

ACTIVITIES OF THE ITALIAN HYDROGRAPHIC OFFICE

1937-1948.

The activities during the last ten years of the Italian Hydrographic Office may be grouped within three periods: The *First Period*, preceding the conflict, during which the survey of the whole coast of Italian Somaliland from Bender Ziada (frontier of British Somaliland) to the Ras Chiambone (frontier of Kenya) was carried out with, in addition, minor surveys for the purpose of correcting data concerning the home coasts of Italy. The *Second Period*, running from the declaration of war up till 1945, during which initiative-activities were reduced then almost completely stopped during the last years of the war. The *Third Period* (1946-1948) which is gradually bringing a renewal of effort, frustrated to a great extent, however, by economic difficulties and insufficiency of means.

First Period.

The "Hydrographic Review" of May, 1940 (Vol. XVII, No. 1), has already given certain details concerning the general organisation of the Somaliland commission, the land operations including astronomical determinations, geodetic and topographical surveys, coastal buoyage and terrestrial magnetism measurements.

In the present article, a summary of the operations at sea only will be given, these, in consequence of the meteorological conditions of the Indian Ocean, forming the chief preoccupation of the Italian Hydrographic Office; and as to the methods of carrying out which, particularly careful study and preparation were made.

The meteorology of the Eastern coasts of Somaliland is affected by the alternations of the monsoons which, as a general rule, have the following regime:—

N.-E. Monsoon : From mid-November to the end of March;

Spring Tangambili (period of calm) : From the beginning of April to mid-May;

S.-W. Monsoon : From mid-May to mid-October;

Autumn Tangambili : From mid-October to mid-November.

In the course of one year, therefore, a period of calm of from 60 to 80 days may be counted upon and if a few days of relative calm during the N.-E. monsoon be added, then it may be said that on the eastern coast boats may operate at sea 90 or 100 days each year.

For survey ships the period is longer since these can take soundings during a great part of the N.-E. monsoon also.

With the S.-W. monsoon, of much greater force than that from the N.-E., neither boats nor ships can operate on the east coast of Somaliland; however, sounding may be carried out along the northern coast, which is sheltered and calm in summer.

If it is borne in mind that the coasts of Italian Somaliland have a stretch of 2,400 kilometres (1300 miles), seven-eighths of which is washed by the Indian Ocean, that the anchorages are almost all open anchorages and consequently can be surveyed during calm periods only, it will become clear why for several years the Italian Office found itself harassed by problems of the means and time which would have been necessary to bring the enterprise to completion.

It was only when echo-sounders, and above all the models adapted for sounding from boats, made their appearance that it became possible to carry out the work within a reasonable time and with a not-too-excessive expenditure of means and energy.

The campaign planned for 1935 and adjourned in consequence of the Ethiopian war, was initiated on land in August 1937; and at sea in February, 1938, by the expedition of two surveying vessels: the "Cherso" and the "Magnaghi".

The principal object of this expedition was to conduct sounding operations

near the coast, over a band of about 3 miles width, and here such operations could only be carried out by means of the boats which, as has already been indicated, cannot work in the Indian Ocean for more than 90 or 100 days in the year. Various programmes, all of them subordinate to this principal necessity, were drawn up to meet the special circumstances.

Different types of sounding-boats adopted by other nations and to which attention had been drawn in the "Hydrographic Review", were considered; and as a result six new motor-boats, solid, having all requisite sea-going qualities and the sailing radius necessitated by the operation-site, were constructed; all were fitted with the Hughes "Universal" type ultrasonic sounding machine.

With regard to the working arrangements of the boats, it was admitted from the outset that they could not be distributed singly or in small groups along the coast, each of them being instructed to carry out the survey of a defined area, for the coast lacks shelters and the shore is inaccessible even in calm periods on account of bottom waves which swell on approaching the coast and form breakers.

Moreover, in view of the delicacy of ultrasonic sounding machines, it was deemed advisable to have the continuous help of a ship's workshop.

For the above reasons it was decided to detach one of the ships to lend help to the boats, making them operate in a single group close by the ship. The "Magnaghi" was chosen for this duty as she could embark all the six motor-boats.

So that the boats might use to the utmost advantage, for sounding, all their hours at sea and avoid long tracks to make the operation-area or return to the mother-ship, it was ruled that they should sound from rafts, along parallel lines, thus allowing all the boats to advance together and to cover the day's area at about the same time.

Two diagrams which, precisely, permitted such a method were adopted (fig. 1 and 2).

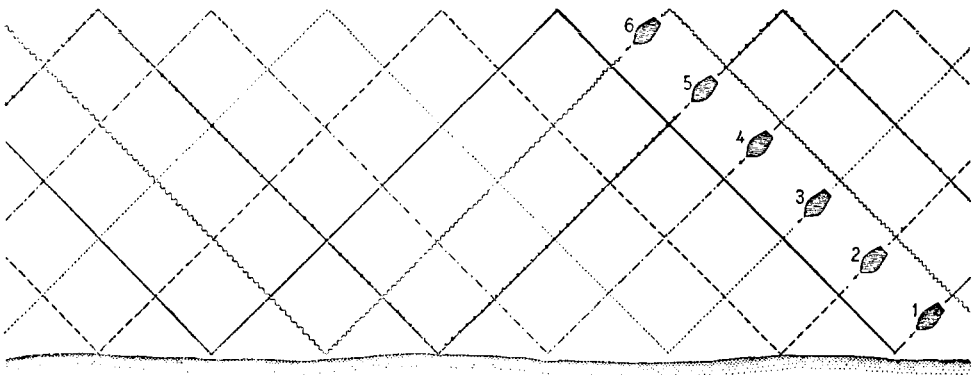


FIG. 1
Boats in "lattice" formation.
Distance between the lines : 1 cm. (0.4 inch) on the graphic.

The survey ship advanced while sounding a narrow band off the band assigned to the boats and within sight of them so that she might assist them when necessary and anchor, at the end of the day's operations, near the extremity of the daily area to be sounded.

Following this method, the boats worked with the maximum of speed and it was possible to take full advantage of the short periods of calm. On an average, the group of six boats and the "Magnaghi" progressed at a rate of 20 miles per day, sounding over a band of 3 miles' width.

In this way all the eastern coasts of Italian Somaliland were surveyed and 12 plans of anchorages executed, during only three periods of calm, corresponding to a little over one year, i.e. the periods of calm of Spring, 1938, of Autumn, 1938, and Spring, 1939; in May and June, 1938, the north coast was surveyed, including 4 roadsteads.

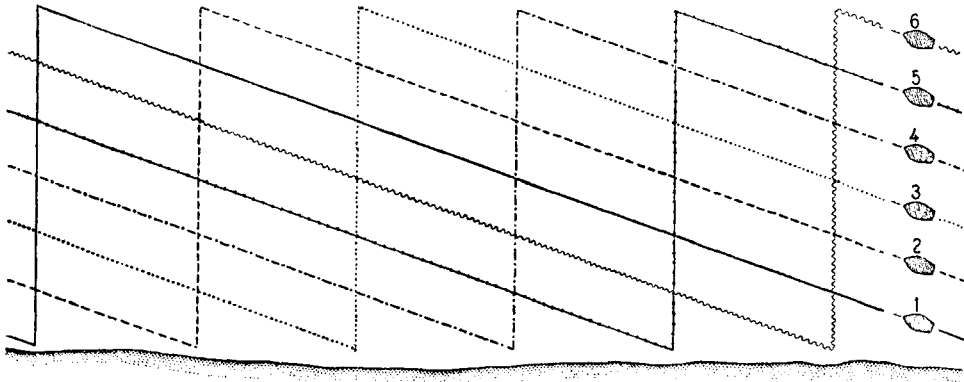


FIG. 2

Boats in mixed formation.

Distance between the lines perpendicular to the coast : 2 cm. (0.8 inch) on the graphic.

The working periods were as follows :—

SEASON	WORKING PERIOD	Working days	Days lost	Working days in roadsteads and shoals	Working days along coast	Length of band sounded in Nautical miles
Tangambili (Spring, 1938)	25th Feb.- 21st April	24	4	9	15	390
S.-W. Monsoon (Summer, 1938).....	22nd May- 5th June	15	—	3	12	160
Tangambili (Autumn, 1938)	21st Octob.- 25th Nov.	22	12	6	16	260
Tangambili (Spring, 1939)	24th March- 29th April	34	2	11	23	460

As will be seen, the total is 1270 miles of coast at scales varying between 1:40 000 and 1:60 000, in 66 working days, while 29 days were set apart for the survey of roadsteads and shoals at scales between 1:5 000 and 1:25 000.

The boats worked 95 days, 80 of these being along the coast of the Indian Ocean in periods of calm and 15 along the coast of the Gulf of Aden during the S.-W. monsoon.

Apart from the 3-mile band sounded by the boats and the “Magnaghi”, the second surveying vessel, the “Cherso”, carried out in 286 effective working days, 23,000 soundings placed by horizontal angle measurements, covering a band stretching from 3 miles offshore to about 40 miles in depths of 2,500, 3,000 and 3,500 metres (1370, 1640 and 1910 fathoms).

In addition to submarine surveying, the two ships also made oceanographic and meteorological observations which, although secondary to the necessities of sounding operations, nevertheless represent an interesting collation of data while not constituting a systematic research.

One hundred and seventy-five stations were made for current-measurements at various depths by means of the Ekman-Merz apparatus and the Italian Hydrographic Office model. Some interesting observations relative to surface currents were obtained either by the use of a floating apparatus or during ships' sounding operations along checked routes with position determined by angle measurements.

Two professors of the Italian Thalassographic Committee spent a few months on board the "Cherso" to study water-temperatures and the chemical composition of the waters, also to collect biological data.

Although incomplete, the data collated have given remarkable results and have confirmed the presence of a cold submarine current which, on reaching the coast, remounts to the surface. It was noted that this current gives rise to the presence of large cetaceans along the coast and to the possibility of finding ambergris on the Somaliland beaches, chiefly in the central part between Itala and Obbia.

This current is sometimes stopped by the monsoons and obliged to transpose its course at the surface, determining between Cape Guardafui and the Island of Socotra the well-known thermic anomalies which thus become sufficiently self-explanatory.

During the campaign, tidal measurements also were carried out in 8 places distributed along the coast, for durations exceeding 29 days; these are likely to provide the elements for the principal harmonic constants.

The places and duration of the registrations are as follows: Burgao, 2 months; Chisimaio, 6 months; Mogadiscio, 12 months; Obbia, 5 weeks; Eil, 1 month; Dante, 6 months; Alula, 3 months; Bender Cassim, 3 months.

Records of a few days' duration were made at several places on the coast either with tide-gauges or with tide-poles.

The tide is of a semi-diurnal character both in the Indian Ocean and in the Gulf of Aden and the amplitude is greatest at Burgao (M.H.W.S., 360 cm.), diminishing as one continues up towards the North to Dante (M.H.W.S., 143 cm.) to increase anew in the Gulf of Aden (at Bender Cassim, M.H.W.S., 237 cm.).

It was not possible to use the ordinary surface tide-gauges with float in making the tidal records because, being necessarily almost always installed in places open to the sea, they would have been incapable of giving correct indications. The Italian Hydrographic Office therefore gave its attention to the preliminary construction of submerged tide-gauges which functioned very well and gave very clear records for long durations of time.

The Somaliland mission lasted about two years for the land groups and 14 months for the survey ships and boats. It achieved the survey of the whole 2,400 km. (1,300 miles) of coast from Bender Ziada to Ras Chiambone to average scale of 1:50 000 and the 16 existing roadsteads to scales varying between 1:5 000 and 1:25 000.

By means of the surveys carried out the Italian Hydrographic Office was enabled to publish in the years 1940, 1941 and 1942, a series of charts which represent a complete hydrography of the Italian Somaliland coasts. The series includes:—

3 general charts to scale of.....	1:1 000 000
7 coastal charts —	1:300 000
1 special chart —	1:75 000
2 special charts —	1:60 000
16 plans of anchorages to scales between 1:10 000 and...	1:50 000

In 1939 the programme of permanent coastal buoyage was also in hand when the outbreak of hostilities caused its suspension.

While the Somaliland mission was being carried out, i. e. during the years 1937, 1938 and 1939, the Hydrographic Office was also pursuing in Italian home waters the programme of such surveys as could not be deferred and which the survey ships "Cariddi" and "Berta" were instructed to execute.

In 1937-38, the "Cariddi" worked firstly in Sardinia to bring up-to-date numerous plans of ports and examined the submarine prolongation of the emerged valleys lying on the Northern part of the island. Afterwards, in 1939, it proceeded to operate off the Ligurian, Tyrrhenian and Ionian coasts.

During the same years the "Berta" carried out a commission in the upper Adriatic to bring plans of ports up-to-date.

Also during this period the Italian Hydrographic Office continued the study and construction of a new terrestrial-induction type of instrument for the quick measurement of magnetic variation and inclination and of an instrument named the thermobatygraph capable of registering water temperature in terms of the depth.

In addition, data derived from magnetic observations at sea during hydrographic operations in Italian waters made by means of a non-magnetic raft, were examined and classified; and a chart of the isogonic lines of Italy and the adjacent seas for the year 1940 was thereafter constructed.

Second Period.

In consequence of the opening of hostilities, the activities of the Italian Hydrographic Office in the domain of surveying and scientific research were considerably reduced both from lack of means, for only one small ship, the "Cariddi", to which the ship "Palmaiola" was afterwards added, was left at its disposal, and on account of the necessities of war.

In spite of that, operations for bringing existing documents up-to-date were continued on the coasts of Liguria and Sicily until 1942, in which year, the two survey ships having been sunk, they came to an end.

Mention should be made of an interesting booklet published during this period which examines submarine navigation conditions in the Straits of Gibraltar, the Dardanelles, the Bosphorus and the Straits of Bab-el-Mandeb, the material for which was derived from numerous experiments made by Italian submarines having crossed those straits.

In 1942 the Italian Hydrographic Office was transferred to Montecatini on account of the bombardments of Genoa and after the armistice in 1943 was obliged by the German authorities to move to Stresa.

While, at Stresa, during the German occupation, the first care of the Hydrographic Office was to place in security its collection of plates and instruments (in which task it succeeded with but relatively light losses), at Tarenta efforts were being made to organise a branch office which might undertake such services as were indispensable to the Navy. e.g. Notices to Mariners, Charts Corrections, publication of Ephemerides.

Third Period.

In 1945, at the end of hostilities in Italy, a programme of all work which appeared indispensable from the fact of the condition of the Italian ports, partly destroyed by bombardments and become dangerous on account of the hundreds of vessels sunk in their waters, was at once drawn up.

The carrying out of the programme was begun in 1946, with means certainly insufficient for the task arising from the fact of the general conditions prevailing in the Navy and in the Country, partly also from lack of the survey ships destroyed during the war.

In 1946, the "Azio" began a general visit of the Italian ports so that the Sailing Directions might be brought up-to-date and the positions of dangers fixed and marked. At the same time two hydrographic commissions were detached to carry out work on land with similar ends in view.

The operations of the "Azio" and of the commissions continued in 1947 and 1948, and are still in hand.

In March, 1947, the "Azio" completed at Venice its inspection for bringing the Sailing Directions up-to-date and began a series of complete or partial surveys of ports for New Editions of nautical plans.

The "Azio" made a completely new survey of Port Marghera (Venice) and of part of the lagoon, afterwards making Tarenta where a total survey of the harbour was carried out. She then visited the ports of Otranta, Palermo, Amalfi, the secondary ports in the Gulf of Naples and those of Leghorn and La Spezia where partial surveys were made.

For their part, the two commissions had received instructions for the partial surveys in the ports of Cagliari, Obbia (in Sardinia), Palermo, Termini Imerese

and Augusta (in Sicily), Naples and La Spezia, which were duly carried out. A completely new survey was made of the Gulf of La Spezia, partly by a commission and partly by the "Azio".

Programme of Work Projected.

While with the scanty means available for the moment operations for the most urgent corrections and surveys are in hand, a programme of work for the next few years is also being drawn up, providing for a completely new survey of all the Italian coasts and adjacent seas.

The original surveys of the Italian coasts are of very ancient date when the restricted methods then available and the absence of echo-sounding machines limited systematic sounding to such depths only as interested surface navigation which alone was practised in those times; deep-sea sounding was rarely thought of.

The original offshore soundings of the Adriatic and the Ionian seas were carried out in 1867 and 1877; those of the coasts of the Tyrrhenian Sea and Sardinia, from 1878-1888 and those of Sicily in 1890, 1891 and 1892.

Moreover, a new survey has become of absolute necessity as a result of changes in sea-bottom which according to the first surveys show themselves chiefly in the Adriatic and in the mouths of rivers.

For several years the Italian Hydrographic Office had had in view a complete new survey of the Italian coasts and adjacent seas but had found this impossible because of the more urgent needs of the colonies which demanded new surveys.

The next few years will see this work undertaken, beginning with the present-day reduced means and speeding up operations as the increase of means and methods permits of it.

Just now a 1500-ton ship is being refitted as a surveying vessel which will be named "Magnaghi" and will replace the former ship of that name destroyed during the war.

Ten survey motor-boats are also being built to the same model as those used in Somaliland but altered and considerably improved as a result of acquired experience.

Meanwhile, until the new "Magnaghi" and the motor-boats are ready for service, a very important task, namely, the fixation of the trigonometrical points, is being accomplished.

Many of the old coastal trigonometrical points have disappeared in course of time; others were destroyed during the war. Others again, obtained from several transports of co-ordinates at different epochs and often by non-rigorous methods, are not sufficiently accurate.

In view of the new survey of all the coasts, the Italian Hydrographic Office has decided to fix a whole series of coastal points starting directly from the fundamental triangulation of Italy.

For this purpose a geodetic commission is already prepared and began work in April of this year from the French frontier.

The submarine survey was also initiated in Spring by the operations of the "Azio" in Liguria and during the next few years and with the new methods will cover the whole of the Tyrrhenian Sea continuing afterwards in Sardinia and Sicily, in the Ionian Sea and finally in the Adriatic.

These surveys will not be restricted to the coastal belt but will be made also at considerable distances from the shores with numerous deep-sea soundings which will provide scientists with ample data concerning the configuration of the seas surrounding Italy.

When this programme has been completed, the Italian Hydrographic Office will have accomplished its duty towards Navigation and Science. All the coasts placed under Italian jurisdiction, whether home or colonial, will have been surveyed in a way corresponding to the requirements of modern navigation. In addition, with the exception of part of the Eritrean colony the surveys of which are old but accurate, all the others will date from a period posterior to the first world-war.

