

INTERNATIONAL COOPERATION IN HYDROGRAPHY

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The earliest map known, which dates from the 7th or 6th Century BC shows the sea as a mighty river named 'Okeanus' encircling the land with Babylon at its centre.

Marinus of Tyre made the first gridded charts for seamen in the first century AD, centred on Rhodes the maritime focal point of the known world; whilst one hundred years later Ptolemy of Alexandria invented his conical projection which made it possible to represent a portion of the spherical earth and sea on a flat parchment.

With the Roman Empire began the long dark ages of cartography when no charts were made and Ptolemy was forgotten. It is about a thousand years later that we hear of sea charts, these being the workman-like 'portulan charts' drawn on vellum by the cartographers of the great maritime states of Venice and Genoa for the navigation of their merchant fleets.

Portulan charts are typified by the many compass roses set down upon them from which radiate the 16 'rhumbs' or directions which were derived from the prevailing winds of the Mediterranean, and which could be used by the pilot for setting courses at sea with a pair of compasses and a ruler.

Studying the early history of marine cartography one finds little cooperation between nations, but rather a changing pattern of leadership in chart-making dictated by the ascendancy of a number of nations in turn in the fields of marine trade and exploration.

Thus we see first the marine kingdom of Aragon in the 13th Century and then Portugal and Spain taking the lead as makers of the portulan chart in the 14th and 15th Centuries during their great days of exploration in the East and West respectively; whilst with the establishment of the Casa da Contrataçao in Seville and the Casa da India in Lisbon in the early 16th Century the world's first Hydrographic Offices may be said to have been established.

Although only a plane chart the Portuguese portulan chart reached a high technical standard and the charts drawn by Pedro and George REINEL are perhaps of outstanding merit.

In 1400 a Florentine patron of letters had found in Constantinople the long-lost works of Ptolemy which he had translated from the ancient Greek into Latin; after which for the next 100 years scholars from all over Europe came to make translations and disseminate in their own countries the works of Ptolemy including his second projection which became widely used. It was undoubtedly with Ptolemy's projection in mind, and aware of the difficulty that Portuguese navigators had in plotting ocean courses, that Mercator devised his now universal projection on which rhumb lines are straight lines and thereby solve the navigator's problems.

In the 17th Century the Netherlands, led by WAGHENAER, took the lead in chartmaking for the mariner which they held for over a hundred years, but these charts were still plane charts derived from the portulan chart and it was left for the French during their scientific renaissance under King Louis XIV to publish 'Le Neptune François' a magnificent atlas of seacharts of the world constructed on the Mercator projection for all the smaller scales. This standard was further enhanced by the publications of J.N. BELLIN, subsequent to the establishment of the French 'Dépôt des Cartes et Plans de la Marine' in 1720.

Great Britain took the lead in the publication of engraved charts subsequent to the establishment of its Hydrographic Office in 1795, and more particularly when its merchant fleets increased in size following the Napoleonic Wars; whilst in the sheer extent of their world-wide survey activities in the mid-nineteenth century the British were pre-eminent.

It was probably, however, the United States that took the first steps towards international cooperation in the latter half of the 19th Century. The United States was to be unique among nations for by 1835 there were established two charting agencies — the Navy 'Depot of Charts and Instruments' and the 'Coast Survey'.

During the Civil War many surveyors and draughtsmen were brought in from Europe and by the war's end the Coast Survey had made great advances in the standardisation of symbols and in colour printing. In 1866 the Naval 'Hydrographic Office' was established in the Octagon in Washington and photolithography was introduced. The rivalry between the two agencies seems to have given impetus to innovations which are reflected in the way that U.S. charts now began to improve upon those in Europe, particularly in the field of colour printing. Perhaps it was also because of these two national agencies that U.S. cartographers became conscious of the need for standardisation of symbols, type styles, borders and topography representation, a conviction they began to voice in the international field.

At the International Congress of Navigation in St. Petersburg in 1908 a resolution was passed to the effect that 'it would be advantageous if an International Conference of Seamen and Surveyors could be arranged with the object of introducing uniformity in conventional signs and abbreviations on charts, drawing up Sailing Directions, regulations for navigation and lighting and buoyage of coasts'.

But it was not until the International Maritime Conference of 1912, also held in St. Petersburg, that Ingénieur Hydrographe M.J.A. RENAUD, in

charge of the French Hydrographic Service, and Prince Albert of Monaco both pressed for the setting up of an international organisation devoted exclusively to the needs of hydrographers.

How World War I intervened and how RENAUD and the British Hydrographer, Rear Admiral Sir John PARRY, got together to arrange an international Hydrographic Conference in London in 1919; and how this led to the formation of the International Hydrographic Bureau on 21 June 1921, housed in Monaco at the request of Prince Albert, is all excellently told by one of the IHB Directors, Captain Vic MOITORET, in his admirable publication 'Fifty Years of Progress' and need not be repeated here.

The original membership of 20 or so Member States has risen over 50 years to the present 43, during which time the standardisation of chart symbols and styles, nomenclature and units of measurement has steadily moved forward, not only through the medium of the five-yearly conferences but also through the circular letters prepared by the Bureau, so that the 'Repertory of Technical Resolutions' has become the acceptable standard for the ever-increasing number of national hydrographic agencies who wish to compile their charts and navigational publications to a recognised and universally acceptable style.

Technical Resolution AI(I) — you can't give greater priority than that — was passed at the 1919 London Conference and decreed that 'as soon as convenient, heights and depths be shown in metres'. It took nearly 50 years before this resolution was accepted by the great majority of those nations who have traditionally continued using the fathom long after 'brazzas' had been set aside in favour of metres by the continental maritime countries. This sudden trend towards accepting the metre universally for showing heights and depths on charts was apparent at the 9th Conference of the IHB in 1967 and was recognised as the final major step on the long road towards standardisation, leaving the way ahead clear for some reduction in the tremendous load of chart compilation that so many Member States are now facing.

A Committee of six Member States (United Kingdom, Netherlands, Germany, U.S.A., Japan, and France) was set up under the chairmanship of the U.K. Hydrographer to study the possibility of developing a truly International Chart, commencing with the simplest case of the small scale passage and ocean charts.

You will all be aware of the two schemes, 1/10 000 000 and 1/3 500 000, which you have accepted and every chart of which has been 'adopted' by one of the Member States.

The progress of these International Charts is reported in the IHB's monthly bulletin and the present 'state of play' is shown on page 97 of the March 1972 number. It appears that we shall see at least 12 International Charts published in 1972 whilst three times this number are under compilation by Member States.

The Committee set out in detail all the specifications for these international charts, many of these the logical results of 50 years of standardisation by the Bureau staff, and I believe that the willing adoption of this

series by Member States must be very satisfying to the Bureau who will surely see here the fruits of many years' labours towards standardisation.

Turning to regional cooperation in hydrography, this began first in 1929 with the formation of the Scandinavian Hydrographic Union. At its meeting in Stockholm in 1948 it resolved to cooperate also in the exchange of information regarding research and technical details pertaining to hydrography, chart production and organisation. The Nordens Hydrografiske Forbund consists of Denmark, Finland, Norway, Sweden and Iceland, and meets annually.

In 1962 the growing hydrographic problems in the North Sea resulted in the formation of a second regional group, the North Sea Hydrographic Commission. At its first meeting in The Hague, Rear Admiral W. LANGERAAR, a prime mover in the formation of this commission, said in his welcoming speech that 'unless we are willing to run the risk that our charts and nautical documents may be called inadequate or obsolescent in the near future, we shall have to unite more than before, pool our resources, share our knowledge, exchange our data, cooperate in surveying and in general shall have to assist each other in many ways, without abandoning our independence, but of our own freewill born of the inescapable truth that navigation and its associated sciences progress at an uncomfortably accelerated speed'. The members of this commission include the Netherlands, Denmark, Germany, United Kingdom, Norway and Sweden, the latter also having a considerable interest in passage through the North Sea. As three of the members belong in the Northern Group the new commission has modelled its constitution and procedure on their experience.

At the first meeting neighbouring Hydrographic Offices agreed bilaterally on provisional limits of survey responsibility, recognising that with the increasing draught of many merchant vessels the whole of the North Sea, rather than the territorial waters only, now requires to be closely surveyed. The United Kingdom agreed to publish before each meeting a chart of the North Sea showing the progress of national and joint surveys and bottom searches. In the early years these were planned to cover areas where the deepest routes through the southern North Sea were to be found. Cooperation with IMCO will ensure that proposed routeing schemes are taken into consideration.

At the Commission's second meeting in Stockholm in 1963 the need for a modern co-tidal chart of the North Sea was recognised, if surveys far from land were to be adjusted to a realistic sounding datum; and the German Hydrographic Office accepted the responsibility of piloting this work which relies on all modern tidal data including observations from oil rigs. This work has now been completed.

At the sixth meeting in Oslo in May 1970 a momentous step was taken when it was decided to go ahead with a limited scheme of international charts for the North Sea. A small study group was set up, a scheme has been accepted, and work has begun. There will be one chart of the North Sea on a scale of 1/1 500 000, with a larger scale cover in three sheets on the scale of 1/750 000. Norway will produce the small scale sheet (INT 140), abandoning two of her newest charts when she has done so; Denmark,

U.K. and Netherlands will produce the three larger scale sheets INT 1401, 1402 and 1403 respectively.

Thus the International Chart is moving into larger scales; there will be more corrections and other difficulties than on the smaller scales but the experience will pave the way for international charts on the largest scales. Some hydrographers regard these as likely to pay the biggest dividends in reduced compilation if the 'copying' nations could instead become the 'printer' nations.

Some idea of the close cooperation in hydrographic work in the southern North Sea may be gained from a glance at recent interlocking surveys carried out by the Netherlands and U.K. Hydrographers in that vital shallow area through which Very Large Crude Carriers (VLCCs) have to pass on their 11 000-mile voyage from the Persian Gulf to North West Europe.

The Hi-Fix stations are situated in both the Netherlands and the U.K. to give adequate fixing cover. In fact the siting of electronic stations by one Member State on the territory of another as encouraged in Technical Resolution J 13 in order to provide suitable fixing cover for a survey is a most useful form of cooperation and many examples could be quoted, such as the siting of the U.K.'s 2-range Decca stations in Southern Spain in 1964-1966 for a survey of the western approaches to the Strait of Gibraltar, or the siting of French Toran stations in Cornwall and the Scilly Isles in 1968-1971 for a survey of the western approaches to the Channel.

Perhaps, however, the greatest unilateral contribution to ocean surveying must be the provision by the United States of America of Transit Satellite and Loran C transmissions for any nation which cares to fit its surveying vessels with suitable recorders. Such systems now give surveying accuracy over vast areas of the world's oceans and thus open up almost limitless possibilities.

In April 1971 an East Asian Hydrographic Commission was set up, with seven members — Burma, China, Indonesia, Japan, Korea, Philippines and Thailand — the initial meeting being held in Tokyo with the Japanese Hydrographer in the chair. All three of these regional commissions operate within the framework of the International Hydrographic Organization, and a Director represents the Bureau at the regional meetings.

VLCCs bound from the Persian Gulf on another 11 000-mile voyage to Japan also have a critical shallow area to pass through in the Malacca and Singapore Straits and here also we find increasing international cooperation in the hydrographic field, and an outstanding example in the recent joint survey of the Main Strait and Phillip Channel carried out by two four-nation teams from Indonesia, Japan, Malaysia and Singapore, operating from the Republic of Indonesia's Survey Ships *Burudjulasad* and *Jalanidhi* with their sounding boats and the survey launch *Aries*.

The area was closely surveyed and examined using Hi-Fix cover. The final processing of the data was carried out by a joint four-nation team in Japan in the early months of 1971 with a final meeting in Tokyo in April 1971.

The published report of this joint hydrographic survey is a model for future cooperation in the hydrographic field both in planning and in the operational stages. Such joint operations are the logical outcome of area cooperative developments, and made possible by the standardisation of the principles and the oiling of the wheels of cooperation provided by the International Hydrographic Bureau under its President and two Directors whose job, as I see it, is to foster in every way possible the growth of international cooperation in our business of surveying the world's oceans.