

## HYDRO INTERNATIONAL INTERVIEWS LARRY MAYER

# Hydrographers Stepping Up to the Challenge



A schizophrenic interest in both ocean engineering and the ocean's record of climate history led Larry Mayer, director, Center for Coastal and Ocean Mapping (CCOM), co-director, Joint Hydrographic Center (JHC) and Professor of Earth Science and Ocean Engineering at the University of New Hampshire (UNH) to an impressive career. Another schizophrenic aspect of his career is that he looks both North, to the Arctic, and South, to the Gulf of Mexico. With more than 50 expeditions to sea, amongst them many to the Arctic, and a new role as leader of an inquiry team installed by the National Research Council that will study the effects of the Deepwater Horizon oil spill on the ecosystem services in the Gulf, he is able to connect the two regions that are playing such a big role in today's and tomorrow's energy supply of the United States and beyond.

*First of all, how did you get involved in founding the CCOM in New Hampshire?*

I was working at the University of New Brunswick, where I occupied the NSERC Industrial Research Chair in Ocean Mapping, when Senator Gregg in New Hampshire earmarked money to set up a new centre of research at the University of New Hampshire that became the Center of Coastal & Ocean Mapping. I took on the position of director and came down from the north again, closer to my roots in New York. The centre is no longer funded by earmarks. In 2009, Federal law authorised the establishment of hydrographic centres in the US and last year we were awarded funding through a national competition.

*Now firmly based in New Hampshire, are there any ties with for instance Scripps in San Diego and Woods Hole Oceanographic Institution?*

I received my PhD from Scripps and am an adjunct researcher at Woods Hole so we have many ties. We work closely with both institutions on a range of ocean mapping and visualisation problems. We are also working with Scripps, Woods Hole and all of the US institutions that operate vessels with multi-beam sonar to establish standards and protocols for their systems.

*Let's go North now. You are preparing for yet another expedition. What are you going to be looking for?*

Yes, I am going to the Arctic on the US Coast Guard Cutter Healy for another 50 days, leaving on 11 August. Our goal is again to further map the morphology, sediment thickness and bathymetry of areas in the Arctic in order to understand where the limits of the US continental shelf are under Article 76 of the Convention on the Law of the Sea. We have been mapping in the Arctic since 2003 and have found many new features in these water on earlier expeditions. These have included seamounts as much as 4000m high and other features that have led us to re-think the geologic and glacial history of the region. More specifically, for the Law of the Sea work, we are searching for the foot of the slope, the 2500m isobaths and the thickness of the sediment in the region.

*Cynics will say you are out there for purposes of land grabbing.*

On the contrary. I can't stress enough that we are doing exactly the opposite. The planting of the flag by Russia a few years ago on the North Pole was a mere political stunt. There are no boundary disputes between the Russian Federation and the United States at all. There is, however, overlap in an area off the North Slope, Alaska, that is claimed to be part both of the Exclusive Economic Zone of Canada and the US. The boundary in the extended continental shelf is also unresolved. Despite this, researchers and scientists from both countries are teaming up in expeditions to map this area! The United Nations Law of the Sea Treaty is very specific on what the morphological and geological requirements are. It is very difficult to work in the Arctic and the scientists from both nations are working together to establish what the morphology of this virtually unmapped region is. Once this is established, the diplomats and lawyers can negotiate boundaries but from a scientific and mapping perspective. We work very closely together.

*All bathymetry data the United States gathered in the Arctic, as well as other data, is freely available to the public and industry. Other countries are sitting on their data. Should they open up their data freely to the public as well?*

I would hope they will. We already shared the bathymetric data gathered on earlier expeditions of the Healy and other research vessels that have collected bathymetry as part of our Law of the Sea programme. I am very proud of the fact that we are sharing our data with the public. Ultimately, our cruises are supported by taxpayers money and thus we have an obligation to make the data available to the public. I can only guess why Canada, for instance, hasn't shared it so far, but I think only matters of great national security are reasons for holding data that have been gathered with public monies.

*Let's head South. You have been involved in the response to the Deepwater Horizon and are heading up a team that will research the influence of the spill on the ecosystems in the Gulf of Mexico. Can you explain a little more about this?*

We became involved in the spill by the Deepwater Horizon soon after it was realised that there was oil accumulating deep in the water column (the deep plume). We proposed using water-column acoustic mapping and visualisation techniques that we have been working on in the lab. We worked closely with a dedicated group of NOAA hydrographers and commercial software developers to modify and create the tools needed. We combined standard water column sampling using CTDs with these acoustic techniques. The acoustic tools found numerous natural gas seeps surrounding the spill, several abandoned wells with small leaks, and when the well was capped, they were critical in establishing the integrity of the well that allowed the capping process to continue.

*Does this success in the Gulf carry any significance for the field of hydrography in general?*

The near real-time use of 3D mapping software for water column data is a hydrographic innovation, but in the Gulf we used it for something it had never been used for before, namely, mapping an oil spill. This technique will also have important applications in hydrography like least-depth determination in wreck surveying. Mapping the surroundings of a wreck and analysing it, will give a much better feel for what you are looking at. It's very exciting to think about other applications. It will be used in the oil & gas industry, for wellhead surveying, for instance, or for fisheries. New hydrographic techniques are opening new customer bases in different fields.

*And what does it hold for the profession of the hydrographic surveyor in particular?*

The hydrographic community is by nature a conservative community. This is important because it is representative of the rigor needed in the field but it also means that the acceptance of new techniques is often slow. As our tools and techniques improve we must also be open to new approaches and recognise that the data sets we collect can contain information of use to many other communities. We need to take advantage of this. Our work on the Deepwater Horizon spill is a reminder for hydrographers to be open to new applications for their techniques.

*How does the Integrated Ocean and Coastal Mapping Processing Center, a fairly new addition to CCOM, fit in with this way of looking at the field and industry?*

It's exactly what I have been talking about. The central theme of the centre is 'Map once, use many times'. For hydrographic data we work with non-hydrographers to figure out how to turn it into products useful for them -- for data collected by those other than hydrographers we ask 'How can we make the data useful for hydrographic purposes'. The centre also looks at data coming from the NOAA exploration vessel Okeanos Explorer and this is transported to and from the ship with a telepresence console. Looking at the data in different ways promotes innovation and therefore also the industry.

*Is there a link between the Deepwater Horizon and deepwater drilling in the Arctic?*

There are many unresolved questions about drilling in the Arctic. For instance, what is the effect of the cold temperatures on the biodegradation of oil? How is oil under the ice removed? And whereas the infrastructure in the Gulf of Mexico is quite good, there is no infrastructure at all in the Arctic. A blowout of the size of Deepwater Horizon in the Arctic could cause a disaster of barely imaginable proportions. Therefore, we need much more research and an adjustment of the regulatory system.

*Do you feel that the regulatory system around deepwater drilling is currently insufficient?*

Yes. The United States should rethink the regulatory system around deepwater drilling. In Europe it is performance-based and much more focused on the risk analysis that drilling contractors carry out. The United States regulations are much more prescriptive requiring many details but only a risk analysis of the worst-case scenario. I think the safety record of countries like Norway that use performance-based standards relative to the US safety record strongly supports the performance-based approach.