# 7 QUESTIONS TO THE NEW DIRECTOR GENERAL OF THE FRENCH HYDROGRAPHIC OFFICE

# â€˜Hydrography is Both a Science and a Techniqueâ€™

In this interview, Laurent Kerléguer, director-general of the French hydrographic office Shom, discusses the latest developments regarding the world of hydrography, climate change and artificial intelligence.

Chief weapons engineer Laurent Kerléguer was appointed director-general of Shom, the French hydrographic office, in July 2019. In this interview, *Hydro International* asks him about the latest developments regarding the world of hydrography, climate change and artificial intelligence. “It’s becoming more urgent than ever to measure the ocean.”

Laurent Kerléguer was born in Brest, France, and has always lived by – or close to – the sea. Although he never had a ‘dream job’ as a child, he always had the feeling that his career would be linked to the sea. “For me as an engineer, hydrography is the perfect combination of science and technology applied to the sea, plus a great opportunity to visit the world and survey the ocean,” he says.

He regards his appointment as director general of such a prestigious hydrographic office, which originated almost 300 years ago, (*the Dépôt des Cartes et Plans de la Marine was created in 1720, Ed.)* as a great honour. “This achievement is the culmination of my whole career dedicated to hydrography and oceanography in the many positions and fields of interest that Shom can offer: development, technology, operations at sea, international cooperation… and also budgets, human resources and administration in general.”

**Which developments do you regard as most promising in the world of hydrography?**

Hydrography is both a science and a technique. Technology has done a lot to improve our methods and efficiency over the past 300 years and since the time of the ‘hydrographic circle’. There have been major breakthroughs such as sonar, global positioning, multibeam echosounders, Lidar… and the innovations are set to continue. Autonomous underwater vehicles (AUVs) are on their way to becoming a standard asset for hydrography, and we are now only just beginning to envisage what artificial intelligence (AI) will bring to our discipline. AI will improve the efficiency and speed of data processing, for example, but it may also help to assess risks and prioritize which areas to survey first. But AI is also changing navigational practices; for example, massive autonomous surface shipping will certainly create the need for hydrographic offices to develop and provide new products and services.

Work on board a survey boat of BHO Beautemps-BeauprÃ©. (Courtesy: Marine nationale â€“ J. Braescu)

Moreover, there is a general trend – driven by the digital-native generation and perhaps also linked to climate change – to contribute to a global effort using limited capacity, but in great numbers. For hydrography, this is crowdsourced bathymetry. I don’t believe this is going to replace professional hydrography, but it’s an interesting complement. Under the auspices of IHO, hydrographic offices are fostering the development of crowdsourced bathymetry by providing guidance, but they must also be able to combine data that is not acquired in accordance with hydrographic standards with their own professional data.

**What opportunities and threats do you see for the hydrographic profession?**

One great opportunity is definitely ‘blue growth’. Ocean transport, exploitation of the sea’s natural minerals and energy resources, leisure activities, protection of the sea, maritime spatial management… these are all major opportunities for the future, because people’s awareness of the ocean has never been so high. As a consequence it is becoming more urgent than ever to measure the ocean; we still know so little about it, except for very limited navigation corridors and harbours. The good news is that some major stakeholders such as the European Union are investing in knowledge programmes, providing a welcome addition to national investments.


Acoustic buoy on deck of BHO Beautemps-BeauprÃ©, ready for launching. (Courtesy: Shom â€“ F. Le-Courtois)

In terms of threats, from the perspective of the safety of life at sea, we have to make sure that navigation documents continue to be based on authoritative data and to prevent a situation in which quantity might replace quality at a certain point. This is not so different from what happens with general information; you can access a lot of different sources, but ultimately you want to be sure that the ‘breaking news’ is not fake news. Cyber threats are also a real issue in today’s digital world. It is not sufficient to produce reliable data and products; it’s also necessary to make sure that they can’t be corrupted along their journey to the end user.

**Which technology will change the hydrographic profession the most?**

I already mentioned the role of technology in advancing hydrography. But no matter what technology we use, we need to keep qualified, trained and certified hydrographers in the loop. The profession has already adapted to major changes in the past (e.g. satellite-based localization requiring no effort from hydrographers, enhanced productivity and the use of multibeam echosounders for surveying). It’s a bit early to tell how AUVs and AI will change our profession, but I don’t hope – and nor do I expect – that hydrographers will be land-based in the future rather than being sailors. Even though autonomous devices might make that a possibility, I think we would end up missing out on something. AI should be seen as an opportunity to raise the hydrographer’s position in the value chain by eliminating laborious and repetitive work that a machine can do better.

**What are your future plans for Shom?**

Shom is the French national hydrographic office, but it is also in charge of supporting military defence activities in the marine environment, plus it develops products and services in support of public maritime policies. This is a very large scope due to the size of the French national exclusive economic zone and its even bigger area of interest in terms of defence. As the national hydrographic office, Shom is very much involved and active within the IHO. We will continue our efforts to reach our common goal of making navigation safer by developing and harmonizing the worldwide ENC coverage.

The next challenge is to implement the new S-100 framework that will allow users to receive the additional services that they need. Indeed, nowadays a navigator wants more than just to navigate safely from port A to port B; he also wants additional information on currents to optimize cruising operations, on tides to maximize the ship’s possibilities to enter a harbour, on meteorology, on services available at the harbour, and so on. In recent years, Shom has endeavoured to provide products that meet the precise needs of its users, in order to make things easier and more convenient for them. It will continue to do so by developing new products and services and improving the organization of its processes to provide such products and services more rapidly.

This is even more important in terms of supporting defence. The challenge here is to provide support to the navy in an ever more complex world. The navy is improving its capacities at a good pace and it requires the environmental support to be developed at the same pace in order to take the best advantage of its systems.

**What innovations are planned, and does the available budget offer enough room for them?**

One major innovation for the coming years will be the renewal of the hydrographic and oceanographic data acquisition capacities. This programme is aimed at replacing the oldest coastal hydrographic ships. It will be designed in terms of capacity, i.e. it is not necessarily a direct ship-for-ship replacement, so the result will possibly be a set of ships, AUVs, USVs, etc. Furthermore, in order to have a coherent system – from mission preparation and data acquisition up to data qualification – particular attention will be paid to the overall architecture, including data processing, because there is no sense in data acquisition without being able to process it in the workflow.

**What is your view on international developments, e.g. in terms of mapping the ocean floor?**

There are huge gaps in our knowledge of the oceans. The first responsibility for hydrographers and more generally for Earth observers is to make sure that no available data is lost. That’s why GEBCO or SEABED 2030 initiatives to gather existing data are so important. In that context, Shom participates – along with many European states and with the financial support of the European Union – in the successful EMODNET programme that allows the production of databases and digital terrain models of European seas.

The second responsibility for hydrographers is to acquire missing data at sea or complement acquisition in areas surveyed using old methods (lead lines, single beam echosounders, etc.). Shom is very active in this too. Our survey ships spend an average of 800 days at sea per year performing bathymetry, hydrology, sedimentology and so on.

We also have to be innovative and make as much use of the technology as possible to fill in the gaps, e.g. in high latitudes or in scarcely populated areas of the Pacific Ocean. Satellite-derived bathymetry can certainly add something here but, although it has been used for many years (in fact, Shom produced its first space chart back in 1983), it is still not yet commonplace.

**Do you see a specific role for hydrographic services related to reducing worldwide climate change?**

Hydrographic services are regular observers of the sea and supporters of the UN goals for a sustainable ocean. The time series gathered over many years have already proven their value in assessing climate change, such as water-level observations from tide gauges which enabled 300 years of data to be reconstructed from archives for Brest, for example. More generally, the bathymetric data produced by hydrographic offices is also useful for running climate models.

By carrying out surveys in preparation for wind farms or any other kind of marine renewable energy system, hydrography indirectly contributes to reducing carbon emissions. And in terms of routing, the future S-100 framework will make it easier to combine navigational safety data with additional information layers, so it will help merchant ships to reduce their energy consumption during their voyages using

information on currents, sea state and winds.

**About Shom**

The mission of Shom, a public authority under the supervision of the French Ministry of the Armed Forces, is to describe and forecast the ocean. As the National Hydrographic Service, Shom collects, processes, archives and disseminates maritime and coastal geographical information in support of public bodies and all users of the sea. Its areas of expertise include: bathymetry, sedimentology, coastal hydrodynamics, oceanography and offshore acquisition systems engineering.

Facts and figures

- French maritime areas: 10 million square kilometres
- 524 employees, with offices in Brest (head office), Toulouse, Saint-Mande, Noumea and Papeete
- Annual budget: €58 million
- 5 French navy ships at its disposal (including one shared with Ifremer)
- 874 maps, including 67% in electronic format.

**About Laurent Kerléguer**

**Laurent Kerléguer** graduated from ENSTA Paris (National School of Advanced Techniques) in 1988 and joined Shom in 1989 as assistant director of the Atlantic Hydrographic Mission. He then held various positions, including on land at Shom's headquarters in Brest, at Shom's local offices (Toulouse, Papeete), as well as on board the hydrographic vessels made available to Shom by the French navy for the accomplishment of its missions. His roles have included: chief of the Applied Oceanography Section of the Military Centre of Oceanography, technical director of the Oceanographic Mission of the Pacific, head of the Shom-Météo Research and Study Bureau, director of Institutional Missions and Relationships, and deputy director of Shom (since June 2015). On 12 July, he was appointed as director general of Shom, taking over from general engineer of armament Bruno Frachon.

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