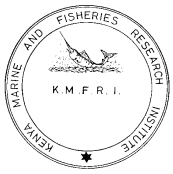
Intergovernmental Oceanographic Commission

Training Course Reports **46**



Training Course on Management of Marine Data and Information for the IOCINCWIO Region

Organized in cooperation with:
Kenya Marine and Fisheries Research Institute

Mombasa, Kenya
1 - 11 December 1997

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TABLE OF CONTENTS

1. INTRODUCTION & OBJECTIVES

The Training Course on Management of Marine Data and Information for the IOCINCWIO Region was held in Mombasa, Kenya, from 1 to 11 December, 1997. The Course was organized in cooperation with and kindly hosted by the Kenya Marine and Fisheries Research Institute, Mombasa.

The course was designed within the continuing training programme of the IODE to familiarize marine data and information managers with current procedures and methods related to marine data and information management, with a special emphasis on newest microcomputer methods and software. Through such training courses the IOC aims to ensure increasing and sustained collaboration of Member States in the IODE programme, and to maintain a high level of competence in the National Oceanographic Data Centres.

The current course covered countries in the Western Indian Ocean region.

2. PARTICIPANTS

The course was attended by participants from Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa and Tanzania and the Lectures were provided by invited data managers from Belgium, Kenya, the United States, and IOC. The list of participants and lecturers is provided as Annex I.

3. COURSE PROGRAMME

3.1 OPENING CEREMONY

The Training Course was officially opened on Monday 10 April by Mr Enock Wakwabi, Centre Director KMFRI/Mombasa, representing Dr Ezekiel Okemwa, Director of the Kenya Marine and Fisheries Research Institute (KMFRI). Dr Okemwa's remarks are contained in Annex II.

On behalf of the Executive Secretary IOC, Mr Peter Pissierssens, thanked Dr Okemwa, KMFRI, and the Government of Kenya for co-organizing and hosting this training course. He expressed the wish that this training course would contribute to the further development of the IODE system and its implementation in the IOCINCWIO region. He reiterated the importance attached by the IOC to the IODE programme and highlighted the important role of the National Oceanographic Data Centres in the IODE system. Mr Pissierssens concluded his remarks with a summarization of course goals, and an introduction of instructors Murray Brown, Dr Edward Vanden Berghe, Mr Mika Odido and Mr Harrison Ong'anda.

3.2 LECTURES & PRACTICALS

The course of training has been structured to reflect a seminal review of the marine data information management process, authored by Murray Brown and Peter Pissierssens. The outline, tentatively named **A Toolkit of Information Management Modules for ICAM and Coastal Oceanography Programmes,** is briefly summarized as follows:

Global concern for the health of coastal ecosystems has afforded the marine science community the opportunity to apply a variety of earth science disciplines to environmental resource management problems at the edge of the sea. Because both terrestrial and marine measurement and information synthesis methods are applicable in this complex environment, and the interrelationships between these ecosystem compartments are enormously complex, very little progress has been made in coupling Integrated Coastal Zone Management (ICAM) programmes and immediately adjacent coastal oceanographic programmes. Toward improving this situation, the Intergovernmental Oceanographic Commission (IOC) has examined a general science programme model (described below) with a view toward identifying coastal information management needs, in terms of skills and resources. The pool of applicable information management techniques in the wider community of global ocean programmes has been surveyed to identify specific methods, tools, and systems (principally concerned with databases and software) that can be applied to all types of coastal programmes. The resulting systematic structure of identified information management needs is being used by the IOC to design a broad suite of training and orientation services (Brown and Pissierssens 1997).

The practical basis for the training is to present a series of lessons that parallel a typical marine science "programme cycle." The toolkit concept and the precise parameters of the programme cycle are the subject of intensive review by the IOC. The interested reader should contact the IOC to obtain a copy of the latest version of this planning document, as it is not included here.

Prior to the first lesson, the students responded to the skills survey in Annex IV, designed to determine what serious deficiencies in their home institutions might hinder participation in the lessons. The results were quite encouraging, as they showed that only a single student came from a DOS-only background; that student subsequently showed excellent progress in learning Windows 95. No students were unfamiliar with major word processing software or spreadsheet software (although the specific versions varied).

Database management software was familiar to about half the class, but very surprising progress was made by all students during class exercises in both Access and Excel. The most significant problems seemed to be in fundamental "system" skills (e.g. writing batch files; manipulating files through a local network) which could easily reflect a conservative approach within their home institutions. Although most students reported some programming language skills, this is an area that probably needs much emphasis, particularly for prospective data managers.

3.2.1 Reviews of Basic Skills

Using the tabulated results of the skills survey, the training staff presented an overview of fundamental computer skills, emphasizing integrated packages.

Windows/DOS Review

Due to the excellent skill levels shown by most of the students, this lesson was shortened. Some areas of personal shortcomings were addressed individually during the subsequent lessons.

ASCII Editors Review

This lesson originally planned to cover WordPad and/or NotePad (typical screen ASCII editors) was shortened as most of the students already demonstrated excellent skill levels.

QuickBasic Review

The students installed QuickBasic 4.5 (QB), followed by a review of the principal commands used with file input/output, file management, string manipulations, and simple arithmetic calculations. Although Visual Basic is currently available in many institutions, it was advised that QB offers the easiest means of rapid data manipulation with minimal training. Simple programmes were written or edited by the students, employing commands often used in data re-formatting. Several exercises actually used dummy data files.

Access Review

The students entered cruise, station, and "bottle" hydrographic data into a simple structure within Microsoft Access, in order to learn the basic of relational databases. This was followed by the use of simple queries to see how the constructed links maintained relationships between the tables.

Dr Vanden Berghe introduced the class to an advanced programme he has written in Visual Basic that parses World Ocean Atlas 94 data into Access data tables.

Excel Review

The students entered simple data tables from the SKAGEX inter-ship quality control dataset, and used Excel's excellent graphics to plot the results.

Virus Fighting Review

The students installed the demo version of a popular anti-viral software package, and searched for the EICAR.COM international standard test virus, within the class CD. The importance of diligent anti-viral measures was stressed.

3.2.2 The Programme Cycle

The programme cycle model presented below can be applied to any ICAM or coastal ocean science programme. It is a comprehensive listing of the discrete stages in the overall programme history. While any specific programme might not include every stage, the general model includes all the stages known to have occurred in recent programmes of various scales.

Scientific and Political Review ⇐

The students were introduced to a hypothetical coastal ocean water quality problem, as described in a governmental memorandum from one ministry to another. This note contained specific clues to the nature of the problem, which led to a general discussion of the research needs related to these problems.

Programme Design ⇐

The Workshop/Global Programme Planning Model. In a typical "planning meeting" setting, the students discussed the types of data to be collected for a hypothetical study, the "Algal Blooms and Fish Kills Offshore Mombasa" (ABFiKOM Study). This typical coastal research programme was used in subsequent exercises as means of unifying some of the lessons.

Research/Programme Proposals. Using templates provided, the students discussed the specific objectives, and used the results to write a proposal for the ABFiKOM Study.

Scientific Scope & Budget. Using a cost model provided, the students derived estimated budgets for ABFiKOM. Very good convergence of estimates was actually observed.

Engineering Development ⇐

Although in some large-scale programmes, new measurement systems and/or data management tools are required (e.g. rapid, global transmittal of data from at-sea drifters), this need is usually *ad hoc* and difficult to describe in a course setting. Students were appraised of the existence of the step in the process, but no exercises were provided.

System Certification ⇐

The foundation of scientific rigor is repeatability of measurements. To ensure the reliability and repeatability of coastal marine data, certification of the data (through means described below) is required. These matters must be addressed in the programme planning documents, and are usually covered in a specific programme task.

Calibration of Instruments. Students were presented with a set of test hydrographic data and an accompanying calibration value for the salinity data. They used Excel spreadsheets to "correct" the salinity accordingly.

Reference Materials

- ***Laboratory Reference Materials***
  Students were presented with a host of standard reference material catalogs, and with references to the IOC international catalog. Descriptions of various processes to insert standard materials into laboratory protocols were discussed.

- ***Literature Reference Materials***
  The ISIS software was installed and demonstrated, providing a means for students to create and manage typical literature citations databases. ISIS contains the means for multiple, repetitive sub-fields to be created (e.g. chapter titles, related publications) which is difficult in pure relational databases systems.

Intercalibration Activities. A number of activities with the SKAGEX inter-ship calibration datasets were presented. These data were kindly provided by Mr Hans Dahlin of the Swedish Royal Academy.

Observations & Measurements ⇐

The active data-gathering stage of any coastal programme is concerned mainly with physical logistics and instrument operation, often followed by laboratory work. To this extent, information management efforts would be limited to those record-taking and information-capture tools that enhance this stage.

Cruises, Deployments, Overflights, Missions, Surveys. The various types of data that can be acquired were described and discussed briefly. It was explained that although strictly speaking

this is the area of the field scientists, the data manager should play a role in developing procedures and methods.

Data Input Routines (Keyboard Capture Utilities). Although the OceanPC software offers the means to enter hydrographic datasets, the time required to train this method is several days. For this reason, this class used Excel to enter hydrographic data, and to view basic statistics. Afterwards, the full OceanPC system was installed (the older DOS version), and two new Windows-compatible OceanPC components were added. A brief, lecture-style overview of Ocean PC was given.

Rapid Data Access Systems. A brief discussion of some World Wide Web systems to broadcast data in real time or very slightly delayed mode, was presented. This material was quite limited, as Web browse capability is not a reality in several of the students' institutions.

Collateral Observations. No matter how well-funded, all coastal programmes require careful gathering of ancillary data from other sources in the region to extend physical coverage and/or to augment the suite of measured parameters. These sources are often not well known, or may be difficult to locate. Both research programmes and standard operational monitoring programmes offer excellent collateral data opportunities. Some of the major packages and databases examined here were: OPCPlot (for charting and mapping), ETOPO5 (for charting bathymetry, GEODAS, for extracting bathymetric vector data, SURFER (for gridding vector data), GEBCO (for creating bathymetry charts and exporting vector bathymetry data), BODC-CMI (to locate current meter data), and BODC-GLOSS (to locate sea level data), WDC-A's World Ocean Atlas 94 (to export hydrographic data), OceanPC (to manage hydrographic data from ICES), and some standard format documentation (i.e. GF3 and SD2).

Practical exercises included extracting gridded bathymetry data from ETOPO5 (with the SELTOPO programme), extracting single-point bathymetric soundings from GEODAS and gridding and contouring them with SURFER, and extracting a selected coastline segment from OPCPlot (in SURFER format).

- ***Database I: Raw Data***
  The first significant "milestone" in the programme cycle is the in-gathering of the first, nearly complete set of programme and collateral digital data into an organized hierarchy (with some sort of directory to their contents and sources). At this stage, the data manager is responsible for the development of the operational meta-data system, and for populating it with rough descriptions of all the collateral data and programme data files already on hand, or anticipated.

- ***Automated" Quality Control***
  Considerable time was spent on the various methods to write or use programmes to examine ocean data, with a view toward identifying problems and inaccuracies.

- ***Collateral Data Management***
  The various problems in managing collateral data, principally getting them into useful and usable formats, was discussed. Data for the western Indian Ocean were extracted from the World Ocean Atlas 94 into OceanPC, and then exported to SURFER to examine the contours of a selected depth surface, a common exercise in automated quality control. The principal data quality control manual from the GODAR project was described and distributed (on the class CD).

- ***Database II: Working Dataset***
  After conversion of all datasets to agreed-upon formats, the scientific efforts should turn toward higher levels of quality control and analysis, using powerful programmes that demand specific inputs. Typically, these analysis programmes are much more complex than the format requirement they place on the programme data manager, so compliance with standard specifications is demanded.

- ***"Expert" Quality Control***
  The students were introduced to Atlast, an excellent tool for visualizing hydrographic data parameters, and a typical "expert" programme which allows educated observers to assess data quality by means of known patterns within the data fields. Gridding with SURFER was also discussed as a means of finding "bulls eye" values which indicate data problems. The T-S diagrams (and other property-property plots) in OceanPC were introduced, and the class examined data from the "ABFiKOM" test dataset.

- ***Database III: Programme Dataset***
  After the majority of quality control measures have been applied, the corpus of data is ready for final analyses by project scientists and for publication to the general scientific community. This is the stage at which "outside" workers get access to the data, so it is important that all quality control work be successfully completed at this time.

- ***Data Publication***
  Depending on the size of the programme, it may be useful to the coastal science community to "publish" the complete dataset in digital format, possibly with an accompanying technical report. This can be done by the programme staff, or by a cooperating Data Center. Because the structure of a published dataset (which must be logical and well-documented) is different from the actual final programme dataset, considerable extra work is usually involved. Many examples were available in the class, and/or were actually distributed to the students, such as the World Ocean Atlas 94 and the GEBCO depth charts.

Media Alternatives. The use of the World Wide Web is not widespread in the IOCINCWIO area, but the students have become familiar with it, through travel and various "stand alone" media. The class CD includes a complete mirror of the IOC site.

WWW Access Engines. For the above reasons, this area was only briefly described. The class CD includes the use of Internet Explorer.

- ***Programme Documentation***
  The programme is not complete until all forms of ancillary documentation are completed, including formal documentation of the contents of the final dataset, and compilation of a set of working ("secondary") documents that were used in the administration of the programme. These form a permanent record of the work, often as useful as the formal technical reports discussed above.

- ***Metadata***
  The students examined typical prose reports from ABFiKOM cruises, and entered the information in ROSCOP forms. The overall architecture of ROSCOP creation and management (both in the older RISIN and the newer ROSWIN software) was discussed. Other means of managing metadata, such as the KeNODC database for datasets documentation, was discussed (see also below).

- ***Database IV: Data Center Archiving***
  Mr Pissierssens provided an overview of the IOC Committee on International Data and

Information Exchange system and its Committee (IODE). The course covered the following topics:

- History of IODE
- IODE's Terms of Reference
- IODE Centres Network
- IODE and information
- Composition of the IODE Committee
- Data Management
- IODE's Data Management Policy 00
- Data types
- The Data Flow
  - = NODC/DNA
  - = RNODCs
  - = WDCs Oceanography

Special attention was given to Marine Information Management. This included the following topics:

- What is information
- IODE's MIM Programme
  - = MEDI
  - = ASFIS/ASFA
    - . ASFA objectives
    - . ASFA products
    - . ASFA availability
    - . ASFA partners
    - . ASFA partner responsibilities
    - . ASFA: Board and Secretariat
    - . ASFA subject coverage
    - . MSCT/FACT
    - . IMS Newsletter
  - = GE-MIM
    - . Terms of Reference
    - . Actions and Products
    - . Publications
    - . MIM and developing countries

- ***Geographic Information Systems***

  Geographic Information System (GIS) is a new tool for use in information management of especially natural resources. These systems have several components comprising the GIS software, requisite computer hardware and peripheral equipment; and in addition a Geographic Positioning System (GPS) equipment vital for position reference of a feature in terms of the co-ordinates on the earth surface.

  In a GIS database, data about earth surface features is stored with a geographic reference usually in UTM co-ordinates. The data about a feature is represented by spatial information (line, point or polygon) and an underlying descriptive database. The output commonly used is a digital map display on the computer screen or an analog plot.

Main Areas of a GIS Database

The following functionalities were described as pertains to GIS

- **Data inventories and collection**

Technology for acquiring data will include field surveys, data archives, satellite images and aerial photography. It could be stated that large sets of data already exist mainly in analog form with graphic presentation at different documents scattered in various offices. The GIS will therefore be the cohesion component enabling the connection of all relevant data in one functional unit.

- **Digitizing**

Prepare the base map of the study area. You may identify this map from any source including books and topo maps. The base map will define the spatial extent of the study area and also define the reference for the geographic features under consideration. This map and any subsequent maps to be digitized must be transferred to MYLAR paper or cartographic film paper to minimize distortions characteristic to ordinary paper. You will need a cartographer to assist at this stage. Use a masking tape to mount the maps onto your digitizer tablet and then follow instructions on the user manual for digitizing. Carry out digitization of all the features identified in addition to the base map. Each of the features will form the various map layers in the GIS data base.

Ensure that the base map and all the map layers are transformed from digitizer units to real world co-ordinates (UTM, etc). Once this is done then the various digital map layers can be viewed much the same way a transparency is "overlaid".

As already mentioned, the features will be mapped as lines points or polygons. This will also largely depend on your scale of mapping. Thus you may delineate areas vulnerable to erosion as points at a scale of 1:250,000. However if you are working at scale of 1:1000 the same areas will be polygons.

The latter will enable you to obtain a real extent of such areas. Thus bigger scales may allow you to include more details of a feature.

For each of the map layers enter the descriptive data following the provisions of the GIS software in use.

During the stage of digitizing employ appropriate technical persons to avoid spending too much time in learning the intricacies of a GIS software. Full time training of GIS expertise may go up to one year.

- **Data analysis**

All data grouped and organized within the GIS design could be used as a basis for spatial analysis using the various analytical tools available in GIS.

Relationships of various features may be investigated by "overlaying" any number of map layers.

Simply ask what land use is at this location on the map layer, or where in the map layer is a particular feature measuring 20 ha occurring.

Obtain perimeters, areas, and lengths of various selected features.

- **Visualization**

You can produce a map output on the screen or on a hard copy device such as a plotter or printer. Such map outputs are largely independent of the original hard copy maps used

during digitizing. Thus you will adjust your scale of output depending on your needs and hardware capabilities.

- **Elaboration of synthesis**
  A number of map layers may be overlaid to produce a derived map layer.

- **Historical perspectives**
  Changes in coastline morphology can be monitored. When possible satellite images or aerial images of different time perspectives can be overlaid on the GIS digital data planes.

- **Monitoring coastal development**
  A number of coastal developments take bearing on conditions of the coastline. It is prudent to know what activities are located at what positions. Erosion intervention activities for example will take note of them accordingly.

- **Developing coastal degradation indexes**
  Coastline classifications can be developed, based on perceived or measured rates of erosion and accretion. Such classification may range from nominal (*e.g.* high, low, etc.) to more superior scales. These may then be represented in the GIS database

Developing a GIS Database

In general, GIS can be realized in several usual work stages

(i) Determine the future utilization of your GIS database. All the problems to do with the GIS creation (personnel, training, equipment, software) and utilization should be clearly perceived and solutions found. A trained person will ensure the right choice of software mentioned in (iii) below as well as the right equipment;

(ii) Data acquisition stage and digitizing (formation of graphical and alphanumeric database). This can take a lot of time and financial resources;

(iii) For forming a GIS, a large number of commercial software is available (ARCINFO, IDRISI, MAPINFO INTEGRAF-MICROSTATION, INTEGRAF MGE, SICAD, UNISYSARGIS, IBM-GPG, etc). The first four are world standards for GIS designs on PC platforms. Creation of GIS is consisting of connection between graphical and alphanumerical databases into one entity establishing topological and relational links between the entities and the attributes. The choice of the software will be primarily determined by an expert assessment. Sometimes factors such as familiarity, finance and donation will determine what software one gets;

(iv) The utilization of GIS. This stage would require preparation of an application for users to enable efficient utilization of the information system and updating of the changes to be continued during the system operation. Most of the GIS software are not "user friendly" so to speak. However, there are provisions for programming to enable non experts to browse the data and even carry out some analysis. Some software manufacturers are also providing easy-to-use additional software. Therefore if this stage is effectively covered then there will be less dependency on the GIS expert once the database is operational.

ANNEX I

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ANNEX II

OPENING SPEECH

Dr Ezekiel Okemwa, Director, Kenya Marine and Fisheries Research Institute

Mr Chairman, distinguished resource persons, course participants, invited guests, ladies and gentlemen, it is indeed a great pleasure for me to [welcome] you during this important session of the opening of the IOCINCWIO Regional Training Course on Ocean Data Management. On behalf of the Chairman of our Board of Management and the staff of KMFRI, and on my own behalf, I wish to extend a very warm welcome to all of you, and especially so to those who have come from outside Kenya. I wish you a pleasant and memorable stay in our country.

Ladies and gentlemen, Kenya Marine and Fisheries Research Institute is very pleased to have been accorded the opportunity of hosting this very important training course. We wish to extend our sincere thanks to IOC-UNESCO of Paris for it s major contribution in funding and organizing the entire course. Our association with the IOC has a long history. Notable is the IOCINCWIO regional focus under which this course is organized. I also take this opportunity to thank very sincerely the Kenya government for the support and authorization to host this course.

This training course is unique in very many ways. The need for capacity building in this region was recognized and emphasized during the fourth session of IOCINCWIO held here in Mombasa early this year. The area of data collection, analysis and distribution is very critical especially to those of us who are daily involved in research activities. In the WIO region, we do not have capacity to effectively generate and handle ocean data and information. We lack trained manpower, the hardware, and we do not have appropriate software.

Mr Chairman, this is why we welcome this training course. It is notable that the subject of this training course was fully addressed by Agenda 21 of the UNCED (Rio, Brazil 1992) which identified the need to strengthen national scientific capabilities for data collection and analysis, the need to create national databases, the need to link these databases to existing data and information services and mechanisms, and the need for cooperation in exchange, storage and archiving of data and information.

We at KMFRI are thankful to IOC for the equipment and basic training towards the establishment of the Kenya National Oceanographic Data Centre (KeNODC). I am sure several other institutions in the region have started their national NODC's.

Ladies and gentlemen, this training course will enable you as participants to acquire hand-on know-how in data and information management. It is my sincere hope that you have all come prepared to take the full length of the training programme and that you will leave this place having acquired the capability that this region will always look forward to, especially as it concerns ocean data management.

Mr Chairman, looking at the list of the trainees and the trainers, I am of the opinion that this course will benefit a great deal from the diversity each participant brought from his/her country. With these few remarks, ladies and gentlemen, it is now my pleasure to declare this IOCINCWIO Regional Training Course on Ocean Data Management officially open and wish you all fruitful and successful deliberations.

Thank you.

This address was read by Mr Enock Wakwabi, Centre Director KMFRI/Mombasa, on behalf of Dr Okemwa, who was unable to attend the opening session.

ANNEX III

COURSE PROGRAMME & TIMETABLE

Column 1: The originally anticipated day for the lesson although considerable adjusting was necessary to accommodate some longer discussion periods, and the shortening of some material which was familiar to most of the class.

Column 2: The principal title of the "lesson," usually corresponding to a major item in the Toolkit essay.

Column 3: Instructors: Peter Pissierssens (PP); Murray Brown (MB); Edward Vanden Berghe (EV); Mika Odido (MO); Harrison Ong'anda (HO); Clive Angwenyi (CA).

Column 4: Subdivisions of the lesson

Column 5: Specific files, programmes, or hard-copy documents used in the work. These have been slightly re-arranged on the course CD-ROM, but their names are mostly preserved.

Finally, Please note that the numbering scheme here does not match the course "lessons" described in the body of this report. This is because the overall programme cycle described in the Toolkit paper includes several more steps than the subset used in data management training.

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
Dec 1	Introduction	PP MB EV MB	Welcome	
			Overview	00_sylla\resource.doc & datamgt.doc & schedule.doc (hard copies needed of both)
			Housekeeping	
			Survey	Forms\survey\pcsurvey.doc (hard copies needed)
	31 IOC/IODE Overview	PP	Lecture /w reference to IOC M&G 5	31_iode\iocmg5.pdf
	Windows/DOS Review	EV	Main commands	
			International differences	
	ASCII Editors Review	PP	WordPad or NotePad	
Dec 2	QuickBasic Review	MB EV MB MB	Install QuickBasic	Qbasic_r\qb45\source\Qb45.exe
			Basic language overview (all generations)	Qbasic\qb45\qb
			Overview of commands and QB Help screens Programming exercises	Qbasic_r\keysort1.txt & keysort2.txt Qbasic_r\geninfo\qbnotes.doc Printout of ASCII codes 0-255? Sample programmes at qbasic_r\qb45*.bas

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
Dec 3	Access Review	EV & MB	General tutorial	Access 97
			Create simple metadata table to capture the datafiles being created during the course: TITLE, SOURCE, PROCESSOR, FILE NAME/LOCATION, CREATOR. Name the table ABFiKOM Data Resources OPTION: Make a form with all of the fields from the table ABFiKOM Data Resources on it, using reasonable sizes for the text boxes; name the form ABFiKOM Data Index OPTION: Make a macro that OPENS the ABFiKOM Data Index form; name the macro AUTOEXEC	Access 97 Access_r\exercise\testdata.txt
Dec 4	Excel Review	MB EV	Excel overview and exercises: TBD	99_ocnpc\exercise\ice1\ice1.xls
Dec 4	Virus Fighting Review	MB CA MB EV	McAfee Scan 3.0	Install
			Quarantine box for student diskettes	Use or read NO diskettes before virus scanning; CA is "Virus Warden" and must approve all diskette usage, unless purchased new.
			McAfee booklet	Virusf_r\gen_info.txt
			Norton virus utility	Demo/discussion
Dec 4	04 Scientific Scope & Budget	MB	Programme plans	Major GCCP project description documents?
		MB	THE PROBLEM: Read and discuss the memo that triggers the marine research project	00_sylla\exercise\problem.doc
		MB	Task List describing hypothetical project to be called "Algal Blooms & Fish Kills Offshore Mombasa" (ABFiKOM); write list in MSWORD or WordPad and save it EXERCISE folder as LIST.DOC or LIST.TXT	Class exercise ICZM and coastal pubs
Dec 4	04 Scientific Scope & Budget	MB	Statement of Work (SOW) examples; use outline.doc to write a brief SOW for ABFiKOM, name it SOW.DOC and save it in EXERCISE folder; determine "official" boundaries of study area and save for later exercise	04_scope\technical\outline.doc & sow.doc
		MB	Budget Spreadsheet examples; use example to create budget for ABFiKOM, name it BUDGET.XLS and save it in EXERCISE folder Short discussion	04_scope\funding\budget.xls

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
Dec 5	08 Instrument Calibration	MB	CTD data file (Sea Bird format, a de facto international standard)	05_calib\saic_ctd.dat
		MB	Reported calibration value for salinity (from bottle sample near bottom of cast)	05_calib\saictext.txt
		MB & EV	Write QB programme to read in SAIC_CTD.DAT and convert salinity values to correct value, using calibration ratio from SAICTEXT.TXT; save corrected data to SAIC_COR.DAT in same folder	Class exercise
Dec 5	09A Reference Materials (Literature)	PP	Bibliographic reference system	ISIS
		PP	IOC publications	09_refs\literature\ioc_pubs.rtf
		MB	Examples of manuals (sea level data)	09_refs\literature\ioc_14i.pdf & iod_14ii.pdf
			Metadata reference system	(See below under Metadata)
Dec 5	09B Reference Materials (Laboratory)	MB	Methods manuals; discussion of contents and usage in a major programme	NOAA Tech Mem NOS ORCA 71 (4 vols.)
		MB	IOC Catalog of lab reference materials	IOC Manuals & guides 25
		MB	Prepare list of standard reference materials to be included in lab analyses	Classroom exercise
Dec 5	28 Meta-data	MB	Overview	28_metad\metadata.doc
		MB	Review cruise report from first ABFiKOM cruise	28_metad\exercise\cruisereport.doc
		MB	Manually fill in the world's oldest environmental metadata form	ROSCOP
		CA	Metadata digital data entry (ICES ROSWIN)	28_metad\winrosc\roscop.htm & i_roswin.exe?
		MB	Example (medium-sized, practical system)	Demonstration/discussion of the indexing system at KeNODC, based on Access
			Example (large, labor-intensive system)	28_metad\FGDC_97.doc
Dec 5	12 Data Input & Statistics	MB	Enter dataset into ASCII (.txt) file	99_ocnpc\exercise\? (might be SKAGEX intercalibration data)
		EV	Import file into Excel and continue data entry	Excel
		EV	Fundamental statistics	Central tendency: MEAN and AVERAGE Dispersion about the center: range, standard deviation, variance
		MB	Overview of OceanPC	Manual (hard copies and digital) 99_ocnpc\opcmanua.doc or opcmanua.wp6
			Install OceanPC Install newest version of OPCPlot over OceanPC's out-of-date version	99_OcnPC\source\opcread.me & Opcinst.exe, Opc1.exe, Opc2.exe, Opcdoc.zip OPCUNPAK.EXE

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
Dec 5		MB	Install ODP1 for Windows ("new OceanPC")	99_ocnpc\source\i_odp1.exe
		MB	ICES data entry; use old-ENTICE to key enter test data	99_ocnpc\exercise\? SKAGEX intercalibration data sheets
		MB	Relevant reports (in order of importance)	NOAA Tech Mem NOS ORCA 66, NOAA Tech Mem NOS ORCA 79, Parkany, Cantillo & Lauentstein, Schantz et *al.*, IOC Tech Set 45
Dec 6	13 Platform Data Integration	MB	Brief descriptions of SAIL and MIDAS	
Dec 6	14 Rapid Data Distribution	MB	Brief descriptions of Web sites.	
Dec 6	15/16 Collateral Data Collection	MB	General mapping	Charting and mapping paper
		MB	PC mapping practical	OPCPlot Workbook OPCPlot Manual
		MB	ABFiKOM Atlas: create "official" chart for planning and mgt. Purposes; name and save the image as ABFIKOM.PCX	Classroom exercise with OPCPlot
		MB	Extract gridded bathymetry data from ETOPO5 world data base; save the file as ABFIKOM.GRD	15_colld\basemap\bathtopo\gridded\etopo5\seltopo.exe & seltopo.bat etopo5.dos, globalre.txt requires alteration of AUTOEXEC.BAT and re-booting
		MB	Examine ABFiKOM.GRD with ascii editor; look for values that would be needed in OPCPlot gridded file header	WordPad
		MB	Plot ABFiKOM.GRD with OPCPlot: Use "ignore header" option in OPCPlot, and enter values directly	Classroom exercise
		MB	Install GEODAS software	Trackline Geophysics database (3 CDs)
			Extract depth data for project atlas region (as XYZ triplets); save data in SOUNDING.DAT	GEODAS and Trackline Geophysics
Dec 6		MO	Install SURFER	21_expqc\surfer\source\srf6info.txt & s6demo.zip & s6tutor.zip
		MO	Grid SOUNDING.DAT with SURFER	SURFER
		MO	Convert gridded datafile to ASCII format (DSAA); save grid in SOUNDING.GRD	SURFER

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
Dec 6		MB	Plot SOUNDING.GRD with OPCPlot	OPCPlot
		EV	Install and demonstrate GEBCO	GEBCO CD
		EV	Extract coastline for project area; save as ABFCOAST.ASC	GEBCO
		MB	Extract selected contours for project area; save as ABFCONTO.ASC	GEBCO
		MB	Plot ABFCOAST.ASC with OPCPlot and compare to internal coastlines plot ABFCONTO.ASC with OPCPlot and compare with SOUNDING.GRD	OPCPlot
		MB	Data Catalogs: Install ODC Current Meter Inventory	15_colld\catalogs\bodc_cmi\read.me & install.exe
		MB	Data catalogs: Use CMI to create an inventory of moorings in VICINITY of ABFiKOM area; save as ABFI_CMI.DAT	CMI query and report functions
		EV	Data catalogs Install IOC/BODC DOS-GLOSS	15_colld\catalogs\readme.txt & glossinv.exe
		EV	Data catalogs: Use GLOSS to create an inventory of sea level stations in VICINITY of ABFiKOM; save as ABFI_GLO.DAT	GLOSS query and report functions
		MB	Data catalogs: hydrographic data and general data (NODC's list of CDs)	15_colld\catalogs\nodcwdca\cd_roms.htm
		MB	Data Catalogs: Overview of NODC/WDCA	NODC Handbook
		MB	Formats: ICES	15_colld\formats\ices\format.txt
		MB	Formats: SD2	15_colld\formats\nodc\overview.txt 15_colld\formats\sd2\format.txt
		PP	Formats: Universal codes (IOC)	15_colld\formats\ioc_codes\country.txt & paramete.txt, ships.txt
		MB EV	Formats: GF3	15_colld\formats\gf3*.*
Dec 6		EV MB	Climatologies: Discuss format; import WOA94 data (see third comment on the right) into OceanPC; name file ABFiKOM.ICE	15_old\softtools\bin2asc\b2a.exe & b2a.doc; 15_old\climatol\woa94\cd\ …; file that best matches ABFiKOM Atlas region 15_old\climatol\woa94\geninfo\ ; readme.txt
		EV	OPTION: Software tools: FTP training with CuteFTP (brief discussion)	15_old\softools\cuteftp\source\ cf1614f7.zip
		MB	OPTION: Software tools: Transfer Pro (brief discussion)	15_old\softools\transpro\source\ xferp110.zip
		MB or EV	OPTION: Software tools: Collage (brief discussion)	15_old\softools\viewers\hdf\collage\ source\col_12b1.zip
Dec 7	REST DAY			
Dec 8	17 Database I	CA	Brief description, demo, and discussion of	

DAY	LESSON TITLE		MAIN ELEMENTS Subject matter or assignment	Resource material(s) to be used
			KeNODC metadata system for tracking data holdings.	
Dec 8	20 Collateral Data Management	MB	Use old-OceanPC to extract subset of ABFiKOM.ICE for exact ABFiKOM area and only for surface samples, and name the extracted subset ABFiKOM.EXT	Old-OceanPC extract function (both area and surface)
		EV	Convert ABFiKOM.EXT to comma-separated version (csv); name new file ABFiKOM.CSV	New-OceanPC CSV function
		EV	Import ABFiKOM.CSV into spreadsheet; sort data by date; export as a text file without comma delimiters, with the name ABFiKOM.TXT	Excel
Dec 8	18 Automated Quality Control	MB & EV	Write QuickBasic programme to examine ABFiKOM.CSV, looking for suspicious values that lie outside the limits in OCL's guidelines	NOAA Tech Report NESDIS 79
Dec 8	19 Database II	CA & MB	Create quick report on current contents of ABFiKOM database; export to Word and add a cover page.	
	21 Expert Quality Control	MB	Examine T-S relationships in ABFiKOM.ice	New-OceanPC TSLOOK
		MB	Mark suspicious data points, and use new OceanPC software to see these data in the editor.	New-OceanPC data edit function
		MO	Grid phosphate values from ABFiKOM.csv (you will need to "tell" Surfer which values are lon, lat, and phosphate	Surfer gridding function
		MO		
		MO	Convert Surfer gridded data to ASCII format; save gridded data as ABFiPHOS.GRD	Surfer data conversion function
		MB	Make a map of ABFiPHOS.GRD in Surfer	Surfer mapping function
		MB	Plot ABFiPHOS.GRD in OPCPlot	OPCPlot
			Plot depth contours (your choice of the file)	OPCPlot
Dec 9	22 Database III	MB	Brief recapitulation of current contents.	
Dec 10	23 Data Publication	PP & MB	UK Marine Atlas GeoVu	
Dec 10	24/30 World-Wide Web & Special Media	PP		
Dec 10	27/29 Reports & Publications	MB	Publication specifications	MMS Technical Style Manual
Dec 10	31 Archives/IODE	PP & MO	Recent IODE status documents	IOC Manuals & Guides
Dec 11	32 Geographic Information Systems	HO	ArcView 1.0	MRJ marine data sampler
Dec 12	Departure			

ANNEX IV

SKILLS SURVEY: Where Should We Begin?

We need to find out how much experience you have had with some of the software and systems to be used in the class. Please answer these questions, so we can adjust the course material to match your skills.

Please circle the "best" answer. If you have a different situation, then please write it in the blank space on the far right.

1. What kind of computer(s) do you work with?			Personal computer (PC)	Workstation (or minicomputer)	Mainframe
2. How much of the time do you work with computer(s)?			Never	Half of the time	All of the time
3. What operating system do you work with?	DOS	Windows 3.x	Windows95	WindowsNT	UNIX
4. How skilled are you with your operating system?			Just beginning	Good/OK	Expert
5. Can you write batch files?		Don't know what they are	No	Yes, but only easy ones	Yes, even control language for systems
6. What word processing software do you use?		None	Other (please name it)	WordPerfect	Microsoft Word
7. How familiar are you with Microsoft Word?	Don't know what it is	Don't use it , but know what it is	Have never used it, but I do use word processors	I have used it, but it is not my usual word processor	I use it often
8. How familiar are you with Microsoft Excel?	Don't know what it is	Don't use it , but know what it is	Have used it, but not often	Use it often, but not an expert	I'm an expert
9. What database management software do you use?		None	Other (please name it)	DBase or Quattro	Microsoft Access
10. How familiar are you with Microsoft Access	Don't know what it is	Don't use it , but know what it is	Have used it, but not often	Use it often, but not an expert	I'm an expert
11. What computer languages can you write new programmes in? Circle one or more.	FORTRAN	BASIC or QuickBASIC	VisualBASIC	C or C++ or Visual C	Machine language
12 How skilled are you with any of the languages you circled above? Circle one each.	No experience Just beginning Good/OK Expert	No experience Just beginning Good/OK Expert	No experience Just beginning Good/OK Expert	No experience Just beginning Good/OK Expert	No experience Just beginning Good/OK Expert
13. Do you manage a collection of marine data?			NO	No simple answer	YES
14. If #13 is YES, then circle the appropriate description:		Hard copy, paper records	Digital files in many different formats; little or no organization	Some organized systems for some datasets, but not 100% integrated	Server-based, integrated collection of data in an organized system

ANNEX V

LIST OF ACRONYMS

ABFiKOM	Algal Blooms and Fish Kills Offshore Mombasa
ASFA	Aquatic Sciences & Fisheries Abstracts/FAO-IOC-UN
BODC	British Oceanographic Data Centre
CD-ROM	Compact Disc with a Read-Only Memory
DNA	Designated National Agency
GIS	Geographic Information System
GEBCO	General Bathymetric Chart of the Oceans /IOC-IHO/
GODAR	Global Oceanographic Data Archaeology and Rescue Project /IODE/
GPS	Geographic Positioning System
ICAM	Integrated Coastal Area Management
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOCINCWIO	IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean
IODE	International Oceanographic Data and Information Exchange/IOC Committee
KeNODC	Kenya National Oceanographic Data Centre
KMFRI	Kenya Marine and Fisheries Research Institute
MEDI	Marine Environmental Data Information Referral System/IOC
NODC	National Oceanographic Data Centre
ODINAFRICA	Ocean Data and Information Network for Africa/IODE
ODINEA	Ocean Data and Information Network for Eastern Africa/IODE
ODV	Ocean Data View
OODBMS	Object Oriented Database Management Systems
ORDBMS	Object Relational Database Management Systems
RDBMS	Relational Database Management Systems
RECOSCIX-WIO	Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean
RNODC	Responsible National Oceanographic Data Centre /IODE/
ROSCOP	Report of Observations/Samples Collected by Oceanographic Programmes /IOC/
Sida	Swedish International Development Authority
UNESCO	United Nations Educational, Scientific and Cultural Organization
WDC	World Data Centre
WOD	World Ocean Database
WODC	World Ocean Database Centre
WWW	World Wide Web

IOC Training Course Reports

No.	Title	Language versions
1.	IOC Indian Ocean Region Training Course in Petroleum Monitoring Perth, 18 February-1 March 1980	English
2.	IOC Regional Training Course for Marine Science, Technicians Cape Ferguson, Queensland, 1-28 June 1980	English
3.	ROPME-IOC-UNEP Training Workshop on Oceanographic Sampling Analysis, Data handling and Care of Equipment, Doha, Qatar, 3-15 December 1983	English
4.	Stage COI d'initiation à la gestion et au traitement de l'information scientifique et technique pour l'océanologie, Brest, France, 28 novembre - 9 décembre 1983	French
5.	Curso mixto COI-OMM de formación sobre el Sistema Global Integrado de Servicios Oceánicos (SGISO), Buenos Aires, Argentina, 15-26 de octubre de 1984	Spanish
6.	UNESCO-IOC-NBO Training Course on Tidal Observations and Data Processing Tianjin, China, 27 August - 22 September 1984	English
7.	Stage COI sur la connaissance et la gestion de la zone côtière et du proche plateau continental Talence, France, 18 septembre - 4 octobre 1984	French
8.	IOC Regional Training Course on Marine Living Resources in the Western Indian Ocean Mombasa, Kenya, 27 August - 22 September 1984	English
9	IOC-UNESCO Summer School on Oceanographic Data, Collection and Management Erdemli, Icel, Turkey, 21 September - 3 October 1987	English
10.	IOC-UNESCO Regional Training Workshop on Ocean Engineering and its Interface with Ocean Sciences in the Indian Ocean Region, Madras, India, 17 March - 5 April 1986	English
11.	IOC-UNESCO Training Course on the Use of Microcomputers for Oceanographic Data Management Bangkok, Thailand, 16 January - 3 February 1989	English
12.	IOC Advanced Training Course on Continental Shelf Structures Sediments and Mineral Resources Quezon City, Philippines, 2-13 October 1989	English
13.	IOC/IODE Training Course on GF3 Data Formatting System Obninsk, USSR, 14-24 May 1990	English
14.	IOC Training Course on Microcomputers and Management of Marine Data in Oceanographic Data Centres of Spanish-speaking Countries, Bogotá, Colombia, 21-30 October 1991	English Spanish
15.	IOC Advanced Training Course on Nearshore Sedimentation and the Evolution of Coastal Environments, Kuala Lumpur, Malaysia, 17-29 February 1992	English
16.	First IOC Training Course on the Applications of Satellite Remote Sensing to Marine Studies Caracas, Venezuela, 24-28 September 1990	English
17.	IOC-KMFRI-RECOSCIX (WIO) Regional Training Course on Microcomputer-based Marine Library Information Management, Mombasa, Kenya, 10-21 August 1992	English
18.	ROPME-IOC Regional Training Course on Management of Marine Data and Information on Microcomputers for the ROPME Region, Kuwait, 18-28 October 1992	English
19.	IOC-SOA Training Workshop on Environmental Effects on Benthic Communities Xiamen, China, 19-23 October 1992	English
20.	IOC Training Course for the Global Sea Level Observing System (GLOSS) directed to the African and South American Portuguese and Spanish-Speaking Countries, São Paulo, Brazil, 1-19 February 1993	English
21.	IOC-SSTC-SOA Training Course on Marine Information Management and ASFA Tianjin, China, 19-30 October 1992	English
22.	First IOC/IOCARIBE-UNEP Training Course on Monitoring and Control of Shoreline Changes in the Caribbean Region, Port-of-Spain, Trinidad and Tobago, 21-30 July 1993	English Spanish
23.	IOC/WESTPAC Training Course on Numerical Modelling of the Coastal Ocean Circulation Matsuyama, Japan, 27 September - 1 October 1993	English
24.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 28 September - 9 October 1992	English
25.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 27 September - 8 October 1993	English
26.	IOC Training Course on Ocean Flux Monitoring in the Indian Ocean. Organized with the support of the Government of Germany, Mombasa, Kenya, 15-27 November 1993	English
27.	IOC-UNEP-SPREP Training Course on Coral Reef Monitoring and Assessment Rarotonga, Cook Islands, 23 February - 13 March 1994	English
28.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 26 September - 7 October 1994	English
29.	IOC-UNEP-WHO-FAO Training Course on Qualitative and Quantitative Determination of Algal Toxins Jena, Germany, 18-28 October 1994	English
30.	IOC Training Course on Oceanographic Data Management for Black Sea Countries Obninsk, Russian Federation, 1-12 August 1994	English
31.	COI-CEADO Curso Regional de Capacitación en Gestión de Datos e Información Oceanográficos Buenos Aires, Argentina, 17-28 de octubre de 1994	Spanish
32.	IOC-UNEP-FAO Training Course on Nutrient Analysis and Water Quality Monitoring Zanzibar, Tanzania, 21-26 November 1994	English
33.	IOC-IOMAC Advanced Training Course on Marine Geology and Geophysics off Pakistan. Pakistan, 12-26 November 1994	English

(CONTINUED)

No.	Title	Language versions
34.	Training Course on Management of Marine Data and Information for the Mediterranean Region Valletta, Malta, 10-21 April 1995	English
35.	IOC-UNEP-WHO-FAO Training Course on Toxin Chemistry and Toxicology related to Harmful Algal Blooms, Trieste, Italy, 3-12 September 1995	English
36.	MAST-IOC Advanced Phytoplankton Course on Taxonomy and Systematics Naples, Italy, 24 September - 14 October 1995	English
37.	IOC-JODC Training Course on Oceanographic Data Management Tokyo, Japan, 16-27 October 1995	English
38.	IOC/IODE Training Course on Marine Geological and Geophysical Data Management Gelendzhik, Russian Federation, 13-29 September 1995	English
39.	IOC/GLOSS-GOOS Training Workshop on Sea-Level Data Analysis, Geodetic & Research Branch Survey of India, Dehra Dun, India, 21 November- 1 December 1995	English
40.	IOC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ; University of Copenhagen, Denmark, 31 July-11 August 1995; IOC-SAREC-DANIDA Training Course on the Taxonomy and Biology of Harmful Marine Microalgæ; University of Mauritius, Republic of Mauritius, 5-14 February 1996; and Annual Report 1995, IOC Science and Communication Centre on Harmful Algæ, DANIDA, University of Copenhagen, Danish Fisheries Research Institute, Danish National Environmental Research Institute	English
41.	IOC-Germany Advanced Training Course on Bathymetric Charting in the Western Indian Ocean METEOR, 15-29 December 1995	English
42.	COI-SHOA-CICESE Curso Sobre Modelación Numérica de Tsunamis Valparaiso, Chile, 11 de Marzo - 11 de Mayo de 1996	Spanish
43.	Seminario/Taller de la COI/GLOSS-SHN sobre Observación y Análisis del Nivel del Mar para países de habla hispano-portuguesa de Latinoamérica Servicio de Hidrografía Naval (SHN), Buenos Aires, Argentina, 19-27 de noviembre de 1996	Spanish
44.	IOC-INCO-ROPME Training Course on Oceanographic Data and Information Management, Tehran, Iran, 19-30 October 1997	English
45.	IOC-ICSU-IAEA-EU Training Course on Marine Geological and Geophysical Data Management for the Countries of the Black and Caspian Seas Regions, Gelendzhik, Russian Federation, 8-19 September 1997	English
46.	Training Course on Management of Marine Data and Information for the IOCINCWIO Region Mombasa, Kenya, 1-11 December 1997	English