

THE FRENCH STATE AND NAUTICAL CARTOGRAPHY

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Abstract

The following paper was presented as the inaugural address at the 12th International Congress of Cartography (Paris, 7-10 September 1987).

It opens with general views on the connections between the nautical chart and the Administration, then gives a general idea of the strong relationship in France between the State and nautical cartography before concluding with the main reasons for the continued existence of this connection.

NAUTICAL CHART AND ADMINISTRATION

The nautical chart and the Administration in general have numerous and obvious connections. Without proposing to classify them, one may mention the following major themes which, in different ways, illustrate these relationships.

Communication, in its strict sense of a 'channel of communication' as well as in the wider and more figurative one of 'exchanges between men', represents a kind of power. The nautical chart is, above all else, a medium of communication (in the sense of 'communication channel'). It records discoveries and sums up the geographical knowledge of the time with a specific aim of communication. The nautical chart is also the proof of communication in its widest sense of 'exchanges'. Whilst showing, at a given time, geopolitical knowledge, it allows one to follow the evolution of a moving world and acts as a privileged medium for other types of communication such as economy, strategy and diplomacy. In addition, reciprocally, the preparation for war and the gaining of wealth have always been the driving forces for research in nautical cartography.

Another aspect showing that a powerful Administration underlies each nautical cartographic project to some extent, is the importance of the human and financial means needed. We shall come back to it later but right now we would

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FIG. 1. — Chart of 'Nouvelle France', by Jean Baptiste Louis Franquelin, 1688. As 'géographe du roi' and 'maître d'hydrographie pour le roi à Québec', Franquelin officially taught hydrography in Quebec during the last quarter of the 17th century. This prestige chart of Northern America is the result of sixteen years of field work and data acquisition.

like to stress the particular aspect of the scientific and technical investment in nautical cartography. The under-exploitation of information concerning the Pacific until the problem of longitude could be solved, as well as the necessity to know the earth's radius in order to make the most of the reckoning instruments (hourglass, compass, log), show how much advances in cartography depend on physics and geophysics. The scientific and technical discoveries and, above all, their implementation, were very often laborious (about one century). This was the case with the Mercator projection (discovered in 1569 and put into practice during the second half of the 17th century), the reflection instruments (1620, Davis quadrant; 1731, Hadley quadrant), and the determination of longitude (1714, Act of the British Parliament; 1770, solution to the problem). Advances in nautical charting have always been supported by strong patronage or by official scientific institutions (Académie des Sciences, Royal Society, Observatoire de Paris, Académie de Marine, Bureau des Longitudes, etc.) which widely covered the field situated beyond the nautical chart itself.

A third aspect expressing the relationships between the Administration and the nautical chart is precisely the power of the nautical chart itself. The ancient nautical chart is an almost magical product which permits the owner to dream and to intimidate the enemy. It is substantially more persuasive than the written documents, because it amounts, in a way, to a title deed of the charted space. Nothing is neglected which can draw attention and improve its appearance: moreover the precious information it gathers, justifies an artistic and meticulous presentation. Its decoration, whether symbolic or thematic, is always inspired by its content.

Blowing cherubs symbolizing winds, navigation instruments (compasses, armillary sphere); crests, coats of arms, flags; marine monsters; coloured insets representing isometric views of ports; scenes portraying local life and production; ships and naval battles: all these themes may be embroidered upon *ad infinitum* so as to obtain, together with a page lay-out that is pleasant to the eyes, the desired transmission of the message.

HIGHLIGHTS OF THE ASSOCIATION STATE/NAUTICAL CARTOGRAPHY IN FRANCE

The Dieppe School

The first example of the strong relationship between the State and marine cartography in France is given by the Dieppe School. At the end of the 15th century, Dieppe established a private hydrographic school of great fame. The Dieppe pilots brought back from their distant expeditions to Brazil, Canada, Spitzbergen, information which a priest, named Pierre Desceliers (1487-1553), put into a format for practical instruction. Probably the holder of a Royal Commission for providing certificates of competency to navigators, he was, in fact, the first author of marine charts in France and the founder of French hydrography. The Dieppe School provided the French Royal Navy of the time with its best pilots and

cartographers — such as Jean Cossin, with his original sinusoidal projection, Guillaume Levasseur, promoter in France of the 'reduced chart' established on a model of meridional parts, Jean Guérard, commissioner for the examination of pilots. The contribution of the Dieppe School to marine cartography was very active and original and was generously sustained by the political State.

The 'Neptune français' (1693-1773) and the beginnings of the Hydrographic Service

The 'Neptune français'

The continuity of the Dieppe School's hydrographic ability was ensured by a dynasty of priests following after Desceliers. Under the administration of the Cardinal de Richelieu, some 'engineers' chosen mainly from the inhabitants of Dieppe, were officially instructed to survey the French coasts. Colbert included hydrography in the immense effort which he deployed in reorganizing the Navy. In 1661, his department assumed the responsibility for the 'Ecole d'hydrographie de Dieppe' and established similar schools in other ports to which pilots from Dieppe swarmed.

To attain his objective, which was the expansion of France, Colbert created the 'Académie des Sciences' in 1666 and instructed surveyors and architects to carry out maritime work as well as coastal surveys. Thus, during the 1670s, the first hydrographic surveys along the coasts of France, Spain and Italy took place.

In 1689, these surveys were discontinued; their work was compiled and published in 1693 in an atlas entitled: "'Neptune français' or New Atlas of charts surveyed and engraved by explicit order of the King for the use of H.M. Naval Forces, showing the correct description of all the coasts of the Atlantic and the Baltic Sea from Norway to the Straits of Gibraltar" (*).

A Dutch forgery of the 'Neptune', published the very same year of its issue, attests to its popularity among seamen. The career of the Neptune was a long one: it was republished in 1753 and again, for the last time, in 1773.

The origins of the French Hydrographic Service

In Colbert's time, in 1680, the first archives of the Navy (the 'cartes et plans du roi') were entrusted to Pène. Forty years later, on 20 November 1720, the 'Conseil de la Marine' asked a captain, the Knight de Luynes, to set apart the documents of the navy and colonies with a view to creating the 'Dépôt général des cartes et plans, journaux et mémoires concernant la navigation' which, in 1886, was to become the 'Service hydrographique de la Marine'. At the 'Dépôt', the military directors were assisted by engineers and the first one attached to this body was Bellin. At the time, the staff of the Dépôt compiled charts

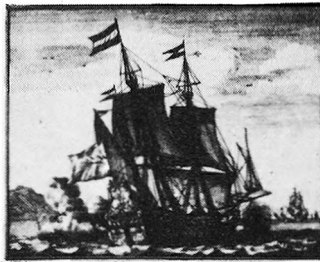
(*) The charts of the French coasts were produced at a scale of about 1/100,000; they benefitted from the astronomical control ordered by Cassini.

L E
NEPTUNE FRANCOIS,
 O U
A T L A S N O U V E A U
 D E S
C A R T E S M A R I N E S.
 LEVEES ET GRAVÉES PAR ORDRE EXPRÉS DU ROY.
 POUR L'USAGE DE SES ARMÉES DE MER.

Dans lequel on voit la description exacte de toutes les Côtes de la Mer Oceane, & de la Mer Baltique, depuis la Norwege juiques au Detroit de Gibraltar. Ou font exactement marquées les routes qu'il faut tenir, les Bancs de sables, Rochers & Brulés d'eau; & generalement tout ce qui concerne la Navigation.

Le tout fait sur les observations & l'experience des plus habiles Ingenieurs & Pilotes.

Reveu & mis en ordre par les Sieurs PENE, CASSINI & autres.



A PARIS,

Chez HUBERT JAILLLOT aux deux Globes.

M. DC. LXXXIII.
 AVEC PRIVILEGE DU ROY

FIG. 2. — 'Neptune français', flyleaf, 1693.

based on information from log books and mariners' observations without ever working themselves in the field. On Bellin's death, in 1772, Jean Nicolas Buache, Geographer to the King like his uncle Philippe Buache, took over. He was admitted to the Academy of Sciences and had his cousin Beautemps-Beaupré taken on at the Dépôt, in 1785.

The State control of the Hydrographic Service appears clearly in this short historical reminder. It was reaffirmed several times, in particular in the 'Arrêt du



FIG. 3. — Survey sheet of the Scheldt river mouth (extract), by Beautemps-Beaupré, 1800.

Conseil du Roi' of October 5, 1773 'prohibiting the drawing up and publication of nautical charts by individuals not duly commissioned to do so' and stating: 'His Majesty in Council has ordered and orders that, in future, all nautical charts, portulans and instructions necessary to the pilotage of vessels of the kingdom, whether war vessels or merchant ships, be exclusively compiled, drawn up and published in His Majesty's Dépôt by persons able to carry out the task competently'.

The Navy made sure that good quality information, not originating from its vessels, was directed to the Dépôt. Thus, d'Après de Maneville, responsible from February 10, 1762 for the nautical documents of the 'Compagnie des Indes' stored in Lorient, was placed under the direction of the harbour master of that port. The State was rightly concerned about this important sector of the French economy: since Colbert's time, this depended on trade and manufactures whose suppliers, as well as the main trading centres, were in overseas territories, side by side with the British ones. So, with the establishment of the Hydrographic Service, the long tradition of State supervision over nautical cartography takes shape, extends and becomes a strict monopoly of an official nature.

Origin and development of modern hydrography: from Beautemps-Beaupré to the present day

The end of the 18th century marked an important turn in the development of hydrography and nautical charting because:

1. The widening of geographical horizons allowed a general mapping of the Earth to be made, thanks to the great scientific explorations;
2. The crucial problem of determining geographical positions was finally overcome;
3. There was a progressive transition from compiling log books (a delightful task for office geographers!) to more or less systematic surveying.

In France, Beautemps-Beaupré played a vital part in this development. He participated in the campaign of d'Entrecasteaux which gave him a chance to test a consistent and totally new method of hydrographic surveying. This method is of direct relevance to the relationship between the State and cartography since nautical cartography was henceforth based on an active collection of field data rather than on compilation. It was thus bound to increase cartographic activities considerably, and this is what happened. The programmes in which, henceforth, cartography was very often coupled with hydrography, would take too much time to explain in details, yet, some general ideas can easily be singled out:

1. The leading personality of Beautemps-Beaupré who won fame in areas as different as the North Sea, the Adriatic, the Baltic and who established a personal relationship with the Emperor, before being entrusted, by Louis XVIII, with the responsibility for systematically surveying the North and West coasts of France.
2. The continuation of important circumnavigation voyages until the middle of the 19th century, which promoted the creation of a world series of nautical charts.

3. The particularly outstanding phenomenon of the birth and development of colonial hydrography, which very often emerged following the conquests. It resulted in an original cartography which virtually remained in force after the independence of these countries. It is a concrete example of the State/cartography association.
4. The important technical advances in hydrography promoting the collection of data at sea but contributing to the saturation of the cartographic capability.

The essential part of the surveys carried out produced an 'original' charting which is the basis of the French chart series. To supplement and adapt it to civilian and military needs, the Hydrographic Office always resorted to the compilation of foreign charts and, very recently, to the agreements on fac-simile reproduction of foreign charts. Finally, the 'International Chart' was established in 1972 under the patronage of the International Hydrographic Bureau.

The French series of charts, which was progressively built up from 1800 onwards by accumulating publications (part of which became editions), reached a world cover and an asymptotic number of about 3,000 charts around 1875. This was the time of both the peak of productivity (about 100 publications annually) and the apogee of the copper engraving technique. From then on, the series inexorably grew old: the average age of the publications increased from 18 years in 1880 to 62 years in 1970 and the productivity decreased to twenty publications a year. The reasons for the obsolescence are easy to single out. In the first phase (till World War 1), bathymetric information was limited and the need to update was reduced. Recently (since World War 2), the multiplication of systematic surveying resulted in a profusion of charts and created insoluble problems of updating. A reduction of the chart series was a requirement (2,000 charts in 1970, 1,500 charts in 1987) at a time when an 'International Chart' programme was slowly being developed and will, in the long term, permit countries to limit their cartographic efforts to the areas of their sovereignty. This prospect seems compatible with the maritime ambitions of a country such as France. The reproduction of standardized international charts with a consistent scheme forecasts a better future for cartographers whose efforts are now directed to the systematic use of automation and to a more flexible product, better suited to a large variety of users: the electronic chart. To sum up, the cartographic crisis is about to be overcome.

CONCLUSION

From the foregoing, the following conclusions can be drawn:

1. From the beginning of time, maritime expeditions sought to discover and take possession of new territories, then to exploit their resources for the benefit of the financing State (the 'explore in order to dominate' technique). Knowledge of the ocean is, primarily, a matter for the concern of territorial sovereignty and for the command of maritime routes which developed thanks to the mastering of the technical sciences related to navigation: positioning, bathy-

metry, tides and currents, cartography. The nautical chart, as the final product, symbolizes this knowledge.

2. The effective or legitimate monopoly of the State in the field of nautical cartography is based, first, on the requirement for quality, directly related to the navigator's need for security. This requirement goes beyond that of data collecting which is the hydrographic survey itself. Now, hydrographic surveying operations are costly and involve important investments in staff as well as in equipment. Moreover, although being completely distinct (the former take place on board ship and the latter at shore-based offices) the surveying and chart making operations are closely related and it is hardly conceivable that the body responsible for drawing up a chart should not also be responsible for the corresponding hydrographic survey. The nautical chart is the result of an acquisition and data processing chain including the hydrographic survey: this process is too costly to be self financed (*). Thus, all hydrographic services are public services under State control. Since we emphasized the quality criterion, it would do well to define the limits of hydrographers' responsibility in this field. They have to make the best use of the funds allocated to them as well as to carry out surveys and compile charts according to the rule book. However, they cannot be held responsible for changes of which they might not have been aware. Their duty is to communicate to navigators, promptly and in the appropriate format, all the information received concerning their security. Any mistake in that field directly involves the responsibility of the State.
3. The fulfilment of military requirements as regards nautical cartography reinforces the appropriateness of State intervention in this field but it does not justify it on its own. From that point of view, two types of hydrographic services can be distinguished: military services (this is the case in France), which cover both civilian and military needs, and civilian services, in which case the Defence Departments have to meet the specifically military requirements.
4. As for the legal aspects, nautical charts produced by the hydrographic services are official documents involving the responsibility of the State, as we mentioned before. It is difficult to conceive of private producers of nautical charts facing the financial consequences of an omission or an error resulting in a wreck. Yet, some nautical charts are produced by private publishers. Their main characteristics are the following: (1) The bulk of their information comes from official nautical charts and, consequently, their cost of production is a marginal one; thus (2) their only originality is their presentation adapted to a profitable clientele (yachtmen in general) as well as a non-professional one (hence a symbolism accounting for easier decoding than with the conventional chart) and, (3) they do not involve their authors' responsibility and are difficult to keep updated.

(*) In 1985, the cost of SHOM's hydrographic surveys amounted to 84.5 MF and the cost of cartography to 18 MF, i.e. a total of 102.5 MF. The proceeds from the sale of charts was 7.5 MF, i.e. only 7.3% of the total outlay.

5. The unilateral development of the hold of States over their maritime front led the United Nations Organization to review the Geneva (1958) and London (1964) Conventions with respect to the Law of the Sea. The new Convention (1982), which followed the 3rd Law of the Sea Conference, made official the breadth of the territorial sea (12 miles), clarified the concepts of contiguous zones, economic zones and exclusive fishing zones, and limited to 200 miles the breadth of the EEZ. The EEZ concept implies the sovereign rights of the coastal State over the resources of the sea bed, its sub-soil and the super-jacent waters. The development of the mineral or living resources, whether renewable or not, in the EEZ as well as in the territorial sea, depends in the first place on hydrographic surveying (bathymetry, type of bottom, tides, currents), the result of which is the nautical chart and its associated documents. Thus, the recent evolution of the Law of the Sea illustrates and strengthens the links between the State and nautical cartography.