and had talked to around 800 people at AGU (2002) and EGS (2003) meetings. Nevertheless, he said he knew of no one in Scripps Institution of Oceanography or Lamont-Doherty Earth Observatory who uses the GEBCO grid. At the same time he said that he had become more and more disillusioned at how GEBCO operated because he believed that difficult issues were being ignored. He had concluded that if 'outsiders' did not wish to be involved in GEBCO then something was badly amiss.

27. Subsequently, after the Porto Venere meeting at which he believed 'not a lot had happened', he had been invited by the Chairman of GEBCO to write about the GEBCO of his dreams. The result had been Annex 5 which, with the approval of the Chairman, had been circulated by e-mail shortly before the meeting. He said that he considered a key issue to be that of resources.

28. Dr Goodwillie continued that in his opinion GEBCO had to overcome both a lack of funding and a lack of focus because successful projects have both funding and focus. A related question is how GEBCO should attract younger people. For example, although he thought that SCUFN and the Nippon Foundation/GEBCO Training Project were active, he said that he had been very disappointed that, as far as he was aware, there had been a lack of ideas from the SCDB for even a single project for the Nippon Foundation/GEBCO students consistent with GEBCO's goal of global mapping. After the

Porto Venere meeting he had received only two emails on SCDB business yet there was lots to be done. Dr Goodwillie said that he concluded that GEBCO was reverting to a closed group. It did not have a mission statement that was being turned into action. GEBCO needed to be aware that the academic research community was moving very fast and had already embraced the Smith-Sandwell predicted bathymetry, and was increasingly using the freely-available GeoMapApp global DEM from Lamont. He concluded his presentation by saying that he wanted GEBCO to make some hard decisions in order to be able to survive.

29. The Chairman thanked Dr Goodwillie for his presentations and said that he would have liked to see solutions proposed as well as a list of criticisms.

30. Dr Goodwillie responded that he realised that he was part of the problem too but he alone did not have the answers. But GEBCO needed to attract funds. There also needed to be more contact with the rest of the world. There were opportunities at the Fall AGU meetings, for example, to attract young scientists who could work with GEBCO. As regards to GEBCO products he wanted to see the GEBCO grid as the natural choice of marine scientists for planning research, an online 1' grid, an organic grid that is regularly updated, easy access to data from government agencies and others, seamless ingestion of data and a content-rich web site. He continued that he saw the highlights within GEBCO to be the GDA-CE and its excellent interface software, the setting up of the AGU and EGS booths, the Strategic Planning Committee meeting at UNH (2002) and the advent of the GEBCO Newsletter.

31. Dr Carron responded that Dr Goodwillie had raised a lot of questions that were to the point and with which he agreed. Regarding a new GEBCO grid, discussions in the last few days had generated valuable new ideas and there was now an opportunity for GEBCO to make progress here. Dr Carron continued that in fact there were not really a lot of new grids being produced and he admitted that the Smith & Sandwell grid was better for many modelling activities. There was now an opportunity for GEBCO to build a new grid with a good shoreline and shallow-water bathymetry but it was hard to find volunteers to help with the task. The incorporation of satellite altimetry into any new bathymetric grid was a difficult philosophical step and some Guiding Committee decisions were needed about this. The technical details of the new grid needs a small working group to address them. The Smith & Sandwell satellite-based grid had the big advantage of being free to users but it did not address the quality of the grid.

32. Dr Falconer responded to Dr Goodwillie by saying that he had laid a lot of challenges before GEBCO. This was good but it would take time to address them all. In his opinion, and from conversations he had had during the meeting, a lot of the issues raised were being addressed now, such as variable grid-sizes, mining electronic nautical charts (ENCs), free internet access to the GEBCO grid etc. In fact GEBCO has a lot of other manpower resources, beyond those people present in Aguascalientes, such as scientific colleagues. Ms Weatherall warned that there might be copyright issues in making the grid freely available. Mr Macnab encouraged GEBCO to move forward saying that the IBCAO had started with boot-legged time and no funds. Now the Swedish government supported Dr Jakobsson but otherwise IBCAO had no other income. Dr Hall concurred. He said that he had allocated 25% of his own time for 25 years to the IBCM without any funding. He continued that he strongly believed in the voluntary approach and funding without any strings attached.

33. Dr Fox said that he shared Dr Goodwillie's viewpoint and consequently he was undecided whether he would attend the GEBCO meeting next year. He thought that it was unrealistic to expect funding on a large scale but GEBCO was the only organisation he knew that had a mandate to study the whole planet. In his opinion GEBCO's function should be to co-ordinate international mapping efforts. He continued that the world had changed in the last 20-30 years; now bathymetry was being collected by hundreds of multibeam systems. Somehow, GEBCO needed to compile all their efforts and the SCDB should enable this to happen.

34. Dr Sharman said he agreed in some sense with Dr Goodwillie but regretted his style of presentation and the lack of constructive suggestions. Dr Loughridge said he concurred with the comments about presentational style which overlooked the positive features of GEBCO. He noted that there had been a

lot of intersessional activity over the years to move forward.

35. The Chairman concluded the discussion by saying that he had a lot of sympathy for Dr Goodwillie's views and the question now was how to translate his suggestions into actions.

4.3 IHB/IOC re-organisation of Ocean Mapping and GEBCO's collaboration with IBCs

36. Mr Macnab explained that he had been asked by Mr Travin, who had been unable to be present, to report on IOC's activities regarding tsunamis and ocean mapping. In spite of IOC's difficult financial situation Ocean Mapping was expected to remain an active programme, but with a 26% cut, and would continue to receive support from IOC. As a result of the cuts IOC could not support a meeting of CGOM in October 2005 and it was not interested in pursuing discussions about the re-organisation of Ocean Mapping. He continued that IOC specifically wanted to improve coastal mapping to help modelling of tsunami run-up. Finally, he noted that the new situation was temporary and would hold for the next two years only; Ocean Mapping might still be cut in two years time.

37. Cdr. Shipman stated that the IHB was very disappointed at what had happened and regretted that IOC had not discussed the situation of Ocean Mapping with IHB beforehand. Capt. Gorziglia had lobbied very hard at the IOC Executive Council meeting to defeat the proposal to cut Ocean Mapping from IOC's Programme. Whatever happened IHB remained committed to GEBCO and was encouraged by its recent activities. Nevertheless the IHB still sought guidance about what GEBCO was trying to achieve and urged the Guiding Committee to consider the current structure of Ocean Mapping and how it helped, or hindered, GEBCO to achieve its objectives. In answer to a question from the Secretary, Cdr. Shipman replied that even though the CGOM meeting had been cancelled the IHB would still like to see a response eventually to the re-organisation document tabled by the IHB in Porto Venere [Action Chairman].

4.4 Networking and the Nippon Foundation

38. Mr Tani made a presentation entitled 'GEBCO exists to serve those who support us' (Annex 6). He began by presenting a SWOT analysis of GEBCO's situation. Important points were that it should be made clear to the Nippon Foundation (NF) that only a small percentage of the ocean had been surveyed and that GEBCO volunteers were ageing with no visible successors. The aim of the NF is to build human networks outside of or beyond the bureaucratic or formal frameworks, in order to supplement, or even remedy the problems of these official frameworks. So, in GEBCO's case, it was hoped that within a generation strong ties would be built between the students, there would be an overlap of generations and regular reunions of alumni would be held (which might include further training). These reunions should include lectures by, and opportunities to meet, more senior GEBCO people so that the network would develop both horizontally and vertically. It was also envisaged that students would get involved in GEBCO business both during and after their courses and that students in consecutive years might meet and overlap at the beginnings and ends of their courses.

39. Dr Goodwillie commented that most NF students seemed to come from HOs and that GEBCO needs more students with an academic background. The Chairman replied that few such applicants had applied to which Dr Goodwillie and Dr Loughridge responded that more effort was needed as had been made in Year 1. Dr Falconer noted that it was probably easier for applicants in HOs in developing countries to include one-year's training overseas and that such students should be used and encouraged to build their own links with universities in their home country.

40. Dr Falconer sought clarification as to whether GEBCO or the NF would become more involved in the Training Project. Mr Tani replied that the NF wanted to develop a strong human network through their training course, and GEBCO would have to emphasise the human network when designing Phase 2 of the project. Dr Yeh agreed that students should be invited to meetings such as this one; he had seen the benefit of this approach at other meetings. Ing. Gen. Cailliau agreed but commented that there was also a problem to ensure that younger people remained in GEBCO.

4.5 UNCLOS and GEBCO

41. Mr Tani related his experiences with matters linked to UNCLOS Article 76 which concerned the limits

of the legal 'continental shelf'. He said that most ratifiers of the convention have to submit their claims by 13th May 2009. In conversations with members of the UN Commission on the Limits of the Continental Shelf (CLCS) he had formed the impression that they did not favour bathymetry computed from satellite altimetry. For example, when they needed to examine the 2500m contour they preferred to refer to GEBCO (see paper by K M Marks and W H F Smith (2005), International Hydrographic Review, 6 (2), 19-29). Some of the Commissioners commend the use of the GDA. He continued that many developing nations require access to reliable bathymetry for their Article 76 submissions. The Japanese Hydrographic Office had held a training course in March 2005 for developing countries. It supported the use of NGDC and GEBCO data for use in Article 76 submissions because it had concluded that ETOPO2 and ETOPO5 were only suitable for preliminary studies but not for the "supporting scientific and technical data" required in Article 4 of Annex II of the CLCS. Mr Tani emphasised that GEBCO needs to ensure that it maintains a credible 2500m contour line and he concluded that the CLCS need to be told about the GDA-CE and about the reliability of bathymetry based on satellite altimetry. The Secretary responded that every Commissioner had already been sent a free personal copy of the GDA-CE in September 2003.

42. The Chairman noted that five of those present were involved in preparing Article 76 claims. He said that the Nippon Foundation/GEBCO students had already submitted a paper to the International Hydrographic Review which referred to GEBCO and UNCLOS. Dr Falconer commented that any new GEBCO grid based on soundings and satellite-derived bathymetry would need to show track control on the 2500m in particular [Action The Gridders].

43. Dr Goodwillie asked whether data collated for Article 76 claims would eventually be released into the public domain. The answer was that it depended on the country. Mr Tani said that some countries would release the data used for their submission after the examination by the CLCS had been completed. A lot of new surveys had been conducted and it would be advisable to watch the DOALOS web site (http://www.un.org/Depts/los/doalos_activities/about_doalos.htm).

5. WHAT DO WE NEED TO DO TO GET US WHERE WE ARE GOING? (FUTURE PROJECTS)

5.1 Tsunamis and GEBCO

44. 5.1.1 Dr Harry Yeh from Oregon State University made a presentation on tsunamis (Annex 7). He began by stressing what data were needed to model tsunamis. He referred to three recent workshops in Tokyo, Japan, Seattle, USA and Birmingham, UK which some GEBCO people had also attended.

45. Dr Yeh summarised the nature of a tsunami; it has a wavelength of 10's to 100's of km and particle motion occurs over the whole water column so that the bathymetry of the deep ocean is important. Thus, tsunami simulations need integrated shallow and deep water bathymetry including detailed information from the continental slope and shelf. In the 1960's modelling had involved the computation of wave-refraction diagrams which predicted the location of the tsunami wave front. In the last 20 years, he continued, an iterative modelling scheme has been possible. The initial conditions, which could be inferred rather crudely, were fed into a numerical model from which a comparison was made between observed and computed values. The initial conditions were then modified in an effort to improve the 'fit'. The Boxing Day 2004 tsunami was unusual in that it was generated by a long linear source. In the last two years the seismological community had improved its ability so as to be able to determine the detailed rupture process of the initial conditions of this event. Numerical simulation models had also been improved in the last few years; modelling now involved the use of an adaptive mesh technique for bathymetric data. With the improvement in the modelling techniques, the availability of accurate bathymetry now becomes a critical factor for tsunami prediction models.

46. Dr Yeh next laid out the requirements for a modern numerical model. As a rule of thumb (after Shuto et al., 1986), a minimum of 30 grid points per wavelength were required. So,

in deep water (4000m), if wavelength was 60-600 km then the minimum grid should be 2 - 20 km

on the shelf (250m), if wavelength was 15-150 km then the minimum grid should be 0.5 -5 km

in shallow water (100m), if wavelength was 10-100 km then the minimum grid should be 0.3 - 3km

in very shallow water (10m), if wavelength was 3-30 km then the minimum grid should be 0.1 - 1km.

47. Dr Yeh emphasised that wave-scattering theory (Mofjeld et al,. 2000) had showed the important effect on tsunami propagation of isolated seamounts or ridges especially, at least for periodic waves, if the top of the feature was less than 400m deep. Dr. Yeh also discussed the comparisons in tsunami waveform in deep water made by Titov et al. (2003); the mismatch in phase between observations and computations may indicate problems in the bathymetry.

48. Good bathymetry was especially important when the source was in shallow water, for example the Papua New Guinea tsunami of 1998. When a model was computed with the first available bathymetry it appeared that the source may have been a submarine landslide. However, when DMA charts and eventually some Japanese swath bathymetry were included an earthquake source could not be discounted. The 1999 simulation had used grids of 22-200m and it was found that the grid-size affected the run-up calculation.

49. Dr Yeh concluded with some recommendations to optimise the numerical modelling of tsunamis. They were,

- adopt grids of 1’ for abyssal plains, and 20” for continental slopes and shelves and, in future, 5” for continental slopes and shelves and ridges and seamounts less than 2000m deep.
- supply soundings in x,y,z (latitude, longitude, depth) format.
- integrate bathymetry with coastal topography.
- enable charts to be downloaded electronically.
- ensure reliable curation of and repositories for the data.

50. Dr Carron added that modellers needed to understand that the GEBCO 1’ grid is a smoothed representation of the seabed and that ETOPO2 is better in some areas. In answer to questions, Dr Yeh said that work was in progress in using variably sized grids for bathymetry. He added that some models can handle only latitude/longitude co-ordinates but others can accept latitude/longitude, geographical or spherical co-ordinates. There was currently no preference provided that latitude was not greater than 60°.

51. 5.1.2 Tsunami-related activities within the international community. Mr Macnab made a presentation on the activities of the IOC with regard to Ocean Mapping (Annex 8). He reported that he had attended a meeting arranged by the IHO to bring together countries affected by tsunamis and those HOs that were able to help with improving coastal bathymetry. The IOC was also represented at the meeting with a remit to seek out capacity building initiatives. The results of the meeting would feed back into the IOC and thence into UNESCO. He noted that IOC already had a Programme for Regional and Global Tsunami Warning Systems and that UNEP was involved in Coastal Zone Rehabilitation and related activities. Coastal zone bathymetry and onshore topography were needed to aid run-up modelling and decisions on land use.

52. IOC had decided on a Programme to build up local expertise and to train people locally e.g. to generate better maps. The programme would be implemented in three phases,

1) determine the regional needs and how best to respond to them,
2) planning, surveys and databases,
3) develop coastal zone models to enable predictions to be made.

53. Data would be gathered in three zones, the ocean (bathymetry), the intertidal zone and onshore (topography). The deliverables from the Programme will be specific to each country. They will include

bathymetric databases and coastal sensitivity maps. The survey results will lead to management plans and the databases will enable coastal engineering models to be developed.

54. Mr Macnab continued that the partners in the Programme will be IOC, IHO, UNEP, national agencies and organisations will technical advice provided by the IMO, IALA and the IHO. IOC's preliminary budget for capacity building is US$810,000 over three years.

55. Mr Tani commented that most of the amplitude and phase characteristics of a tsunami were determined by the shallow-water morphology of the seabed and deep water bathymetry was only important in estimating the arrival time. He queried how GEBCO, which is mandated to concentrate on the ocean not less than 200m deep, can get involved in serious tsunami business. Mr Macnab responded that GEBCO was not directly involved but IOC did recognise the importance of deep-water bathymetry too. The Secretary asked whether coastal zone mapping was, or should be, a component of the Nippon Foundation/GEBCO Training Course. Mr Macnab replied that training was probably not necessary at such a high level but the Chairman noted that this was an opportunity that GEBCO should not overlook.

56. Dr Loughridge said he was confused. It appeared that GEBCO's parent bodies had a need for this Programme without any reference to, or request for assistance from, GEBCO. Mr Macnab replied that this was not intentional; GEBCO should regard the setting up of IOC's new programme as an opportunity to take part. In the same vein Dr Nava announced that INEGI had recently initiated similar training programmes and asked how they should get involved. Mr Macnab said that they should contact IOC. Dr. Schenke also noted that several national programmes already existed for capacity building and asked whether IOC had links to such programmes. He also suggested that it might be possible to obtain free software licenses. Mr Macnab responded that he did not know about links; the French, Indian and UK Hydrographic Offices had already offered help. He said that a bigger problem was to ensure co-operation between some adjacent countries! Cdr. Shipman added that the IHO already has a database of offers of assistance in which Germany has assumed a co-ordinating role.

57. In response to Dr Fox, Mr Macnab said that the Programme would start with a series of information-gathering visits in the Fall of 2005 and these would lead to the development of a three-year programme. In reply to Ing. Gen. Cailliau, Mr Macnab said that it was unclear at present how the Programme would be funded. Some HOs had offered to conduct surveys but perhaps the tsunami relief funds could also be used.

5.2 SCOR Working Group proposal

58. Dr Sharman summarised the history and development of the proposal to SCOR for a Working Group on Critical Bathymetric Studies (Annex 9). The objective was to maximise the return on investment in bathymetric surveys particularly since it is difficult to get funding for such surveys. The concept behind the proposal was to form an international group of experts, with a wide range of expertise, to determine those areas of the ocean where better bathymetry would have the most impact on science and society. Many GEBCO people had contributed to the proposal. Dr Falconer added that the proposal included the names of a provisional team, less than half from GEBCO, but the final say on membership, if the proposal was funded, would be SCOR's.

59. Dr Hall noted that the 2001 Proceedings of the SCOR Executive Committee, chaired by Robert Duce, President of SCOR, had stated that,

'… SCOR needs to limit use of its funds to sustain links to groups with which SCOR has a priority working relationship. The consensus of the Executive Committee was that SCOR should discontinue its support for travel to the annual GEBCO meetings, but should look for individuals who are attending GEBCO meetings anyway (with other funding) to represent SCOR. It was suggested that SCOR bring up the issue of travel support for the GEBCO at the IOC meeting in July.

A related issue is whether GEBCO is filling the needs of the scientific community. It was noted that bathymetry is critical for many fields of science, including for drilling, physical oceanography, and modeling. Large, but inaccessible, databases exist and GEBCO data are not easy to use. Alternative

software and technologies are available, but most of them are at very low resolution. SCOR should promote easy availability and handling of bathymetric data. With the publication of WG 107's report and recommendations, it would be an appropriate time for SCOR to review the issue. Duce suggested that interested members of the Executive Committee review the WG 107 report and recommend appropriate future actions.'

60. Subsequently Dr Duce had sent a letter to Sir Anthony Laughton [former Chairman of GEBCO] declining to provide future support for travel for a SCOR liaison to attend GEBCO meetings. SCOR had also sought GEBCO's advice on a draft letter from the President to Data Centres about the collection and archiving of bathymetric data. On the basis of advice received the letter had been withdrawn. Dr Hall urged GEBCO to interact more with SCOR to establish a better understanding of mutual interests.

5.3 GEO/GEOSS

61. Dr Fox described the recent activities of GEO /GEOSS (see http://earthobservations.org/) which he described as a high-level organisation largely driven by satellite observations to co-ordinate Earth observations on an international basis. It included 58 countries, the EC and a number of participating organisations (IOC, UNEP etc.). There was no subscription. GEO is the umbrella organisation and one of its objectives is to create interoperable databases within GEOSS. The G8 Ministers had asked GEO to co-ordinate efforts in response to the 26th December 2004 tsunami but it was not clear how GEBCO featured in this response. In March 2005 he had approached the Chairman of GEBCO with the suggestion that GEBCO affiliate to GEO. Consequently the Chairman had applied to GEO and he, Dr Fox, had offered to be GEBCO's representative (alternate Dr. Schenke) because he was already involved through his work in NGDC. GEBCO could only become a full member once its representative had attended a GEO meeting.

62. Dr. Schenke note that this was the first time that bathymetry had been accepted in connection with satellite and remote sensing. He was pleased at the outcome but realised that it would be a challenge for GEBCO. He promised that the German representatives in GEO would be supportive.

5.4 Regional Issues Working Group

63. Mr Macnab, who presented the report (Annex 10), remarked that this was a one-man Working Group. He began by noting that GEBCO had access to two sorts of data 1) depths computed from satellite altimetry (while recognising the deficiencies of such data) and 2) acoustic depths which were more accurate but which suffered from a heterogeneous distribution, variable modes of processing, incomplete collation in databases and issues of ownership. Nevertheless, he continued, the two types of data are complementary and should be used together for the foreseeable future. The priority is to organise an intelligent processing scheme for the data that will remove errors. The task is too great for any one group to tackle for the whole world and Mr Macnab proposed to divide the world into areas and encourage groups to take responsibility for each region. He continued that two 'IBC'-like projects were already underway (the Arctic and the Southern Ocean) and two others were starting so that half of his proposed areas were already taken care of. He suggested that each area should be overseen by a Project Group that involved scientists and hydrographers from local states. The work should be carried out, to a large extent, in the region involved. The Project Groups would likely be semi-autonomous but would involve the Nippon Foundation/GEBCO students and would work with neighbouring groups.

64. Mr Macnab continued that he expected the data to be dealt with using bins, grids and tiles with the latest data compression techniques. It would be necessary to identify pilot areas such as the Indian Ocean, where a lot of new mapping was expected, and the North Atlantic Ocean, where a lot of data had been collected by coastal states for UNCLOS purposes. He concluded by saying that he did not wish to impose his scheme on GEBCO but noted that it had worked well for the IBCAO.

65. Dr Fox said he agreed with the concepts. Mr Tani commented that he liked the idea of regional charts but politically it would be necessary to include or subsume the current IBCs. Dr Goodwillie also favoured Mr Macnab's proposal. He said he preferred to consider smaller focused areas because it was

a much easier way to work and the IBCAO model was a good one to follow. Dr Falconer commented that GEBCO wished to improve its maps as fast as possible and Mr Macnab's proposal was not necessarily incompatible with that approach.

66. Dr Carron said that he too liked the ideas but he thought they would take a long time to accomplish. He said that he would like to begin to identify individuals now for the Project Groups and it would be necessary to enquire in the regions concerned. His opinion was that the group for the global project should be built up first and that this would then lead to the development of the regional groups.

67. Mr Macnab commented that his proposal was just a way to make progress; the challenge was to find the people who would actually carry it out.

68. The Chairman noted that there were differences in timescale and area between the Carron and Macnab approaches. Mr Macnab's approach might take longer; it was an approach to the problem and not a firm plan. In general workers who recruit themselves to a task, and therefore are strongly motivated, are winners. He believed that the results of the regional mapping would feed into the new global grid.

69. Dr Falconer opined that if GEBCO endorsed the development of regional Project Groups this would assist the involvement of some countries e.g. Chile and Australia in the South Pacific.

70. Mr Tani enjoined the committee to bear in mind the viewpoint of policy makers e.g. for tsunami mitigation. GEBCO's actions might help new surveys to be conducted and the release of classified data. Further, after the establishment of their outer continental shelves, some countries intend to release their UNCLOS data compilations, for which some new surveys were conducted. For most UNCLOS member states the time limit for submission is 13th May 2009; thus, eventually, there may be the chance to obtain and make use of this data to improve GEBCO charts. GEBCO has to be proactive and prepared for this opportunity. Finally, Mr Tani said that the committee should recognise that the Nippon Foundation/GEBCO students will form an increasingly active network and in future some geographically strategic choices of students should be made.

71. After some discussion Dr Falconer proposed that,

'GEBCO supports the concept of a regional approach to generating new products in the provisional areas shown on the figure presented by Mr Macnab'.

72. Dr. Schenke noted that three of the areas were already, or about to be, mapped (IBCAO, IBCSO and the IBCM). Dr Frias said he was happy with Mr Macnab's approach. Former GEBCO reviewers might be recruited to help; he said that he knew of two or three in Mexico who could work on the North Pacific. Ing. Gen. Cailliau wondered about common standards between projects because they appeared to be semi-autonomous. Mr Macnab replied that standards would be needed and also people who were prepared to adhere to them and co-operate. Dr Hall added that the IBCM had started with a detailed specification but had ended with just a common vertical reference datum.

73. Dr Fox thought that a starting point would be to compile a list of regional experts and Mr Macnab responded that a good way to do that was to attend regional hydrographic conferences.

74. The discussion continued later in the absence of Mr Macnab who had had to leave. Dr Falconer continued that although regional working groups existed around the world it would be useful to co-ordinate their efforts, as Mr Macnab had proposed and offered to do, in the sense of keeping abreast of their activities rather than to control them. Dr Goodwillie commented that he believed that Mr Macnab wanted to follow the successful IBCAO model of working with a small focused group. He opined that it was easier to generate such an active group outside GEBCO.

75. Dr Falconer rephrased his original proposal as follows,

'The Guiding Committee **endorses** the concept of regional compilations and products of bathymetry by those who wish to do so and **notes** that Ron Macnab will liaise with these groups and that GEBCO List Servers are used to enable this process'.

Proposed by Dr Falconer, seconded by Dr Loughridge. The motion was carried. For: 5, Against: 0,

Abstentions: 1.

5.5 A worldwide grid

76. Dr Fox considered that there was an action on him to fix the problem inherent in ETOPO2 [Action Dr Fox]. He also planned to construct a global bathymetric tool with people at Lamont Doherty Earth Observatory. He recognised the need for a system by which grids could be submitted electronically and wanted to build one himself.

77. Dr Carron informed the committee that a small group, of which he was a member, planned to build a 1.0'-0.5' grid based on altimetric bathymetry either collaboratively with the IHO, IOC and GEBCO or independently. The grid would contain embedded data at a grid size of 0.1'. The group recognised that coastal regions were problematic and they planned to ask coastal states for help. The group hoped for funding from NOAA and the US Navy among others. There was an opportunity for GEBCO to assist with this enterprise if it wished, by contributing brains and /or data, but the group would go ahead regardless. This group was reacting to a crisis situation now, revealed by the 26th December 2004 tsunami, to meet the needs of numerical tsunami modellers who could not afford to wait for another ten years. He ended by asking whether GEBCO was going to release its 1' gridded data and whether GEBCO wanted to put its imprimatur on the new grid.

78. The Chairman enquired whether Drs. Carron and Fox were working together. Dr Fox responded that his own project was different. He wanted to develop a tool to patch in new grids and the first thing was to discover how easy it was to do. He offered to report back to the next GEBCO meeting [Action Dr Fox].

79. Dr Hall interjected that CCOM was building a database of multibeam data and wanted to use SRTM data, between 62ºS and 62ºN, for the terrestrial grid.

80. Dr Sharman commented that it was important to recall that the altimetric bathymetry was actually derived from satellite gravity so that there was uncertainty in the absolute depths.

81. Dr Loughridge proposed that the Guiding Committee should vote on Dr Carron's proposals.

82. In answer to Dr Falconer, Dr Carron said that the group had not yet worked out the details of how data were going to be submitted to GEBCO and quality controlled. Nevertheless four sub-groups were planned 1) to produce topography (probably based on SRTM), 2) to consider shorelines and the land-sea interface, 3) to consider how to include depths computed from satellite altimetry and 4) to work via an IHB Circular letter and to use personal contacts to obtain shallow-water data. The group will also collaborate with tsunami modellers. The project will take 2 to 2.5 years and will be directed by an Editorial Board which will include Tony Pharaoh from the IHB.

83. In response to the Chairman's request for further discussion on the issues of the release of the GEBCO grid and GEBCO putting its imprimatur on the proposal from Dr Carron and the gridders Dr Falconer formally proposed that the existing GDA-CE grid be loaded on the GEBCO web site subject to the copyright of the dataset within the GDA. Ing. Gen. Cailliau added that he felt that GEBCO was very efficient but that it needs a significant new product. It needed to demonstrate that it could produce a quick and flexible response to a new situation such as the 26th December 2004 tsunami. Mr Tani enquired about the situation of those who had paid for the GDA-CE if the grid was now to be freely available; the answer was that the GDA-CE provides data and software beyond the raw grid. It was agreed that measurement data cannot be copyrighted but the grid, being a derivative of data, may be subject to copyright.

84. Two formal proposals were then put to the vote:

85. 'The Guiding Committee **agrees** that the GDA-CE grid should be loaded on to an appropriate web site and made freely available to all, subject to the copyright of the dataset within the GDA.'

Dr Loughridge proposed, seconded by Dr Falconer. The motion was carried unanimously. For 5, Against: 0.

86. 'The Guiding Committee gives its imprimatur to a new global grid, based on all available data, as

proposed by Dr Carron and his group'.

Dr Loughridge proposed, seconded by Dr Falconer. The motion was carried unanimously. For 5, Against: 0.

87. Dr Loughridge suggested that the NGDC could construct a mirror site for the GDA-CE grid. Ms. Weatherall said that BODC were already planning a site in UK to release the GDA [Action Ms Weatherall]. Mr Tani also offered to arrange a mirror site in Japan as well [Action Mr Tani]. Dr Hall suggested that the site should emphasise the advantage of the GDA software made available on the CD. It was agreed that the new grid should be 'advertised' on the internet prior to its release. A small working group was formed to coordinate the release of the grid [Action Ms Weatherall, Dr Fox, Permanent Secretary].

5.6 The IHB business plan for GEBCO

88. Cdr Shipman began the discussion by presenting two slides (See Annex 11). The first showed a graphic intended to refresh minds on what GEBCO was and was trying to do; the second showed a possible business plan for the GDA to be addressed by Mr Pharaoh.

89. Mr Pharaoh presented the business plan for the GDA that had been developed at the IHB. The essence of the plan was that GEBCO, with the IHO and IOC, would identify sources of bathymetric data which they would then use to generate products. Particular features were that data contributors would be involved as 'stakeholders', the GDA would be the prime product, a 'lite' form of GDA-CE with a 10' grid and simplified software would be freely available to schools, universities and hydrographic conferences as an inducement to buy the full 1' grid. The plan involved further versions of the GDA-CE and the 'lite' version.

5.7 Current activities at Lamont-Doherty Earth Observatory

90. Dr Goodwillie reported on 'cyber-infrastructure activities' in the marine geophysics group at Lamont (Annex 12). This was jargon for the information technology (data management system) required to access and distribute data and was leading to interoperability and relevant functions such as web map services (WMS). The mgDMS, as it is called, can be accessed at http://www.marine-geo.org/. As part of the mgDMS, a variable-resolution global bathymetric grid is being developed. This incorporates the Smith & Sandwell predicted bathymetry, the IBCAO and other grids, multibeam data and high-resolution grids down to 4m. The web map services (WMS) functionality allows maps to be customised with hyperlinked locations providing overlays. Dr Goodwillie reminded the committee that the GDA was just one of three available gridded bathymetric datasets and it would be used by Lamont if the grid became freely available. He concluded by saying that he was unclear how the GDA could operate in a WMS environment and it might need a big allocation of resources to do so.

91. Dr Loughridge pointed out that NGDC had been involved in WMS four years ago. Dr Fox remarked that he had made a presentation similar to Dr Goodwillie's in Porto Venere but using GMT to create the base map but now Carla Moore had already started on a WMS product. He noted that NSF was not necessarily in the data archiving business for the benefit of marine geoscience. Mr Pharaoh replied that WMS just made the data more accessible; it didn't make it any better. The next step for GEBCO might be to be able to download undersea feature names as well as depths. Dr Sharman concurred; he said that the 30 arc minute altimetric database is basically a 2' grid that has been over sampled.

92. Dr. Schenke was concerned that GEBCO could not compete with the changes that were being discussed. Dr Falconer agreed that GEBCO should complement and not compete with these developments.

6. DO WE HAVE THE PROPER ORGANISATION TO GET THERE? (ORGANISATIONAL ISSUES)

6.1 Vice-Chairmanship

93. The Chairman invited the Secretary to report on discussions held among some Guiding Committee members in December 2004. The Secretary explained that several members, who were also members of the Nippon Foundation/GEBCO Training Project Management Committee, had met in Durham, New Hampshire and held informal discussions recognising that those present did not constitute a properly convened session of the GC and therefore could not take any formal decisions.

94. During the discussions Dave Monahan had summarised his position in being both the Chairman of GEBCO and the Nippon Foundation/GEBCO Project Manager. He had noted that there was seen to be a conflict of interest in combining both roles. He reported that, although he was no longer an employee of the Canadian Hydrographic Service (CHS), he had been asked by the CHS to continue as a Canadian member of the Guiding Committee representing the IHO. He noted that it had been a difficult time while the new course was being set up at UNH because key CCOM staff had been absent and because he preferred to work on just one problem at a time rather than several at once.

95. The Secretary continued that Dr Schenke had noted that the lack of a Vice-Chairman made the Chairman's present position more difficult. He had suggested that a Vice-Chairman should be appointed. At this point Dave Monahan left the room to enable a freer discussion to take place. The subsequent discussion can be summarised as follows, 1) those GC members present said they wished Dave Monahan to continue as Chairman, 2) the GC should appoint an Acting Vice-Chairman to assist the Chairman, 3) The appointment of the Acting Vice-Chairman would need to be ratified by a majority of all nine of the present GC members by email, 4) the appointment of the Vice-Chairman should be formally confirmed during the GC meetings planned to take place in Mexico in June 2005 and 5) this arrangement meant that, as things presently stood, the Vice-Chairman, and not the Chairman, would represent the GC on the Nippon Foundation/GEBCO PMG. Dave Monahan returned and he was informed of the GC members discussion. Subsequently Robin Falconer was invited to be the Acting Vice-Chairman. He accepted the invitation on the understanding that his position had to be ratified by the majority of GC members and formally confirmed at the GC meeting planned to be held in Mexico in June.

96. It was formally proposed that, 'The Guiding Committee **endorses** Dr Falconer as the Vice-Chairman of GEBCO'

Proposed by Dr Loughridge, seconded by ……, The motion was carried unanimously . For: 5, Against: 0.

6.2 Guiding Committee Membership

97. The Chairman invited discussion in particular about those members of the committee whose attendance record was poor. Dr Loughridge expressed his dismay that, when he phoned him recently, Dr Jones had not even been aware that he was a member of the committee. The Secretary expressed his great surprise because he too had been in contact with Dr Jones about whether he would come to Aguascalientes and Dr Jones had not mentioned the issue of his committee membership. Dr. Schenke explained that Dr Udintsev was absent because of a visa problem exacerbated by his return from a research cruise only six weeks ago.

98. Dr Loughridge expressed his concern that the Guidelines prohibit membership of the Guiding Committee by a representative of the IHO DCDB. He proposed a motion that, 'The Guiding Committee modifies its Terms of Reference to reflect that the Director of the IHO Data Center for Digital Bathymetry (IHO DCDB) is an at-large member in full-standing of the Guiding Committee'.

99. Dr Loughridge confirmed that 'in full standing' meant with full voting rights. In discussion he said that he thought that the committee could pass such a motion and it was clear that if the motion was out of order the IHO and IOC would soon inform the committee. Cdr. Shipman said he was also unsure. The 2003 Guidelines were unclear on the matter and he was not even sure that they had been approved by IHO Member States. Ing. Gen. Cailliau and Dr. Schenke said they were in favour of the motion but noted that the committee would need to check whether it was in order with the IHO and IOC [Action

Secretary]. Ing. Gen. Cailliau was unsure whether the committee could effectively change the balance between IHO and IOC members.

100. Proposed by Dr Loughridge, seconded by ……. . The motion was carried unanimously. For: 6, Against: 0.

101. Dr Fox thanked the Guiding Committee for their initiative and said that he understood that the appointment was *ex officio* as Director of the NGDC and not personal to him alone.

102. Dr Goodwillie commented that he looked to the committee to provide leadership and he would like each committee member to explain (i) his suitability as a member of the Guiding Committee, (ii) his contributions to GEBCO, (iii) his future vision of attainable GEBCO goals over the next 1, 2, 5, 10 years, (iv) what he considers to be the biggest barriers to GEBCO and (v) his new and innovative ideas that will excite, attract and retain young, fresh talent to GEBCO. The Chairman said he was sympathetic to Dr Goodwillie's point of view and considered that its introduction could be involved in any reorganisation of GEBCO. He also responded that he would like to conduct an exercise of self-evaluation among the committee members from time to time according to a set of criteria which he presented (Annex 13). Dr Falconer added his support to the Chairman's proposal and suggested that it might even be extended to the Sub-Committees. Dr Goodwillie thanked the committee for entertaining his suggestions.

6.3 Finance Working Group

104. The Chairman introduced the item by saying that there were two aspects to GEBCO's finances 1) the management of available funds and 2) the search for new funds. It was not clear to him that the Finance Working Group had been considering both aspects.

105. Dr Hall, the only member present of the Finance WG, replied that personally he had not done anything in the last year. He opined that GEBCO should concentrate on attracting funds from a rich individual rather than from funding agencies. His approach to a toy manufacturer had been rejected but he was still optimistic because (in the USA?) Foundations have to give away a certain amount of money every year for tax reasons.

106. Dr Loughridge reported a conversation he had had with Cdr. Lusiani in which it became clear that it was not a good time at present to approach Prince Albert II of Monaco, whose great-grandfather had done so much to assist the birth of GEBCO, but this should not be ruled out in future. He recalled that Sir Anthony Laughton had approached Prince Rainier some years ago.

107. The Chairman noted that the Finance WG had no Chairman and that Mr Newton had declined an offer to take on the post. One name was proposed for Chairman when Dr Hall interjected that the WG doesn't necessarily need such a person; the important thing was to set GEBCO's sights high. The Chairman concluded that Mr Cherkis and Dr Hall would continue to seek funds and that separately the Permanent Secretary would continue to have oversight of the accounts in Southampton.

6.4 'Products Committee'

108. The Chairman introduced the concept of a Products Committee which would have a separate remit from the Sub-Committee on Digital Bathymetry. He asked for comments on the need for such a committee. Dr Falconer responded that he had heard lots of comments at the meeting relating to GEBCO products. This was a different requirement from the technical issues covered by the SCDB and needed input from people interested in marketing and sales.

109. The Chairman concluded that he detected little enthusiasm for the concept but said it should be re-considered before the next meeting in the context of the re-organisation of GEBCO [Action Chairman].

6.5 Bathymetric Editor

110. The Chairman introduced the item by stating that Mr Hunter was resigning as Bathymetry Editor (BE). He continued that he felt that GEBCO had managed the BE badly and asked whether GEBCO still needed a BE. The Permanent Secretary explained the background to the funding and management of the BE at the National Oceanographic Centre in Southampton, UK. Dr Sharman said he felt uneasy about the relationship between GEBCO, BODC, the BE and his local management because he could not see any formal mechanism whereby GEBCO could manage the BE.

111. Dr Goodwillie opined that GEBCO does need someone to take on the role of data scout. He considered that it was not true that the Guiding Committee had provided a lack of direction, rather the job had not been filled by the right person. A lot of postdoctoral researchers would fill the post with energy and enthusiasm. This was disputed by Dr. Schenke who remarked that the BE post was actually a technical one. Dr Falconer noted that in the case of the BE, through the courtesy of NERC/UK, GEBCO had been provided with one full-time equivalent employee. GEBCO should refine a list of the tasks that needed to be done and then consider whether one or more people were needed to do them [Action Chairman, Dr Smith]. Dr Fox responded that whoever filled the post should be presented with a clear set of tasks and performance measures.

112. Dr Loughridge reported that he had also talked to Dr Smith. He noted that when Dr Jones had been Head of BODC he had in effect guided Mr Hunter. Perhaps, he asked, the problem is that the BE has not been given anything to do! He suggested that first the BE should be persuaded to withdraw his resignation and produce a work plan which would be compared with GEBCO's needs. He said that he was very reluctant to tamper with the source of funding from the NERC and feared that there could even be a chain reaction effect on the Digital Atlas Manager's situation.

113. Dr Goodwillie replied that he had been concerned for ten years that the present incumbent of the BE post was not the right person and he would like to hear why he is the best candidate. The Chairman responded that 'candidate' was the wrong word because the discussion concerned the present occupant of the post. The committee was considering a human resources issue and it had to take care to anticipate the risks of taking certain actions.

114. Dr Falconer suggested that there had been a good exchange of views and that the Chairman should now talk to the BE and his line managers. The Chairman agreed [Action Chairman].

6.6 Honorarium for the Permanent Secretary

115. The Chairman noted with dismay that the IOC had intimated that they would not pay an Honorarium to the Permanent Secretary in 2005. He thought that this was reprehensible and also incorrect because the cuts to the IOC budget were to occur after 2005. He proposed to protest in writing to the Executive Secretary of the IOC stating that GEBCO would underwrite the Honorarium if IOC reneged on their obligation.

116. Cdr. Shipman responded that the Chairman might also consider writing to the IHO who might also take the matter up with the IOC. Ing. Gen. Cailliau said he supported the Chairman writing to IOC before the IHO [Action Chairman].

6.7 GEBCO web site

117. Dr Goodwillie noted that GEBCO lacked the resources to make big changes to the web site but he would like to see more biographical profiles included to improve GEBCO's transparency. He warned that if the URL was moved away from NGDC GEBCO would lose the valuable services of Ms Carla Moore yet on the other hand some people had an erroneous perception that GEBCO was part of the

NGDC.

118. Dr Falconer noted that he had been asked in Porto Venere to seek a new URL. He reported that gebco.org had been taken (even though not for a valid use) as had gebco.com. When he had used a search engine to seek the GEBCO web site not all the likely keywords, such as bathymetry and ocean mapping, had led to the GEBCO web site near the top of the list. He continued that the options open to GEBCO were limited. The URL gebco.int was specialised and required GEBCO to be party to intergovernmental treaties, which it was not. On the other hand Mr von Rosenberg had personally acquired gebco.net for the use of GEBCO and it was linked to GEBCO's site at NGDC. The only other alternative was to set up a URL such as gebco-bathymetry.org or gebco-bathy.org (or some similar combinations). He proposed to start to use gebco.net, which was simple to remember, but to maintain the link to the NGDC site where the files would continue to reside.

119. Dr Sharman considered that the search engines seemed to work well, although others differed, and he confirmed that if the URL moved away from NGDC that GEBCO would lose the services of Ms Moore. Dr Fox concurred.

120. The Chairman concluded that there was strong support to keep the arrangement set up by Mr von Rosenberg and thanked him and Dr Falconer for their efforts.

6.8 The Nippon Foundation/GEBCO Trainees

121. The Nippon Foundation/GEBCO Project Manager summarised the employment situations of the trainees who were just completing the Year 1 course. Five were returning to employment in their home countries, one was beginning a PhD and one (from Fiji) was unemployed. He continued that he was insisting that the Fijian student should look for employment in her own country first but several members offered to use their contacts to find employment elsewhere because it was important that her skills in bathymetry were not lost.

122. Dr Loughridge suggested that in future the students should be given some status such as 'Nippon Foundation scholars'. Ing. Gen. Cailliau affirmed that it was equally important to keep in touch with these scholars after their graduation. It was agreed to add the names of the students to the GEBCO web site [Action Secretary].

6.9 Roles of the Chairmen of Sub-Committees and the Duties of the SCDB

123. Dr Fox urged that the SCDB, which currently has a big workload, should have a narrower focus. He suggested that some work should even be split off to another WG. Dr Falconer asked whether the Chairmen of the Sub-Committees should be *ex officio* members of the Guiding Committee. He suggested that there was more than enough business for GEBCO to deal with and that this issue could be discussed later [Action Chairman].

7. HOW DO WE TELL THE WORLD AND EACH OTHER THAT WE ARE GETTING THERE? (COMMUNICATION ISSUES)

7.1 Personality List

124. The Secretary began the discussion by quoting from an email sent by Mr Macnab which said 'I admire the principle of inclusiveness, but with over 80 entries, I believe the Personality List has become too bloated to serve any real purpose. I agree that it is desirable for GEBCO to remain "an open community and not [one that is] closed, opaque or secretive" but my sense is that it has become a fuzzy and amorphous organization, with people coming and going in a somewhat haphazard fashion and with roles that are poorly defined, if at all. The List identifies individuals who function at many different

levels of engagement, from spectators to executives …….. I consider that it would be far more effective to maintain a formal membership roster that identifies the appointed members of GEBCO's constituent committees and working groups, and to complement that with a mailing list of persons who are interested in ocean mapping, but who make little if any direct contribution to the goals and objectives of GEBCO.' Dr Goodwillie commented that he agreed with the email and said that he did not recognise many of the names on the Personality List although he made good use of the alphabetical list. Dr Falconer concurred that creating two lists is a good idea; he thought that the Secretary and the Chairman should produce a first draft for the Guiding Committee to review. Dr Fox disagreed that 80 was too many. Dr Schenke approved of the alphabetical list of names and noted that the membership of Working Groups and Committees includes only the active members anyway. Dr Sharman opined that the Personality List was well structured and wondered what was the problem. Dr Loughridge also favoured the current list and found it useful but he agreed that two lists was a good idea too. Finally, Dr Falconer suggested that inactive people and defunct Working Groups should be deleted from the Personality List and this met with approval [Action Secretary].

7.2 Electronic Newsletter

125. The Chairman revealed that he had stopped writing electronic Newsletters when they began to be posted on the GEBCO web site because he felt that they were too informal for public consumption. The Secretary said that he had initiated this action after indicating he would do so in an email which had been copied to the Chairman, to which the latter had not responded. He apologised for the misunderstanding and agreed to remove past Newsletters from the web site [Action Secretary]. Dr Loughridge said he preferred an informal newsletter. Dr Schenke considered that a newsletter should be part of GEBCO's outreach activities to tell the world what it was doing. Dr Goodwillie concurred and suggested that perhaps a more formal newsletter was required. Dr Falconer agreed that a newsletter on the GEBCO web site was a good idea but when Dr Goodwillie was invited by the Secretary to write such a newsletter he demurred.

7.3 Logos

126. A selection of logos produced by Mr Hunter was circulated to the committee. They elicited a variety of comments such as, maybe GEBCO needed a range of logos (with and without text), embedded logos were undesirable (i.e. a GEBCO logo containing the IHO and IOC logos), the logos were uninspiring and the logo presently on the web site was adequate. Dr Frias agreed with a critical comment from Mr Heredia that the logo needed to reveal the importance of charts in GEBCO's activities and he thought that the Mexican Navy might be able to help with the design. Dr Schenke favoured obtaining outside assistance and Cdr Shipman offered the assistance of a professional draughtsman at IHB. Dr Schenke suggested that the IHB be asked to design a logo. Dr Frias suggested that the Mexican Navy should be involved too.

127. The Chairman summarised that a single GEBCO logo was preferable without the IOC and IHO logos embedded and that the logo needed to indicate something about what GEBCO did. It did not need to spell out GEBCO's name in full. Dr Falconer was in favour of accepting the offers from both the IHB and Mexico. The Chairman invited Dr Frias and Mr Heredia to take the lead in designing a new logo for GEBCO [Action Dr Frias, Mr Heredia, Cdr Shipman].

7.4 Outreach

128. 7.4.1 Dr Goodwillie commented that all of GEBCO should be concerned that no one at either Scripps Institution of Oceanography or Lamont-Doherty Earth Observatory used GEBCO and that of 800 people he had spoken to several years ago at AGU (2002) and EGS (2003) meetings, although they were interested in GEBCO, none was interested in contributing their efforts on a voluntary basis to

GEBCO as an organisation.

129. He asked whether GEBCO wanted to set up booths at conferences again. The Chairman replied that generally people in GEBCO like to build charts and do not care about outreach; and that may be a deficiency but it also had to be recognised that it was a characteristic of GEBCO people. Dr Goodwillie responded that GEBCO ought to look for opportunities to reach its users. Dr Yeh suggested that the best outreach was done by example, for instance, every time that he attended a meeting where ETOPO2 was displayed he would praise the superiority of the GEBCO grid. He also thought that having a GEBCO mirror site in Japan(ese) would make a big impact in SE Asia. The Chairman replied that it was better to go to a conference and give a paper. Dr Goodwillie concurred with Dr Yeh. When he looked at the literature few people used the GDA-CE bathymetry in their figures. He offered, once the grid had been made available over the internet, to write an article for EOS about GEBCO [Action Dr Goodwillie]. Dr Loughridge added that it should be possible to produce statistics showing the number of hits received by the GEBCO web site as a measure of the value of the site [Action Secretary].

130. 7.4.2 National Geographic Maps. Ms Weatherall raised the issue of the status of the request from National Geographic Maps on 15th March 2005 to make use of the GDA-CE in their cartographic products. She needed guidance from the Guiding Committee. Dr Falconer responded that National Geographic products could provide an excellent vehicle for GEBCO publicity but that it should be remembered that it was not a not-for-profit organisation. Two options were to provide the GDA-CE a) for free or b) in exchange for some pecuniary recompense. He suggested that the Chairman and the Chairman of the SCDB (Dr Smith) should meet the National Geographic people and explore funding mechanisms or even, as Dr Hall had suggested, payments ‘in kind’.

131. Dr Goodwillie asked if GEBCO would have to sign over any rights to the data. The Chairman responded that Dr Smith had advised caution in dealing with this company. Dr Loughridge agreed. He said that his experience of agreements between the National Geographic and NOAA was that one had to be careful but if one was careful then usually one got what one wanted. Dr Hall considered this to be a non-issue; from 13 million copies of a National Geographic map he had published he had received only 9 responses. Dr Falconer concluded that, within reason, publicity can do no harm. He asked the Chairman and Dr Smith to contact National Geographic Maps [Action Chairman, Dr Smith].

7.5 Draft Minutes

132. It was agreed that in future the Secretary would send out draft Minutes to all attendees requesting a response within two weeks [Action Secretary].

8. WORK PLAN (DETAILS OF WHO DOES WHAT)

133. The Chairman lead a brief review of the Work Plan which was updated on the spot (Annex 14). Among comments made were that the IBCAO was widely accepted and that the proposal for a POBACE project in the IPY had been accepted. It was also noted that a special issue of the journal Marine Geophysical Researches on GEBCO was being cancelled although papers that had already been accepted would be published in MGR.

134. Dr Yeh commented that he did not see any reference to special initiatives on tsunami problems e.g. in the northern Indian Ocean. Dr Goodwillie replied that Mr Macnab had already mentioned the idea of creating a northern Indian Ocean chart to the IOC. The Chairman thought that there was no obvious response that GEBCO should make to the 26th December 2004 tsunami. Dr Falconer suggested that the committee could make a statement that GEBCO wanted to focus on the bathymetry of the northern Indian Ocean. Dr Yeh agreed because this might be an opportunity to conduct new surveys or to obtain

the release of data not normally accessible or even to obtain funds.

135. A discussion followed about GEBCO's relevance to society as a whole. Dr Fox and Mr Tani thought that GEBCO should expand its remit into shallow water, but without actually collecting data itself, as a way of expanding GEBCO. Dr Goodwillie considered that Drs Carron and Smith already planned to do this; he continued that it was in outreach activities that GEBCO was failing.

136. The discussion then roamed over the subject of shallow-water bathymetry. The Chairman concluded that he would look into the subject of soundings from less than 200m with Dr Fox and the IHB [Action Chairman, Mr Pharaoh].

9. CLOSURE AND DATE OF THE NEXT MEETING

137. There was a consensus that the Guiding Committee and the SCDB should normally meet together each year to save time and money although Dr Falconer thought that there was merit in the Guiding Committee meeting in closed session for one day. Cdr Shipman said he appreciated the importance of the meeting locations moving around the world but he stressed that there was an open invitation from the IHO for the Guiding Committee and the Sub-Committees to meet in Monaco.

138. Dr Fox proposed that the next series of GEBCO meetings should be held in the Alfred Wegener Institute in Germany. Dr Schenke replied that he was honoured to be asked and that he was very willing to host the meeting in Bremerhaven. Various dates in April were tentatively suggested and constraints identified. Dr Schenke and the Secretary were asked to determine the best dates and circulate them to the GEBCO community [Action Dr Schenke, Secretary].

139. The Chairman thanked the Mexican hosts of the meeting for their very good logistical arrangements with very friendly and professional helpers and for arranging such excellent presentations by Mexican scientists. Dr Nava replied that he had enjoyed his involvement with the meeting and he hoped it would strengthen GEBCO. He thanked his INEGI colleagues and wished everyone a safe journey home. Dr Loughridge added, with deep regret, that after 20 years this would probably be his last meeting as a member of the Guiding Committee. There being no other business the Chairman closed the meeting at 1747.

ANNEX 1

Twenty-first Meeting of the GEBCO Guiding Committee
in the Instituto Nacional de Estadística, Geografía e Informática, Aguascalientes, Mexico
11th – 12th July, 2005

AGENDA

1. OPENING OF THE MEETING AND WELCOME FROM INEGI HOSTS

2. CONDUCT OF THE MEETING

2.1 Adoption of the Agenda

3. WHAT HAVE WE BEEN DOING? (ONGOING PROJECTS)

3.1 Sub-Committee on Digital Bathymetry (SCDB)

3.2 Sub-Committee on Undersea Feature Names (SCUFN)

3.3 Nippon Foundation/GEBCO Training Project

3.4 Finance Working Group

3.5 Educational Working Group

3.6 Report of the Bathymetric Editor

3.7 Report of the Digital Atlas Manager

3.8 The SSPARR Project

3.9 Regional Issues Working Group

3.10 Other Achievements

4. WHERE ARE WE GOING? (GUT ISSUES)

4.1 Strategic Plan

4.2 What's the point of GEBCO?

4.3 IHB/IOC re-organisation of Ocean Mapping and GEBCO's collaboration with IBCs

4.4 Networking and the Nippon Foundation

4.5 UNCLOS and GEBCO

5. WHAT DO WE NEED TO DO TO GET US WHERE WE ARE GOING? (FUTURE PROJECTS)

5.1 Tsunamis and GEBCO
5.2 SCOR Working Group proposal
5.3 GEO/GEOSS
5.4 Regional Issues Working Group
5.5 A worldwide grid
5.5 A worldwide grid
5.7 Current activities at Lamont-Doherty Earth Observatory

6. DO WE HAVE THE PROPER ORGANISATION TO GET THERE? (ORGANISATIONAL ISSUES)

6.1 Vice-Chairmanship
6.2 Guiding Committee Membership
6.3 Finance Working Group
6.4 'Products Committee'
6.5 Bathymetric Editor
6.6 Honorarium for the Permanent Secretary
6.8 GEBCO web site
6.8 The Nippon Foundation/GEBCO Trainees
6.9 Roles of the Chairmen of Sub-Committees and the Duties of the SCDB

7. HOW DO WE TELL THE WORLD AND EACH OTHER THAT WE ARE GETTING THERE? (COMMUNICATION ISSUES)

7.1 Personality List
7.2 Electronic Newsletter
7.3 Logos
7.4 Outreach
7.5 Draft Minutes

8. WORK PLAN (DETAILS OF WHO DOES WHAT)
9. CLOSURE OF THE MEETING

ANNEX 2

Report by the Chairman of the GEBCO Sub-Committee on Undersea Feature Names

1. Summary:

Report of IOC-IHO/GEBCO SCUFN XVII
The Seventeenth Meeting of SCUFN took place at the Head Department of Navigation and Oceanography (HDNO) of the Russian Federation Ministry of Defense St. Petersburg, Russia, from 8-11 June 2004.
The Meeting was attended by 6 (of 8) accepted SCUFN members (Agapova, Cherkis, Huet, Schenke, Sobolev, Taylor) and by one unofficial new member (Ohara). Eight invited guests and advisors (Fomin, Frias, Naryshkin, Palmer, Smirnov, Travin, Turko, Udintsev) attended in addition.

The Meeting was welcomed by Admiral Komaritsyn.
Ms. Lisa A. Taylor agreed to serve as rapporteur for the Meeting.
Mr. Trent Palmer attended as representative of ACUF/USBGN (Secretary).
In sum: 63 name proposals. From Russia (54), UK (4), DE (4) and N (1)
were received during the intersessional period, prior to the Meeting.
A number of 41 pending name proposals from SCUFN XVI (Monaco, April 2003) and 3 matters from SCUFN XV (Monaco, Oct 2002) were on the agenda of the Meeting.

2. SCUFN Membership

1.The membership of SCUFN was reviewed. Five out of eight members were present at the meeting, meaning a good turnout. Mr. Walter Reynoso Peralta, Argentina, was not able to attend this meeting due to travel difficulties and being student of the Nippon Foundation/GEBCO program.
2.The membership of Mr. Jesus Dias, Colombia, had been withdrawn. It was tasked to seek a replacement within IHO.
3.As new member, proposed by Japan, Dr. Yasunhiko Ohara (to replace Mr. Kunikazu NISHIZAWA (Japan Hydrographic Department), attended the meeting. He is from the Ocean Research Laboratory, experienced and a well recognized geophysicist, but at this meeting no voting privilege, He is now approved by the Guiding Committee by correspondence as full member.
4.Another new member, who attended this meeting, is Lic. José Luis FRIAS Salazar, the host and organiser of our meeting. He was approved by the GEBCO-GC by correspondence during the intersessional period. We know José Luis as very knowledgeable scientist, active in the GEBCO GC and highly involved in the IBCCA program. Welcome to SCUFN.
5.With the IHB Circular Letter 90/2004 IHO Member States were invited to nominate candidates for SCUFN. With Circular Letter 56/2005 three new candidates are submitted from the IHO side. Their appointment must be formally endorsed by the 21st GEBCO-GC Meeting.

3. List of actual members of SCUFN (July 2005)

Dr. Hans-Werner SCHENKE [IOC] (Chair)
Alfred Wegener Institute für Polar und
Meeresforschung (AWI)

Dr. Galina AGAPOVA [IOC]
Geological Institute of the Russian
Academy of Sciences

Mrs. Lisa A. TAYLOR [IHO]
National Geophysical Data Center

Dr. Yasuhiko OHARA [IHO]
Ocean Research Laboratory
Hydrographic and Oceanographic
Department of Japan

Mr. Norman Z. CHERKIS [IOC]
Five Oceans Consultants

Lic. Walter REYNOSO Peralta [IHO]
Servicio de Hidrografía Naval

Lic. José Luis FRIAS Salazar [IOC]
Instituto Nacional de Estadística
Geografía e Informática (INEGI)

Capt. Vadim SOBOLEV [IHO]
Head Department of Navigation and Oceanography (HDNO)

<u>To be confirmed by the GEBCO Guiding Committee:</u>

LCdr. Harvinder AVTAR (IHO)
National Hydrographic Office

Capt. Albert E. THEBERGE (IHO)
Office of Coast Survey

LCdr. Rafael PONCE Urbina (IHO)
Dirección Gal Adj de Hidrografia y Cartografia

4. Report of SCUFN XVII

i. A number of actions from previous meetings had to be discussed and finalized during SCUFN XVII. A number of items including name assignments and discussions had been carried out by correspondence, mainly by email.

ii. Remaining items from previous meetings
From SCUFN XV (Monaco, Oct 2002) **(1 out of 3 accepted)**

Three proposals were left from SCUFN XV
Final acceptance was applied to the **Tropic Seamount** (Southeast Atlantic)
The features Mahi Mahi FZ and **Moana Wave Ridge** and **Svendson Ridge** (SW Pacific) are kept in reserve position in the Gazetteer, pending until more bathymetric evidence is supplied by proposer.

5. From SCUFN XVI (Monaco, April 2003) **(15 out of 41 accepted)**

Proposals discussed during this Meeting are from following regions:

SW Pacific (2)
Campbell Escarpment (Dr. L. Carter) accepted
Joseph Gilbert Seamount (Dr. L. Carter) accepted

SE Indian (1)
Six Fracture Zones proposed by James Cochran, LDEO, no details upon request. Pending, to be followed up by SCUFN members.

SE Pacific (10)
Arauco Basin: Pending, lacking bathymetric evidence, in reserve
Acongagua Canyon, (Capt. H. Gorziglia) accepted
La Ligua Canyon, accepted
Biobio Canyon, (Capt. H. Gorziglia) accepted
Chiloé Basin: Pending, lacking bathymetric evidence, in reserve
Guafo Fracture Zone: Pending, request additional positions, in reserve
Mocha Fracture Zone: Pending, request additional positions, in reserve
Valdivia Basin: Pending, lacking bathymetric evidence, in reserve
Valdivia Fracture Zone: Pending, request two additional positions, in reserve
Valparaiso Basin: Pending, lacking bathymetric evidence, in reserve

W Indian (11)
11 feature names taken from IBCWIO: **Antandroy Seamount; Conducia Canyon; Grandidier Seamount; Macua Seamount; Memba Canyon; Mocalengia Canyon; Mocambo Canyon; Nacala Canyon; Pemba Canyon; Sakalave Seamount; and Sangage Canyon.** No response from the map compiler and Chief Editor. Further action by SCUFN members.

Gulf of Mexico and Pacific (6)
Chorreras Canyon, accepted (name origin pending)
Chubasco Bank (Dr. R.L. Fisher) accepted
Sigsbee Abyssal Plain, accepted
Swan Trough, accepted
West Cayman Rise, accepted
Tehuantepec Fracture Zone : Pending, magnetic and gravity field data requested, in reserve

Southern (1)
Drygalsky Seamounts, accepted

SE Atlantic (3)

Echo Bank, accepted
Le Trou Sans Fond Canyon, accepted
Estêvão Gomes (prop. by Prof. Vanney, the name of Gomes should be preserved for a more appropriate feature.

Arctic (7)
Shmakov Escarpment, accepted
Greenland-Spitzbergen Sill, accepted
Karasik Seamount (placed in reserve until new bathymetric data be presented by G. Agapova, who propose for this feature the name Leninskiy Komsomol Seamount.
Zhilinsky Spur, Pending, lacking bathymetric evidence, in reserve
Naletov Ridge, same feature named already in ACUF as **Brass Ridge**. Discussion about the generic term of this feature (ridge, seamount chain, fracture zone of seamounts). Held in reserve, decision deferred until SCUFN XVIII.
ACUF Names from **Currituck Seamount**, pending, reserve, examine NIWA charts 1:1Mio
Hatherton Seamounts, pending, reserve, examine NIWA charts 1:1Mio
Kaiwhata Bank, pending, reserve, examine NIWA charts 1:1Mio,
Lee Seamount pending, reserve, examine NIWA charts 1:1Mio
Scholl Deep pending, reserve, examine NIWA charts 1:1Mio
Pukaki Seachannel pending, reserve, examine NIWA charts 1:1Mio

Proposals submitted during intersessional period **(30 out of 38 accepted)**
No proposals were submitted by IOC Editorial Boards

Four (4) proposals from Prof. Robert Whitmarsh, University of Southampton, UK – Indian Ocean

- **Tropic Bird Orchid Knoll**, accepted
- **Darwin Knoll**, accepted
- **Wallace Knoll**, accepted
- **Sharpeigh Knoll**, accepted

Eight (8) proposals from Dr. Galina Agapova, Geological Institute of the Russian Academy of Sciences – Arctic Ocean

- **Admiralteystvo Rise**, accepted
- **Admiralteystvo Trough**, accepted
- **Al'banov Bank**, accepted
- **Litke Passage**, accepted
- **Medvezhy Trough**, accepted
- **Hydrographers Rift** Valley, postponed, only portion of median valley
- **Sedov Rift** Valley, postponed, only portion of median valley named
- **Kotsebu Trough**, not accepted, not enough data provided

Three (3) proposals from Dr. Galina Agapova, Geological Institute of the Russian Academy of Sciences – Antarctica / Southern Ocean

- **Dubinin Trough**, accepted
- **Lazarev Trough** (already in the Gazetteer)
- **Man Trough**, not accepted, bathymetric data used from outdated sources

1. Five (5) proposals from Dr. Galina Agapova, Geological Institute of the Russian Academy of Sciences - Pacific Ocean

- **Alba Guyot**, accepted
- **Gagarin Seamount**, accepted
- **Gelendzhik Seamount**, accepted
- **Gramberg Guyot**, accepted
- **Pallada Guyot**, accepted

2. Seven (7) proposals from the HDHO - Arctic Ocean

- **Makorta Seamount**, accepted
- **Garkusha Seamount**, accepted
- **Rossokho Seamount**, accepted
- **Zefirov Seamount**, accepted
- **Shinkov Seamount**, accepted
- **Teplov Seamount**, accepted
- **Bukovskiy Knoll**, accepted (proposed as Gramberg Seamount)

3. Eleven (11) proposals from the HDNO - Atlantic Ocean

- **Georgiy Zima Seamount**, accepted
- **Rybin Seamount**, accepted
- **Lukin-Lebedev Seamount**, accepted
- **Gramberg Seamount**, accepted, (originally proposed as Bukovskiy Seamount)
- **Kazanskiy Seamount**, accepted
- **Yermolenko Seamount**, accepted, (originally proposed as Bukovskiy Peak)
- **Somov Hill**, accepted, (originally proposed as Mikhaylov Seamount)
- **Gnitsevich Seamounts** (provisionally accepted) more position coordinates requested
- **Snezhinskiy Seamounts** (provisionally accepted) pending, subject to information from ACUF gazetteer
- **Vladimirskiy Rise**, pending, reserve, multibeam data to be checked (near Vema F.Z.). Pending, reserve, examine NIWA charts 1:1Mio
- **Vartan'yan Seamount**, not accepted, feature is part of the Konstantinov Ridge

There remained 20 proposals from HDNO that could not be handled during the meeting due to lack of time. It was agreed they would be dealt with by correspondence.

One (1) proposal from Prof. Yngve Kristoffersen, Department of Earth Science, University of Bergen, Norway, April 2004 - Arctic Ocean. To be addressed and completed by correspondence(email).

Four (4) proposals from Alfred Wegener Institute of Polar and Marine Research, Bremerhaven, Germany, May 2004 - Arctic Ocean. To addressed and completed by correspondence (email).

6. Summary of proposal evaluation:

98 undersea feature names were considered during SCUFN XVII, 45 proposals were finally discussed and accepted. This is not a huge outcome from this meeting, but it must be considered, that the majority of proposals were received only few weeks before the Meeting. Thus neither the SCUFN chairman nor the SCUF secretary and members had time to judge the proposals in advance. This will be changes changed in the future (cf. item 3.3.9)

7. Intersessional Activities

Intersessional activities concentrated on checking and harmonizing of GEBCO's and ACUF's Gazetteers. A lot of work was done by ACUF-members to check spelling and romanization / transliteration of Russian names

As one outcome and correspondence with Russian SCUFN members it was decided that issues of romanization / transliteration of Russian names be discussed under a specific agenda item at SCUFN XVIII.
Thank to the activities of the ACUF Secretary and Norman Cherkis, member of both committees.

8. Standardization of undersea feature naming

Discussion during the Meeting left the presumption that changes to the **IHO-IOC Publication B-6 "Standardization of Undersea Feature Names"** may be necessary in the future. However, this discussion was **deferred** to the next meeting. The secretary briefly reviewed the protocol for naming undersea features, and stated that there may be a need to improve these rules. The secretary requested that sub-committee members review the document and come to the next meeting prepared to make recommendations for changes.

The SC discussed need to expand the availability of B-6 in additional languages.
J. L. Frias agreed to review the Spanish/English version of the current 3rd edition of B-6 (2001) for accuracy.
G. Agapova offered to work on a Russian/English version and
Y. Ohara offered to look into creating a Japanese/English version.

9. Gazetteer of Undersea Feature Names

1. Web-based Map Interface for Undersea Feature Name Gazetteer

- L. Taylor of Woods Hole Workshop on Federated Approaches to Marine Names Gazetteers
- Wide request for the ability to access gazetteers on-line
- members to review the prototype of the web-based map gazetteer interface

2. Improvements to the IHB Gazetteer Software

- secretary presented the updated IHB Gazetteer Viewing Software and encouraged the sub-committee to review the software
- renamed the 'IHO-IOC Gazetteer Viewing Software'

10. List of actions

The action items, sum of 44) reflect, that especially if the proposals are placed short before the meeting, a lot of work for the committee members remain. Also incomplete proposals create a large workload to members. Thus it must be considered, and strived for, that proposing names are straight forward, the proposal form and process must be done in electronic form. Proposers must be able to check for example with the help of the Web-based Map Interface for Undersea Feature Name Gazetteer and/or the 'IHO-IOC Gazetteer Viewing Software' whether the feature to be proposed is already named and if the proposed name is still free.
The information interchange and the pre-validation of proposals must be done using email in order to speed up to the approval process.

11. Other Business

Deadlines for submitting proposals for consideration at SCUFN annual meetings It was agreed that, in the future, proposals which are to be considered at SCUFN meetings must be submitted 30 days before meetings if in digital form, and 60 days if in analogue form.

This, in order to allow sufficient time for SCUFN members to read the proposals in advance of meetings. If at all possible, proposals should be submitted in digital form as they are easier to distribute, display and incorporate into the meeting minutes.

12. Intersessional communication

The sub-committee discussed the need to communicate effectively between meetings and agreed that using a list serve would facilitate correspondence. L. Taylor agreed to set up a list serve.

13. Next Meeting

The 18th Meeting of SCUFN will be held at the IHB, Monaco, on 3-6 October 2005.

ANNEX 3

Report of the GEBCO Finance Working Group
by Anthony Laughton, Chairman GEBCO Finance Working Group
16th June 2005

GEBCO funds are held in three separate accounts. Two are held by Southampton University, of which one is in dollars and the other in Sterling. The third is held by the IHB in Euros and is the residue of the Centenary Celebration GEBCO Fund.

1. **Southampton GEBCO Fund (Annex 1)**
   administered by Southampton University (Project HK997700)

Part of the income to this fund this year has come from BODC, being the half share of the income from the sale of the Centenary GDAs.

The other part is the result of the vigorous actions of our Permanent Secretary who complained to the finance authorities at Southampton University about delays in the transmission of dollar income into the fund. At a time of the deterioration of the dollar, this resulted in a significant loss to GEBCO. The university agreed to compensate for this.

Once again I have failed to extract the second and third tranches of the grant from GMS. GMS have entered into administration and their 2004 revenue "will represent only 10% of our 2001 revenue, when this agreement was made". In August 2004, Global Marine announced in a press release that agreement had been reached for the sale of Global Marine to Bridgehouse Marine. Singapore Telemedia, a subsidiary of Singapore Telecom, has now acquired Global Crossing, the US parent company of GMS, which went into liquidation. I do not believe that there is any mileage in pursuing this route for further funds.

Expenditure from this account has largely been used to support the attendance of GEBCO members to meetings, and for the advertising of GEBCO with leaflets and with displays at exhibitions. A special honorarium for Bob Whitmarsh was agreed by the Chairman, to reflect the exceptional efforts and time Bob put in to secure the Nippon Foundation contract.

2. **The Nippon Foundation Fund (Annex 2)**
   administered by Southampton University (Project HK997702)

Income to this fund is in US Dollars, but some expenditure is in Pounds Sterling. The statement is made in both $ and £. As the Southampton books are held in Sterling, the balance when converted back to dollars reflects changes in the currency exchange.

3. **The IHB GEBCO Centenary Fund (Annex 3)**
   administered by the IHB

This fund is in Euros. Income has arisen from IOC and from a refund on VAT. Expenditure has been to support GEBCO members to meetings. For simplicity, I recommend that this fund now be closed

Summary (including expected income and expenditure)

Southampton GEBCO Fund (as at 13/6/05)	£36,224.80 equiv to at £1 = $1.806	$65,420
Nippon Foundation Fund (as at 30/4/05)	£247,147.74 equiv to at £1 = $1.806	$ 446,373
IHB GEBCO Centenary Fund (as at 12/5/05)	-297.23 € equiv to at 1 € = $1.3	-$386
	Total	**$555,407**

I am planning to retire as your Chairman of the Finance Working Group following this meeting. I wish GEBCO every success for the future.

ANNEX 4

GEBCO Strategic Plan v4.0

Prepared at the University of New Hampshire meeting, May. 2002
Annotated at Aguascalientes, Mexico July 2005

…

GEBCO facilitates scientific cooperation and exchange to advance global bathymetric mapping. GEBCO fosters collaborations among individuals and organizations with established and developing expertise, assisting local and regional mapping efforts to attain a global standard of quality. GEBCO maintains a synthesis of ocean floor bathymetry, incorporating local, and regional maps and data in a global context. GEBCO brings together producers and users of bathymetry, enabling them to make quality products widely useful in science and education.

1. An overview of the organisation

GEBCO is an organisation with some rare, if not unique, characteristics, which have forced the development of a distinct management style…

2. Technological Drivers

new

Harvesting shallow water soundings

ABYSS Lite
Interoperability via the web

3. Organizational Response

…

The IHO continues to provide standards for the quality and completeness of sounding data, and coordinates the participation of its members in the GEBCO program. Building on the success with GEBCO, the IOC established its Consultative Group on Ocean Mapping (CGOM) to coordinate IOC Ocean Mapping activities. This group is also responsible for coordinating the activities of the International Bathymetric Charts (IBC) projects at a regional scale. The IBC projects are encouraged to feed their regional maps into the GEBCO global compilation for inclusion in the GDA, both as contours and in the grid. The importance of contributing digital sounding data by both the VHOs and the IBC mapping projects to the IHO DCDB for use by both GEBCO and the IBCs is essential for the long-term success of GEBCO. A common comprehensive data base allows data to be interpreted once and distributed through one portal

The Guiding Committee is fully aware that these accomplishments need to be continuously monitored and updated and that new activities must be undertaken

4. Present Situation - Organizational

None of the participating organisations or individuals has been standing still. One highly relevant development is that IOC started a series of regional International Bathymetric Charts (IBCs), bathymetric charts at a scale of 1:1M, or better in near shore regions. These are designed to provide

bathymetry for scientific research purposes and are eventually intended to have geologic overlays. There are seven areas at present, covering a small portion of the ocean. The intent is to have all data from all charts put into one center so that all can use them. In the analogue paper chart days, the IBC s could be regarded as a bridging product between navigation-scale charts and GEBCO, but the advent of digital, scale-free mapping, has made this distinction moot.

The IHO and members continue to be pressured by the increasing draft of ships, and seeks to provide complete bottom coverage in areas critical to shipping. Large data sets in the deep ocean are collected by HO s for defense purposes and are usually initially classified. Changes in defense policies and the age of the data sometimes lead to their release for non-defense use. At the same time, new uses for hydrographic data are multiplying, such as cable laying, pipeline construction and marine conservation area management, and new users appearing. HO s seek to balance their resource use with user needs and need to see return on all their efforts. Soundings that they must collect for navigation purposes increase in value returned when they are used for more than one product.

Despite the establishment of the IHO DCDB, not all sounding data collected at sea ends up in this Data Base. Management of sounding at international level is becoming a critical issue. ((GS has words—but I cant find them))

GEBCO membership

Robin will supply

Restructuring

GEBCO recently undertook an internal analysis of its current performance and recognized some areas that required attention: these contributed to the decision to prepare this plan. Clients' needs have shifted through time, and the uses of GEBCO products in industry, government, defense as well as academia have increased and diversified. Although known in professional circles, the activities and products of GEBCO could be more widely disseminated to the public through education and through the media.

GEBCO therefore sought the views of users and potential users of ocean morphology through a questionnaire. The principal conclusions were that:-

4a) there was an overwhelming need for bathymetric data in a gridded format at a grid size of 1km or less
4b) there was still a significant need for paper charts, but with contours at intervals of 100m or less
4c) new data should be rapidly assimilated and distributed
4d) access to GEBCO products should be by CD or Internet
4e) a considerable quantity of existing acoustic data had not been made available for integration into GEBCO products.

Against this technological and organizational background**, GEBCO will continue to provide maps of the sea floor over an increasing range of scales, using a wider range of instruments and data, producing a greater array of products for existing and new clients,**

and operating in close collaboration with existing and new partners.

5. Strategic Steps to strengthen GEBCO's relationships with the IHO and IOC, and other international bodies

GEBCO will seek ways to combine the two [IHO navigational hydrography and IOC science mapping] programs. Among possible solutions are:- ensuring regional chairs become GEBCO contributors, having regional maps feed into the world map, having local maps published as part of the GDA. The overall objective is to have sounding data submitted by only once by VHOs for use in both series, and interpreted once, for distribution through one portal.

GEBCO will investigate the feasibility of increased interaction with other international bodies, in roles ranging from partner to client. As an example, FAO has a need for knowledge of depth data on Continental Shelves in support of fisheries.

Nippon Foundation

SCOR

1.1 GEOSS/GEO

GEBCO will review its organizational structures, including its committees and sub-committees, to ensure that they are capable of successfully addressing their tasks and of fulfilling their responsibilities.

1.2 Regional Issues WG commissioned at the last GC meeting in 2004

1.3 The products committee

1.4

The Guiding Committee will:

seek funding from Patrons

seek funding from organizations and communities of users of GEBCO bathymetry who value bathymetry as necessary for their sciences uses Nippon Foundation

seek funding from the commercial and industrial sector who can profit from improved ocean bathymetry

Aggressively seek and build a constituency of patrons, supporters and users of GEBCO data products. These constituents will be encouraged to provide continuing funding to develop bathymetry of use to them...

Charge the finance committee with responsibility to modernize and improve financial management of GEBCO resources, seek new continuing funding and monitor expenditures to maximum effectiveness...

1.5 **6. Strategic Steps to Broaden the Scope, Utility, Appeal and Application of GEBCO Products and Activities**

6.1 A new edition of the GDA will be issued in 2002 incorporating the latest maps at a variety of scales and a world-wide grid of ocean depths at 1 minute spacing. More than one quarter of the world's oceans will be completely updated in this edition.. Continued development of the GDA and its further distribution will be achieved through:-

i) seeking out and assimilating raw bathymetric data and new bathymetric compilations and encouraging the production of such compilations. The Nippon Foundation students are all producing a new map.

ii. developing a variable resolution grid with the eventual goal of a grid at one tenth of a minute world wide. The gridding process will be improved to allow more rapid assimilation of data and techniques will be developed for providing uncertainty information of grid points.

iii) processing the contour vectors and grids so as to assure rapid and seamless GIS compatibility.

iv) developing an open data base system for the universal submission of depth data so as to encourage further submissions of data.

v) ensuring the availability of GEBCO products through the Internet and developing platform independent products

vi) developing an organizational structure for filling gaps in areas of coverage

vii) encouraging the production of a world-wide shoreline at a scale of 1: 250 000 and better

6.2 Methods and resources will be sought to ensure that the paper edition of GEBCO will be updated and re-issued.

6.3 GEBCO will develop and distribute some educational products. These can contribute to IOC s program of Training, Education and Mutual Assistance (TEMA) for less developed countries as well as have a more general educational role

6.4 the work of the nomenclature committee in international naming of seafloor features will continue and be supported through the encouragement of further submissions, development of an automatic name placement tool for cartographic software, and the production of a digital version of IHO Special Publication 23, the Limits of Oceans and Seas.

6.5 GEBCO data is being used at present by some Coastal States to establish provisional positions for the 'foot of the continental slope' in terms of Article 76 of the Law of the Sea Convention (1982). GEBCO will determine a provisional world-wide position for the 'foot of the slope' to be used only to facilitate desk-top studies required to establish the areas where more accurate surveys may be needed.

6.6 Bathymetric mapping will be improved through the integration and full usage of all types of geoscience data including the integration of multibeam data with widely-

spaced single beam data, full calibration of altimetry, and other types of bathymetry in the GDA.

6.7 An education and outreach program will be implemented with the objectives to:

i. Increase the recognition of GEBCO, its products, their utility and value with the Earth Sciences and hydrographic communities and the general public
ii. Initiate and nurture the broad interdisciplinary use of GEBCO products
iii. Seek feedback guidance from this much larger clientele as to what additional products and research thrusts would benefit mankind.

Activities will include 1) having a GEBCO booth at scientific meetings, DONE 2) a subject matter expert contact page on the Internet by which the public can reach the appropriate GEBCO personalities 3) GEBCO articles and news releases to periodicals 4) brief biographies and photographs of GEBCO personalities posted on the web page.

7. Summary

Recognizing that GEBCO aims to provide the international authoritative synthesis of global ocean floor topography, any implementation plan should address the following main strategic objectives:

1. provide more rapid assimilation of all available data into a digital, variable grid-sized, gridded database of bathymetry Done and continuing
2. provide web access to (all or part) of the frequently updated digital database for a wider community with optional customizing display features Done
3. develop educational products
4. 'market' GEBCO and its products to data contributors, other GEBCO users, parent bodies and the general public
5. find resources to carry out all of the above
6. review and, if necessary, alter GEBCO's current organizational structure that links to GEBCO's internal activities and maintains external relations with parent bodies and other relevant international organizations.Ongoing

8. Conclusions

…

These are the personal views of the author and are not endorsed by GEBCO, its Committees or sponsoring bodies

ANNEX 5

What is the point of GEBCO?

by Andrew Goodwillie,
Lamont Doherty Earth Observatory

1) Who am I? (The context in which I give this presentation)

- Ten years in GEBCO:

- Contributed bathymetric grid of the Indian Ocean and Environs
- Designed, organised, manned AGU/EGS GEBCO information booths
- GEBCO website work
- Wrote gridding documents for GEBCO CD and website

- Youngest 'active' member of group?
- View GEBCO from perspective of the science community, from SCDB and the grid
- An eternal optimist who had a huge amount of enthusiasm for GEBCO
- But, I'm frustrated with GEBCO's increasing disconnection to users, flawed structure,
lack of relevance, inability to adapt to the times, dearth of appeal for young researchers
- This document inspired by the chairman's question: "What is the GEBCO of my dreams?"
- What I say below is, I think, what many of us already know but are unwilling to voice

2) Potential for the role of GEBCO in the earth sciences community

- *The* world authority for the provision of global bathymetry
- The designated world authority for establishing the names of undersea features
- Responsive and efficient action to meet the needs of the community
- A willing and committed member of the scientific community
- Accountable, respectable, open, and transparent
- Focussed on delivering a small, realistic number of cutting-edge products
- Sensible allocation of the resources made available to us
- Attract on-going funding for GEBCO projects

- Attract a broad range of interested parties to attend purposeful and invigorating GEBCO-sponsored meetings/workshops
- Attract active post-docs and researchers to lead our projects
- Promote societal awareness of importance of bathymetry
- Provide a clear, achievable mission statement

3) Potential for the products released by GEBCO

- GEBCO bathymetry is *the* natural choice for researchers, teachers, public
- GEBCO products provide context for research, detailed surveys, and operational planning
- Global 1-minute bathymetric grid freely available on the web
- The grid is clearly distinguishable from Smith/Sandwell predicted bathymetry
- A continuously-improving, reliable grid
- People choose to contribute their bathymetry data to GEBCO
- Newly-available bathymetry seamlessly ingested into grid
- Print-on-demand and web-based Map Services functionality
- A useful, versatile, content-rich, often-visited website

4) GEBCO – recent highlights

- Release of GDA–CE CD containing 1-minute bathymetric grid
- Quality of PC Windows software included on the GDA–CE CD
- Information/education/outreach booths at AGU and EGS
- Strategic Planning Committee meeting, New Hampshire, May, 2002
- The GEBCO newsletter circulated by e-mail
- Gazetteer of Undersea Feature Names (BP No.8) on the web and updated

Except for the Gazetteer, none of these are on-going as far as I know.

5) Negative characteristics of GEBCO

5.1) Overall:

- Talk a great deal once a year then take little apparent or effective action over the next 11 months (e.g. decision in April 2004 to make the grid freely available)
- Rely almost exclusively upon highly-motivated volunteers to do GEBCO's work
- Squander opportunities
- Continually miss involving our potential user base due to inability to act promptly

5.2) Organisational:

- Lack of communication within the group

- Expertly – or inadvertently – avoid difficult and thorny issues
- Hide behind paralysing, suffocating bureaucracy
- Choose the politically-correct path of least resistance
- Stick our head in the sand until problems go away
- Go to our annual meetings and burble, but to little effect
- Create arguably shallow official minutes of meetings
- Do nothing whilst the median age of members increases
- Wallow in complacency; congratulate ourselves at every opportunity
- Only add people to GEBCO committees/ "personality" list: winnowing rare
- Appoint instead of elect office holders and committee members
- In eyes of community, continue to operate as an insular old boys' club
- Have no interest in member transparency via web profiles
- Comprise mostly senior-ranked, high-up people from associated organisations
- Fail to pair available resources with realistic goals
- Fail to change with the times

As a member of this group, I am part of the problem.
Solution depends entirely upon the *enduring,* constructive involvement of group members.

6) Finances

- Always the same problem: we have no money
- Continually fail to obtain funding to further our core bathymetry projects
- Provide no incentives for younger researchers to want to contribute any significant effort to GEBCO

Nippon Foundation:

- Potentially lots of money – irresistibly appealling
- Many restrictive conditions; sustained commitment uncertain

But, specific GEBCO operations do receive money with no strings attached:

- IHB-IOC institutional donations
- NERC line-item budget for fully-funded resources focussed on GEBCO:
  - Salary for Pauline Weatherall (GEBCO Digital Atlas Manager) and
  - salary for Peter Hunter (GEBCO Bathymetric Editor)
  - Comprises a substantial level of funding
  - My pleasure to work constructively with Pauline over ten years

7) GEBCO Bathymetric Editor (GBE)

7.1) Requirements/Putative Terms of Reference:

- GBE is *the* individual charged with and directly responsible for continued improvement of GEBCO bathymetry. That is, the GBE has a position of great responsibility and, ideally, high visibility at the centre of GEBCO bathymetric mapping activity
- GBE is the organisation's bathymetric representative on the global stage
- Remains knowledgeable about worldwide bathymetric mapping activities by initiating timely contact with collectors of bathymetry data across the globe
- Stays abreast of bathymetry-related literature in current journals
- Actively chases bathymetry data to further the goals of GEBCO
- Coordinates the work of GEBCO regional reviewers and monitors availability of reviewers' output
- Pro-active, enthusiastic, resourceful, dynamic individual

7.2) The incumbent GBE:

- Apparently is not demonstrably accountable – or of much interest – to GEBCO or NERC. Why?
- Barely-recognised as GBE outside GEBCO/Southampton Oceanographic Centre
- Arguably, appears very poorly-suited for this key, fully-funded GEBCO position

8) GEBCO Guiding Committee (GC)

- Guiding Committee does not provide recognisable, energetic leadership
- Appears unwilling to openly and incisively discuss difficult issues
- Chooses to overlook or even ignore concerns of members (e.g. my letter of June 2003 to each GC member)
- GEBCO Bathymetric Editor issue:
    - Accepts continued Southampton rubber-stamp approval of GBE
    - Squandered this incredibly valuable, fully-funded position
    - Concept of reviewers/contourers dropped but role of GBE preserved
    - Unwillingness/refusal to take any action to replace the GBE
- Failure to adapt to changing demands
- Some GC members customarily don't bother to attend meetings or provide substantive issues for discussion
- Little desire to replace inactive or ineffective GC members
- Has allowed our very limited resources to be spread too thinly
- Continually shown appalling management of limited resources (e.g. GBE, blatant neglect of initiating a new, comprehensive Pacific compilation, triplication of Mozambique Channel bathymetry)
- Largely responsible for items in **Section 5: Negative characteristics of GEBCO**

So, what is the process of selection and approval of Guiding Committee

members?
Who would be the properly-responsible electors?

9) Anecdotes and Questions

- What is the GEBCO plan for the next 1, 2, 5, and 10 years?

- With GEBCO membership comprising so many powerful, highly-placed people, I am amazed that we have absolutely no clue how to attract from varied sources on-going, targeted funding for GEBCO's core bathymetry work

- We rely far too heavily – and complacently – upon the efforts of a very few active volunteer individuals to carry the entire GEBCO operation forward

- We are safe in the knowledge that following each GEBCO meeting almost all of us can slip back into our real jobs. Our own careers are perceived as being independent of GEBCO so we have little truly vested interest in GEBCO and virtually no identified accountability. We cannot expect to run a professional organisation simply by allowing members to donate a couple of hours of their time to it now and then. To become again a world-renowned organisation we cannot wait for various individuals to retire in order for them to be able to devote time to projects (e.g. Mike Carron – new Pacific compilation)

- How can we possibly expect to attract researchers to contribute time, energy, data to GEBCO when (i) we cannot be bothered to be transparent (e.g. web profiles, outreach, getting a gebco domain web address, unwillingness to open up SPC participation in May 2002), (ii) we so blatantly squander our resources (e.g. repeatedly choosing to ignore the liability of our GBE), and (iii) we allow fiascos such as deciding to make the global bathymetric grid freely available on-line and then completely fail to act upon this decision?

- Would each member of the Guiding Committee explain (i) his suitability as a member of the Guiding Committee, (ii) his contributions to GEBCO, (iii) his future vision of attainable GEBCO goals over the next 1, 2, 5, 10 years, (iv) what he considers to be the biggest barriers to GEBCO, (v) his new and innovative ideas that will excite, attract and retain young, fresh talent to GEBCO?

- Apart from intensive productive work on the initial global bathymetric grid, which increasingly appears to have been an anomaly, there is very little group-wide action between meetings. Then, in the run-up to a meeting, there's a must-be-seen-to-be-doing-something flurry of activity. The sense of urgency and excitement that accompanied the release of the grid has long since been dissipated. [Note: SCUFN past (and present?) is excepted from this perception.]

- We were forced to deal with shallow-water areas when we constructed the global grid and we know that the grid is of poor quality in many coastal areas.

What are we doing to free up shallow-water data? Do we as a group continue to focus on our tradition of deep water, or now on shallow-water, or both? With what resources? What are we actively doing to acquire use of *any* bathymetry data across the globe?

- We decided to move away from a soundings-only based GEBCO grid to one that includes predicted bathymetry. What key characteristics, then, will distinguish the GEBCO and Smith/Sandwell predicted bathymetry grids? Why should the GEBCO organisation bother to continue to exist if SCDB/GC have chosen to work towards – and endorse as its own product – perhaps much of what Walter has already created and that is already very widely used?

- Why does there seem to be the view that the best way to move ahead on bathymetric activity is increasingly to work outside the GEBCO system?

- The GEBCO operation is not moving forward with the times. Certain members wish to do so but the bureaucracy and political correctness holds us back. We often hear of the traditional contourers dismissed as "dinosaurs". Perhaps, though, it is those in charge of the organisational structure of the group that are outdated.

- Two standard responses to the issue of removing/replacing the current GBE:

  (i) "*We cannot do anything to jeopardise the funding received from NERC*."

  (ii) "*Bureaucratically, it's too difficult to take any steps along this path*."

  Both do-nothing attitudes are shocking and corrosive.

- What continued and long-lasting benefit has GEBCO received from having a fully-funded GBE? If NERC eliminated GBE funding would we even notice?

- We are too timid to seriously consider and effectively embark upon a rigourous new bathymetry of the Pacific Ocean because none of us wants to do the "donkey work" necessary to produce a scientifically-acceptable grid

- We are content to sanction the release of a highly disparate and, in places, woefully inadequate global bathymetric grid. This does us no favours when we try to convince people to view us as providers of the authoritative bathymetry of the world

- What benefit does GEBCO's bathymetric mapping operation gain from association with IHB if IHO, its parent, has been largely unsuccessful – or reluctant – in freeing up national holdings of bathymetry data, particularly data in shallow-water areas?

- Historically, GEBCO has had a long association with IHO/IHB and IOC, but increasingly, there seems to be a perception that this link provides little more than travel money and an unwelcome level of bureaucracy. What intrinsic benefits do we receive from IHB, IHO and IOC? Would someone please

clearly explain *all* of the benefits that GEBCO receives from its so-called parents IOC and IHO?

- There appears to be little respect from some IHB Directors for the role of academic scientists within GEBCO: we appear to be viewed as “dabbling amateurs” who are merely to be tolerated

- GEBCO (and its standing and *ad hoc* committees) appears to be viewed by some members as little more than an intellectual hobby and favourable resumé entry

- There’s little point in talking about producing an evolving, ‘organic’ bathymetric grid when our organisational structure and mode of operation have stagnated

- Older-aged members can be both valuable (due to their experience) and less useful (administrators’ lack of day-to-day hands-on working with bathymetry data)

- The increasing age profile of GEBCO members coupled with lack of younger people joining our group does not augur well for the future of GEBCO

- If we have a message, we are doing a lousy job of communicating it

10) The way forward

The problem: GEBCO is fundamentally and increasingly flawed
The solution: Must work towards achieving the ideals of **Section 2:**

- Overcome our devastating lack of leadership
- Change GEBCO management structure and attitudes
- Accountability and transparency within GEBCO:
    - Term-limited and performance-based membership of the Guiding Committee
    - Term-limited and performance-based chairmanship of GEBCO
    - Term-limited and performance-based chairmanships of sub-committees
    - Justified membership of sub-committees: qualifications and commitment
- Identify and attract funding
- Move away from the volunteer, wait-for-people-to-retire model
- Address age distribution within our group to ensure future survival
- Provide incentives for new talent/younger people to join GEBCO
- Replace the GEBCO Bathymetric Editor or redirect funding to other use
- Set realistic goals based upon resources available
- Identify and focus on core product(s)
- Year-round action – and progress – on carefully-selected projects
- Pacific, Pacific, Pacific
- Improve our presently-limited web content/presence

- Justify NERC's commitment to our continued funding
- Reach out to the user community
- Set out and justify our mission statement

ANNEX 6

Networking and the Nippon Foundation

by Shin Tani

To serve the people who support us
λStrength
–People may think GEBCO is authoritative as it is international/intergovernmental body.
–National commitment is available.
λWeakness
–Decreasing national/international interest
–Ocean is wide. No termination of task.
–Lack of successors.
λOpportunity
–Data needs for UNCLOS Art. 76

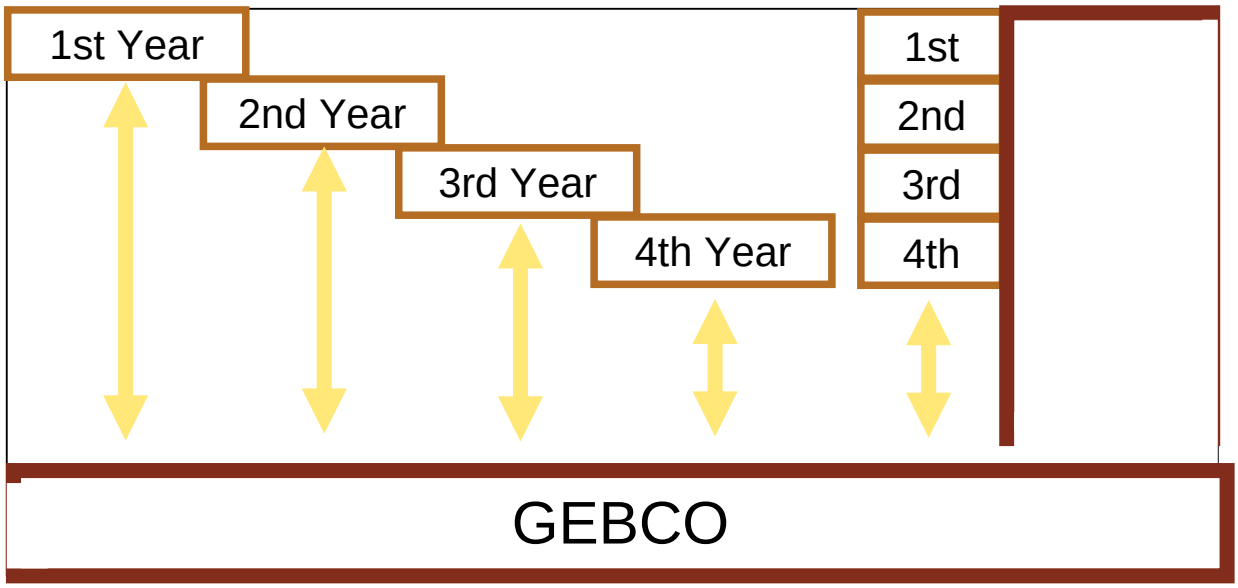
Message to the Nippon Foundation
λOnly a small portion of the oceans has been surveyed
λDeveloping nations have a strong need for data for UNCLOS 76 submissions. (data for tsunami modelling and prediction would be added as another need)
λGEBCO is supported by ambitious voluntary experts who get older every year, with no visible successors.

Aim
λBuild a human network which complements/substitutes cooperation at (inter)governmental level.

Within each student cohort create,
λStrong ties

Between the students from different years ensure,
λSome temporal overlap
λAlumni reunion for all, may include update training

Vertical network
λLectures by and time with GEBCO members
λInvolvement of students/alumni in GEBCO business after completion of or even during the course


1st Year
2nd Year
3rd Year
4th Year
1st
2nd
3rd
4th
GEBCO

ANNEX 7

File too large to download

ANNEX 8

IOC AND OCEAN MAPPING

Ron Macnab (for IOC)
Geological Survey of Canada (Retired)
ron.macnab@ns.sympatico.ca

Reduction of IOC's Ocean Mapping activities

At its recent Biennial Meeting, the IOC Assembly was asked to approve the elimination of the Commission's Ocean Mapping Programme as part of a significant cost-cutting initiative. This proposition was defeated on the strength of interventions from several national delegations that argued for the Programme's retention, citing how the Boxing Day Tsunami had dramatically illustrated the need for improved global bathymetry. It was agreed that the Ocean Mapping Programme would be retained, but with a budget reduction in the order of 20-25%.

It is still too early to determine the full implications of this development, however in the GEBCO context, the fallout will include the following two consequences:

CGOM Meeting: due to financial restrictions, there will be no meeting of the Consultative Group on Ocean Mapping in October of this year, as originally proposed.

GEBCO re-organization: in light of financial uncertainties and the press of other priorities, IOC proposes to suspend the discussion that was launched during the 2002 Meeting in Portovenere, concerning GEBCO re-organization.

International Bathymetric Charts

Within the constraints imposed by the above Programme reduction, IOC endorses current initiatives to launch IBCs in three Oceans: Indian (IBCIO), North Atlantic (IBCNA), and Southern (IBCSO).

Capacity building in coastal bathymetry

Within the framework of a coordinated international response to the Boxing Day Tsunami, IOC is launching a capacity-building project for improving the state of coastal bathymetry and nearshore topography in the Indian Ocean. This project will not undertake any new mapping, but instead it will concentrate on coordination, training, and technology transfer with a view to enabling affected coastal states to undertake the necessary work on their own as much as possible, and in close cooperation with their neighbours. It is recognized that affected coastal states will be the primary beneficiaries of this work, so a guiding principle is that they need to shoulder the responsibility for performing the tasks, with international assistance to be determined on a case-by-case basis. In this context, international assistance could include advice, in-kind support, or assistance in obtaining the necessary funding to undertake mapping operations. The Italian Government has pledged to support the capacity-building component of this activity.

ANNEX 9

Proposal for a Critical Bathymetric Studies Working Group

Executive Summary
A SCOR working group should be formed to evaluate and recommend bathymetric studies in critical regions of the world's oceans that are currently under-surveyed. These critical regions are those in which bathymetric surveys would provide highly valuable data. These data would apply to studies of currents, ocean mixing, tsunami propagation, and safe navigation as well as enhancing the accuracy of satellite-altimeter estimations of seafloor topography. The charge of the working group would be to perform an independent, multi-dimensional analysis of the costs and benefits of bathymetric studies and to identify regions where such studies would reap maximal societal and scientific value. This group would offset the current trend of narrowly focused, proposal-driven, solely-scientifically funded bathymetric studies. While the SCOR working group would have no funding authority, the impetus generated by their recommendations would bolster the chances of success of proposals to survey and study those regions identified by the working group. Their recommendations would include minimum standards of collection, including ancillary data (such as side-scan sonar), stewardship, and access, all to fulfill the promise of multi-disciplinary benefit to society and science.

Background

Current, bathymetric mapping, coverage of the world's oceans is highly heterogeneous: very dense coverage in some areas, such as busy coastal ports, and very sparse coverage in other areas, such as the South Pacific Ocean. This is clearly true for the public domain data, but is likely true for the classified holdings of the world's military organizations as well. To some degree, the oceans suffer the "Tragedy of the Commons" (Hardin, G., 1968), where the ocean is exploited by all, but under the stewardship of none. This is true for exploration as much as it is for fisheries. Only areas of specific interest are mapped in detail, while vast areas are left unexplored.

While the accurate mapping of seafloor topography is in great demand, it remains woefully incomplete. The need for accurate bathymetry is demonstrated by its use in satellite altimetry estimations of seafloor topography, tsunami modeling, global circulation studies, oceanic mixing models, and safety to navigation, as was so brutally demonstrated by the grounding of the USS *San Francisco* nuclear submarine in January 2005. From deep ocean circulation (Mercier and Speer, 1998) to ocean mixing (Polzin, *et al.*, 1997; Ledwell, *et al.*, 2000), bathymetry plays a significant role as a boundary or triggering condition. The contention has been made that we know the surface of the moon better than we know the solid surface of the earth. Yet, the resource requirement for complete mapping of the seafloor is huge. An evaluation for the Global Ocean Mapping (GOMAP) conference, June 2002, estimated 1,000 ship-years for complete survey coverage, not considering transits and redundant coverage. At current ship costs, this approximates $10 Billion ($10^{10}$) U.S., hence a very low probability of becoming a reality.

Rationale

While complete mapping is unrealistic, focused studies: studies, in critical regions that will have maximal impact on science and society are a real possibility. These studies would maximize the advancement of knowledge across the full spectrum of bathymetry applications,

from enhancing satellite altimeter-based estimations of seafloor topography to safe navigation. These focused studies would differ from currently funded studies in that they would be optimized for the full spectrum of applications *vice* evaluation based on a single discipline or geographic region; the data will be collected with more than one intended use. This will require a multi-dimensional, multi-disciplinary analysis of needs and sensitivity by an objective group of scientists, something that has not been done in the past. A SCOR working group is an ideal vehicle for such analysis.

The proposed working group would provide guidance and suggest priorities for bathymetric surveys that would complement the current bathymetric coverage, filling in blank or sparse regions in the context of multiple applications of bathymetry. The use of satellite altimetry to calculate free-air gravity anomaly, which is then correlated with bathymetric relief for estimating seafloor topography in regions otherwise unsurveyed, provides an important leverage for the limited, acoustic survey resources available. Thus, one of the evaluations would be the impact of an acoustic bathymetric survey on the quality of the altimetric estimations within the region. Likewise, tsunami propagation modeling is highly dependent on accurate bathymetry, as tsunamis propagate as shallow water waves, with a velocity proportional to the square root of the depth. The tragedy of the Indian Ocean tsunami of December 2004 has made the public highly aware of the need for effective propagation modeling, threat analysis, and appropriate warning infrastructure. Bathymetry is the critical foundation for the first two components.

The oceans, particularly currents and mixing, play a significant role in shaping and moderating our global climate. Recent research suggests that small variations in bathymetry and seafloor roughness can have major effects of current steering and deepwater mixing. For the global climate scientific community to gain an operative understanding of these processes, accurate seafloor topography and roughness are a required input to modeling efforts.

The proposed working group will be charged with evaluating the sensitivity of all of these efforts to improved bathymetry in critical areas. The working group will also evaluate the multidimensional benefits of improved bathymetry to the entire spectrum of scientific research and understanding, as well as the benefits to society in terms of hazard response and mitigation. SCOR is a logical source for a broad spectrum, scientifically supportive, neutral party to evaluate the optimal use of resources to the benefit of all ocean sciences. They are best able to break the competitive, narrow interest logjam in specific, research-focused surveys and to identify critical areas of bathymetric research that will optimize the benefit to, and impact on, science and society.

Finally, the working group would issue guidelines and recommendations for minimum standards of data collection, stewardship, archiving, and distribution. These would include the collection of ancillary geophysical data, in addition to bathymetry, that would enhance the utility and impact of the bathymetric data in other multi-disciplinary studies. The standards of stewardship, archiving, and distribution are necessary to make these data available to the multiple studies to which they might apply. The long-term preservation of these data is essential to their effective and wise use. The SCOR Working Group on Critical Bathymetry has the potential to significantly extend and leverage the investment of limited resources for describing the ocean's floor.

Terms of Reference

1. Identify and evaluate the most critical regions needing new bathymetry. Using multidimensional analysis and evaluation, rank the regions in terms of which would result in the greatest impact on both science and society.
2. Provide both:
   a) independent evaluations of the global advantage to studying certain bathymetric regions and
   b) compelling recommendations for those studies.
3. Issue guidelines and recommendations for minimum standards of data collection, stewardship, archiving, and distribution to ensure full, broad, and long-term use of the bathymetric and ancillary data.

Meetings:

The inaugural meeting for the working group is proposed for the Fall 2005 American Geophysical Union (AGU) meetings in San Francisco, December 2005. Pre-meeting interactions amongst GEBCO, IHO, IOC, CGOM, NGDC (as WDC MGG and IHODCDB) will clearly establish memberships, full and associate, as well as hone the Terms of Reference and the communications infrastructure and protocols. The primary agenda for the inaugural meeting would be to establish a work schedule, an electronic forum for meeting, interaction, and consultation, and a schedule of subsequent physical meetings.

A working period of four years is proposed for the working group to:

i. assemble,
ii. define the evaluation process,
iii. acquire and define the requirements of science and society for bathymetry,
iv. review extent data in the context of multi-disciplinary requirements for data,
v. evaluate the relative value of bathymetric studies in various geographic regions, and
vi. generate a working group report on the results of that, final evaluation.

The final physical meeting would probably be at either GEBCO 2009 or Fall AGU 2009, and would highlight the public release of the working group report.

Working Group Members:

1. Chairman, someone with broad experience in bathymetry and its diverse applications
   a. *Suggestion: Dr. Walter H.F. Smith, Chair, GEBCO Sub-Committee for Digital Bathymetry with research interests focused on reconnaissance of global deep-water bathymetry from space*
2. Bathymetric data resource expert
   a. *Suggestion: Dr. George F. Sharman, Director WDC Marine Geology and Geophysics, Boulder, USA*
   b. *Suggestion: Dr. Christopher G. Fox, Director IHO Data Center for Digital Bathymetry, USA*
3. Tsunami modeling expert
   a. *Suggestion: Dr. Vasily Titov, Research Scientist, Tsunami Program, Ocean Environment Research Division, Pacific Marine Environmental Laboratory, USA*
   b. *Suggestion: Dr. Kenji Satake, Active Fault Research Center, National Institute of Advanced Industrial Science and Technology, Japan*

4. Physical Oceanographer
    a. *Suggestion: Dr. Sarah T. Gille, Assistant Professor, Scripps Institution of Oceanography and Department of Mechanical and Aerospace Engineering, University of California San Diego, USA*
5. Chemical Oceanographer, with a focus on oceanic mixing
6. Biological Oceanographer
7. Senior International Hydrographic Organization (IHO) representative
    a. *Suggestion: Captain Hugo Gorziglia, Director 2 of the IHO, Monaco*
8. Senior Intergovernmental Oceanographic Commission (IOC) Consultative Group on Ocean Mapping (CGOM) member
    a. *Suggestion: Dr. Gunter Giermann, Chairman of CGOM, Germany*
9. Bathymetrist with multi-dimensional analysis expertise
    a. *Suggestion: Dr. Martin Jakobsson, Department of Geology and Geochemistry, Stockholm University, Sweden*
10. General Bathymetric Chart of the Oceans (GEBCO) representative
    a. *Suggestion: Dr. Hans Werner Schenke, Chair, GEBCO Sub Committee on Undersea Feature Names (SCUFN), Germany*

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ANNEX 10

A REGIONAL APPROACH TO BATHYMETRIC DATA MANAGEMENT

(A proposal for assembling and rationalizing available acoustic depth observations for use in the development of a global grid of ocean bathymetry)

Ron Macnab
Geological Survey of Canada (Retired)
Dartmouth NS, Canada
ron.macnab@ns.sympatico.ca

1. INTRODUCTION

This presentation proposes a consolidation of existing and proposed initiatives to identify, retrieve, and rationalize historic and modern soundings that have been collected throughout the world ocean. The database so produced will be used to construct grids and maps of ocean depths for a variety of scientific and technical purposes. One of the more significant applications will be to provide an accurate dataset for the reliable calibration of synthetic bathymetry derived from observations of satellite altimetry. It will also serve as an organized framework for the assimilation of future observations.

It is suggested that the overall undertaking be partitioned among Work Areas that correspond to eight major oceanic regions, with a separate Working Group assigned to each region. Two Work Areas – the Indian Ocean and the North Atlantic Ocean – are identified as Pilot Projects for the development and testing of technical and organizational approaches.

2. BATHYMETRY FROM SPACE – GLOBAL, BUT IMPRECISE

Contemporary global maps of satellite-derived bathymetry are impressive in their scope and detail. With a coverage that is worldwide except for the central part of the Arctic Ocean, they offer portrayals of the world's seafloors in a fashion that enables the viewer to grasp readily the distribution and characteristics of major features.

While visually spectacular, such global portrayals are misleading because they convey a false impression of the current state of ocean mapping: seafloor features that have dimensions of less than 8-12 km remain invisible, and the depths of visible features can be in error by as much as several hundred metres.

These limitations arise from fundamental restrictions in the resolving power of altimetric measurements from satellites, and from uncertainties in the transformation of sea surface height variations to ocean depths. These limitations are unlikely to be overcome satisfactorily in the foreseeable future.

3. ACOUSTIC BATHYMETRY – PRECISE, BUT DIFFUSE

Acoustic sounding is the sole technology that is capable of supporting accurate, high-resolution observations of seafloor topography, but of the world's oceans only a fraction has been mapped by that means. For decades, survey and research vessels have plied the seas collecting acoustic observations, but the resulting data sets have a distribution that is on the

whole highly heterogeneous, and which tends to reflect the specific missions of their collection platforms (Figure 1).

Moreover, these acoustic data sets have been collected with a variety of sounding and navigation systems, so they feature a range of accuracies and resolutions. To further complicate matters, they've been subjected to non-uniform post-processing operations, particularly where sound velocity corrections are involved. Some data sets have been consigned to World Data Centres where they are preserved in raw, unedited form. Many others are believed to remain ensconced in geographically-dispersed archives which may or may not be open to the public.

The upshot to all of the above is that substantial quantities of acoustically-measured depth observations exist, but in fragmented, disparate form. It is probably safe to declare that no one knows how many data sets exist, or where they might all be stored - World Data Centres contain significant volumes of data that are available to the public, but private and classified archives are believed to hold as many if not more observations.

4. THE COMPLEMENTARITY OF SATELLITE AND ACOUSTIC BATHYMETRY

Acoustic soundings and satellite altimetry are complementary. Satellite altimetry comprises a data set with low resolution, but with coherent global coverage. Acoustic soundings, on the other hand, have potentially higher resolution, but they are fragmented, poorly distributed, and incoherent; however if they can be put in order, they represent a valuable asset. Improved maps of global bathymetry will follow if we can devise a procedure for combining both data sets in a way that preserves the strong points of each.

The Smith and Sandwell model of global bathymetry represents a pioneering effort to merge satellite and acoustic bathymetry, applying the latter to 'calibrate' the former. The outcome of this process is very presentable when viewed globally or over a sizeable region, however the portrayal tends to break down when the focus shifts to smaller areas: an 'orange peel' texture often dominates, crisscrossed by artifacts left over from unresolved problems with the acoustic calibration set (Figure 2).

5. BUILDING A COMPREHENSIVE DATABASE OF GLOBAL BATHYMETRY

Bathymetric observations collected by acoustic means represent the only technique for achieving desired levels of detail in the portrayal of seabed features, but as outlined above, existing acoustic data sets are scattered and poorly organized.

With time and concerted international cooperation, it is conceivable that the world's oceans will be adequately mapped some day through the widespread deployment of acoustic technology, however that distant day is unlikely to occur within the careers and lifetimes of most working oceanographers. Consequently, it is both necessary and timely to consider means for the effective use of existing data holdings. The development of a comprehensive and rationalized database of soundings is a crucial first step in that process. In its implementation and operation, the database must transcend the functionality of current archives whose primary mandate is to provide stable and secure storage for large volumes of data without engaging in the exhaustive analysis and processing that are essential for creating seamless portrayals of the seabed.

Beyond improving global bathymetric knowledge, the construction of the proposed database could be expected to have several beneficial spinoff effects: promoting liaison and networking of institutions and bathymetric specialists within and between Project Areas (defined in the following section); developing effective linkages between regional specialists and the global bathymetric community; providing opportunities for training, technology transfer, and capacity building; and laying a foundation for lasting international scientific and technical cooperation within each region.

Perhaps the most important benefit of the proposed undertaking will flow from its identification of areas that are in need of detailed mapping: this will serve as a basis for the efficient deployment of vessels engaged in the acquisition of new sounding observations, be it through systematic surveys or cruises of opportunity. Upon completion of these operations, the database will provide an organized structure for the coherent assimilation of new soundings.

6. PROJECT AREAS AND WORKING GROUPS

In view of its global reach, the proposed task would likely exceed the resources and the energy of a single team, therefore the undertaking will be divided into manageable segments in order to achieve meaningful results in a timely fashion. Eight Project Areas have been provisionally identified, each one corresponding to a major oceanic region plus marginal seas (Figure 3):

Arctic Ocean
Indian Ocean
Mediterranean and Black Seas
North Atlantic Ocean
South Atlantic Ocean
North Pacific Ocean
South Pacific Ocean (perhaps divided in two)
Southern (circum-Antarctic) Ocean

Progress has already been made in two of these Areas: (1) the Arctic Ocean, where the International Bathymetric Chart of the Arctic Ocean (IBCAO) has been constructed from all available observations and is ready to assimilate new soundings as they become available; and (2) the Southern Ocean, where a project to build the International Bathymetric Chart of the Southern Ocean (IBCSO) was launched in 2004 along lines similar to those followed in the development of IBCAO.

For each of the other Project Areas, a Working Group will be established to perform the following general tasks:

Identify and assemble all available observations in its project area
Perform rigourous quality control, correct/adjust as appropriate
Archive observations in a documented data base with metadata
Bin soundings at appropriate intervals with statistics, retaining metadata
Grid or tile bin contents at spacings appropriate to data point distribution
From the grid or tile model, create shaded relief images and contour maps

Working Group leaders and members will be appointed on the basis of competence and

qualifications. The selection process will focus on organizations and individuals that have the required enthusiasm, willingness, and resources to commit to the undertaking, and on those that will benefit the most from training and technology transfer. Working Groups will establish their own operating procedures, however they will be expected to agree to certain conditions and specifications in the interests of adhering to IOC/IHO standards for bathymetric products.

Preferably, Working Groups will be based within their respective regions, in order to underscore local involvement, responsibilities, and commitments. Ideally, they will be housed in existing government, hydrographic, research, or academic centres that are equipped with (or which may be readily upgraded to include) all the necessary human and technical resources, including where possible facilities that could function as regional data centres. It is not essential that the regional data centres be co-located with the main bases of operations, and there may be valid reasons for situating them in existing facilities elsewhere in their regions – or even outside of their regions, if justified by the economics of the operation and the need for expediency.

7. PILOT PROJECTS

The activity will commence by concentrating on Pilot Projects in two specific Areas: the Indian Ocean (Figure 4), and the North Atlantic Ocean (Figure 5). The former will be chosen because that is where the need for detailed bathymetry is perceived to be the greatest: the impacts of the Boxing Day Tsunami have pointed to serious infrastructural deficiencies throughout the region, e.g. an ineffective early warning system coupled with a lack of emergency preparedness and insufficient measures for disaster mitigation. Within this context, detailed and accurate maps of ocean bathymetry are vital for developing a more robust and dependable infrastructure.

The North Atlantic Ocean has been chosen for the second Pilot Project for two reasons: (1) it is one of the world's best mapped oceans, and (2) it has already been targeted for a significant data compilation effort that will mobilize the energies and resources of institutions that are located in the surrounding coastal states. Hence it is anticipated that the methodologies and the standards for assembling and handling large data sets will be developed and put into practice relatively quickly. Moreover, many of the prospective participants in this initiative represent developing states, so there will be opportunities for devising efficient techniques and policies for capacity building.

The Project Areas that have been selected as Pilot Projects are both vulnerable to tsunami damage. In view of their common concerns and given the similarity of their tasks, it is expected that there will be frequent interactions between the two Projects as they share their expertise, the lessons learned, and the results of their respective activities.

8. PARTICIPATING ORGANIZATIONS

Participating organizations within each Project Area will be drawn from hydrographic services, research laboratories, academic institutions, and other groups that have ocean mapping interests.

Co-coordinating roles will be assumed by the Intergovernmental Oceanographic Commission (IOC) and the International Hydrographic Organization (IHO). Existing components of the

IOC's program for constructing International Bathymetric Charts (IBCs) will be invited to participate in the IDGDB initiative by making available their data sets and derived products for assimilation into the broader program.

As an organization with interests in the development and use of global bathymetric products, the General Bathymetric Chart of the Oceans (GEBCO) will be invited to coordinate its operations with those of the regional Working Groups. Similarly, the IOC/IHO Data Center for Digital Bathymetry (DCDB) which currently archives a substantial portion of the world's bathymetric observations in unedited form, will be invited to assume a role in the management and archiving of edited data sets and of the data products (grids, digital maps, etc) that will be developed by the regional Working Groups.

9 PROJECT MOBILIZATION

In each Pilot Area, project mobilization will consist of activities spread over two stages, each lasting about one year. The first stage will begin with the preparation of a project prospectus that outlines the scope of the undertaking and defines general requirements. This will be widely circulated to prospective participants, with an invitation to participate. If warranted by the level of response, a regional planning meeting will be called to gather prospective institutional participants at the executive level who will: (a) assess levels of interest in proceeding with the project; (b) discuss the scope of the activity; and (c) appoint a Planning Group to develop contacts, enlist participants, and investigate fund-raising mechanisms.

The second stage will begin with a regional technical meeting involving participants at the working level, who will: (a) consider technical procedures and specifications; (b) review necessary measures for training and capacity-building among participating organizations; and (c) appoint a Working Group that will be charged with the project's implementation as outlined above in Section 5.

Regular meetings will take place thereafter, providing participants with opportunities to review progress and to discuss results.

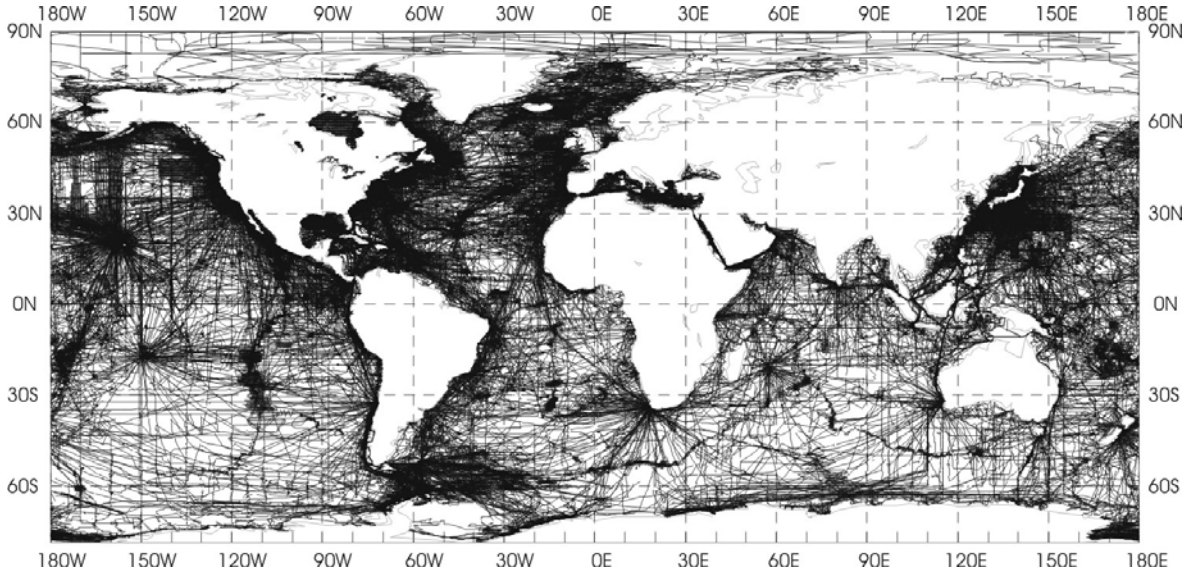


Figure 1. Conventional echo-sounding tracks that are preserved in the digital archives of the US National Geophysical Data Center in Boulder, CO. NGDC has performed limited quality assessments on these data sets, and many remain in the raw, unedited form which they had upon submission. Investigators who choose to avail themselves of the data must first perform a comprehensive analysis to detect and eliminate errors. The NGDC archives encompass all the world's oceans, but they are by no means complete because many other data sets are known to exist in both analog and digital form.

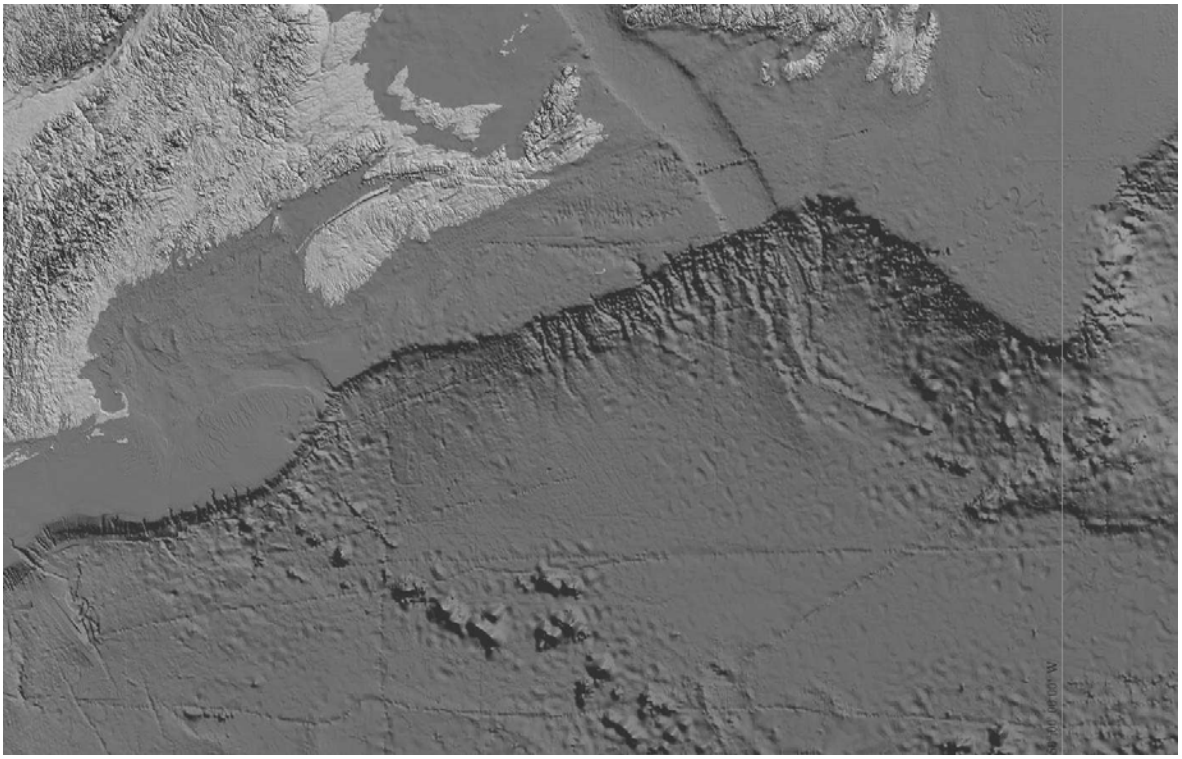


Figure 2. The continental margin and deep seabed off eastern Canada, portrayed in the Smith and Sandwell (1997) map of global bathymetry, derived from observations of satellite altimetry which have been calibrated with acoustic soundings. Randomly-distributed linear artifacts on the seabed are most likely caused by sounding tracks that require additional adjustment. Note also the line of spurious depth values crossing the Laurentian Channel.

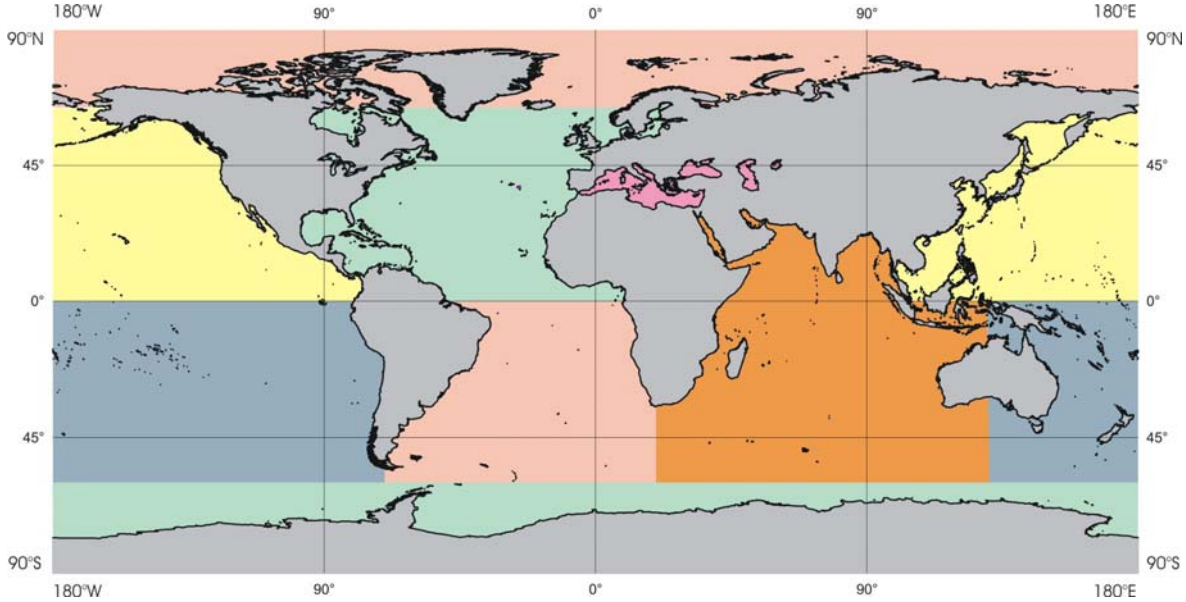


Figure 3. The world ocean, divided into eight Project Areas. Each area will be the responsibility of a specific Working Group.

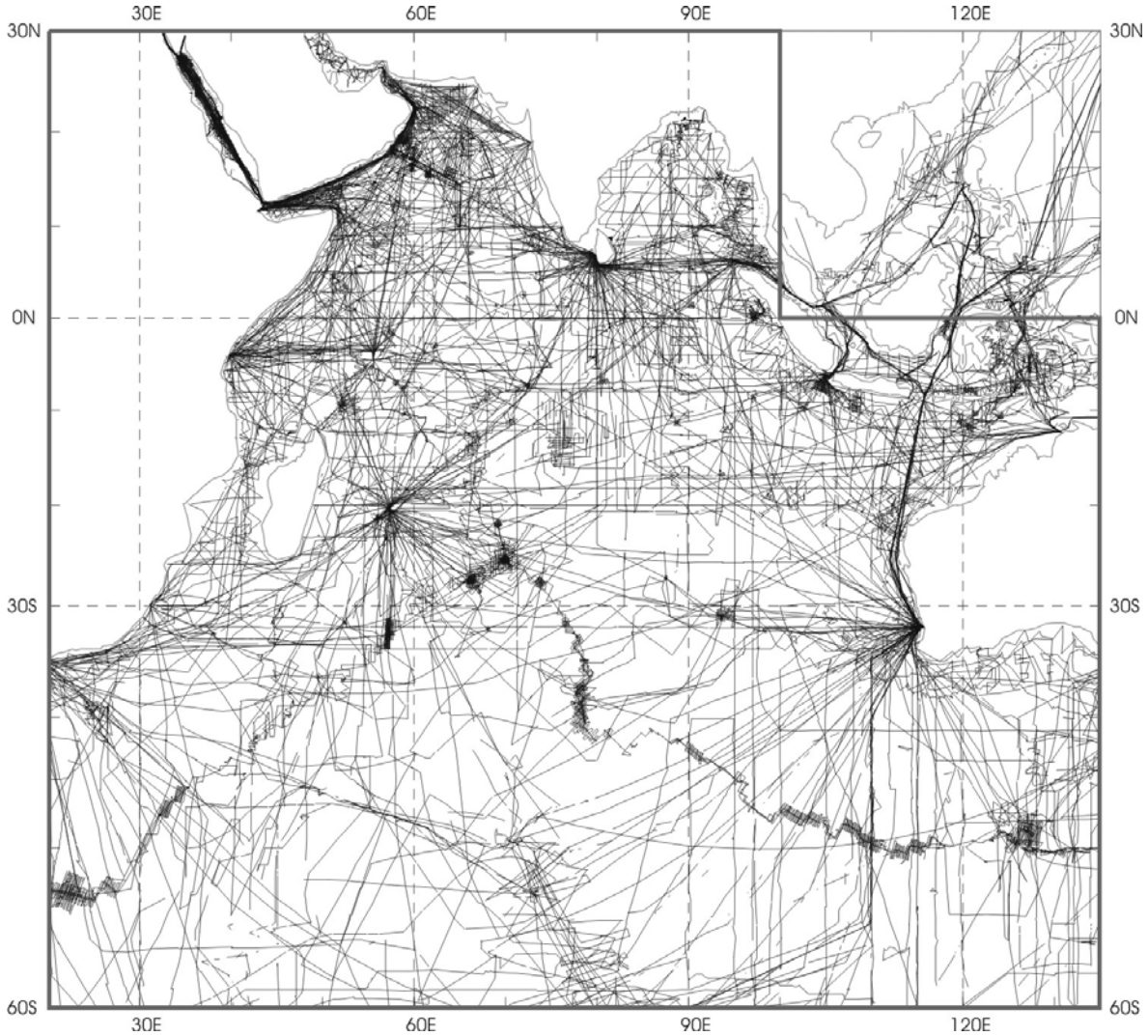


Figure 4. Distribution of public domain bathymetry archived at NGDC for the Indian Ocean. Additional information may exist in other data centres.

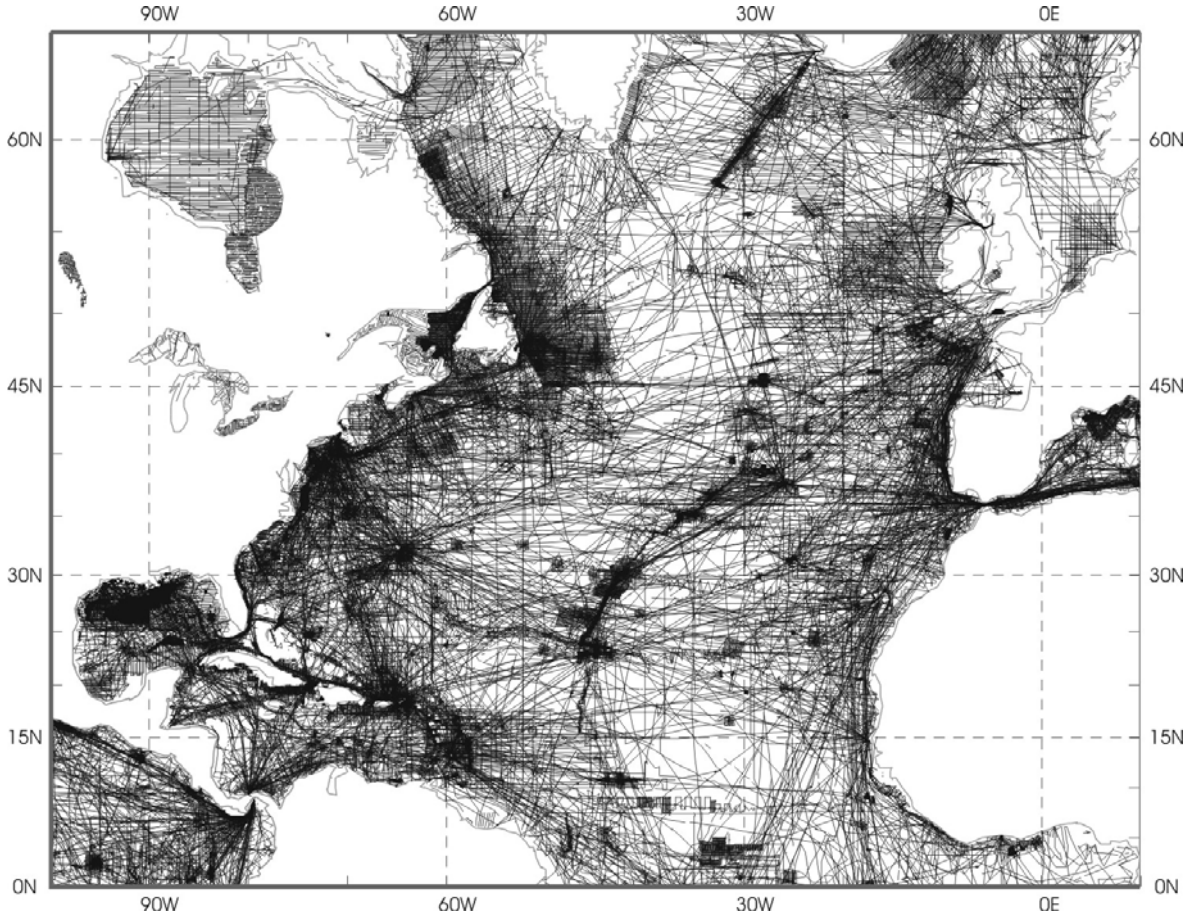
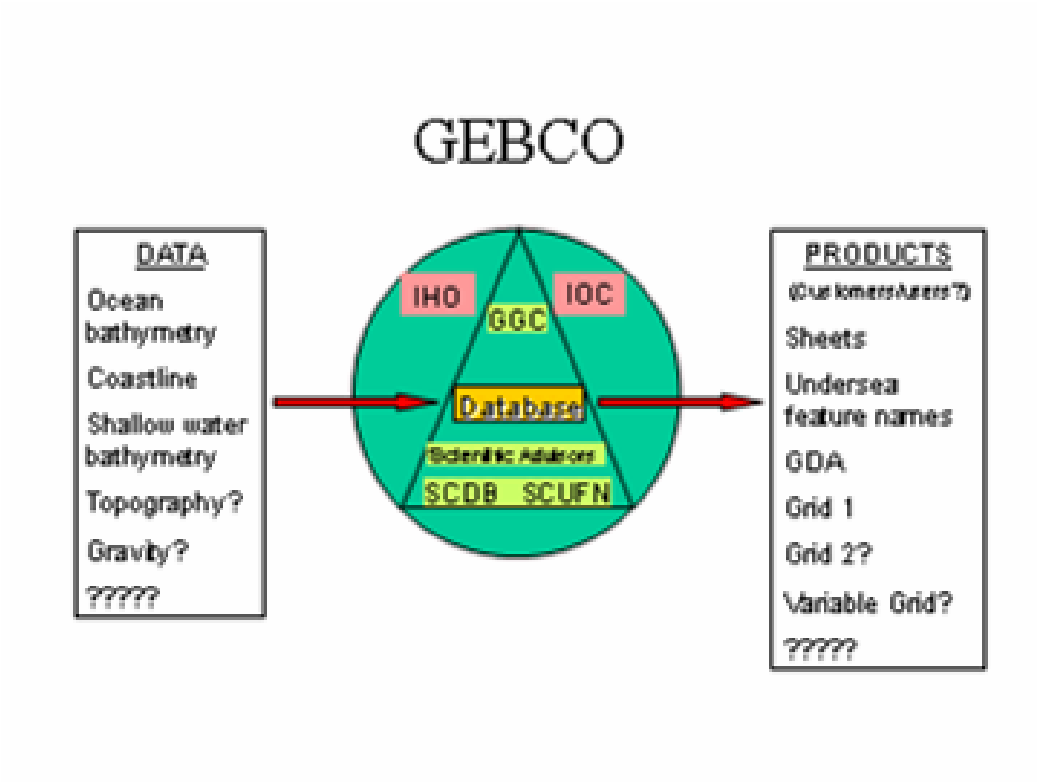
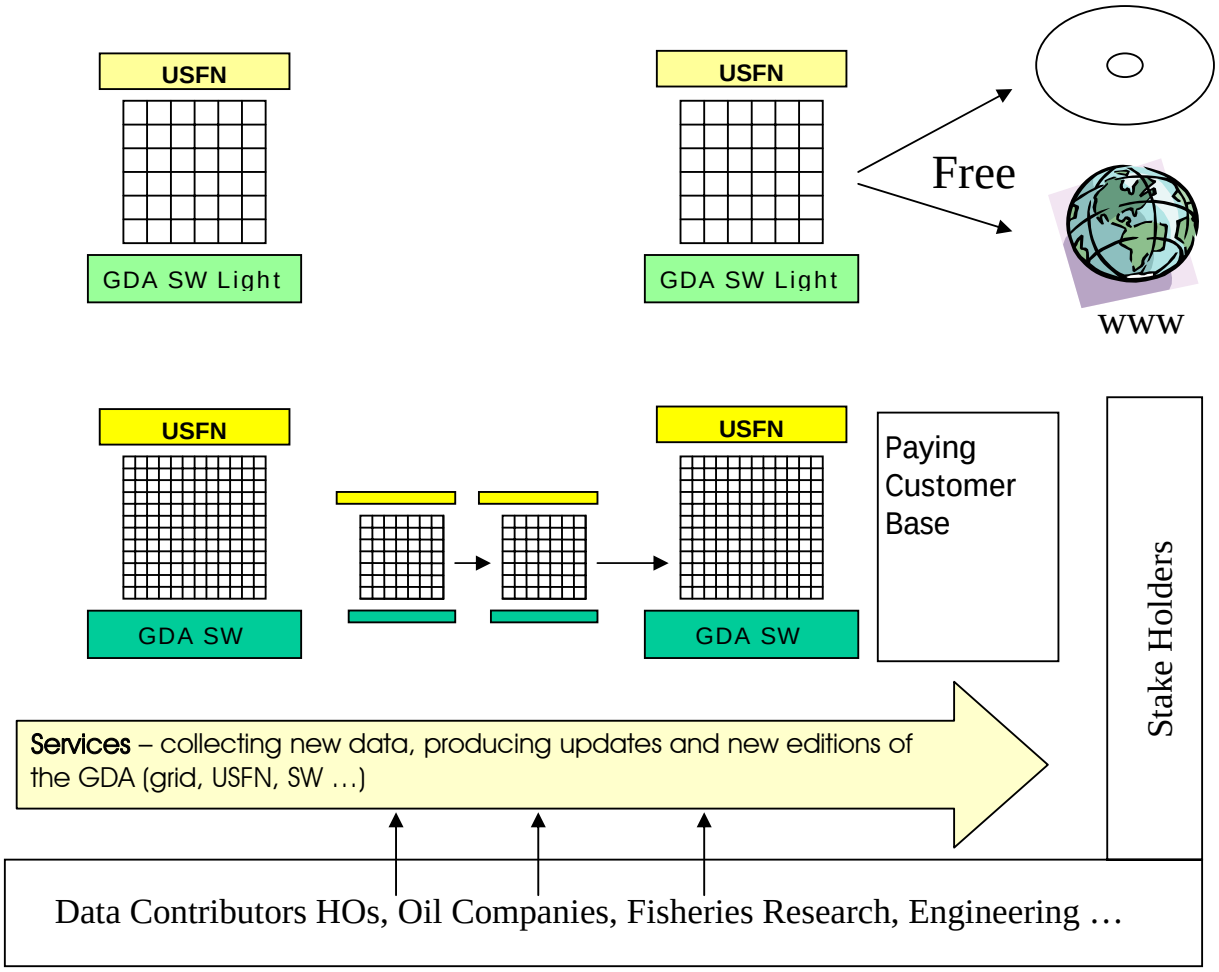


Figure 5. Distribution of public domain bathymetry archived at NGDC for the North Atlantic Ocean. Additional information may exist in other data centres.

ANNEX 11

by Steve Shipman and Tony Pharaoh




USFN
GDA SW Light
USFN
GDA SW Light
Free
www
USFN
GDA SW
USFN
GDA SW
Paying Customer Base
Stake Holders
Services – collecting new data, producing updates and new editions of the GDA (grid, USFN, SW …)
Data Contributors HOs, Oil Companies, Fisheries Research, Engineering …

ANNEX 12

Andrew Goodwillie

File too large to download

ANNEX 13

1

Dave Monahan

PROTOTYPE ONLY, DRAFT IDEA

Evaluation of the Guiding Committee	Met	Needs Work	N/A
1. The roles of the Guiding Committee and the Permanent Secretary are defined and respected, with the Guiding Committee focused on policy and planning and the Permanent Secretary delegated as the facilitator of the organization's paperwork			
2. The Permanent Secretary is recruited, selected, and employed by the Guiding Committee. The Guiding Committee provides clearly written expectations and qualifications for the position, as well as reasonable compensation.			
4. The Guiding Committee's nominating process ensures that the membership remains appropriately diverse with respect to gender, ethnicity, culture, economic status, disabilities, and skills and/or expertise.			
5. The Guiding Committee members receive regular training and information about their responsibilities.			
6. New Guiding Committee members are oriented to the organization, including the organization's mission, bylaws, policies, and programs, as well as their roles and responsibilities as members.			
7. Guiding Committee organization is documented with a description of the committee responsibilities.			
8. The Guiding Committee has a process for handling urgent matters between meetings.			
9. The Guiding Committee has an annual calendar of meetings. The Guiding Committee also has an attendance policy.			
10. Meetings have written agendas. materials relating to significant decisions are given to the Guiding Committee in advance of the meeting.			

3

4

DRAFT V2.0

ANNEX 14

GEBCO Work Plan

2005/2006

Composed by attendees at GEBCO meetings IHB, April 16-17, 2003
Revised / reviewed Porto Venere 5-6 April, 2004
Revised / reviewed Aguascalientes, 11-12 July 2005

List of agreed tasks

TASK 1 PRODUCTION OF PRODUCTS
TASK 2 GEOSCIENCE DATA INTEGRATION
TASK 3 DATA ASSIMILATION AND ACQUISITION
TASK 4 REVIEW ROLES, RESPONSIBILITIES AND MEMBERSHIPS
TASK 5 UPDATING
TASK 6 OUTREACH
TASK 7 FEATURES
TASK 8 EDUCATIONAL PRODUCTS
TASK 9 FINANCE
TASK 10 NIPPON FOUNDATION GEBCO TRAINING PROJECT

Text in green has been revised or is new

Details of Tasks

TASK 1 PRODUCTION OF PRODUCTS

OBJECTIVE – To complete production of products and disseminate them

1.1	**1.6 GDA**			
1.1.5	Platform independence via HTML	Sharman		
1.1	GDA on web	Fox, Weatherall, Tani, Whitmarsh		
	1.7			
1.1.3	1.8 Topology / ESRI formats	Weatherall/ Fox		
1.1.4	1.9 GDA to handle other grids	Cramer		
	1.10			
1.2	**1.11 Further Development of Grid**	Carron		
1.2.3	Uncertainty estimates	Carron/Hall/Tani		Development
1.2.4	Variable resolution grid	Carron/ Sharman, Pharaoh		later
1.2.5	Continual Updated Grid from new data	Carron, Fox		
1.2.7	Develop new grid at 1 minute resolution	Carron, Smith	Start 05	
1.2.8	Shallow water requirements	Carron, Hall		
1.2.8.1	ENC soundings	Weatherall, Goodwillie	Pharaoh, Hall	
1.2.8.2	Analogue chart soundings	Hall		
1.2.10	Data source meta data	Weatherall, Goodwillie		
1.3	**1.12 Internet Availability**	Sharman		
1.3.2	Updated grid on web (free)	Sharman		Weatherall has done this for 20 degree squares GC decided to apply this to entire grid
1.3.3	Licensing / Agreement	Weatherall		

TASK 2 GEOSCIENCE DATA INTEGRATION

OBJECTIVE – To include all types of geoscience data to improve and update GEBCO products

2.1	**1.13Altimetry**	Smith		
2.1.1	Calibrate with Japanese db	Smith/Tani	Start Jun 02	Ongoing
2.1.2	Liaison with ABYSS	Smith		Ongoing
2.2	**1.14Multibeam Integration with single beam**	Monahan		
2.2.1	Multibeam data base proposal Scripps	Fox	Proposal Funded	
2.2.2	Lamont's Data base project	Goodwillie		
2.2.3	Evaluate SRTM	Hall, Sharman		
	WG on tsunamis and bathymetry	Yeh, Tani		

TASK 3 DATA ASSIMILATION AND AQUISITION

OBJECTIVE – To increase the amount and type of data available for inclusion in the DCDB and in GEBCO products

3.2	**Filling Gaps**			
3.2.2	Bathymetry from Buoys	Anderson, Hall		Ongoing
3.2.4	RIDGE multibeam to GEBCO	Goodwillie, Tani		
3.2.5	NERC Cruises	Hunter		
	New coastline NGA	John v		
3.4	**Polar Ocean Bathymetry Co-ordination Effort IPY-PROG**	Schenke		
	Indian Ocean tsunami requirements	Macnab, Yeh		
	Shallow water,	Fox, Monahan, Tani		

TASK 4 REVIEW ROLES, RESPONSIBILITIES AND MEMBERSHIPS

OBJECTIVE – To ensure that organizational structure continues to fulfill requirements

4.1	**1.15 Review personality list**	GC	ongoing	
4.1.1	Succession Planning	GC	ongoing	
4.1.2	Emeritus Members	GC	Next meeting	
4.2	**1.16 Review sub-committees**	GC	ONGOING	
4.3	**1.17 Establish new groups**		ongoing	
4.5	**1.18 Improve diversity**	Smith/Goodwillie	Get started	
4.5.1	Recruit new skills			
4-7	**New organisational structure for ocean mapping**			
4.7.1	Establish WG		ongoing	
	Regional WG	Macnab		

TASK 5 UPDATING

OBJECTIVE – To ensure that GEBCO products include the latest data and incorporate current thinking.

	Folds into new grid			
	1.19			

TASK 6 OUTREACH

OBJECTIVE – To make GEBCO more accessible to the entire marine community.

6.1	**1.20Paper Edition**			
6.2	**1.21Displays at conferences**			
	Create Outreach WG	Lusiani, Tani		
	1.22			
6.5	**1.23Website and Contacts**			
6.5.2	Submission of additional experts	Members	ongoing	
6.5.4	Maintenance of list servers	Sharman/Weatherall	ongoing	
6.5.5	Biographies on web	All		ASAP
6.5.6	Authorization of material for website	Whitmarsh		
6.5.7	Multiple language web sites	Tani		
6.5.8	Contact data base	Weatherall	ongoing	
6.6	**general articles to journals**	all	ongoing	
	EOS new grid	Goodwillie		
	GEBCO and UNCLOS	Nippon Foundation scholars		
6.7	**World map**	Jacobson, scholars		
6.9	**1.24Develop GEBCO logo**	Frias, Heredia		
6.11	**Co-operation with the International Committee for Global Mapping**	Monahan	ongoing	Investigate asap
	National Geographic	Smith, Monahan		

TASK 7 FEATURES

OBJECTIVE – To standardize and enhance the verbal description of the sea floor

7.1	**1.25SCUFN**			
7.1.1	1.26Gazetteer	Schenke, Huet	ongoing	2
	1.27			
7.2	**1.28GIS version of S23 Limits**	Divins/ IHB		Hold due to politics
7.4	**1.29Automatic Name Placing**	Schenke/Cramer		Investigate
	1.30			
7.5	**1.31Land/ Water Mask**	Carron		?

TASK 8 EDUCATIONAL PRODUCTS

OBJECTIVE – To bring the sea floor to the next generation

8.1	**1.32Education Working Group**	Sharman		
8.1.2	Educational version of GDA	Pharaoh, Weatherall		

TASK 9 FINANCE

OBJECTIVE – To continuously examine and enhance the financial basis for GEBCO

9.1	**1.33Existing funds**			
9.2	**1.34Future funds**	Hall, Cherkis		
9.2.1	Seek future sources	Hall, Cherkis		Nippon
9.2.2	Seek partnerships	Hall, Cherkis		Nippon

TASK 10 NIPPON FOUNDATION GEBCO TRAINING PROJECT

OBJECTIVE – To train a new generation of scientists and hydrographers in ocean bathymetry, mostly from less developed countries.

10.1	**Nippon Foundation/GEBCO training project**			
10.1.1	Establish the NF/G Project Management Group	DONE		
10.1.2	Appoint Project Manager	DONE		
10.1.2	Finalize contract with Teaching Organization	DONE		
10.1.3	Put training program in place	DONE		
10.1.4	Begin defining Fellowship projects	FUNDING ON HOLD		
10.1.5	Information to IHB re student advertising	DONE		
10.1.6	Seek students	DONE		

ANNEX 15

Acronyms

Acronym	Full name
AGU	American Geophysical Union
BE	GEBCO Bathymetry Editor
BODC	British Oceanographic Data Centre (UK)
CCOM	Center for Coastal and. Ocean Mapping
CDROM	Compact Disk
CGOM	IOC Consultative Group on Ocean Mapping
CHS	Canadian Hydrographic Service
CLCS	Commission on the Limits of the Continental Shelf (United Nations)
DCDB	Data Center for Digital Bathymetry (IHO)
DEM	Digital Elevation Model
DMA	Defense Mapping Agency (USA)
DOALOS	Division for Ocean Affairs and the Law of the Sea (United Nations)
EC	European Commission
EGS	European Geophysical Society
ENC	Electronic Navigation Chart
ETOPO2	Earth Topography (2 arc-minute grid)
ETOPO5	Earth Topography (5 arc-minute grid)
G8	Group of Eight (US, Japan, Germany, France, the UK, Italy, Canada and Russia)
GC	Guiding Committee
GDA-CE	GEBCO Digital Atlas – Centenary Edition
GEO/GEOSS	Group on Erath Observations/ Global Earth Observation System of Systems
HCA	IHO Hydrographic Committee on Antarctica
HDNO	Head Department of Navigation and Oceanography
HO	Hydrographic Office
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBC	International Bathymetric Chart
IBCAO	International Bathymetric Chart of the Arctic Ocean (IOC/IASC/IHO)
IBCM	International Bathymetric Chart of the Mediterranean (IOC)
IBCSO	International Bathymetric Chart of the Southern Ocean (IOC)
IHB	International Hydrographic Bureau (Secretariat of IHO)
IHO	International Hydrographic Organization
IMO	International Maritime Organisation (United Nations)
INEGI	Instituto Nacional de Estadística, Geografía e Informática (Mexico)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IPY	International Polar Year
mgDMS	marine geophysical Data Management System
MGR	Marine Geophysical Researches (journal)
NERC	Natural Environment Research Council (UK)
NF	Nippon Foundation (Japan)
NGDC	National Geophysical Data Centre (USA)
NOAA	National Oceanographic and Atmospheric Administration (USA)
NOL	National Oceanographic Library (UK)
NSF	National Science Foundation (USA)
PMG	Project Management Group
POBACE	Polar Ocean Bathymetry Co-ordination Effort
SCDB	GEBCO's Sub-Committee on Digital Bathymetry
SCOR	Scientific Committee on Oceanic Research (ICSU)

SCUFN	GEBCO's Sub-Committee on Undersea Feature Names
SRTM	Shuttle Radar Topography Mission
SSPARR	Seafloor Sounding in Polar and Remote Regions
SWOT	Strengths, Weaknesses, Opportunities and Threats
UNCLOS	United Nations Commission on the Law of the Sea
UNEP	United Nations Environment Programme
UNH	University of New Hampshire (USA)
URL	Uniform Resource Locator
USCGC	United States Coastguard Cutter
WG	Working Group
WMS	Web Map Services

ANNEX 16

GEBCO PERSONALITY LIST

(Revised 28 November 2005)

JOINT IOC-IHO GUIDING COMMITTEE FOR GEBCO

Dr Robin K.H. Falconer (Vice-Chairman)
Dr Meirion Jones
Lic. José Luis FRIAS Salazar
Dr Hans-Werner Schenke
Dr Gleb B. Udintsev
Ingénieur général Etienne Cailliau
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Dr Michael S. Loughridge
Commander Paolo Lusiani
Dr Kunio Yashima
Dr Chris Fox (Director, IHO Data Center for Digital Bathymetry, NGDC)

SUB-COMMITTEE ON DIGITAL BATHYMETRY (SCDB)

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Dr Michael Carron
Mr Norman Z. Cherkis
Dr Andrew Goodwillie
Mr Alexis E. Hadjiantoniou
Dr John K. Hall
Dr Meirion T. Jones
Dr Michael S. Loughridge
Mr Ron Macnab
Capt. Andrey Popov
Mr William Rankin
Dr Hans-Werner Schenke
Dr George Sharman
Mr Shin Tani

SUB-COMMITTEE ON UNDERSEA FEATURE NAMES (SCUFN)

Dr Hans-Werner Schenke (Chairman)
Dr Galina Agapova
L Cdr Harvinder AVTAR
Mr Norman Cherkis
José Luis Frias
Ing.en Chef Michel Huet (Secretary)
Mr Kunikazu Nishizawa
Mr Yasuhiko Ohara
L. Cdr. Rafael PONCE Urbina
Lic. W. Reynoso
Mr Vadim Sobolev
Ms Lisa Taylor
Capt. Albert E. Theberge
Mr D. Travin
Adviser/Observer: Mr. Trent Palmer

Ad Hoc STRATEGY PLANNING COMMITTEE

Members to be appointed

EDUCATIONAL GDA WORKING GROUP

Dr George Sharman (Chairman)
Dr Michael Carron
Mr Norman Z. Cherkis
Dr. Andrew Goodwillie
Mr Alexis E. Hadjiantoniou
Dr Meirion T. Jones
Dr Michael S. Loughridge
Mr Shin Tani
Prof. Bob Whitmarsh (Secretary)

FINANCE WORKING GROUP

Mr Norman Cherkis
Dr John K. Hall

OUTREACH WORKING GROUP

Dr Robin Falconer
Dr Chris Fox
Dr Andrew Goodwillie
Other members to be confirmed

WORKING GROUP ON REGIONAL PROBLEMS

Mr Ron Macnab (Chairman)
Members to be appointed

NIPPON FOUNDATION/GEBCO TRAINING PROJECT MANAGEMENT COMMITTEE

Dr Robin K.H. Falconer (Chaiman)
Mr Robert Anderson
Dr José Frias
Dr Martin Jakobsson
Dr Michael Loughridge
Mr David Monahan (Project Manager)
Dr Hans-Werner Schenke
Dr Walter Smith
Mr Shin Tani
Prof. Bob Whitmarsh (Secretary)

NIPPON FOUNDATION/GEBCO TRAINING PROJECT SCHOLARS

Mr Clive Angwenyi (2005)

Dr Srinivas Karlapati (2005)
Lt Cdr Hugo Montoro (2005)
Mr Taisei Morishita (2005)
Lt Cdr Abubakar Mustapha (2005)
Lt Cdr Walter Reynoso (2005)
Ms Shereen Sharma (2005)

GEBCO PERMANENT SECRETARY
Prof. Bob Whitmarsh

GEBCO BATHYMETRIC EDITOR
Mr Colin Jacobs

GEBCO DIGITAL ATLAS MANAGER
Ms. Pauline Weatherall

REPRESENTATIVES OF THE IOC SECRETARIAT AND THE I.H. BUREAU

Mr Dmitri Travin, Intergovernmental Oceanographic Commission
Captain Hugo Gorziglia, Director, International Hydrographic Organization
Commander Steve Shipman, International Hydrographic Bureau

SCIENTIFIC ADVISORS

RADM Christian Andreasen
Dr. David L. Divins
Commander Luis GONZAGA Campos
Ing. prin. Laurent Louvart
Dr Larry A. Mayer
Dr German Naryshkin
Mr George B Newton
Mr John Woodward

CORRESPONDING MEMBERS

Lieutenant Emilio Boassi
Dr Marie-Helène Cormier
Dr Ray Cramer
M C Luis A DELGADO Argote
Mr Daniel P. Donnell
Lt Cmd Luis Antonio Félix
Dr R.L. Fisher
Dr. Valeriy Fomchenko
Lt Cmd. Alexandre Fontainha
Dr Sarah Gille
Dr Troy L. Holcombe
Dr. Russell Howorth
Mr Peter Hunter
Dr Don Hussong

Sir Anthony Laughton
Dr. Karen M. Marks
Dr Carlos Mortera
Dr Christian de Moustier
Dr Arne Nielsen
Mrs Lois C. Varnado
Mr John W. von Rosenberg
Dr David Wells
Dr Ian Wright
Mr Alexei A. Zinchenko

CHAIRMEN/CHIEF EDITORS: IOC'S REGIONAL `OCEAN MAPPING' PROJECTS

Professor Dr -lng. Werner Bettac (Chairman & Chief Editor IBCWIO)
First Admiral Mohd. R. Bin Hassan (Chairman IBCWP)
Lic. José Luis FRIAS Salazar (Vice-Chairman IBCCA)
Captain Fernanhdo Mingram (Chairman IBCSEP)
Dr HOU Wenfeng (Chief Editor IBCWP)
Mr Ron Macnab (Chairman IBCAO)
Professor Carlo Morelli (Chairman IBCM)
Ing. Mario A. REYES Ibarra (Chief Editor IBCCCA)
Ing. Gen. André Roubertou (Chairman IBCEA)
Capt. Andrej Popov (Chief Editor IBCM)

CHAIRMAN: IOC CONSULTATIVE GROUP ON OCEAN MAPPING

Dr Günter Giermann

ALPHABETICAL LIST

Dr Galina Agapova
Geological Institute of the
Russian Academy of Sciences
Pyzevskiy, 7
109017 Moscow
RUSSIAN FEDERATION
Fax: +7-095-951-0443
Tel: +7 (095) 230 8180 or 8145
Email: marine@ginras.ru
Time Zone: +3 (Summer +4)

Mr Robert Anderson
Science Applications International Corporation
26279 Twelve Trees Lane, Suite A
Poulsbo, Washington 98370
UNITED STATES OF AMERICA
fax +1.360.697.4869 or 360.697.4140
tel +1.360.697.3754 or 360.697.4144
mobile +1.808.391.6990
Email: andersonrm@saic.com
Time Zone: -8 (Summer -7)

RADM Christian Andreasen
Chief Hydrographer
National Geospatial-Intelligence
Agency (NGA)
4600 Sangamore Road
Bethesda, Maryland 20816-5003
UNITED STATES OF AMERICA
Fax:+1 (301) 227 4211
Tel: +1 (301) 227 7407
Email: andreasenc@nga.mil
Time Zone: -5 (Summer -4)

Mr Clive Angwenyi
74 Greenleaf Crescent
Brampton, ON
CANADA L6X 2V6

LCdr. Harvinder AVTAR (IHO)
National Hydrographic Office
107-A, Rajpur Road, Post Box No. 75
Dehradun, INDIA
Fax: +91-135-2748373
Tel: +91-135-2747365
E-mail: Avtar_Hydro70@rediffmail.com or nho@sancharnet.in
Time Zone :

Professor Dr-Ing. Werner Bettac
(Chairman & Chief Editor IBCWIO)
Poolstrasse, 7

D - 22844 Norderstedt
GERMANY
Fax:+49 (40) 31 90 5150
Tel:+49 (40) 52 24 720
Email: bettac@wtnet.de
Time Zone: +l (Summer +2)

First Admiral Mohd. Bin Hassan
Hydrographic Directorate
Department of the Navy
Jalan Padang Tembak
50634 Kuala Lumpur
MALAYSIA
Fax: +60 (3) 235 3075
Tel: +60 (3) 2698 7972

Lieutenant Emilio Boassi
Servicio Hidrográfico y Oceanográfico
de la Armada (SHOA)
Errázuriz 232, Playa Ancha
P O Box 324
Valparaiso
CHILE
Fax:+56 (32) 266542
Tel:+56 (32) 266508
Email: eboassi@shoa.cl
SHOA Web: http:/www.shoa.cl
Time zone: -4 (Summer, S. Hemisphere -3)

Ingénieur général Etienne Cailliau
Croas Audren
9810 PLOUARZEL
FRANCE
Fax : +33 (0)2 98 22 12 08 (O)
Tel +33 (0)2 98 22 08 61 (O)
Email : etienne.cailliau@wanadoo.fr
Time Zone: +1 (Summer +2)

Dr Michael Carron
Senior Principal Scientist
Antisubmarine Department
Sound, Ocean, and Living Marine Resources (SOLMAR)
SACLANT Undersea Research Center
Mail from Non-US or non-Canada
Viale San Bartolomeo 400
19138 La Spezia, Italy
Mail from US or Canada
APO AE 09613-5000
Fax: +39 0187 527 330
Phone: +39 0187 527 445
Email: carron@nurc.nato.int
Time Zone: +1 (Summer +2)

Mr Norman Z. Cherkis

6300 Saddle Tree Drive
Alexandria
VA 22310 2915
UNITED STATES OF AMERICA
Fax:+703 971-3141
Tel: +703 971-3141
Email: fiveoceanscon@yahoo.com
Website: http://www.neptunesci.com
Time Zone: - 5 (Summer -4)

Dr Marie-Helène Cormier
Lamont Doherty Earth Observatory
Columbia University
61 Route 9W
PO Box 1000
Palisades
NY 10964-1000
UNITED STATES OF AMERICA
Fax:+845 365-8168
Tel: +845 365-8351
Email: cormier@ldeo.columbia.edu
Time Zone: - 5 (Summer -4)

Dr Raymond N Cramer
British Oceanographic Data Centre (BODC)
Joseph Proudman Building
6 Brownlow Street
Liverpool L3 5DA
UNITED KINGDOM
Fax:+44 (151) 795 4912
Tel:+44 (151) 795 4884
Email: rnc@bodc.ac.uk
Time Zone: UT (Summer +1)

Dr Luis A DELGADO Argote
Investigador Titular A
Departamento de Geologia
Centro de Investigación Cientifica
y Educación Superior de Ensenada (CICESE)
Km 107 Carretera Tijuana-Ensenada
22860 Ensenada BC
MEXICO
Fax: (617) 449 33
Tel: (617) 445 01 to 08, ext 2410
Email: ldelgado@cicese.mx
Time Zone: -9 (Summer -8)

Dr. David L. Divins
National Geophysical Data Center
Mailcode E/GC3
325 Broadway
Boulder, CO 80305
UNITED STATES OF AMERICA
Fax: +1-303-497-6513

Phone: +1-303-497-6505
Email: david.divins@noaa.gov
http://www.ngdc.noaa.gov/mgg

Mr Daniel P. Donnell
4600 Sangamore Road
Bethesda
MS
Mailstop D-144 Code PVMI
UNITED STATES OF AMERICA
Fax: +1-301-227-4586
Phone: +1-301-227-3399
Email: donnelld@nga.mil

Dr Robin K.H. Falconer
Vice-Chairman GEBCO
Institute of Geological and Nuclear Sciences Ltd.
69 Gracefield Road
PO Box 30-368
Lower Hutt
NEW ZEALAND
Fax: +64 (4) 570 4600
Tel: +64 (4) 570 1444
Email: r.falconer@gns.cri.nz
Time Zone: +12 (Summer, S. Hemisphere +13)

Lt Cmd Luis Antonio Félix
Diretoria de Hidrografia e Navegação
Rua Barão de Jaceguay
s/no Ponta da Armação
CEP - 24048-900
Niterói, RJ
BRAZIL
Fax: +55 (21) 620 0073/613-8210
Tel: +55 (21) 613 8249
Email: gebco@chm.mar.mil.br or gebcobr@hotmail.com
Time Zone: -3 (Summer -2)

Dr Robert L. Fisher
Geosciences Research Division
Scripps Institution of Oceanography
La Jolla, California 92093-0220
UNITED STATES OF AMERICA
Fax: +1 (858) 534 0784
Tel: +1 (858) 534 3597
Time Zone: -8 (Summer -7)

Dr. Valeriy Fomchenko
Head Department of Navigation and Oceanography
8-11, Liniya V.O. B-34
199034 St Petersburg
RUSSIAN FEDERATION
Fax: +7 (812) 277 59 00
Tel: +7 (812) 277 4362

Time Zone: +3 (Summer +4)

Lt Cmd. Alexandre Fontainha
Diretoria de Hidrografia e Navegação
Rua Barão de Jaceguay
s/no Ponta da Armação
CEP - 24048-900
Niterói, RJ
BRAZIL
Fax: +55 (21) 620 0073/613-8210
Tel: +55 (21) 613 8249
Email: gebco@chm.mar.mil.br or gebcobr@hotmail.com
Time Zone: -3 (Summer -2)

Dr C. G. Fox
Director , National Geophysical Data Center
NOAA Mail Code: E/GC
325 Broadway
Boulder, Colorado 80305-3328
UNITED STATES OF AMERICA
Fax:+1 (303) 497 6386
Tel: +1-(303) 497 6215
Email: Christopher.G.Fox@noaa.gov
Website: http://www.ngdc.noaa.gov/ngdc.html
Time Zone: -7 (Summer - 6)

Lic. José Luis FRIAS Salazar
Instituto Nacional de Estadística,
Geografía e Informática
Heroe de Nacozari Sur 2301,
Jardines del Parque, CP 20270
Aguascalientes, Ags.
MEXICO
Fax: +52 (449) 442 41 76
Tel: +52 (449) 910 53 00, ext 5833
Email: jose.frias@inegi.gob.mx
Time Zone: -7 (Summer -6)

Dr Günter Giermann
Offenbachstr. 32
D-53173 Bonn - Bad Godesberg
GERMANY
Fax:+49 228 35 47 94
Tel:+49 228 35 47 94
Time Zone: +1 (Summer +2)

Dr Sarah Gille
Physical Oceanography Division
Scripps Institution of Oceanography
La Jolla, California 92093-0230
UNITED STATES OF AMERICA
Fax: +1 (858) 534 9820
Tel: +1 (858) 822 4425
Email: sgille@ucsd.edu

Time Zone: -8 (Summer -7)

Commander Luis GONZAGA Campos
Diretoria de Hidrografia e Navegação
Rua Barão de Jaceguay
s/no Ponta da Armação CEP - 24048-900
Niterói, RJ
BRAZIL
Fax:+55 (21) 620 0073/613-8210
Tel:+55 (21) 613 8249
Email:
Time Zone: -3 (Summer -2)

Dr Andrew Goodwillie
Oceanography 208
Lamont Doherty Earth Observatory
61 Route 9W
Palisades
NY 10964-8000
UNITED STATES OF AMERICA
Fax: 845-365-8156
Tel: 845-365-8717
Email: andrewg@ldeo.columbia.edu
Time Zone: -5

Captain Hugo Gorziglia
Director
International Hydrographic Organization
4 quai Antoine ler
B.P.445 - MC 98011 Monaco Cedex
PRINCIPALITY OF MONACO
Fax: +377 93 10 81 40
Tel: +377 93 10 81 00
Email: hgorziglia@ihb.mc
Web: http://www.iho.shom.fr
Time Zone: +1 (Summer +2)

Mr Alexis E. Hadjiantoniou
Hellenic Navy Hydrographic Service
TGN 1040
Athens
GREECE
Fax: +30 (1) 651 7811
Tel: +30 (1) 655 1830
Email: dcd@hnhs.gr
Email: alex@ath.forthnet.gr (private)
Time Zone: +2 (Summer +3)

Dr John K. Hall
Marine Geology, Mapping and Tectonics Division
Geological Survey of Israel
30 Malchei Israel Street
Jerusalem 95501
ISRAEL

Fax: +972 (2) 534 6590 or (2) 531 4257
Tel: +972 (2) 534 6455
Email: jkh1@012.net.il
Time Zone: +2 (Summer +3)

Dr Troy Holcombe
National Geophysical Data Center
325 Broadway NOAA Mail Code: E/GC3
Boulder, Colorado 80303
UNITED STATES OF AMERICA
Tel.: +1-979-845-3528
Email: tholcombe@ocean.tamu.edu
Time Zone: -7 (Summer -6)

Dr HOU Wenfeng
(Chief Editor IBCWP)
Director
National Marine Data and Information Service
93, Liuwei Road, Hedong District
Tianjin 300171
CHINA
Fax:+86 (22) 24304 408
Tel:+86 (22) 24301 297
Email: houwf@netra.nmdis.gov.cn
Time Zone: +8

Dr Russell Howorth
South Pacific Applied Geoscience
Commission (SOPAC)
SOPAC Technical Secretariat
Private Mail Bag, Suva
FIJI
Tel:+679 381 139 or 381 377
Fax:+679 370 040
Emails: russell@sopac.org.fj
Website: www.sopac.org.fj
Time Zone: + 12

Ing.en Chef Michel Huet
International Hydrographic Bureau
4 quai Antoine 1er
MC 98000 Monaco Cedex
PRINCIPALITY OF MONACO
Fax: +377 93 10 81 40
Tel: +377 93 10 81 04
Email: mhuet@ihb.mc
Web: http://www.iho.shom.fr
Time Zone: +1 (Summer +2)

Mr Peter Hunter
Challenger Division for Seafloor Processes
National Oceanography Centre
Empress Dock
Southampton SO14 3ZH

UNITED KINGDOM
Fax: +44 (023) 80 596 554
Tel: +44 (023) 80 596 559
Email: peter.hunter@noc.soton.ac.uk
Time Zone: UT (Summer +1)

Dr Don Hussong
Pier 69
2727 Alaska Way
Seattle
Washington 98121-1107
Fax: +1 (206) 441 596 9308
Tel: +1 (206) 441 596 9305
Email: d.hussong@seafloor.com
Time Zone: –8 (Summer -7)

Mr Colin Jacobs
GEBCO Bathymetric Editor
Challenger Division for Seafloor Processes
National Oceanography Centre
Empress Dock
Southampton SO14 3ZH
UNITED KINGDOM
Fax: +44 (023) 80 596 554
Tel: +44 (023) 80 596 576
Email: clj@noc.soton.ac.uk
Time Zone: UT (Summer +1)

Dr Martin Jakobsson
Department of Geology and Geochemistry
Stockholm University
106 91 Stockholm
SWEDEN
Fax: +46 8 674 7897
Tel.: +46 8 164719
Email - martin.jakobsson@geo.su.se
Time Zone: +1 (Summer +2)

Dr Meirion T. Jones
4 Norfolk Drive
West Kirby
Wirral CH48 2HR
United Kingdom
Email: mtj@bodc.ac.uk
Tel: +44 151 625 3395
Time Zone: UT (Summer +1)

Dr Srinivas Karlapati
National Institute of Oceanography
G.O.D.
Dona Paula
Goa 403 004
INDIA
Email: fan_v@yahoo.com

Sir Anthony Laughton PhD FRS
Chairman GEBCO (representing SCOR)
Okelands, Pickhurst Road
Chiddingfold, Godalming
Surrey GU8 4TS
UNITED KINGDOM
Fax: +44 (1428) 683967
Tel: +44 (1428) 683941
Email: anthony.laughton@soc.soton.ac.uk
Time Zone: UT (Summer +1)

Dr Michael S. Loughridge
2630 Iliff St
Boulder
Colorado 80305
UNITED STATES OF AMERICA
Fax:+1 (303) 494 1747
Tel: +1-(303) 494 6008
Email: mike@loughridge.net
Website: http://www.ngdc.noaa.gov/ngdc.html
Time Zone: -7 (Summer - 6)

Ing. prin. Laurent Louvart
Etablissement Principal du SHOM
13 rue du CHATELLIER, BP30316
29603 Brest
FRANCE
Fax:+ 33 (0) 2 98 22 08 99
Tel:+ 33 (0) 2 98 22 1763
Email: louvart@shom.fr
Website : http://www.shom.fr
Time Zone: +1 (Summer +2)

Commander Paolo Lusiani
Istituto Idrografico della Marina
Passo Osservatorio 4
16100 Genova
ITALY
Fax: +39 010261400
Tel: +39 01024431
E-mail: lusianip@marina.difesa.it
Time Zone: +1 (Summer +2)

Mr Ron Macnab
Geological Survey of Canada (Retired)
11 Lyngby Avenue
Dartmouth NS, B3A 3T6
CANADA
Fax: +1(902)463-0908
Tel: +1(902)463-3963
E-mail: ron.macnab@ns.sympatico.ca
Time Zone: -4 (Summer -3)

Dr. Karen M. Marks

Laboratory for Satellite Altimetry
NOAA mail code E/RA-31
National Oceanic and Atmospheric Administration
1335 East-West Highway, room 5322
Silver Spring
Maryland 20910-3282
UNITED STATES OF AMERICA
Fax: +1-301-713-3136
Tel : +1-301-713-2857, extension 124
Email: Karen.Marks@noaa.gov
Time Zone: -5 (Summer -4)

Dr Larry A. Mayer
Director, Centre for Coastal and Ocean Mapping
University of New Hampshire
Durham
NH 03824
UNITED STATES OF AMERICA
Fax: +1 (603) 862 0839
Tel:+1 (603) 862 2615
Email: lmayer@unh.edu
Time Zone: -5 (Summer -4)

Capt. Fernando Mingram
Servicio Hidrográfico y Oceanográfico
de la Armada (SHOA)
Errázuriz 232, Playa Ancha
P O Box 324
Valparaiso
CHILE
Fax:+56 (32) 266542
Tel:+56 (32) ??????
Email: director@shoa.cl
SHOA Web: http:/www.shoa.cl
Time zone: -4 (Summer, S. Hemisphere -3)

Mr David Monahan
Chairman, GEBCO
Center for Coastal and Ocean Mapping/NOAA-UNH Joint Hydrographic Center
University of New Hampshire
24 Colovos Rd.
Durham
03824 New Hampshire
UNITED STATES OF AMERICA
Fax +1 (603) 862 – 0839
Tel. +1 (603) 862 - 3755
Email: monahand@ccom.unh.edu
Time Zone: -5 (Summer -4)

Lt Cdr Hugo Montoro
Psje. Rosario Araoz No.140 Dpto 401
Urb Pando II Etapa San Miguel
Lima 32
PERU

Professor Carlo Morelli
(Chairman IBCM)
DINMA
Facoltà d'Ingegneria dell'Università
Piazzale Europa, 1
I - 34127 Trieste
ITALY
Fax:+39 (040) 676 3497
Tel: +39 (040) 676 7158
Email: morelli@geodinma.univ.trieste.it or morellic@univ.trieste.it
Time Zone: +1 (Summer +2)

Mr Taisei Morishita
Continental Shelf Surveys Office
Hydrographic and Oceanographic Department
Japan Coast Guard
5-3-1Tsukiji
Chuo-ku
Tokyo 104-0045
JAPAN

Dr Carlos Mortera
Sismotectonica y Geofisica Marina
Instituto de Geofisica
Universidad Nacional Autonomica de Mexico
Ciudad Universitaria
Coyoacan 04510
Mexico D.F.
MEXICO
Fax: +52 (55) 5616 2517
Tel: +52 (55) 5622 1126 ext. 34
Email: carlosm@ellin.igeofeu.unam.mx
Time Zone: -7 (Summer -6)

Dr Christian de Moustier
Centre for Coastal and Ocean Mapping
University of New Hampshire
Durham
NH 03824
Fax: +1 (603) 862 0839
Tel: +1 (603) 862 3434
Email: cpm@ccom.unh.edu
Time Zone: -5 (Summer -4)

Dr German Naryshkin
All-Russian Research Institute
for Geology and Mineral Resources
of the World Ocean
(VNIIOKEANGEOLOGIA)
1, Angliisky Avenue
190121 St Petersburg
RUSSIAN FEDERATION
Fax:+7 (812) 114 1470

Tel: +7 (812) 113 8379
Email: vniio@g-ocean.spb.su
Time Zone: +3

Mr George B. Newton
Chair, US Arctic Research Commission
4350 N. Fairfax Drive, Suite 510
Arlington
VA 22203
UNITED STATES OF AMERICA
Fax: +1 (703) 390 5084
Tel: +1 (703) 788 7729 or +1 (703) 525-0111
Email: gbnewton@plansys.com
gbnewton@verizon.net
Time Zone: -5 (Summer -4)

Dr Arne Nielsen
Head of Oceanographic Department
Royal Danish Administration of Navigation Hydrography
Overgaden O. Vandet 62B
DK 1034 Copenhagen K
Fax: +(45) 31 57 4341 or 32 54 1012
Tel.: +(45) 32 68 9605
Email: arn@fomfrv.dk
Time Zone +1 (Summer +2)

Mr NISHIZAWA Kunikazu
Head, Ocean Research Laboratory
Hydrographic and Oceanographic Department
Japan Coast Guard
5-3-1, Tsukiji, Chuo-ku
Tokyo 104-0045
JAPAN
Fax: + 81 (1) 3 3541 3870
Tel: + 81 (0) 3 3541 4387
email: kunikazu-nishizawa@kaiho.mlit.go.jp
Time Zone +9

Dr Yasuhiko Ohara
Ocean Research Laboratory
Hydrographic and Oceanographic
Department of Japan
3-1 Tsukiji 5 Chome
Chuo-ku
Tokyo 104-0045
JAPAN
Fax: +81 (3) 3541 3870
Tel: +81 (3) 3541 4387
Email:ohara@jodc.go.jp
Time Zone: +9

Mr. Trent Palmer
Secretary ACUF
US Board on Geographic Names
National Imagery and Mapping Agency (NIMA)

Stop D-61
Bethesda, Maryland 20816-5003
UNITED STATES OF AMERICA
Fax: +1 (301) 227 5515
Tel: +1 (301) 227 3050
E-mail: palmert@nima.mil
Time Zone: -5 (Summer -4)

LCdr. Rafael PONCE Urbina
Dirección Gal Adj de Hidrografia y Cartografia
Eje 2 Oriente, Tramo H. Escuela Naval Militar
No. 861, Edificio "B", 1/er. Nivel.
Col. Los Cipreses, Delegación Coyoacán
C.P. 04830 México D.F.
MEXICO
Fax: +52 556 246500 Ext. 1242
Tel: +52 556 246515
E-mail: hidrografia.mexico@gmail.com
Time Zone: -6 (Summer -5)

Capt. Andrey Popov
Technical Director
ChartPilot
8-11, Liniya V.O. B-34
199034 St Petersburg
RUSSIAN FEDERATION
Fax: +7 (812) 321 6537
Tel: +7 (812) 277 4362, mob. 7-901-639-1825
Email: a.popov@chartpilot.ru
Time Zone: +3 (Summer +4)

Mr William Rankin
Code OTT
United States Naval Oceanographic Office
1002 Balch Boulevard
Stennis Space Center
Mississippi 39522-5001
UNITED STATES OF AMERICA
Fax: +1 (228) 688 4931
Tel: +1 (228) 688 5709
Email: william.e.rankin@navy.mil
Time Zone: -6 (Summer -5)

Lic. Walter REYNOSO Peralta
Servicio de Hidrografía Naval
Avenida Montes de Oca 2124
1271 Buenos Aires
ARGENTINA
Fax: + 541 1 4301 3883
Tel: + 541 1 4301 0061 / 68
E-mail: wreynoso@hidro.gov.ar or wreyper@hotmail.com

Ing. Mario Alberto REYES Ibarra
Director General de Geografía

Instituto Nacional de Estadística
Geografía e Informática, INEGI.
Heroe de Nacozari Sur No. 2301
Frace. Jardines del Parque
C.P. 20270 Aguascalientes, Ags.
MÉXICO
Fax: (52-449) 442 41 60
Tel: (52-449) 910 54 06
Email: mario.reyes@inegi.gob.mxTime Zone: -7 (Summer -6)

Ingénieur général André Roubertou
(Président IBCEA)
c/o Service Hydrographique et
Océanographique de la Marine
BP 5
00307 Armées
FRANCE
Fax:+33 (1) 40 65 99 98 (at SHOM)
Tel:+33 (1) 45 77 52 86 (private)
Time Zone: +1 (Summer +2)
Mark all corespondence (including Fax messages) Prière de faire suivre
France

Dr. Hans-Werner Schenke
Bathymetry & Geodesy
Alfred-Wegener-Institut für Polar-und Meeresforschung
Postfach 12 01 61
Columbusstrasse
D-27568 Bremerhaven
GERMANY
Fax: +49 (0) 471 4831 1977
Tel: +49 (0) 471 4831 1222-1223; home +49 471 200262
Email: Schenke@AWI-Bremerhaven.de
Time Zone: +1 (Summer +2)

Dr George Sharman
National Geophysical Data Center
325 Broadway NOAA Mail Code: E/GC3
Boulder, Colorado 80305-3328
UNITED STATES OF AMERICA
Fax:+1 (303) 497 6513
Tel:+1 (303) 497 6345
Email: George.F.Sharman@noaa.gov
Time Zone: -7 (Summer -6)

Cdr Steve Shipman
International Hydrographic Bureau
4 quai Antoine 1er
B.P.445 - MC 98011 Monaco Cedex
PRINCIPALITY OF MONACO
Fax: +377 93 10 81 40
Tel: +377 93 10 81 06
Email: sshipman@ihb.mc
Web: http://www.iho.shom.fr

Time Zone: +1 (Summer +2)

Dr Walter H. F. Smith
NOAA Lab for Satellite Altimetry
NOAA code E/RA31,
1315 East-West Highway, Room 5408
Silver Spring
Maryland 20910-3282
UNITED STATES OF AMERICA
Fax:+1 (301) 713 3136
Tel:+1 (301) 713 2857, ext. 126
Email: walter@raptor.grdl.noaa.gov or Walter.HF.Smith@noaa.gov
Web: http://ibis.grdl.noaa.gov/SAT
Time Zone: -5 (Summer -4)

Captain V. Sobolev
8,11 Linija
199034 St-Petersburg
Russian Federation
Fax: +7-812-323-75-48
Tel: +7-812-323-75-48
Email: gunio@chartpilot.ru
Time Zone: +3 (Summer +4)

Mr Shin Tani
Cabinet Counselor
Coordination Office for Continental Shelf Surveys
Cabinet Secretariat, Government of Japan
1-11-39, Nagata-cho
Chiyoda, Tokyo, 100-0014
JAPAN
Fax: +81 (3) 3506-4503
Tel: +81 (35501-2563
Email: stani@jodc.go.jp or t@ni.777.ac
Time Zone: +9

Ms Lisa A. Taylor
National Geophysical Data Center
Mailcode E/GC3
325 Broadway
Boulder, CO 80305-3328
UNITED STATES OF AMERICA
Fax: +1 303-497-6513
Tel: +1 303-497-6767
Email: Lisa.A.Taylor@noaa.gov
Time Zone: -7 (Summer -6)

Capt. Albert E. Theberge
Office of Coast Survey
1315 East-West Highway, Room 6207
Silver Spring
Maryland
USA
Fax: +1 (301) 713-4019

Tel:
E-mail : Albert.E.Theberge.Jr@noaa.gov
Time Zone: -5 (Summer -4)

Mr Dmitri Travin
Intergovernmental Oceanographic Commission
UNESCO
1, rue Miollis
75732 Paris Cedex 15
FRANCE
Fax:+33 1 45 68 58 12
Tel: +33 1 45 68 40 44
Email: d.travin@unesco.org
Time Zone: +1 (Summer +2)

Dr Gleb B. Udintsev
Vernadsky Institute of Geochemistry
19 Kosygina Street, 117975 Moscow
RUSSIAN FEDERATION
Fax: +7 (095) 938 2054 (for Udintsev)
Tel: +7 (095) 977 5125 (home evenings)
+7 (095) 137 86 48 (office)
Email: galstrel@mail.ru or geokhi.ras@relcom.ru or glebudinstev@pochta.ru
Time Zone: +3 (Summer +4)

Mrs Lois C Varnado
Scientific Technology Staff, Code 0TT
Naval Oceanographic Office
1002 Balch Boulevard
Stennis Space Center
MS 39522-5001
UNITED STATES OF AMERICA
Fax: +1 (228) 688 4931
Tel: +1 (228) 688 4546
Email: varnadol@navo.navy.mil
Time Zone: -6 (summer -5)

Mr John W. von Rosenberg
National Geospatial-Intelligence Agency (NGA)
4600 Sangamore Road
Bethesda, MD 20816-5003
Mailstop D-144 Code PVMI
UNITED STATES OF AMERICA
Fax: +1 301-227-4586
Phone: +1 301-227-3399
Email: vonrosenbj@nga.mil
Time Zone: -5 (Summer -4)

Ms Pauline Weatherall
GEBCO Digital Atlas Manager
British Oceanographic Data Centre (BODC)
Joseph Proudman Building
6 Brownlow Street
Liverpool L3 5DA

UNITED KINGDOM
Fax:+44 (151) 795 4912
Tel: +44 (151) 795 4873
Email: paw@bodc.ac.uk
Time Zone: UT (Summer +1)

Dr David Wells
Geodesy and Geomatics Engineering
Head Hall
15 Dineen Drive
Fredericton, NB
Canada E3B 5A3
Fax:+1 (506) 453 5147
Tel: +1 (506) 453 4943
Email: dew@unb.ca
Time Zone: UT –5 (Summer –4)

Prof Bob Whitmarsh
Permanent Secretary, GEBCO
School of Ocean & Earth Science
National Oceanography Centre
Empress Dock
Southampton SO14 3ZH
UNITED KINGDOM
Fax: +44 (023) 80 593052
Tel: +44 (023) 80 596564
Email: bob.whitmarsh@noc.soton.ac.uk
Time Zone: UT (Summer +1)

Mr John Woodward
Technical Hydrographer
Royal Danish Administration
of Navigation and Hydrography
Overgaden O. Vandet 62B
DK 1023 Copenhagen K,
DENMARK
Fax: + 45 (3) 157 4341
Tel: + 45 (3) 268 9500
Email: jjw@fomfrv.dk
Time Zone: +1 (Summer +2)

Dr Ian Wright
National Institute of Water and Atmospheric Research Ltd.
Greta Point
Evans Bay Parade
PO Box 14-901
Kilbirnie, Wellington
NEW ZEALAND
Fax: +64 (4) 386 2153
Tel: +64 (4) 386 0300
Email: i.wright@niwa.cri.nz
Time Zone: +12 (Summer, S.Hemisphere +13)

Dr Kunio Yashima

Tsukiji Hamarikyu Building 8F,
5-3-3 Tsukiji
Chuo-ku
Tokyo 104-0045
JAPAN
Fax: +81 81-3-3543-0762
Tel: +81 (3) 3543-0686
E-mail: yashima@jha.jp
Time Zone: +9

Mr Alexei A. Zinchenko
Secretary to the UN Commission on the Limits of the Continental Shelf
2 UN Plaza DC2-0438
New York N.Y. 10017
UNITED STATES OF AMERICA
Fax: +001 (212) 963 5847
Tel: +001 (212) 963 3966
Email: zinchenko@UN.org
Time Zone: -5 (Summer -4)