Historical database on Soviet tuna longline tuna research in the Indian and Atlantic oceans (first results of YugNIRO-NMFS data rescue project)[①]

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Abstract

YugNIRO (formerly AzCherNIRO, till 1988), Kerch, Ukraine started tuna research in the Indian Ocean in early 1960-ies and such studies continued till early 1990-ies. For research purposes medium-sized fishing trawlers converted for pelagic longlining were used. Recent data inventory accounted about 130 research, searching, and fishing pelagic longline cruises for 1961-1989 targeted tunas *(*generally *Thunnus)*, billfishes *(Makaira, Tetrapturus, Xiphias gladius),* pelagic sharks (*Carcharhinus, Isurus, Alopias, Prionace glauca, Galeocerdo cuvier*). Other pelagic species were recorded as bycatch. More than 5200 longline sets with about 2.5 millions nominal hooks were shot. For every research cruise the following data were colleted on set by set basis: number of hooks, hooks distribution by depth, total catch, and catch by species. Almost all the fish caught were measured, weighed, and analyzed. Estimated catch depth of every fish was recorded. Environmental data and MBT station data generally available. Due to lack of computer equipment and limited funding throughout years of data sampling this valuable data were stored on paper as logbooks of longline catches and biological analysis. In spite the careful treatment by YugNIRO personnel, there were a danger of loss for these unique data due to natural deterioration of media under time impact, accidents, natural disasters, other extraordinary situations, etc. In late 2002 under support of NMFS and NFWF data "rescue" project which principal goals were preparation of computer database and make this data available for joint YugNIRO/SWFSC analysis and for IOTC and ICCAT was started. "Rescue" is carried out by digitizing of the data, which exist only as manuscripts, in order to store them on computer media in the form of relational database. This project is at the final stage at presents, since most of the data available are in the digital form. These data represent unique dataset for Indian Ocean which could be used as an independent long-term biological and fisheries database as well as additional information to databases of IPTP/IOTC and national databases of other research center. Data and database description, database structure, first results of the database creation, data digitizing, and analyses, and potential access to the data is presented in this paper.

[①] This paper could not be cited without prior authorization of the authors.

Introduction

YugNIRO (formerly AzCherNIRO, till 1988), Kerch, Ukraine (founded in 1922) was one of the several research institutes of the Ministry of Fisheries of the USSR, responsible for marine and oceanic fisheries research. Principal area of responsibility of YugNIRO was Black Sea, Indian Ocean and Antarctic Ocean (Indian Ocean sector). During more than 45-years of oceanic research there were collected enormous amount of data on marine resources, including data on the biomass of the stocks and species biology (during pelagic and bottom trawl surveys, acoustic surveys, and with pelagic and bottom longlines, lift nets, squid jigs and other gears) which is storing in YugNIRO archives mostly in paper form.

YugNIRO started tuna research in the Indian Ocean in early 1960s and such studies continued till mid-1990s. One of the principal directions were research of biology, ecology and fisheries potential of large pelagic species such as tunas, billfish and sharks. These studies were carried in regular fisheries research expeditions, which used pelagic longlines as sample gears. During more than 30 years of research more than 130 cruises mostly to the Indian Ocean, while some cruises operated in the Atlantic, with over 5200 longline sets with about 2.5 millions nominal hooks were carried out (Table 1, 2). All the data collected were stored in YugNIRO archives, as logbook of longline scientific fishing operations and biological analysis datasheets. Such storage prevented extended analysis of the data and created a probability of data loss due to natural deterioration of media under time impact, accidents, natural disasters and other extraordinary situations. YugNIRO was unable to transfer them on up-to-date media because of absence of appropriate equipment and funds.

Data "rescue" project, which principal goal was preparation of computer database in order to make this data available for analysis and for IOTC and ICCAT was started late 2002 under support of US National Marine Fisheries Service (NMFS) and National Fish and Wildlife Foundation (NFWF). "Rescue" is carried out by digitizing of the data, which exist only as manuscripts, in order to store them on computer media in the form of relational database.

By 2006 most of the data was keyed and checked for consistency. This paper describes data sources, data, database structure, terms of access to the database. Most of the information related with Atlantic Ocean data is generally omitted here.

Materials and methods

Data were collected by YugNIRO scientists in research cruises and by Yugrybpoisk[1] scientific crew in scouting/exploratory cruises. Medium-size (LOA 54.2-54.8 m, GRT 600-775) trawlers of SRTM type converted for longlining were used for research (Fig. 1). During early years smaller vessels (LOA 50.8 m, GRT 507) were also used. Most of vessels has laboratories onboard and were equipped with oceanographic and biological equipment necessary for biological and environmental research and sampling.

As followed from YugNIRO principal area of research, most of cruises were carried out in the Indian Ocean. During early years principal area of research was Gulf of Aden and Northwestern Indian Ocean. Later cruises were expanded to Mozambique Channel, Southern Areas and Eastern Indian Ocean (Fig. 2)[2].

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[1] Auxiliary organization which carried out fisheries research under general auspice of YugNIRO. Former Yugrybpromrazvedka (till 1988) – Department of Searching and Scientific Research Fleet at the Southern Basin of Ministry of Fisheries of the USSR. Starting from 1993 operated as fishing company.

[2] Here and at further maps coastline and bathymetry is from GEBCO digital atlas (**IOC, IHO, and BODC, 2003**).

There were several types of data collected during cruises:

a. Fisheries data: date and time of operations, position of longline set, number of hooks used and their depth distribution in accordance with basket types, total catch, catch by species in weight and numbers.
b. Biological data: in majority of cruises every fish or vertebrate animals caught or escaped were recorded. All the fish caught were analyzed, i.e. measured[1], weighed (total weight), sex and stage of maturity was determined (for teleosts), gonads were weighed. The visual estimates of stomach fullness (using semi-quantitative scale from 0 to 4[2]) and the weight of stomach contents (to the nearest g) were recorded. Liver weight was also recorded during some cruises. Stomach content samples were collected; vertebrae and dorsal fin spines were sampled for ageing.
c. Environmental data: General environmental conditions during longline set operations were recorded at each longline station. Besides every longline station was accompanied at least one MBT profiling or oceanographic (Nansen' Bottle station). MBT profiles and oceanographic stations were made on regular basis during oceanographic surveys during cruises, during searching activities and on the passage of vessel to and from ports of call. Positions of MBT and oceanographic stations are presented at the Fig. 3 and 4, respectively. Since most of MBT and oceanographic data were digitized earlier, it was not an important part of data "rescue" efforts during this project.

Data were digitized by manual keying of the information from logbook of fishing operations and biological analysis into computer database. Microsoft FoxPlus DBMS and Microsoft Visual FoxPro DBMS were used for MS-DOS based PCs and Windows NT/2000/XP based PCs respectively.

Database content

A relational database which includes several linked tables was developed for storing and retrieving of the data.

Data files includes LL_F.DBF (Fishing operations), LL_W.DBF (Weather conditions), LL_C.DBF (Catch composition), LL_AN.DBF (Biological analysis), LL_FOOD.DBF (Stomach content), and LL_SF.DBF (Size frequencies). The latter table usually not used, since for most of cruises all the catch was analysed and presented in the table LL_AN.DBF. Database structure is presented in the Appendix I.

A set of **reference databases**, were also developed to keep supplementary usually redundant data: List of species caught, list of prey items, list of vessels, tables of longline hooks vertical distributions by tipes of baskets.

Front-end user interface were developed to facilitate data input and data quality control. Quality control procedures includes input checking of the following variables (see also Appendix I): date of operation (start of cruise < date < end of cruise); position (lat ≤ 70, long ≤ 180, minutes of lat and long ≤ 60, sign of lat = 'E' or 'W', sign of long = 'N' or 'S'); time of operations (hours ≤ 24, minutes ≤ 60); for every operation time of the start of operation < than time of the

[1] Usually fork length (FL) for tuna; lower-jaw – fork length (LJFL) for billfish; total length (TL), FL and standard length (SL) for sharks; FL for other species; during some cruises more than one type of length measurements were taken for tuna, billfish and other species.

[2] 0 – empty stomach, 1 – traces of food, 2 – less than ½ of stomach, 3 – more than ½ of stomach, 4 – full stomach, its walls stretched.

operation' end; LL set direction ≤ 360°; wind strength ≤ 45 $m \times s^{-1}$; wave strength ≤ 9 points, Beaufort scale; current direction ≤ 360°; current speed ≤ 12 knots; cloudiness ≤ 10 points. During input of biological data there was visual control of correspondence between input codes of species with Latin name of the species. Were also controlled: fish sex (= 'F' female, 'M' male or 'J' juvenile or 'B' intersex); stomach fullness (≤ 5 points); prey digestion (≤ 6 points). Every new record checked for duplicates.

For post-keying quality control, procedures were developed such as software to check the database for: 1) distance between successive stations should not exceed maximum vessel speed × time between stations; 2) correspondence between dates and sequential numbers of stations; correspondence of the key fields contents between linked tables; 3) correspondence between catch by species to total catch; correspondence between catch species composition, number and weight and species composition, number and weight of fish in the biological analysis; 4) correspondence between fish length (TL>FL>SL; LJTL>LJFL[1]). Quality control also included visual inspection of location of stations (sea or shore) and outliers from scatterplots of length-weight (TL-TW, FL-TW[2], etc.) and length-length (TL-FL, FL-SL, LJTL-LJFL).

Most of the available data have been keyed into the database, post-keying quality control performed and the database is largely free of entry errors. Further work, however, is required to further validate some entries, check quality of entries of stomach content data and input remaining data (mostly stomach contents) that were recently uncovered. Validation of stomach content data will be assisted by data (detailed data of top predator's stomach contents collected at sea and processed in the laboratory on shore) that were not part of the data rescue project.

At this stage Indian Ocean part of the database consists of 111 cruises, 4700 longline sets with 2098346 nominal hooks. Biological data available for 65494 fish individuals (Table 3). Environmental data available for this data set is presented in the Table 4.

Current state of the project, database, data ownership and data availability

Original plans for this data rescue project included a final stage involving joint analysis of the data by scientists of YugNIRO and the SWFSC. Unfortunately, just before the final stage was to begin, NMFS and NFWF experienced reduced budget funding and were unable to continue the project. Alternative sources of funding had to be pursued if the project was to be continued. The IRD (France) offered to assists in the form of a research project developed with IRD UR 109 THETIS: "Retrospective study of structural changes in the pelagic ecosystem of the Indian Ocean during the last 40 years, using the diet of tuna, billfish and other pelagic predators as indicators of fauna diversity". Principal scientists from YugNIRO involved in the data rescue project currently working as visiting scientists in CRH, IRD, Sete, France. For the goals of this project database is temporarily hosted in CRH, while YugNIRO is the primary owner of this dataset.

To achieve one of the goals of the data rescue project: to make this data available for scientific community, the data could be released by requests of individual scientists involved in the Indian Ocean studies as well as by requests of IOTC. All requests should follow the IOTC Resolution 98/02 "Data confidentiality policy and procedures". Permissions to use this data will be developed in accordance with this resolution although all restrictions or permissions will be considered on case by case basis. At this stage all inquires for the data should be addressed to corresponding author of this note.

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[1] SL – standard length, FL – fork length, TL – total length, LJFL – lower jaw-fork length, LJTL – lower jaw-total length.

[2] TW – total weight

Acknowledgements

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References

IOC, IHO, and BODC, 2003. "Centenary Edition of the GEBCO Digital Atlas", published on CD-ROM on behalf of the Intergovernmental Oceanographic Commission and the International Hydrographic Organization as part of the General Bathymetric Chart of the Oceans; British Oceanographic Data Centre, Liverpool.

[1] www.oceanassoc.com

Abbreviations used

AzCherNIRO – Azov-Black Sea Scientific Research Institute of Marine Fisheries & Oceanography, Kerch, Crimea, USSR. Renamed into YugNIRO in 1998 (see abbreviations below).

ICCAT – International Commission for the Conservation of the Atlantic Tunas. 8, Corazon de Maria, Madrid, Spain.

IOTC – Indian Ocean Tuna Commission. PO Box 1011, Fishing Port, Victoria, Mahé, Seychelles.

IRD – Institut de recherche pour le développement. 213, rue La Fayette 75480 Paris Cedex 10, France.

MBT – mechanical bathythermograph

NMFS – National Marine Fisheries Service. 1315, East West Highway, 9th Floor, Silver Spring, MD 20910, USA.

NFWF – National Fish and Wildlife Foundation, 1120 Connecticut Ave., NW Suite 900, Washington, DC 20036, USA.

NOAA – National Oceanic & Atmospheric Administration, U.S. Department of Commerce, 14th Street & Constitution Avenue, Washington, DC 20230, USA.

SWFSC – Southwest Fisheries Science Center, US NMFS. 8604 La Jolla Shores Drive, La Jolla, California 92037-1508, USA.

THETIS – **TH**ons tropicaux et **E**cosystèmes pélagiques: **T**axies, **I**nteractions et **S**tratégies d'exploitation. Research project of IRD.

USSR – Union of the Soviet Socialist Republics.

YugNIRO – Southern Scientific Research Institute of Marine Fisheries & Oceanography, Kerch, Crimea, Ukraine. Formerly AzCherNIRO.

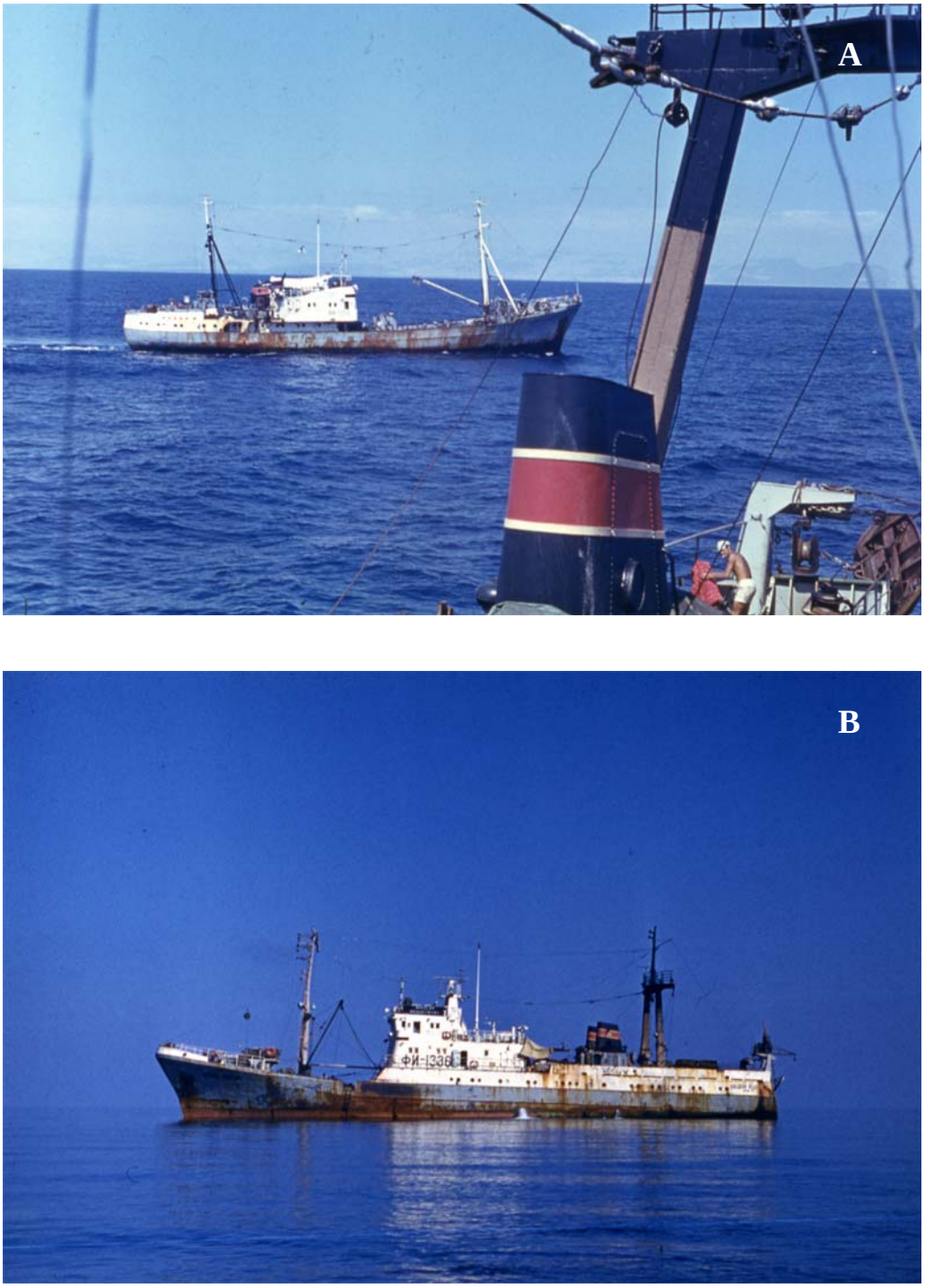

Fig. 1. Vessels of STRM-type (A) and SRTM-K-type (B) which were used in the YugNIRO longline research cruises to the Indian and Atlantic Oceans.

Table 1. List of YugNIRO longline research and scouting expeditions in the Indian and Atlantic oceans[1]

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
1	Aelita	UMOY	5	14.05.1972	20.10.1972	Northwest Indian Ocean, Gulf of Aden	51	66	20 695	A (Available)
2	Aelita	UMOY	7	10.04.1974	05.10.1974	Mascarene Ridge, underwater shoals	51	17	3 634	A
3	Aelita	UMOY	8	27.10.1974	30.03.1975	Northwest Indian Ocean	51	1	250	A
4	Aelita	UMOY	12	10.10.1976	20.03.1977	Mozambique	51	6	1 125	A
5	Aelita	UMOY	13	02.04.1977	20.08.1977	Mozambique	51	21	5 375	A
6	Aelita	UMOY	14	10.05.1978	28.07.1978	Southwest Indian Ocean	51	35	14 650	A
7	Aelita	UMOY	16	31.10.1981	22.03.1982	Southwest Indian Ocean	51	4	2 000	A
8	Aelita	UMOY	17	10.04.1982	30.09.1982	Southwest Indian Ocean	51	2	725	N/A (Not Available)
9	Aelita	UMOY	19	10.04.1983	20.09.1983	Southeast Atlantic	47	3	1 000	A
10	Aelita	UMOY	21	05.11.1984	20.04.1985	Southwest Indian Ocean, 2 sets in Northwest Indian Ocean	51	50	21 925	A
11	Aelita	UMOY	22	25.06.1985	10.11.1985	Northwest Indian Ocean	51	37	15 655	A
12	Ariel	UMRV	1	18.03.1968	26.10.1968	Madagascar, Seychelles	51	52	25 050	A

[1] Probably incomplete
[2] Northwest Indian Ocean means area from 12°S to 10°N, from east coast of Africa to 70°E

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
13	Ariel	UMRV	2	18.08.1969	20.11.1969	Gulf of Aden	51	6	1 315	A
14	Ariel	UMRV	3	15.01.1970	19.05.1970	Gulf of Aden	51	30	8 650	A
15	Ariel	UMRV	4	04.08.1970	04.12.1970	Northwest Indian Ocean, Seychelles-Somalia area	51	64	25 080	A
16	Ariel	UMRV	5	05.02.1971	10.08.1971	Northwest Indian Ocean, Madagascar, Seychelles	51	89	44 420	A
17	Ariel	UMRV	7	18.10.1976	06.12.1976	Southwest Indian Ocean	51	17	4 240	A
18	Ariel	UMRV	8	26.02.1977	31.07.1977	Northwest Indian Ocean, Southwest Indian Ocean, Saya-de-Malha Bank	51	47	14 661	A
19	Ariel	UMRV	9	23.02.1978	19.05.1978	Southwest Indian Ocean, Saya-de-Malha Bank	51	18	7 400	A
20	Ariel	UMRV	10	04.07.1978	05.11.1978	Eastern Indian Ocean, Saya-de-Malha Bank	57	6	2 625	N/A
21	Ariel	UMRV	11	10.05.1979	20.10.1979	Gulf of Guinea	34	100	52 720	A
22	Ariel	UMRV	12	01.11.1979	29.02.1980	Western Sahara, Sierra Leone, Gulf of Guinea	34	72	46 610	A
23	Ariel	UMRV	13	23.04.1980	26.09.1980	Northwest Indian Ocean	51	61	30 005	A
24	Ariel	UMRV	14	27.04.1982	28.09.1982	Northwest Indian Ocean	51	55	26 030	A
25	Ariel	UMRV	15	10.12.1982	20.05.1983	Eastern Indian Ocean, Southeastern Indian Ocean	57	32	12 750	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
26	Ariel	UMRV	16	10.06.1983	20.11.1983	Eastern Indian Ocean, Southwest Indian Ocean, Northwest Indian Ocean	57	42	20 005	A
27	Ariel	UMRV	17	28.12.1983	20.05.1984	Northwest Indian Ocean	51	55	26 660	A
28	Ariel	UMRV	18	15.08.1984	25.12.1984	Northwest Indian Ocean	51	52	25 235	A
29	Ariel	UMRV	19	20.01.1985	15.06.1985	Northwest Indian Ocean	51	51	26 370	A
30	Ariel	UMRV	20	28.05.1986	21.07.1986	Northwest Indian Ocean	51	57	26 700	A
31	Chernomor	UPFA	1	15.07.1966	12.12.1966	Northwest Indian Ocean	51	73	30 500	A
32	Chernomor	UPFA	2	27.01.1967	25.05.1967	Northwest Indian Ocean	51	76	31 450	A
33	Chernomor	UPFA	3	26.01.1968	16.04.1968	Northwest Indian Ocean	51	64	20 560	A
34	Chernomor	UPFA	4	14.02.1969	18.05.1969	Northwest Indian Ocean	51	77	37 018	A
35	Chernomor	UPFA	5	22.01.1970	23.04.1970	Northwest Indian Ocean, Maldives, Chagos	51	96	45 398	A
36	Chernomor	UPFA	6	28.07.1970	20.12.1970	Northwest Indian Ocean, Madagascar, Seychelles	51	90	35 200	A
37	Chernomor	UPFA	7-I	02.11.1971	11.03.1972	Eastern Indian Ocean	57	47	25 545	A
38	Chernomor	UPFA	7-II	08.05.1972	12.10.1972	Eastern Indian Ocean	57	80	41 867	A
39	Chernomor	UPFA	8	30.10.1972	20.02.1973	Eastern Indian Ocean	57	59	30 660	A
40	Chernomor	UPFA	9	10.06.1976	20.11.1976	Eastern Indian Ocean	57	12	3 450	A
41	Chernomor	UPFA	10	20.01.1977	27.02.1977	Eastern Indian Ocean	57	13	3 675	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
42	Chernomor	UPFA	11	04.06.1977	19.09.1977	Northwest Indian Ocean, Eastern Indian Ocean, Saya-de-Malha Bank	51, 57	70	32 016	A
43	Chernomor	UPFA	12	28.10.1977	09.03.1978	Eastern Indian Ocean	57	44	20 231	A
44	Chernomor	UPFA	13	10.04.1978	20.09.1978	Madagascar, Saya-de-Malha Bank, Mauritius	51	51	24 125	A
45	Chernomor	UPFA	14	24.06.1980	07.11.1980	Northwest Indian Ocean	51	42	20 670	A
46	Chernomor	UPFA	15	07.12.1980	16.04.1981	Northwest Indian Ocean	51	65	31 165	A
47	Chernomor	UPFA	16	05.05.1981	20.11.1981	Northwest Indian Ocean	51	45	19 100	A
48	Ehstafeta Oktyabrya	UDUM	17	20.02.1979	10.04.1979	Kenia, Chagos	51	57	40 762	A
49	Golub Mira	UBIV	13	10.01.1977	10.06.1977	Southwest Indian Ocean, Saya-de-Malha	51	16	4 885	A
50	Golub Mira	UBIV	15	20.07.1978	10.01.1979	Northwest Indian Ocean, Saya-de-Malha	51	55	27 600	A
51	Golub Mira	UBIV	16	14.02.1979	10.06.1979	Southwest Indian Ocean, Saya-de-Malha	51	54	28 500	A
52	Golub Mira	UBIV	17	20.08.1979	10.12.1979	Northwest Indian Ocean	51	21	13 750	A
53	Kerchenskij Pioner	UPJJ	8	10.02.1972	20.07.1972	Southeast Atlantic	47	50	0	N/A
54	Kerchenskij Pioner	UPJJ	9	20.01.1973	10.06.1973	Northwest Indian Ocean, Eastern Central Atlantic,	51, 34,	24	0	N/A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
						Southeast Atlantic	47			
55	Kerchenskij Pioner	UPJJ	15	10.06.1977	20.11.1977	Eastern Central Atlantic	34	32	0	N/A
56	Kerchenskij Pioner	UPJJ	17	20.10.1979	10.03.1980	Northwest Indian Ocean	51	18	7 374	A
57	Kerchenskij Pioner	UPJJ	18	11.04.1980	12.09.1980	Chagos Archipelago	51	4	1 500	N/A
58	Kerchenskij Rabochij	UPMA	15	10.05.1977	20.10.1977	Northwest Indian Ocean	51	54	29 550	A
59	Kerchenskij Rabochij	UPMA	16	10.07.1978	20.12.1978	Northwest Indian Ocean	51	82	56 489	A
60	Kerchenskij Rabochij	UPMA	17	20.03.1979	12.04.1979	Northwest Indian Ocean, Chagos	51	64	36 624	A
61	Kerchenskij Rabochij	UPMA	18	17.07.1979	13.12.1979	Northwest Indian Ocean	51	26	13 580	A
62	Kerchenskij Rabochij	UPMA	21	10.01.1983	20.07.1983	Northwest Indian Ocean	51	50	29 750	A
63	Kerchenskij Rabochij	UPMA	22	10.09.1983	20.02.1984	Northwest Indian Ocean	51	67	33 570	A
64	Kerchenskij Rabochij	UPMA	23	10.09.1984	20.01.1985	Northwest Indian Ocean	51	59	23 100	A
65	Kerchenskij Rabochij	UPMA	24	10.02.1985	20.06.1985	Northwest Indian Ocean	51	19	8 750	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
66	Kerchenskij Rabochij	UPMA	25	10.08.1985	20.02.1986	Northwest Indian Ocean	51	59	28 250	A
67	Kerchenskij Rabochij	UPMA	26	10.03.1986	20.08.1986	Northwest Indian Ocean	51	46	21 528	A
68	Kometa Galleya	UZZE	5	04.04.1989	03.07.1989	Mozambique	51	39	13 868	A
69	Kontakt	UVSP	2	20.05.1964	10.10.1964	Red Sea, Gulf of Aden	51	33	?	A, input in progress
70	Krasnyj Luch	UYGK	0	30.04.1986	19.05.1986	Equatorial Atlantic	34	19	109 490	A
71	Marlin	UHMX	1	06.12.1964	21.04.1965	Red Sea, Gulf of Aden	51	12	2 160	A
72	Marlin	UHMX	2	15.06.1965	20.10.1965	Red Sea, Gulf of Aden	51	20	1 300	A
73	Marlin	UHMX	4	12.10.1966	14.03.1967	Gulf of Aden, Somalia	51	71	22 185	A
74	Marlin	UHMX	5	19.07.1967	25.01.1968	Gulf of Aden, Somalia	51	43	11 390	A
75	Marlin	UHMX	6	22.01.1968	02.07.1968	Gulf of Aden, Somalia	51	51	10 985	A, input in progress
76	Marlin	UHMX	7	20.02.1969	06.01.1970	Gulf of Aden	51	52	15 245	A
77	Marlin	UHMX	8	28.02.1971	12.11.1971	Mascarene Ridge, underwater shoals	51	124	33 105	A
78	Marlin	UHMX	9	26.06.1973	20.02.1974	Southwest Indian Ocean	51	10	2 500	A
79	Marlin	UHMX	10	01.03.1974	22.05.1974	Southwest Indian Ocean	51	2	500	A
80	Marlin	UHMX	11	08.06.1974	28.11.1974	Southwest Indian Ocean	51	2	1 000	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
81	Marlin	UHMX	14	01.05.1976	18.10.1976	Southwest Indian Ocean, Saya-de-Malha	51	19	3 900	A
82	Marlin	UHMX	15	14.04.1977	26.09.1977	Northweat Indian Ocean	51	56	26 331	A
83	Marlin	UHMX	16	10.10.1977	05.03.1978	Northweat Indian Ocean, Saya-de-Malha	51	72	36 973	A
84	Marlin	UHMX	17	19.04.1978	15.09.1978	Northweat Indian Ocean, Saya-de-Malha	51	64	39 428	A
85	Marlin	UHMX	18	08.11.1978	17.02.1979	Mascarene Ridge, Saya-de-Malha	51	82	65 695	A
86	Myslitel	ESDF	1	18.01.1969	01.04.1969	Pakistan	51	19	2 900	A
87	Myslitel	ESDF	2	04.06.1969	24.10.1969	Pakistan	51	57	22 050	A
88	Myslitel	ESDF	6	25.05.1973	07.09.1973	Seychelles-Mascarene Ridge, underwater shoals	51	8	2 185	A
89	Myslitel	ESDF	7	12.01.1974	01.02.1974	Seychelles-Mascarene Ridge, underwater shoals	51	15	6 345	A
90	Myslitel	ESDF	9	17.07.1975	25.12.1975	Southwest Indian Ocean	51	18	5 839	A
91	Myslitel	ESDF	10	01.12.1975	31.05.1976	Southwest Indian Ocean	51	16	4 403	A
92	Myslitel	ESDF	11	08.08.1976	20.10.1976	Eastern Indian Ocean, Sumatra-Java Area	57	46	23 360	A
93	Myslitel	ESDF	12	01.06.1977	30.11.1977	Eastern Indian Ocean, Sumatra-Java Area, Saya-de-Malha	57	53	40 818	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
94	Myslitel	ESDF	13	07.02.1978	23.02.1978	Southwest Indian Ocean	51	17	7 510	A
95	Myslitel	ESDF	14	15.07.1978	13.11.1978	Mozambique	51	46	21 850	A
96	Myslitel	ESDF	15	23.12.1978	01.06.1979	Eastern Indian Ocean, Sumatra-Java Area	57	46	43 480	A
97	Myslitel	ESDF	16	08.06.1980	08.10.1980	Northwest Indian Ocean	51	45	30 170	A
98	Myslitel	ESDF	17	01.11.1980	30.04.1981	Southwest Indian Ocean	51	33	15 815	A
99	Myslitel	ESDF	19	05.03.1983	29.10.1983	Southern Indian Ocean, Saya-de-Malha	51	4	875	A
100	Myslitel	ESDF	22	02.04.1985	08.05.1985	Northwest Indian Ocean	51	27	16 770	A
101	Myslitel	ESDF	23	27.07.1985	01.12.1985	Northwest Indian Ocean	51	31	15 450	A
102	Myslitel	ESDF	24	07.03.1986	29.05.1986	Eastern Central Atlantic	34	39	19 330	A
103	Neva	UIAA	0	14.10.1963	17.10.1963	Gulf of Aden	51	8	940	A
104	Nikolaj Reshetnyak	EWGC	12	19.10.1978	19.01.1979	Mozambique	51	43	38 020	A
105	Nikolaj Reshetnyak	EWGC	13	15.05.1979	07.09.1979	Mozambique	51	34	17 400	A
106	Nikolaj Reshetnyak	EWGC	20	02.12.1986	28.01.1987	Northwest Indian Ocean	51	35	16 764	A
107	Nikolaj Reshetnyak	EWGC	21	11.05.1987	10.06.1987	Northwest Indian Ocean, Mauritius	51	33	16 125	A
108	Nikolaj	EWGC	22	20.08.1987	20.01.1988	Madagascar	51	40	19 550	A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
	Reshetnyak									
109	Nikolaj Reshetnyak	EWGC	23	30.01.1988	02.06.1988	Northwest Indian Ocean	51	19	10 399	A
110	Nikolaj Sipyagin	UNQJ	16	16.04.1979	17.09.1979	Eastern Central Atlantic	34.	92	0	N/A
111	Nikolaj Sipyagin	UNQJ	17	09.10.1979	04.03.1980	Eastern Central Atlantic	34.	77	0	N/A
112	Pantikapej	UURM	3	14.09.1973	07.11.1973	Somalia	51	22	5 110	
113	Pantikapej	UURM	8	10.01.1977	10.07.1977	Southwest Indian Ocean	51	2	470	A
114	Pantikapej	UURM	9	27.06.1977	04.12.1977	Eastern Indian Ocean	57	37	23 229	A
115	Pantikapej	UURM	10	15.01.1978	05.06.1978	Eastern Indian Ocean, Northwest Indian Ocean	51, 57	60	32 230	A
116	Pantikapej	UURM	11	10.07.1978	20.12.1978	Eastern Indian Ocean, Saya-de-Malha	51, 57	36	17 830	A
117	Pantikapej	UURM	12	10.04.1980	20.09.1980	Northwest Indian Ocean	51	53	26 531	A
118	Pantikapej	UURM	13	10.10.1980	20.03.1981	Southwest Indian Ocean, Saya-de-Malha	51	57	29 750	A
119	Pantikapej	UURM	15	10.05.1983	15.10.1983	Southwest Indian Ocean	51	35	15 441	A
120	Primorets	ESLW	21	21.02.1987	28.05.1987	Northwest Indian Ocean	51	16	7 330	A
121	Primorets	ESLW	22	15.08.1987	27.12.1987	Northwest Indian Ocean	51	4	2 000	N/A
122	Slava Kerchi	UNQP	16	29.09.1979	25.02.1980	Northwest Indian Ocean	51	6	3 580	N/A

No	Vessel' name	Radio call sign	Cruise No	Cruise		Areas of research / fishing[2]	FAO area	Number of longline sets	Number of hooks	Logbooks availability
				Start	Finish					
123	Slava Kerchi	UNQP	25	10.11.1986	20.03.1987	Southwest Indian Ocean, Northwest Indian Ocean	51	9	4 150	A
124	Slava Kerchi	UNQP	26	05.04.1987	20.08.1987	Northwest Indian Ocean	51	7	3 500	A
125	Vladimir Vorob'ev	UBIO	1	22.10.1961	28.02.1962	Northwest Indian Ocean	51	4	660	A
126	Vladimir Vorob'ev	UBIO	2	20.07.1962	10.10.1962	Gulf of Aden	51	19	4 782	A
127	Vladimir Vorob'ev	UBIO	3	16.05.1963	23.01.1964	Gulf of Aden	51	4	1 200	A
128	Vladimir Vorob'ev	UBIO	4	20.07.1964	10.12.1964	Seychelles-Mascarene Ridge, Madagascar	51	17	3 400	N/A
129	Vladimir Vorob'ev	UBIO	8	20.02.1967	10.08.1967	Gulf of Aden, Somalia Oceanic waters	51	77	12 030	A
130	Zheleznyakov	UDUG	1	30.08.1970	14.04.1971	Somalia, Gulf of Aden	51	160	76 047	A
	Total		130					5306	2 435 425	

Table 2. Temporal distribution of YugNIRO longline research and scouting expeditions in the Indian and Atlantic Oceans

Year of operations	Total number of cruises	Number of sets in the database
1960	0	0
1961	1	1
1962	2	15
1963	1	4
1964	3	0
1965	1	17
1966	2	74
1967	3	196
1968	3	116
1969	5	231
1970	5	358
1971	3	231
1972	4	306
1973	4	61
1974	5	29
1975	2	18
1976	5	116
1977	13	433
1978	14	571
1979	12	510
1980	8	268
1981	2	157
1982	3	57
1983	7	224
1984	3	167
1985	6	282
1986	6	194
1987	5	108
1988	1	19
1989	1	39
1990	0	
Total	130	4802

Table 3. Number of fish analysed by principal species of groups of species in the database (Indian Ocean). Some species is grouped to genera level in this table.

Total species/taxa		**142**			
Species/group of species	Total	Non-empty stomachs	Size range		Length used
			Min	Max	
Total number of fish in the database	65494	29132			
Tuna (principal species)					
Thunnus albacares	21900	13935	44	194	FL
Thunnus obesus	7165	4402	49	200	FL
Thunnus alalunga	2987	1956	42	147	FL
Katsuwonus pelamis	723	327	40	92	FL
Billfish					
Xiphias gladius	458	193	38	391	LJFL
Istiophorus platypterus	1389	666	55	325	LJFL
Makaira indica	151	70	98	306	LJFL
Makaira mazara	383	175	121	360	LJFL
Makaira spp.	428	197	142	347	LJFL
Tetrapturus audax	430	219	85	314	LJFL
Tetrapturus angustirostris	38	21	85	177	LJFL
Sharks/rays (list of species not complete)					
Carcharhinus spp.	15402	835	50	305	FL
Isurus oxyrinchus	1057	307	70	342	FL
Isurus paucus	44	10	115	309	FL
Isurus spp.	157	51	89	280	FL
Dasyatis violacea	603	79	20	70	DW
Other fishes					
Alepisaurus ferox	3077	1223	39	203	FL
Alepisaurus brevirostris	44	30	47	99	FL
Alepisaurus spp.	15	3	57	114	FL
Coryphaena hippurus	440	190	44	180	FL
Acanthocybium solandri	300	101	72	175	FL
Scomberomorus all species	38	11	70	160	FL

Table 4. Oceanographic data associated with YugNIRO longline fisheries research in the Indian Ocean.

			Nansen Bottle					
Year	**MBT**	**Total casts**	**t°C**	**S**	**O2**	**PO4**	**SiO3**	**NO2**
1961	0	38	38	38	36	36	36	8
1962	0	136	136	136	136	136	136	97
1963	0	237	237	237	237	237	237	0
1964	497	238	238	238	238	238	238	0
1965	224	162	162	162	162	162	0	0
1966	459	109	109	109	109	109	0	0
1967	0	254	254	254	254	254	70	0
1968	359	174	174	174	174	174	115	0
1969	399	488	488	488	488	488	373	0
1970	1055	401	401	401	401	401	401	0
1971	135	138	138	138	138	138	138	0
1972	373	154	154	154	154	127	70	0
1973	247	169	169	169	169	169	0	0
1974	274	129	129	129	129	129	0	0
1975	0	0	0	0	0	0	0	0
1976	620	229	229	229	229	229	35	0
1977	1037	251	251	251	251	251	127	0
1978	1389	423	423	423	394	323	158	0
1979	786	198	198	198	198	153	0	0
1980	690	31	31	19	19	0	0	0
1981	956	3	3	0	0	0	0	0
1982	356	10	10	10	10	10	0	0
1983	921	83	83	83	83	0	0	0
1984	778	2	2	2	0	0	0	0
1985	1155	179	179	179	179	0	0	0
1986	877	219	219	219	59	51	0	0
1987	1666	79	79	79	79	0	0	0
1988	165	53	53	53	53	0	0	0
1989	217	81	81	81	81	81	81	0
1990	0	0	0	0	0	0	0	0
Total	15635	4668	4668	4653	4460	3896	2215	105

Appendix I

Description of the structure of longline surveys database

Structure for table: LL_F.DBF (Fishing operations)

	Field	Content	Type	Length	Decimal	Unit
1	CALL_LAT	Radio call sign	Character	5		XXXXX
2	CRUISE_NO	Cruise number	Numeric	2		99
3	NO_SET	Sequential number of LL set	Numeric	3		999
4	DATA	Date	Date	8		DD/MM/YYYY
5	LAT	Latitude at the position of longline set start	Character	6		99999A Degrees – 99 (two symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of latitude (N/S)
6	LONG	Longitude at the position of longline set start	Character	7		999999A Degrees – 999 (three symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of longitude (E/W)
7	LAT_SETE	Latitude at the position of longline set end	Character	6		99999A Degrees – 99 (two symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of latitude (N/S)
8	LONG_SETE	Longitude at the position of longline set end	Character	7		999999A Degrees – 999 (three symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of longitude (E/W)
9	LAT_HAUL	Latitude at the position of longline haul start	Character	6		99999A Degrees – 99 (two symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of latitude (N/S)
10	LONG_HAUL	Longitude at the position of longline haul start	Character	7		999999A Degrees – 999 (three symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of longitude (E/W)
11	LAT_HAULE	Latitude at the position of longline haul end	Character	6		99999A Degrees – 99 (two symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of latitude (N/S)

12	LONG_HAULE	Longitude at the position of longline haul end	Character	7		999999A Degrees – 999 (three symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of longitude (E/W)
13	BEG_SET	Start time of LL setting	Character	5		99.99 hours.minutes
14	END_SET	Finish time of LL setting	Character	5		99.99 hours.minutes
15	HAUL_DATE	Day of the start of hauling	Numeric	2		99 calendar day
16	BEG_HAUL	Start time of LL hauling	Character	5		99.99 hours.minutes
17	END_HAUL	Finish time of LL hauling	Character	5		99.99 hours.minutes
18	SET_COURSE	LL set direction	Character	3		999 degrees
19	DEPTH	Ocean depth	Numeric	4		9999 m
20	LEN_BUOYRP	Length of buoy ropes	Numeric	3		999 m
21	LEN_BASKET	Length of baskets	Numeric	3		999 m
22	LEN_HKLINE	Length of branchlines (includes branchline, konoyama, and sekiyama)	Numeric	2		99 m
23	NO_HOOK	Total number of hooks in the set	Numeric	4		9999
24	NO_BASKET	Total number of regular baskets	Numeric	4		9999
25	X1_BASKETS	Number of baskets set as regular LL (single baskets, 5 hooks per basket)	Numeric	3		999
26	X1_DEPTH1	Minimum hook depth for regular LL	Numeric	3		999 m
27	X1_DEPTH2	Maximum hook depth for regular LL	Numeric	3		999 m
28	X1_HOOKS	Number of hooks set in single baskets	Numeric	4		9999
29	X2_BASKETS	Number of baskets set as deep LL (double baskets, 10 hooks per basket)	Numeric	3		999
30	X2_DEPTH1	Minimum hook depth for deep LL	Numeric	3		999 m
31	X2_DEPTH2	Maximum hook depth for deep LL	Numeric	3		999 m

32	X2_HOOKS	Number of hooks set in double baskets	Numeric	4		9999
33	X3_BASKETS	Number of baskets set as highly deep LL (triple baskets, 15 hooks per basket)	Numeric	3		999
34	X3_DEPTH1	Minimum hook depth for highly deep LL	Numeric	3		999 m
35	X3_DEPTH2	Maximum hook depth for highly deep LL	Numeric	3		999 m
36	X3_HOOKS	Number of hooks set in triple baskets	Numeric	4		9999
37	OTHER	Comments	Memo	10		
38	CATCH_NO	Total catch in number of individuals	Numeric	3		999
39	CATCH	Total catch in weight	Numeric	7	1	99999.9 kg
40	BAIT_CODE1	Code of the bait 1	Character	8		Taxonomic code of the bait in accordance with VNIRO coding system (IPS), modified by YugNIRO
41	BAIT_CODE2	Code of the bait 2	Character	8		Taxonomic code of the bait in accordance with VNIRO coding system (IPS), modified by YugNIRO
	Total			190		

Structure for table: LL_W.DBF (Weather conditions)

	Field	Content	Type	Length	Decimal	Unit
1	DATA	Date	Date	8		DD/MM/YYYY
2	CALL_LAT	Radio call sign	Character	5		XXXXX
3	LAT	Latitude at the position of longline set start	Character	6		99999A Degrees – 99 (two symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of latitude (N/S)
4	LONG	Longitude at the position of longline set start	Character	7		999999A Degrees – 999 (three symbols), Minutes – 99 (two symbols), Tenths of minute – (one symbol), Sign of longitude (E/W)
5	BEG_SET	Start time of LL	Character	5		99.99 hours.minutes

		setting				
6	AIRT	Air temperature t°C	Character	4		99.9 Precision 0.1 degree
7	SST	Sea surface temperature t°C	Character	4		99.9 Precision 0.1 degree
8	T_SETDEPTH	Water temperature at the depth of set t°C	Character	4		99.9 Precision 0.1 degree
9	WINDDIR	Wind direction	Character	3		999 Degrees
10	WINDSTR	Wind strength	Character	4		Meters per second 99.9 Precision 0.1
11	WAVEDIR	Wave direction	Character	3		999 Degrees
12	WAVESTR	Wave strength	Character	1		Beaufort scale
13	CURRDIR	Surface current direction	Character	3		999 Degrees
14	CURRSPEED	Surface current speed	Character	2		Knots
15	CLOUD	Cloudiness	Character	2		Points (0-10)
16	OTHER	Comment	Memo	10		
	Total			72		

Structure for table: LL_C.DBF (Catch composition)

	Field	Content	Type	Length	Decimal	Unit
1	DATA	Date	Date	8		DD/MM/YYYY
3	CALL_LAT	Radio call sign	Character	5		XXXXX
4	NO_SET	No of LL set	Numeric	3		999
4	S_IPS	Code of the catch item	Character	8		Taxonomic code of the catch item in accordance with VNIRO coding system (IPS), modified by YugNIRO
5	CATCH	Total catch of this species	Numeric	8	3	9999.999 kg
6	NO	Total number of this species in the catch (non damaged individuals)	Numeric	3		999
7	NO_BITE	Total number of this species in the catch (individuals bitten by sharks, toothed whales, etc.)	Numeric	2	3	99
8	NO_ESCAPE	Total number of this species in the catch (individuals dropped from hooks dead or alive)	Numeric	2		99

9	OTHER		Memo	10		
	Total			49		

Structure for table: LL_AN.DBF (Biological analysis)

	Field	Content	Type	Length	Decimal	Unit
1	DATA	Date	Date	8		DD/MM/YYYY
2	CALL_LAT	Radio call sign	Character	5		XXXXX
3	NO_SET	Number of LL set	Numeric	3		999
4	S_IPS	Code of the catch item	Character	8		Taxonomic code of the catch item in accordance with VNIRO coding system (IPS), modified by YugNIRO
5	NO_FISH	Sequential number of the fish in analysis	Numeric	3		999
6	TL	Total length of fish	Numeric	5	1	999.9 cm
7	FL	Fork length	Numeric	5	1	999.9 cm
8	SL	Standard length	Numeric	5	1	999.9 cm
9	DL	Disk length (for rays)	Numeric	3		999 cm
10	LJFL	Lower jaw – fork length (for billfish)	Numeric	3		999 cm
11	EFL	Eye-fork length (for billfish)	Numeric	3		999 cm
12	EFL_F	Eye-fork length (from forward vertical of the eye to fork) (for billfish)	Numeric	4		9999 cm (were measured in some cruises)
13	TRL	Anal length (from lower jaw to anus)	Numeric	3		999 cm
14	DW	Total weight	Numeric	3		999 kg
15	TW	Gutted weight	Numeric	7	3	999.999 kg
16	SEX	Sex	Character	1		M-male, F-female, J-juvenal, B-all sexes, I-intersex
17	STAGE_MATU	Gonad maturity stage	Character	3		XXX Points of maturity scale (1-6)
18	GONAD_W	Gonads weight	Numeric	7	1	99999.9 g
19	STOMAC_FIL	Stomach fullness	Character	1		Points (0-4)
20	STOMAC_K	Bowels fullness	Character	1		Points (0-4)
21	FOOD_W	Weight of stomach content	Numeric	4		9999 g
22	LIVER_W	Liver weight	Numeric	4		9999 g
23	FOOD_CONT	Food components	Memo	10		Points (0-4)
23	HOOK_NO	Number of hook	Numeric	2		99

		within basket which caught fish				
24	DEPTH_H	Depth of hook which caught fish	Numeric	3		999 m
25	COND	State of fish	Character	1		A – alive, D – dead
26	DIGESTION	State of food digestion	Numeric	1		Points (1-5)
	Total			102		

Structure for table: LL_FOOD.DBF (Stomach content)

	Field	Content	Type	Length	Decimal	Unit
1	CALL_LAT	Radio call sign	Character	5		XXXXX
2	DATA	Date	Date	8		DD/MM/YYYY
3	NO_SET	Number of LL set	Numeric	3		999
4	S_IPS	Code of the catch item	Character	8		Taxonomic code of the catch item in accordance with VNIRO coding system (IPS), modified by YugNIRO
5	NO_FISH	Sequential number of the fish in analysis	Numeric	2		999
6	FI	Code of the prey item	Character	8		Taxonomic code of the catch item in accordance with VNIRO coding system (IPS), modified by YugNIRO
7	FI_WEIGHT	Weight of the prey item	Numeric	9	2	999999.99 g
8	VOL_PERC	Volume % of the prey item	Numeric	3		999
9	NO	Total number of the prey items	Numeric	4		9999
10	LENGTH_MIN	Minimal length of the prey items	Numeric	5		99999 mm
11	LENGTH_MAX	Maximal length of the prey items	Numeric	5		99999 mm
12	DIGEST	Degree of digestion	Numeric	1		9
13	WEIGHT_RES	Reconstituted ("restored") weight of the prey items	Numeric	6		999999 g

14	NO_RES	Reconstituted ("restored") number of the prey items	Numeric	4		9999
15	PROCES_TYP	Place of processing	Character	1		F – in the field, L – in the laboratory
16	COMMENTS		Memo	10		
18	PROCESSR	Name of person who identify and analyse prey item	Character	25		
	Total			108		

Structure for table: LL_SF.DBF (Size frequencies). This table usually not used, since for most of cruises all the catch was analysed and presented in the table LL_AN.DBF

	Field	Content	Type	Length	Decimal	Unit
1	CALL_LAT	Radio call sign	Character	5		XXXXX
3	DATA	Date	Date	8		DD/MM/YYYY
4	NO_SET	Number of LL set	Numeric	3		999
4	S_IPS	Code of the catch item	Character	8		Taxonomic code of the catch item in accordance with VNIRO coding system (IPS), modified by YugNIRO
5	SEX	Sex (M – male, F – female, J – juvenile, B – both sexes, S – when M & F already inputted but without weighting by size classes, i.e. S – is pooled data for M & F, with weighting by size classes	Character	1		
6	FLEN	Start length	Numeric	4	1	cm
7	INTL	Size class interval	Numeric	3	1	cm
8	AN_INCL	Is biological analysis included in the size frequency measurements?	Character	1		Y/N
9	SF_W	Total weight of the measured sample	Numeric	6		999999 g
10	SF_LEN	Code of	Character	4		XXXX

		measured size				
11	F1	Number of fish in size class	Numeric	3		999
12	F2	Number of fish in size class	Numeric	3		999
13	F3	Number of fish in size class	Numeric	3		999
…	…					
108	F98	Number of fish in size class	Numeric	3		999
109	F99	Number of fish in size class	Numeric	3		999
110	F100	Number of fish in size class	Numeric	3		999
111	W1	Weight of fish in size class	Numeric	5		99999 g
112	W2	Weight of fish in size class	Numeric	5		99999 g
113	W3	Weight of fish in size class	Numeric	5		99999 g
…	…					
209	W98	Weight of fish in size class	Numeric	5		99999 g
210	W99	Weight of fish in size class	Numeric	5		99999 g
211	W100	Weight of fish in size class	Numeric	5		99999 g

Appendix II

IOTC RESOLUTION 98/02 DATA CONFIDENTIALITY POLICY AND PROCEDURES

Recognizing the need for confidentiality at the commercial and organisational levels for data submitted to IOTC, the following policy and procedures on confidentiality of data will apply:

DATA SUBMITTED TO THE SECRETARIAT

The policy for releasing catch-and-effort and length-frequency data will be as follows:

• Catch-and-effort and length-frequency data grouped by 5° longitude by 5° latitude by month for longline and 1° longitude by 1° latitude by month for surface fisheries stratified by fishing nation are considered to be in the public domain, provided that the catch of no individual vessel can be identified within a time/area stratum. In cases when an individual vessel can be identified, the data will be aggregated by time, area or flag to preclude such identification, and will then be in the public domain.

• Catch-and-effort and length-frequency data grouped at a finer level of time-area stratification will only be released with written authorisation from the sources of the data. Each data release will require the specific permission of the Secretary.

a) A Working Party will specify the reasons for which the data are required.

b) Individuals requesting the data are required to provide a description of the research project, including the objectives, methodology and intentions for publication. Prior to publication, the manuscript should be cleared by the Secretary. The data are released only for use in the specified research project and the data must be destroyed upon completion of the project. However, with authorisation from the sources of the data, catch-and-effort and length-frequency data may be released for long-term usage for research purposes, and in such cases the data need not be destroyed.

c) The identity of individual vessels will be hidden in fine-level data unless the individual requesting this information can justify its necessity.

d) Both Working Parties and individuals requesting data shall provide a report of the results of the research project to IOTC for subsequent forwarding to the sources of the data.

PROCEDURES FOR THE SAFEGUARD OF RECORDS

Procedures for safeguarding records and databases will be as follows:

• Access to logbook-level information will be restricted to IOTC staff requiring these records for their official duties. Each staff member having access to these records will be required to sign an attestation recognising the restrictions on the use and disclosure of the information.

• Logbook records will be kept locked, under the specific responsibility of the Data Manager. These sheets will only be released to authorised IOTC personnel for the purpose of data input, editing or verification. Copies of these records will be authorised only for legitimate purposes and will be subjected to the same restrictions on access and storage as the originals.

• Databases will be encrypted to preclude access by unauthorised persons. Full access to the database will be restricted to the Data Manager and to senior IOTC staff requiring access to these data for official purposes, under the authority of the Secretary. Staff entrusted with data input, editing and verification will be provided with access to those functions and data sets required for their work.

DATA SUBMITTED TO WORKING PARTIES

• Data submitted to Working Parties will be retained by the Secretariat or made available for other analyses only with the permission of the source.

• The above rules of confidentiality will apply to all members of Working Parties.

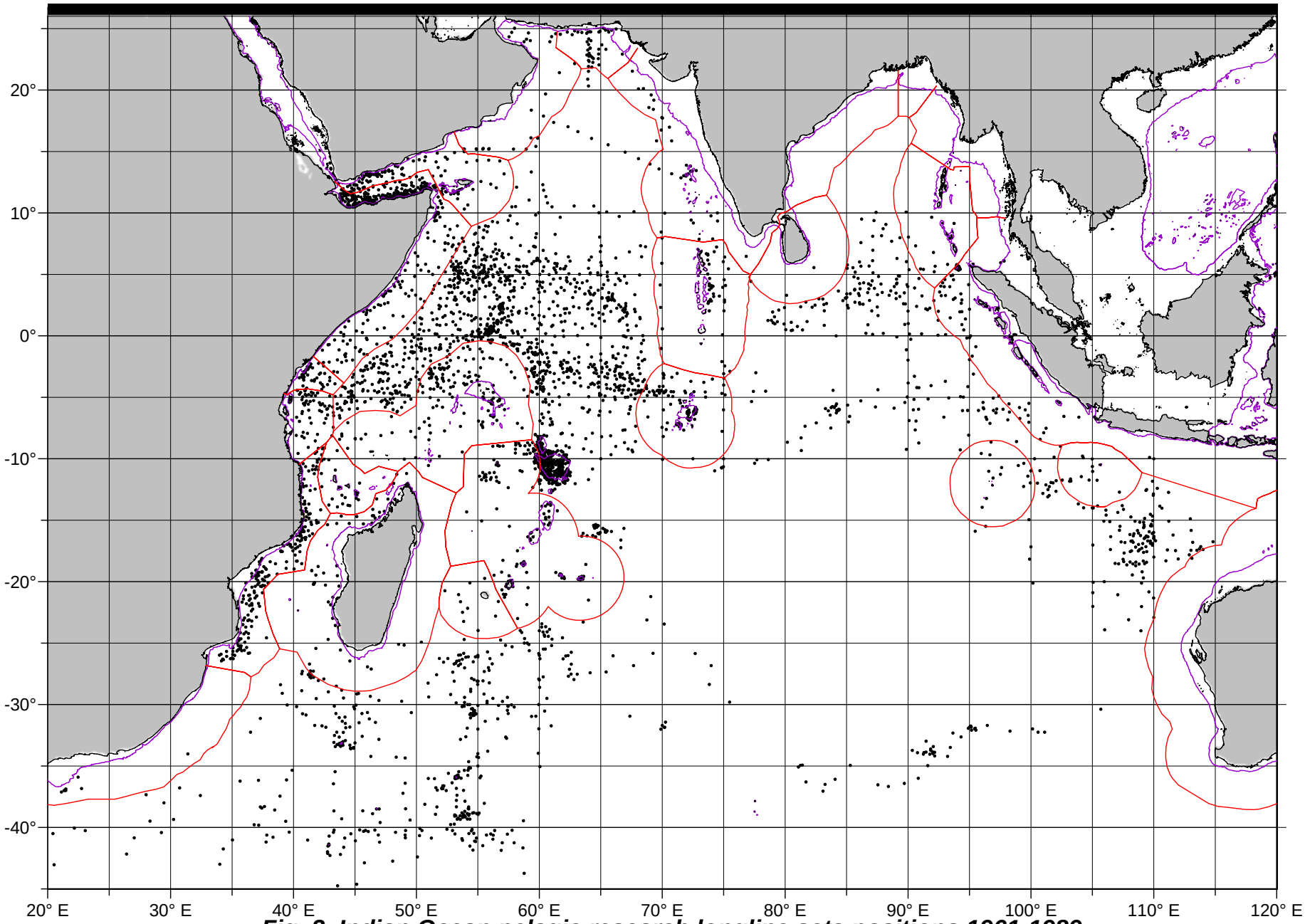

Fig. 2. Indian Ocean pelagic research longline sets positions 1961-1989

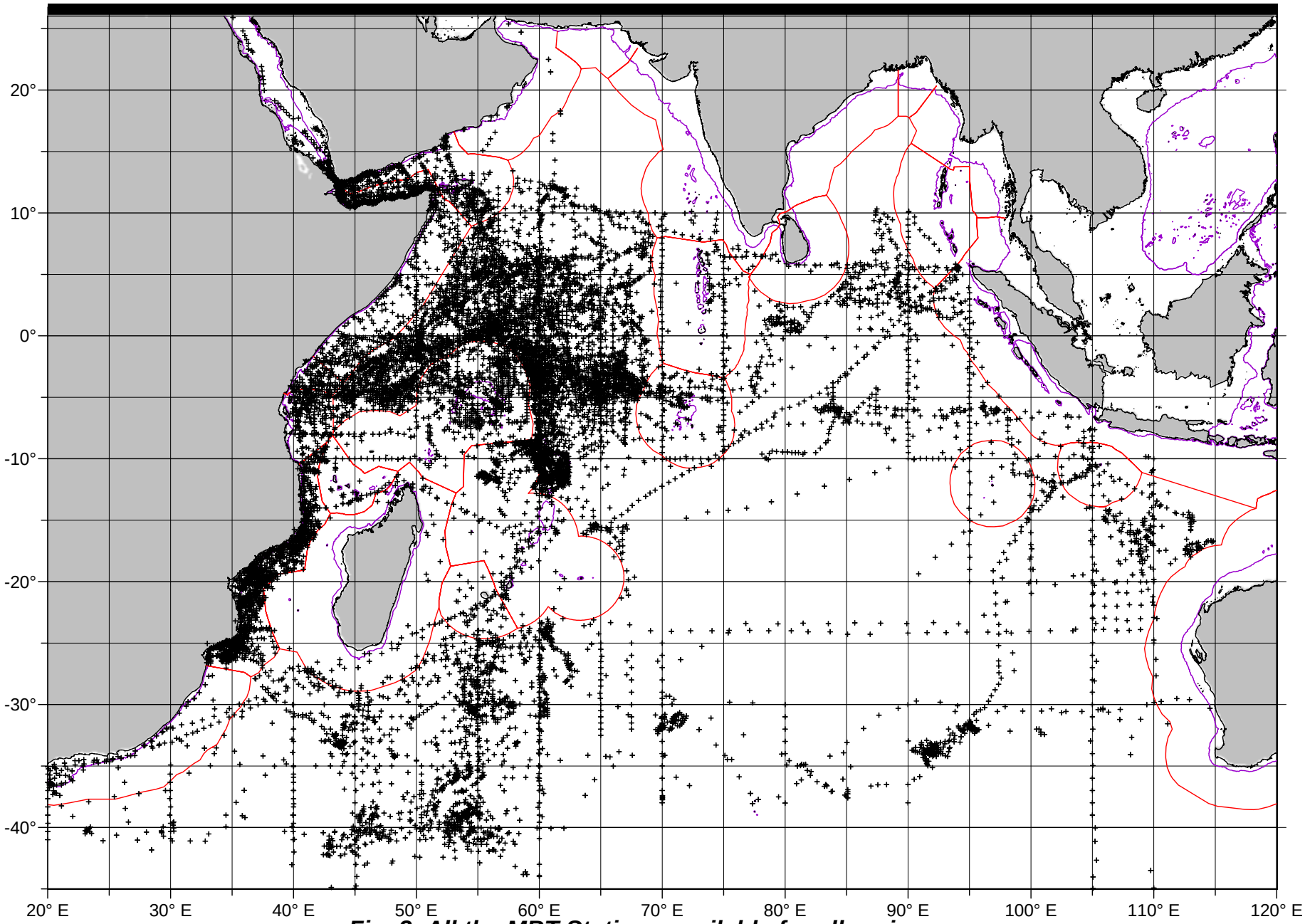

Fig. 3. All the MBT Stations available for all cruises

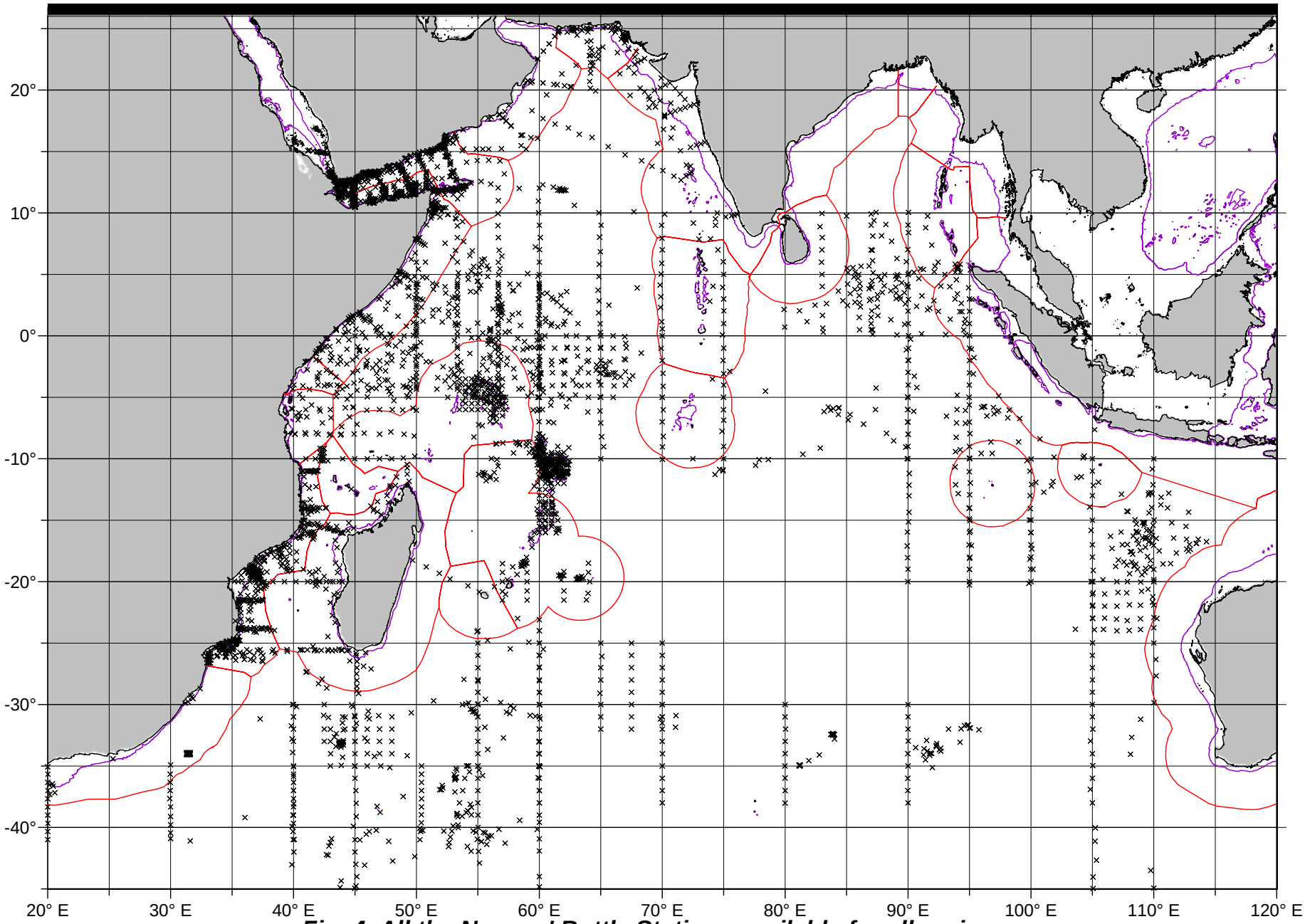

Fig. 4. All the Nansen' Bottle Stations available for all cruises