»I want nothing less than all the physics of the sea chart«

*An academic discussion with MATHIAS JONAS**

Dr. Mathias Jonas is Vice President of the Federal Maritime and Hydrographic Agency. The 55 year old National Hydrographer of Germany and Managing Director of the department »Nautical Hydrography« is responsible for national activities in wreck search, sea survey and the issue of related nautical publications. He represents those tasks in various organs of the International Maritime Organization (IMO) and the International Hydrographic Organization (IHO). In the interview with *Hydrographische Nachrichten* the expert for electronic sea charts talks about his preference for paper and about the future of the printed sea chart. And he believes that dealing with the ocean awakes the good in man.

National Hydrographer | IHO | Baltic Sea | S-100 | universal hydrographic data model | standards | sea chart | paper chart

* The interview was held by Lars Schiller and Thomas Dehling September 23rd, 2016 at the Federal Maritime and Hydrographic Agency (BSH) in Rostock

Translation by Verena Eisemann

HN: What does a National Hydrographer do? Are there any clearly defined tasks?

Mathias Jonas: In my function as National Hydrographer I represent the National Hydrographic Office of the Federal Republic of Germany within the IHO.

HN: Does the German National Hydrographer have any different tasks than the one in other countries?

Jonas: In many countries the head of the Hydrographic Office is exclusively responsible for cartographical issues and nautical publications. In Germany, there are more tasks like surveying and the supervision of the fleet as we do not charter surveying capacity but we have our own ships. Insofar, I have quite a broad field of issues compared to other National Hydrographers.

HN: How does the cooperation with the hydrographers of neighbouring countries work?

Jonas: Our bilateral cooperation is good and we coordinate with each other in the bodies of the IHO. The professional exchange is great. However, the Hydrographic Offices of the neighbouring countries are organised in a different way. In Poland and in the Netherlands for example, they belong to the navy, thus they are not part of a civil ministry. Hydrographic surveying and the publication of nautical charts by the navy have a long naval tradition in coastal states based on its strategic importance for the case of operation. Only due to special circumstances in history, hydrography has become part of civil administration in comparatively few countries. In the old Federal Republic of Germany it happened after World War II; on the other hand, hydrography in the former GDR remained in the responsibility of the military until the end. In Denmark, the Hydrographic Office is part of the civil administration; however, the survey units are military. In all other Scandinavian countries and Baltic States it is part of the traffic administration. These different structures make cooperation across borders very challenging.

> *»Hydrography has a long naval tradition based on its strategic importance for the case of operation. Only due to special circumstances in history, hydrography has become part of civil administration in comparatively few countries«*
>
> Mathias Jonas

HN: Are there any sensitive issues in the cooperation?

Jonas: The gas pipeline across the Baltic Sea has a certain political dimension in the German-Polish relationship. Of course, hydrography doesn't play a main role in the political process of the pipeline, nonetheless, the topographic circumstances have to be clear. Therefore, it is very important that non-political professionals remain in dialogue. Even in times when the project was politically controversial, we exchanged data and helped each other and kept us informed.

HN: Do you cooperate with our French neighbours as well?

Jonas: We do not only cultivate our regional neighbourhood, but also the bigger one in Europe. For this purpose we founded a working group within the IHO in order to represent the Hydrographic Offices in Europe to a greater extent. The aim is not only the strengthening of our position in terms of ideation but also materially through EU-funds. France has a lot of experience in using EU-funds for projects that's why we aim at closer cooperation. We have launched one project already: Coastal Mapping. With it we demonstrate how high-resolution capturing of offshore areas on both sides of the coastline can be technically improved. In a following project based on the first one, we want to capture the bathymetry of subsequent waters in high resolution up to a depth of 10 metres.

HN: What is a special feature of cooperation in the Baltic Sea region?

Jonas: The Baltic Sea is regarded as our laboratory for marine policy. It is a clearly defined geographic

territory, which is prone to high user pressure with very differing national interests at the same time. Three years ago, all neighbouring states started a common project, the Baltic Sea Bathymetry Database (BSBD). A website offers the link to a bathymetric database that is maintained by Sweden. The result shows what is possible, when all Baltic Sea states cooperate by supplying data and if one party on behalf of all others puts together all data of the Baltic Sea. At the same time, we learned the difficulties of such a project not only from a technical point of view, but also from the administrative one. However, I am very optimistic.

HN: Do you coordinate with the neighbouring countries the usage of the different Baltic Sea areas?

Jonas: Spatial planning in the Baltic Sea plays an important role. The process of authorising wind energy plants, cable routes and pipelines gives us a clear idea of our neighbour's interests. Together we discuss which sea area is suitable for which usage. This allocation of usage and protection areas doesn't belong to the still prevailing concept of hydrography, but it is based on it. It is very nice to see how similarities and mutual trust become stronger through cooperation.

HN: Since January 2014 you are Vice President of the Federal Maritime and Hydrographic Agency. What has changed within the agency since you have started?

Jonas: I am very much interested in topics that are not related directly to nautical hydrography. When I represent the agency I must have knowledge of the entire range of topics, whether it is about flag states administration, maritime spatial planning or oceanography. All this has influence on my view of hydrography because I need to reflect on the relationship of these topics and hydrography. I have already given up the idea that hydrography is all about sea charts. My American colleagues say that it should not be »chart-driven« anymore, but »data-centred« and I cannot agree more. The Federal Maritime and Hydrographic Agency has broadened its hydrographic spectrum from the mere producing point of view to the entire ocean knowledge. We administer the available data and information in such a flexible way so we can satisfy all requests and user interests without restrictions. The concept of hydrography is in a developing process. Apart from ground topography and geology, data of water column, salinity and dynamics belong to it because all of them are interdependent. Some time ago a TV reporter asked me for a briefest description how the state of the Baltic Sea is. My answer was only three sentences long. However, at the same time I thought that the question deserved more profundity, the presentation and relation of each individual aspect.

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Mathias Jonas

HN: You talk about nautical hydrography, and your department in the Federal Maritime and Hydro-

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graphic Agency carries that title. How do you differ between nautical hydrography and hydrography?

Jonas: The German name of our agency is »Bundesamt für Seeschifffahrt und Hydrographie«. ›Seeschifffahrt‹ means maritime traffic or shipping, everyone has a vague idea of what this is. However, the German term ›Hydrographie‹ does not only stand for the department »Nautical Hydrography« but also for the department »Marine Sciences«, directed by Dr. Bernd Brügge. Therefore, we call the combination of hydrographic surveying and nautical cartography »nautical hydrography«.

HN: What are you responsible for as head of the department »Nautical Hydrography«?

Jonas: There are four areas. One of it is the surveying ships with special technology, which are also used in the marine sciences for monitoring the environment. Then, the entire field of hydrographic surveying including marine geodesy, Thomas Dehling is head of that department. Another one is cartography, which is information processing for obtaining a certain product. Finally, graphic technology with two big offset printing machines. All in all, 230 employees work in these four areas. In comparison to other departments in this building they are part of a common production. Collecting data, processing and interpreting them and finally manufacturing the product. Only selling the charts, books and data sets is not our issue. My experience is that this special working process has a positive influence on the social and professional cooperation.

HN: How do you share the work with President Mrs Breuch-Moritz?

Jonas: The entire responsibility remains with the President of course. She gave me the task to represent all question regarding hydrography. In the daily working routine we take decisions with the heads of all four departments.

HN: Let's look back in time. At the end of the 1970s you began as merchant seaman. After the Service at the Armed Forces of the German Democratic Republic you studied Nautical Engineering. What attracted you to the sea in younger years?

»The Baltic Sea is regarded as laboratory for marine policy. It is a clearly defined geographic territory, which is prone to high user pressure with very differing national interests at the same time«

Mathias Jonas

Jonas: I could answer that being born and raised in Rostock, a sea-related job is inevitable. I could also tell you about our family tradition. One of my ancestors, Olerich Gottfried Jonas, moved from the island of Usedom to the formerly Hanseatic city Anklam in order to become a fisherman. All other descendants were fishermen too, except my grandfather and father, who were heating engineers. However, all these answers are not really true because as a child I surely didn't see it this way. I guess I was a romantic person who wanted to travel the world. That wasn't so easy in the former GDR. Seafaring was definitely the only possibility to leave the country legally and see the world. I chose the job according to my desire.

HN: In the end you didn't spent too much time on board of ships. Instead you went to the Maritime Academy of Rostock-Warnemünde.

Jonas: Counting all seafaring days together I spent quite a few years on merchant ships. For the Federal Maritime and Hydrographic Agency I was head of mission on the »Gauss« a couple of times. Spending your life on sea is a very special life plan. You must be the type of person for it and do without social relations. I admit that this was very hard for me.

HN: What did you do at the Universities of Rostock and Hamburg?

Jonas: In Rostock I was scientific assistant and taught navigation at the radar simulator, but mainly I was involved in research projects. We invented the first computer-based assistant system for ships, for example the advance calculation of man-over-board rescue manoeuvre. From today's point of view it sounds quite simple, but at that time it was new. We were really successful and the former company Krupp Atlas took over our product – that was still before the German reunification. On a specialist trade fair in Southampton we received an award. After the reunification Professor Jens Froese, who was head of SUSAN at that time, looked for young people, also in Rostock, with new ideas and ambition. That's how I came to ISSUS at Hamburg University of Applied Sciences. There I continued to develop user interfaces for integrated navigation systems.

HN: How did you come to the Federal Maritime and Hydrographic Agency?

Jonas: In September 1993, on behalf of Professor Froese I took part in a presentation on a study about the feasibility of future integrated navigation systems. During the following discussion I mentioned fervently our research on that topic at ISSUS. A few weeks later, at the beginning of 1994, I was employed for electronic sea charts. Right at that time a Russian company wanted to offer an electronic sea chart on the German market. I was just in time with my computer knowledge and nautical background. Four weeks later, I went to London to participate in a working group on that topic.

HN: So, you would say that it was a gradual approach to hydrography?

Jonas: Yes, indeed. I was responsible for the legal type approval of electronic chart systems. For almost nine years I worked in this sector, which encompassed the technical check of electronic sea chart systems, satellite navigation receiver and integrated navigation systems. All that offered a good basis for switching to hydrography in 2004.

HN: In a press release of the Federal Maritime and Hydrographic Agency it says that you are a professional for »digital hydrography«. What does it mean?

Jonas: Currently, we experience a great transformation from the analogous to the digital era, as well in all fields of hydrography: Measurement technology, data processing, the product itself and in sales. That's what the term means.

HN: What is your attitude toward paper in this digital era?

Jonas: I grew up in a low-stimulus country. As a child I used to read a lot and definitely I am a »book person«. In the end, paper is a medium with advantages and disadvantages; it doesn't need electricity. You can read the newspaper in the tub. The printing resolution is very good. For a lot of information, paper is a very good medium, which on top doesn't cost a lot. However, for distributing ever changing geoinformation fast enough and across great distances you need a digital medium.

HN: Do you think the printed sea chart can still be improved?

Jonas: Maybe the cuttings of sea charts can be individualised. The current cutting is always a result of balancing the manageable total amount of charts of an area and the desired detail of the resulting scales. In order to solve this compromise, a procedure would be necessary with which you can select a certain area from a database and print it on paper according to a true to scale automatised generalisation. If you stick to the chart

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ing data we obtain a depth number, a contour line. On the input side however, there is much more information. We need to close this gap by presenting the information we have. The dilemma is that electronic sea charts use modern technology, but the presentation of the contained information remains on the level of paper based charts. Consequently, the available data is reduced; that is true not only for the topography but also for the reference systems and the reduction of soundings. We know far more about the current water level than shown in the systems.

HN: Why don't you bring the knowledge together?

Jonas: So far, out of technical reasons we can only put together separate data sets for certain applications. In case we are able to achieve that for all information sources, the result needs to be presented differently than it is the case today. The current presentation is still based very much on the paradigms of the paper based sea chart, which emphasises the optical aspect. In future we will define automatic processes that will interpret data contents and offer action plans. For this we have to bring together technically all information and make them interoperable.

HN: You regulate the IHO data formats in order to be successful?

Jonas: Yes, this takes place in cartography, only to a smaller extent in surveying. The Hydrographic Standards and Service Committee (HSSC), which I manage, coordinate eight working groups, which deal with the infrastructure of technical standards. For a long time, specialists focused on electronic sea charts: Data exchange, data presentation and data encryption. Eleven years ago, we decided to establish a universal hydrographic data model called S-100. It will offer the possibility to present data of all domains – ground topography, wind, waves, sea disturbance, but as well weather and traffic information – in one single data model. All the information is available in one device. I think in strategic steps, as it is my task to keep professionals motivated so we don't lose the common goal out of sight.

»We have an increasing gap between the information we can survey and what we offer on charts. We need to close this gap by presenting the information we have«

Mathias Jonas

HN: There are people that regard standards very sceptically. What are your arguments to convince them?

Jonas: Very often, standards are pushed ahead by companies and implemented with significant market power. Our intergovernmental organisation works differently. Together with the industry we achieved a worldwide common standard. There is no electronic sea chart data producing state, which doesn't stick to the standard. I am convinced that this concept is applicable to other areas as well with the aid of the universal hydrographic data model, if the standard is technically manageable and carried by the authority of the IHO.

HN: Your task is then to make the data model known to the different data suppliers?

Jonas: That's correct. My first success is that the national Ice Services of the northern hemisphere already use an S-100 compatible format for the sea ice charts. Currently, I am in dialogue with the technical specialists of the International Cable Protection Committee (ICPC). The global data exchange will depend on high-performance cable connections across the oceans. For the cable layout, the maintenance and operation an S-100 compatible format could be very useful as well as for securing and passing data.

HN: So you are serious about opening the current concept of electronic sea charts to other user groups?

Jonas: The popular notion that hydrography is for navigation of surface seafaring only, is outdated. I want nothing less than all the physics of the sea chart. This data set must include all relevant physical characteristics of the ocean ground, water body and the water surface dynamics. Furthermore, all information on human activity above and under water must be taken into account. From my point of view this guiding principle should be the future base for standardisation efforts of the IHO.

HN: The IHO wants to draw public attention to hydrography with the »World Hydrography Day«. What else can be done?

Jonas: I am not sure if we should address the public. In view of our goals it could be more efficient to contact the expert public, which deals professionally with the ocean. We should convince them to support our goals and solutions. Our aim must be to use hydrography visibly. My project of the all physical sea chart would be suitable and maybe we are able to reposition hydrography in future under the aspect »engineering the blue«.

HN: What do you expect of the DHyG?

Jonas: I really enjoy paying my contribution to the DHyG; the *Hydrographische Nachrichten* alone are worth it. The society works on a very high professional level as can be seen in the organisation of this year's HYDRO conference and the annual newcomer awarding. Maybe the DHyG could intensify its contact to the international industry with the aim to make the technology site Germany more popular and attract students to study hydrography at the HCU.

HN: How do you write a course book – *The Electronic Chart* – in a team?

Jonas: We started in 1998 with a German version. Beforehand, all the authors discussed which topics to choose, how to deal with overlapping and repetitions and how to link the chapters. We talked about an author's freedom and decided in how far we accept something, which doesn't fit into one's own point of view. We started this tasks based on honesty. For the announced fourth edition, we included into our team two young experts from Germany and England. We belong to three generations now. One, which conceptually developed

this system, one, which implemented it (I count myself to this generation), and one, which uses this technology as a standard.

HN: In 2014, Rostock started the project »A city reads Uwe Johnson's ›Jahrestage‹«. Why did you join this event and recited a chapter in the radio?

Jonas: Johnson wasn't published in the former GDR, that's why I didn't know his work. Maybe the *Jahrestage* wouldn't have attracted me because Johnson isn't an easy to read author. To broadcast a spoken text is a special form of absorbing it. You read the given lines over and over again and with an increased perception for the rhythm of the language. I really enjoyed being part of this city project.

HN: What would you like to be able to do?

Jonas: I would like to play the piano.

HN: What do you know without being able to prove it?

Jonas: I believe that we narrow our perception if we regard things only from the technical point of view and their usage. That's what I don't like about globalisation because this is not in our human nature. The all-encompassing mechanisation hasn't brought any moral development globally. I believe that dealing with the ocean can help to develop a humanistic attitude. We all are fascinated by the ocean, the great expanse, which has mobilised the inventiveness and forces of mankind. I am sure that taking over responsibility for the ocean will lead us to a more respectful behaviour with our community.

HN: Finally, I would like to repeat the reporter's question: Mr. Jonas, how do you see the state of the Baltic Sea?

»Our aim must be to use hydrography visibly. My project of the all physical sea chart would be suitable and maybe we are able to reposition hydrography in future under the aspect ›engineering the blue‹«

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Jonas: The Baltic Sea is in better shape than many of us believe, but it isn't as good as it should be. Currently, the greatest problems are still the phosphates and nitrates that the agriculture brings into the sea. Shipping traffic will increase. We must guarantee safe seafaring, prevent the introduction of foreign animals in ballast water and stick consequently to the valid emissions of ship exhaust gases. Designated protected areas must be excluded from economic use. This demands counselling from the economy, regulation by administrations and the courage to implement unpopular measures. All political assurances are useless if we don't implement the knowledge that we have about the ocean. If we succeed then we are able to keep the Baltic Sea sound even under a high usage pressure. ⚓