國際海洋資訊

International Ocean Information

12
June 2021
雙月刊 | Bimonthly

臺灣洋流能發電近況與展望

Present Status and Future Prospects of Ocean Current Power Generation in Taiwan

德國海洋資訊

Germany Ocean Information

海洋委員會 發行
Ocean Affairs Council

國際海洋資訊 12 June 2021 雙月刊 Bimonthly
International Ocean Information

目錄 Contents

發行人語	向德國取經　完善更好的海洋空間規劃	01
專題報導	臺灣洋流能發電近況與展望	02
國際議題	德國巡防艦至南海航行之戰略意義	07
產業動態	德國海洋空間規劃	12
組織焦點	德國海洋相關部門與海洋政策	16
資訊新知	德國海洋研究機構－基爾亥姆霍茲海洋研究中心	21
法規制度	德國《空間規劃法》與海洋空間規劃	27

Letter of Publisher	Learning from Germany to Better Engage in Marine Spatial Planning	31
Special Report	Present Status and Future Prospects of Ocean Current Power Generation in Taiwan	32
International Issues	The Strategic Significance of German Frigate's Navigation in the South China Sea	37
Industry Dynamics	Marine Spatial Planning in Germany	42
Organization Focus	Germany's Marine Related Agencies and Maritime Policy	46
Latest News	Germany Executive Agency for Marine Research - GEOMAR Helmholtz Centre for Ocean Research Kiel	51
Regulatory Systems	Germany's "Federal Spatial Planning Act" and Maritime Spatial Planning	57

Learning from Germany to Better Engage in Marine Spatial Planning

Translated by Linguitronics

Minister of the Ocean Affairs Council: Chung-Wei Lee

Ocean space plays crucial roles from multiple aspects, including economic, social and environmental, and offers a variety of functions such as transportation, energy, research, fishery, etc. As Taiwan actively develops and promotes renewable energy policies, reasonable use of ocean space so that adequate planning for environmental conservation, offshore energy and fishery development, etc., can be made has become one of the most important issues that our nation must consider. Following Germany's establishment of its Exclusive Economic Zone (EEZ) in the North Sea and the Baltic Sea, the Federal Maritime and Hydrographic Agency (BSH) proceeded with marine spatial planning and conducted international negotiations with neighboring countries in accordance with the EU Marine Spatial Planning Directive. In the "Industry Dynamics" and "Regulatory Systems" sections of this issue, we discuss the strategy and development of Germany' maritime spatial planning from different perspectives to serve as reference for Taiwan's formulation of similar plans.

In addition to offshore wind power, Taiwan's government is also actively promoting ocean current energy research. In this issue's "Special Report," we introduce the development process of ocean current generator sets conducted by the National Academy of Marine Research in 2020 as well as the selection and planning of test sites. Meanwhile, the "Latest News" section introduces the marine science interdisciplinary research from seabed geology to marine meteorology conducted by the GEOMAR Helmholtz Centre for Ocean Research Kiel in Germany. Furthermore, Germany's Indo-Pacific policy has also led to the deepening of its relations with countries in the Indo-Pacific region. For instance, in this issue's "International Issues" section, we analyze the active diplomatic thinking and approaches manifested by the Germany's plans to send a frigate through the South China Sea--a topic that is well worthy of our attention and observation.

Port of Hamburg, Germany
Image by Ling-Chieh Chen

Present Status and Future Prospects of Ocean Current Power Generation in Taiwan

Ming-Hung Cheng (Associate Researcher at the Marine Industry and Engineering Research Center, National Academy of Marine Research), Chuan-Tsung Lee (Assistant Researcher at the Marine Industry and Engineering Research Center, National Academy of Marine Research), Jian-Ming Liau (Director of the Marine Industry and Engineering Research Center, National Academy of Marine Research), Jiahn-Horng Chen (Vice President of the National Academy of Marine Research), Yung-Fang Chu (President of the National Academy of Marine Research)
Translated by Linguitronics
Keywords: Ocean current power generation, Floating Kuroshio Turbine, Floating Platform Kuroshio Turbine, international ocean current test site

Over the past few years, with green energy becoming the focus of attention, all available land for onshore wind and solar energy have been successively developed and now reached full utilization. To obtain more renewable energy and due to the superior geographical conditions surrounded by the sea, Taiwan has turned its attention to marine energy. Marine energy can be further divided into wave energy, tidal energy, ocean current energy, and thermal energy conversion. Broadly speaking, ocean energy also includes wind and solar energy generated above water and biomass energy harvested from the ocean, all of which can be used to generate electricity. In terms of international development, thermal energy conversion and tidal energy power generation technologies are relatively mature and utilized in commercial operations while the power generations of ocean wave and current energy are still regarded as emerging technologies. According to estimates made by Dr. Frank H. Shu, an Academician of the Academia Sinica, Taiwan can obtain about 50 GW of energy from the Kuroshio, an oceanic current that flows steadily through the seas of eastern Taiwan all year round [1].

The earliest instance of development of Taiwan's ocean current power generation began in the National Energy Program-Phase II (NEPII) which was initiated in 2014 and completed in 2018. In 2019, the Ocean Affairs Council implemented the "Development and Promotion of Key Technologies for Ocean Current Energy" preliminary project [2]. Following the establishment of the National Academy of Marine Research (NAMR) in April 2019, NAMR was entrusted by the Ocean Affairs Council in 2020 to carry out the 4-year "Development and Promotion of Key Technologies for Ocean Current Energy" project. Building upon previous achievements, the outcomes attained by NAMR in 2020 can be divided into two main parts, one of which is the development of ocean current energy generator and actual tow tests performed at sea (this part can be further divided into two categories: floating and floating platform), while the other concerns site selection and planning of an international test site of ocean current energy in the eastern waters of Taiwan. Present development results will be shown in the sections below followed by a description of subsequent plans.

Development of Floating Kuroshio Turbine

Floating Kuroshio Turbine are installed by mooring power generators to the sea bed using anchoring devices so they remain floating in the water. The ocean current then propels the generator blades to generate electricity. Internationally, this approach to power generation has been utilized in the Kuroshio power plant development plan supported by the New Energy and Industrial Technology Development Organization (NEDO) of Japan. Starting in 2011, the University of Tokyo, IHI, and Mitsui & Co., Ltd. established a three-party collaboration, completing actual field tests in the waters off of Kuchinoshima in August 2017. From 2018 until today, the organizations have been continuing to develop 500 kW units and performing long-term power generation tests. In Taiwan, following a three-year collaboration among the academic and research teams of National Taiwan University, National Taiwan Ocean University, and Taiwan Institute of Economic Research in conjunction with CSBC Corporation from 2015 to 2017, the project team unveiled to the public an "800 W Floating Kuroshio Turbine (FKT) Power Generation Model Unit Water Tank Towing Power Generation Set" in January 9, 2018 in the department building of National Taiwan University's Department of Engineering Science and Ocean Engineering [2]. In 2019, the Ocean Affairs Council supported the development of three key technologies for power generation, including completion of the design and manufacture of 10 kW (single generator set) direct-drive permanent-magnet synchronous generators, design analysis and manufacturing technology of FRP blades for ocean current power generation, and design and manufacturing technology of passive hydraulic compensation watertight shaft seals [2]. In 2020, in conjunction with National Taiwan University and National Taiwan Ocean University, the NAMR completed the planning, design and construction of the transmission, power post-processing and control systems as well as the integrated detailed design, processing and assembly of the 10 kW power generation turbine unit. The team also built a set of 10 kW power generation turbine units, and completed power generation test verification and watertight testing towing field tests off the shores of Anping from October 6 to 7 of the same year [3]. In 2021, the NAMR will proceed with the development of a 20 kW Floating Kuroshio Turbine while at the same time probing into key technologies for buoyancy engines that can control the floating and sinking of the unit, providing the unit with the ability to avoid harsh sea conditions when typhoons pass through by submerging and then return to the most suitable position for power generator when the storm leaves. The 20 kW Floating Kuroshio Turbine anchorage system and field tests are expected to be completed in 2022 in anticipation of gradually completing the development of units viable for commercial operations.

Development of Floating Platform Kuroshio Turbine

Floating platform Kuroshio Turbine are different from the abovementioned floating type in that the power generator are placed on a surface platform. Blades below the platform are propelled by the ocean current, driving the generator above to generate electricity. The generator is not submerged under water, therefore it does not need to feature a watertight design. This approach has been utilized in the R&D project for ocean current power generation initiated by Wanchi Steel Industrial Co., Ltd. in 2009. In 2014, the company furthermore established a collaboration with National Sun Yat-Sen University (NSYSU) to implement a National Energy Program funded by the Ministry of Science and Technology that entails conducting field tests at sea of ocean current power generation units. Towing tests performed in 2015 and mooring tests in 2016 showed that the minimum start-up flow rate of the ocean current energy generator set is just 0.45m/s while maximum power output is nearly 33 kW when the flow rate is 1.43m/s. From 2016 to 2019, a 400 kW ocean current power generation demonstration machine was installed on a phase-by-phase basis. In 2020, the NAMR cooperated with National Sun Yat-sen University and Wanchi Steel in conducting a power generation field test at sea for ocean current generating units with several hundred-kilowatt capacity off the coasts of Anping from March

24 to 25 of that year (Figure 1). During the test, the turbine experienced rotation due to the influence of side flow. To resolve the issues encountered during the test, unit design was modified at that time. Through analysis generated by ANSYS AQWA software, sweeping statistics on random wave spectrum response of the ocean current generator set during the towing process revealed that the ocean current generator produces a side wave with a wave height of 1.1 meters and a period of 5 seconds, resulting in overturning of the turbine unit due to resonance. Furthermore, actual observation data showed that when the turbine unit is overturned, the maximum wave period is 5.7 seconds with an average period of 4 seconds. These results indicate that the main causes of turbine unit rollover are due to not only the imbalance of pontoon water intake, but also the natural resonance frequency of the turbine unit. Relevant unit modifications are still being carried out, and field tests at sea will be conducted once again after modifications are completed to further understand power generation efficiency [4].

Figure 1/ Floating platform generator towing field test
Images by National Academy of Marine Research

Site selection and planning of ocean current test sites

Planning the optimal site for ocean current energy testing is also an important aspect. To this end, the NAMR and NSYSU team developed an unstructured grid model based on the SCHISM-WWM wave current model to calculate high-precision three-dimensional ocean currents and wave changes in eastern Taiwan. In addition to tidal conditions in Taiwan, HYCOM (Hybrid Coordinate Ocean Model) forecast results were added to incorporate the influence of ocean currents and eddies into this system to obtain more accurate current conditions in the sea area. ADCP deployment data from 2015, 2016, and 2019 were additionally used for calibration to obtain high-resolution ocean current simulation results that can be used as references for selecting the most suitable sea area. According to the 2019 OAC Executive Ocean Current Energy Key Technology Report [2], three suitable zones in the eastern seas of Taiwan were selected. In 2020, these three optimal sea areas were further reordered from north to south into Zone A, Zone B and Zone C. Based on the results of above-mentioned simulations, terrain-related test site anchoring stability and cable routing distance, relevant legal location and spatial distribution evaluations of the three optimal sea areas, Zone A was selected as the priority area for conducting ocean current energy field tests.

Zone A, as the highest priority test site of ocean current energy, was then further subdivided into smaller sections for conducting seafloor substrate quality surveys in this area. According to the survey results and comprehensive analysis of the collected sub-bottom profiler and multi-channel reflection seismic data, the topography of the site in Sections 1 and 2 is flat with thicker sediments, thus providing a greater variety of anchoring methods to choose from. However, as both sections are in proximity to Taitung Canyon, it should be noted that the continuous erosion and expansion of Taitung Canyon may cause geological hazards on the adjacent side. In Section 3, the seabed topography is slightly steeper than that in the other two sections, indicating that there is less sediment accumulation based on field observation. Gravity anchoring is therefore more suitable, but attention must be paid to the uncertainty

of the anchorage caused by the hilly terrain. Integrating the detailed evaluation results of the currents, topography and cable routing distance and slope of these three sections, and considering the current status of land acquisition in the sea area, all three sections 1, 2, and 3 of Zone A, the optimal sea area, are following evaluation and analysis included as alternative fields for conducting ocean current energy testing. The test sites located in the three sections listed can accommodate different testing needs. However, as the sea area land use permit for Section 3 has already been obtained, considering the difficulty of applying for land use in sea areas and Section 3's leading weighted score, the section remains the highest priority planned testing site [5].

Table 1/ Analysis and comparison of using submarine cable power transmission and hydrogen production platform to convert electrical energy [7]

Transportation plan	Liquid hydrogen (LH_2)	Lithium battery (Li-battery)	Submarine cable
Conversion efficiency	Conversion efficiency is low. The output of the generator needs to be converted and compressed into hydrogen energy using electricity, and then converted back to the required kinetic energy (electric energy or energy for driving tools) using hydrogen energy, resulting in higher loss due to multiple conversions.	Conversion efficiency is high. The output power of the generator only needs to be charged into the lithium battery through the power distribution system, and then transported back using a vehicle (some energy is lost), resulting in lower loss of energy.	Conversion efficiency is high. The output power of the generator only needs to be transmitted to the user through the transmission and distribution system, resulting in lower loss of energy.
Industry development	Taiwan already has a hydrogen production industry, but the sector has not yet reached maturity. As hydrogen production industries in other countries around the world are also not yet fully mature, government units should consider simultaneously developing the hydrogen production industry when promoting the green energy industry to redirect the orientation of domestic industrial development, which will be conducive to Taiwan's level of energy autonomy. The development of the hydrogen storage industry can also enhance the use of green energy.	Energy storage-related industries such as batteries are relatively mature, with manufacturers in each key link of the upstream, midstream, and downstream segments of the supply chain. Nevertheless, while the industry's overall structure is almost complete, we still lack access to certain key electronic components and materials. As such, the key issue at present is overcoming challenges in materials and process technology to improve energy storage density and life.	Taiwan has currently not yet established a complete submarine cable industry as other countries have; therefore, the assistance of foreign manufacturers will still be required in terms of both deployment and maintenance.
Environmental ecology	Since the hydrogen production platform floats upon the surface of the sea, it is more environmentally friendly. Under this premise, if the hydrogen production platform and self-propelled vehicle can utilize the hydrogen power produced by ocean current generators, lower conversion efficiency in energy use is acceptable as this approach can reduce carbon emissions in accordance with international green energy trends.	Due to the relatively limited number of recharge cycles of lithium batteries, not only is energy utilization efficiency low in the long run, heavy metal substances produced after the decomposition of the used lithium batteries will pollute the environment if the batteries are not properly processed and recycled.	The layout of submarine cables will affect submarine ecology, and cable maintenance will also slightly damage submarine ecology. The deployment of cables is therefore subject to government policies and regulations as well as environmental impact and underwater resources assessment, resulting in relatively longer construction periods.

Apart from the selection of the optimal ocean current energy test site, the NAMR has also conducted a preliminary assessment of the ocean current generator set maintenance base port. Following analysis of the environmental conditions, preliminary configuration and scoring benchmarks of various evaluation factors of main fishing ports located in southeastern Taiwan (Jialan [Fugang] Fishing Harbor, Hsin-kang Fishing Harbor, Ta-wu Fishing Harbor, Jinzun Fishing Port, Xinghai Fishing Port and Houbihu Fishing Port), Jialan (Fugang) Fishing Harbor has been preliminarily identified as the recommended site for establishing a base port [6]. After power has been generated in the test site, the issue of power transmission is another important aspect of ocean current energy. Results from a preliminary assessment of submarine cable power transmission, hydrogen production platform electric energy conversion and battery energy storage are as shown in Table 1 according to the three aspects of conversion efficiency, industrial development, and environmental ecology. Considering that it is relatively difficult to deploy cables in the test site currently selected due to extremely deep water depths, and the current conversion efficiency of offshore hydrogen production and energy storage remains relatively low, battery energy storage is recommended at this stage [7].

Conclusions

Power generation of ocean current energy is still in the development stage both in Taiwan and internationally. Although the Kuroshio Current is a stable source of marine energy in eastern Taiwan, the water depth is relatively deep. Therefore, to develop power generator suited to this environment, challenges such as deep-sea anchors, dynamic cables, typhoon avoidance methods as well as antifouling and anticorrosion must still be overcome. Meanwhile, the project has formulated ocean current power generator testing procedures and operating methods referencing existing international regulations. Plans for facilities required at relevant test sites have also been made to facilitate the establishment of ocean current energy test sites with international credibility so that overseas manufacturers may select Taiwan as the test site for their prototypes, thus accelerating the development of Taiwan's ocean current energy industry.

References

[1] 黃聖凱（2015），海洋能源－潮流發電之探討，台船月刊，466，專題報導 https://www.csbcnet.com.tw/monthly_pub/466.html
[2] 國立中山大學（2019），洋流能關鍵技術開發與推動專業服務委託案（案號：OAC108001）成果報告書，海洋委員會委託計畫。
[3] 國立臺灣大學（2020），浮游式洋流發電機製作與實海測試專業服務委託案（案號：NAMR109008）成果報告書，國家海洋研究院委託計畫。
[4] 國立中山大學（2020），數百KW級洋流發電機組實海發電測試專業服務委託案（案號：NAMR109032）成果報告書，國家海洋研究院委託計畫。
[5] 國立中山大學（2020），臺灣洋流能海域測試場規劃評估專業服務委託案（案號：NAMR109009）成果報告書，國家海洋研究院委託計畫。
[6] 國立中山大學（2020），洋流發電配套方案與基地港規劃專業服務委託案（案號：NAMR109022）成果報告書，國家海洋研究院委託計畫。
[7] 國立臺灣大學（2020），洋流發電機自走式載具與避離方案研擬專業服務委託案（案號：NAMR109007）成果報告書，國家海洋研究院委託計畫。

The Strategic Significance of German Frigate's Navigation in the South China Sea

Ting-Hui Lin (Member of the Oceanic Affairs Council, Deputy Secretary-General of the Taiwan Society of International Law)
Translated by Linguitronics
Keywords: Germany, South China Sea, free navigation, Indo-Pacific strategy

In November 2020, German Defense Minister Annegret Kramp-Karrenbauer openly stated that the German Federal Army will be strengthening its presence in the Indo-Pacific region [1]. The following March, quoting the words of high-level German government officials, international media disclosed that a German frigate will be setting off for Asia in August and passing through the South China Sea on its return journey. If the German federal government's plans remain unchanged, this frigate will become Germany's first warship to cross the South China Sea since 2002 [2]. In response, the Ministry of Foreign Affairs of the People's Republic of China expressed its stance that "all countries enjoy the freedom of navigation and overflight provided by international law in the South China Sea, but this cannot be used as an excuse to endanger the sovereignty and security of coastal states." Meanwhile, the United States, which has been continuing to implement its free of navigation operations (FONOPs, a concept that differs from the free navigation undertaken by Germany) in the South China Sea, immediately released a State Department statement indicating "We welcome Germany's support for a rules-based international order in the Indo-Pacific [3]."

Figure 1/ The F222, a German frigate of the same model as the vessel that may navigate in the South China Sea
Source/ German Ministry of Defense website

Germany is a European country that has, over the years, been the center of attention for other countries due to its role in the two world wars, particularly in terms of its the post-war activities abroad. Military activities, moreover, are often interpreted as possible preludes to overseas military expansion. As such, German government administrations that have come into power these past few decades have been careful to not extend their political influence to regions outside Europe, especially military-wise, so as to avoid arousing doubts in the international community.

However, as the international political climate continues to change, China's rise in terms of political, military and economic power has become a threat to the international system led by the United States, and Germany is now unable to remain aloof. Even though bilateral trade between Germany and China reached nearly US$190 billion in 2019 with Germany enjoying a trade surplus as high as US$25.3 billion, Germany has persisted in defending the fundamental value of human rights despite benefiting greatly from China's economic and trade achievements.

Germany's Indo-Pacific policy: The importance of freedom and openness

The German Ministry of Foreign Affairs issued the "Policy Guidelines for the Indo-Pacific" [4] in September 2020, clearly stating Germany's eight interests in the Indo-Pacific region, proposing to implement the 7 principles of the policy in the Indo-Pacific region, and finally summarizing the 7 initiatives to be made in the future. The eight interests that Germany has in the Indo-Pacific region include:

I. Peace and security: With multiple countries owning nuclear weapons in the Indo-Pacific region, including China, India, Pakistan, Democratic People's Republic of Korea, the United States and other countries and even the United Kingdom and France, which have overseas territories, the degree of hostility between powers in the geopolitics of the region greatly affects global stability.
II. Diversifying and deepening relations: Germany aims to expand its relations with the Indo-Pacific countries from economic, trade and investment development to the political field.
III. Neither unipolar nor bipolar: Since the structure of any hegemony or bipolar system could lead to countries being forced to choose sides, just as they were during the Cold War, it is therefore even more important for the Indo-Pacific countries to be able to choose freely.
IV. Open shipping routes: This is of interest as more than 90% of global trade is by sea, and a quarter of the goods must cross the Strait of Malacca. With more than 2,000 ships traveling between the Indian Ocean and the South China Sea a day, disruption of these maritime trade routes will affect the prosperity of Europe.
V. Open markets and free trade: Millions of job opportunities in Germany are closely related to trade in the Indo-Pacific region, and Germany's Federal Government firmly believes that rules-based free trade enhances prosperity on both sides.
VI. Digital transformation and connectivity: Germany must consider technology, security policies, and economic and social risks when working with Indo-Pacific countries.
VII. Protecting our planet: Germany is interested in ensuring that the growth of the Indo-Pacific region is environmentally friendly and natural resources are sustainably managed for future generations.
VIII. Access to fact-based information: This highlights the increasing importance of social media, pointing to the fact that while information communication has become an effective foreign policy tool in the Indo-Pacific region, the spread of misinformation must be forcefully combated.

For these reasons, Germany proposes the following principles as a prerequisite to further promoting cooperation with the Indo-Pacific region. The first is European action, meaning that, as the EU is a whole, Germany's Indo-Pacific policy is also consistent with the EU's strategy. Secondly, Germany adopts multilateralism, especially in terms of a multilateral cooperation framework with ASEAN countries in the areas of climate change, environmental protection, disarmament, arms control, nuclear non-proliferation, and protection of human rights. The third and fourth principles are "the rules-based order" and achieving the "United Nations Development Goals", while the fifth states that economic development and respect for human rights are not mutually exclusive but are complementary goals requiring a holistic approach, and the sixth calls for inclusivity as Germany supports inclusive regional cooperation initiatives and does not consider containment and decoupling strategies to be conducive. As such, the ASEAN-centric security architecture offers a valuable framework for involving key actors. Lastly, the seventh principle calls for "a partnership among equals."

Military partnership and maritime power display

As for why Germany has shifted its focus to the Indo-Pacific region, German Defence Minister Kramp-Karrenbauer mentioned in a video conference with Singapore's Minister of Defence Ng Eng Hen that the global political and economic center has shifted from the transatlantic region to the Indo-Pacific region; consequently, the region will have a major impact on future international order. As the smooth flow of the Indo-Pacific sea lanes is vital to Germany's trade with the European Union, this is the reason why Germany intends to expand its military presence in the Indo-Pacific region--because the move is conducive to Germany's own interests. On the other hand, the 218SG diesel-electric submarine built by ThyssenKrupp, a German shipbuilding company, for the Singapore Navy was launched on August 31, 2020 for trial sailing. Among the four submarines ordered by Singapore (including the "Invincible," "Impeccable," "Illustrious," and "Inimitable,") this is the first submarine to be tested in waters. Although all the vessels are traditional diesel-electric submarines, they will become the most advanced submarines in East Asia in terms of design and equipment. Meanwhile, the Singapore Army has also purchased several German-made Leopard 2A4 main battle tanks. Furthermore, to combat network security issues arising from information war sparked by foreign counterparts, Germany established the "German Information Centre" in Singapore while also cooperating with Singapore's Ministry of Defence on cyber security. Based on all of the above, Singapore's Changi Base will naturally become a German warship supply base when German warships enter the Indo-Pacific region in the future.

Figure 2/ Singapore's German-made submarine
Source/ Singapore Ministry of Defence website

Apart from Singapore, Japan has also become an important military partner of Germany as it seeks cooperation in the Indo-Pacific region. In particular, the two countries signed the Agreement Between the Government of Japan and the Government of the Federal Republic of Germany on the Security of Information in Tokyo on March 22, 2021, facilitating the sharing of relevant information between the two parties and enabling them to conduct equipment export and joint training to promote cooperation in the Indo-Pacific region. Since Germany has security interests in the Indo-Pacific region, in order to demonstrate Germany's military presence in the region, the country also plans in the future to deploy German warships to regional seas, participate in regional military exercises and visit naval ports [5], including those of Japan.

Moreover, as Germany is a member of the European Union and must act consistently with the EU's "Common Foreign Security Policy" (CFSP), Germany's military operations must also take into account the integrity of the "North Atlantic Treaty Organization" (NATO). Therefore, Minister Kramp-Karrenbauer stated that the military partnership between Germany and the Indo-Pacific countries will be promoted under the framework of NATO, which shows that the free navigation of German warships in the South China Sea is viable from the perspectives of the European Union and NATO. For instance,

on April 19, 2021, the Council of the EU approved conclusions on an EU strategy for cooperation in the Indo-Pacific, stating that according to international law—particularly the 1982 UN Convention on the Law of Sea, it supports monitoring of maritime security and freedom of navigation by the navies of various nations. Meanwhile, the NATO upholds maintaining free navigation in the Arctic Sea, designating the US, UK, Norway and Denmark to engage in joint operations to maintain freedom of navigation in the Barents Sea, and is also committed to ensuring similar rights are exercised in the South China Sea without foreign intervention.

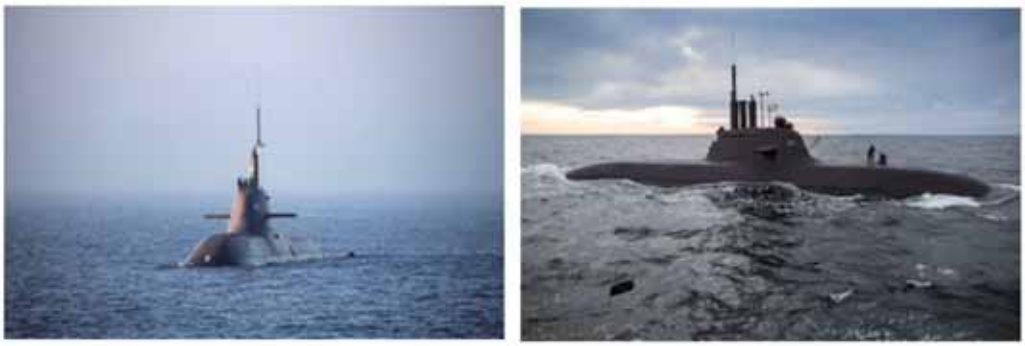

Figure 3/ German submarine
Source/ German Ministry of Defense website

The purpose of free navigation by German warships in the South China Sea

Over the past three centuries, the economies of European countries have been closely intertwined with those of Indo-Pacific nations, and Indo-Pacific's position in the global industrial supply chain cannot be underestimated as this also the main basis for the economic prosperity of all countries. For Germany, ensuring the safety of trade routes in either the Indian Ocean or the South China Sea is beneficial to European countries. However, due to political and military factors, countries in the Indo-Pacific regions are facing a growing series of hostilities caused by territorial disputes causing it to be difficult to find a common basis for territorial sovereignty and integrity under current circumstances. For Germany, nonetheless, a global order based on laws and regulations is of utmost importance; under this premise, therefore, multilateralism must be taken into consideration. Although countries may uphold different ideas and policies, as long as they remain in interaction with each other, over the course of time new ideas will emerge, contributing to reaching a shared action. As such, Germany supports the peaceful and fair settlement of disputes and conflicts provided by international laws and the United Nations Convention on the Law of the Sea.

Since Germany has no territorial disputes in the South China Sea and due to geographical considerations, Germany pays far less attention to Indo-Pacific affairs and South China Sea issues than European affairs. Under the framework of the seven major industrial countries (G7), although Germany supports the Japanese proposal, it places an even greater emphasis on the peaceful resolution of disputes and the importance of free, barrier-free and legal use of the ocean. In April 2016, at a meeting attended by foreign ministers of the world's seven major industrial nations, the Statement on Maritime Security was adopted as led by Japan. The statement recognizes that "free, open and stable seas are a cornerstone for peace, stability and prosperity of the international community," and reaffirms that international law must be utilized to maintain the right and freedom of barrier-free navigation in economic seas. Germany's motivation for making active proposals on maritime issues is however far lower than that of the United States and Japan. This is in contrast to the German military power that

used a powerful army as the main axis in the past to expand its maritime power and overshadow countries all over the world with fear. Before WWI erupted, for instance, Germany formulated Plan Z and caused the parliament to pass related bills for expanding the navy, while Kaiser Wilhelm II's "Weltpolitik" (world policy) became the basis for launching a war of aggression. Germany, after experiencing the devastation of two world wars, is now thus unwilling to arouse the speculation of other countries, appearing extra cautious in terms of foreign affairs, especially the presence of its military strength in other sea areas of the world.

Conclusion

Germany has stated that during free navigation in the South China Sea, it will not enter the territorial waters of the inner islands and reefs of the South China Sea. Therefore, the most likely route for German warships will be on busy trade routes, and the focus will be on demonstrating the ability to maintain the smooth flow of free trade routes. The main purpose of Germany's participation in free navigation is not only to exhibit the importance it attaches to the Indo-Pacific region, but also to realize the active diplomatic approach of "helping others and helping oneself." In the future, after the United Kingdom follows through with Brexit, countries that will dominate the EU's foreign and security policies will be mostly European powers such as France, Germany, and Italy. Although France already dispatched Ruby-class nuclear submarine "Emeraude" and the submarine support ship "Seine" to the South China Sea in February 2021 to exercise the right of freedom of navigation, France's stance on this matter appears to be more obscure compared with Germany's attitude and position. In order to show consistency with France in its foreign and security policies and highlight the EU's common foreign stance, what Germany seeks to make clear in terms of the South China Sea issue is the value proposition of the right of freedom of navigation. As such, in terms of the fundamental value of abiding by international law, the law of the sea and international rules, Germany stands with France.

What is worth observing in the follow-up is that China's response and counterattack to Germany's entry into the South China Sea will affect Germany's subsequent actions. Although EU countries are obligated to face the rise of emerging markets in the Indo-Pacific region, EU countries have over the long term maintained the mentality of being colonial home countries to nations in the Indo-Pacific region. Due to historical factors, however, Germany's actions are relatively constrained in the Indo-Pacific waters, and the extent to its activities will not surpass those of France and the United Kingdom. As a member of G7, the European Union and NATO, nonetheless, Germany's stance must be consistent with that of other member states in order to maintain a place in the multilateral system. As for whether Germany's freedom of navigation represents support of the United States' policies and forms a part of the Indo-Pacific strategic framework led by the United States, the European Union, led by Germany and France, still adopts diplomatic autonomy. Although consistent with the United States in terms of values such as human rights and international norms, and although equally dissatisfied with China's practices violating international norms, it is still too early to tell whether joining the ranks of free navigation signifies an alliance with the United States in the Indo-Pacific region.

References

[1] Bundeswehr to Strengthen its Presence in the Indo-Pacific Region (Nov. 16, 2020), Federal Ministry of Defence https://www.bmvg.de/en/news/bundeswehr-presence-indo-pacific-region-5012320 (Mar. 27, 2021)
[2] 中央社（2021年3月3日），〈德國官員：將派巡防艦行經南海 2002年以來首次〉 https://www.cna.com.tw/news/firstnews/202103030008.aspx
[3] U.S. Calls German Warship's Plan to Sail South China Sea Support for Rules-based Order (Mar. 4, 2021), Reuters https://www.reuters.com/article/us-southchinasea-germany-usa-idUSKCN2AW016 (Apr. 13, 2021)
[4] Policy Guidelines for the Indo-Pacific Region (September 2021), The Federal Government https://rangun.diplo.de/blob/2380824/a27b62057f2d2675ce2bbfc5be01099a/policy-guidelines-summary-data.pdf (Mar. 28, 2021)
[5] Germany Intends to Strengthen Security Cooperation with Japan (Dec. 15, 2020), Federal Ministry of Defence https://www.bmvg.de/en/news/germany-intends-to-strengthen-security-cooperation-with-japan-4918446. (Mar. 28, 2021)

Marine Spatial Planning in Germany

German Institute Taipei

Keywords: Marine Spatial Planning, EEZ, UNCLOS, BSH

The sea is often regarded as a predominantly free and untouched space. However, the economic zone adjacent to the coastal sea and the coastal sea itself are under a growing pressure to be used. In addition to the traditional usage of shipping and fishing, new interests have emerged during the past decades, e.g. sand and gravel mining, gas extraction, laying of pipelines and cables, research purposes and military exercises as well as the rapidly increasing offshore wind energy. These different economic interests are not only colluding with each other but also threatening the marine environment.

The United Nations Educational, Scientific and Culture Organization (UNESCO) definition for Marine Spatial Planning (MSP) is as follows: MSP is a public process of analysis and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that are usually specified through a political process.

Germany's marine spatial planning

In order to settle the growing conflict of business, science and environment, Germany has introduced an official marine spatial planning for exclusive economic zone (EEZ) in the North and Baltic Sea region. It serves as a planning tool to coordinate utilization interests and protection claims. It aims to record all human activities on the sea, resolve existing conflicts of utilization and to prevent future problems. Furthermore, it establishes protection zones for the marine environment. Last but not least, the marine spatial planning helps implementing political aims like Germany's renewable energy policy as well as the national energy transition.

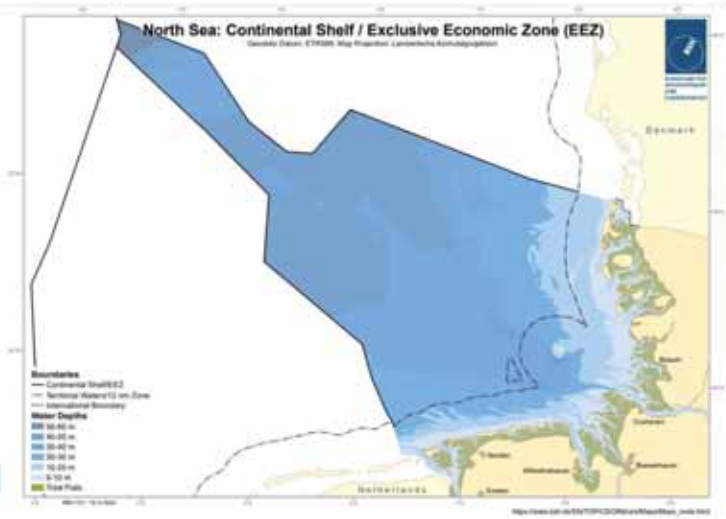

Figure 1/ North Sea: Continental Shelf / EEZ
Source/ BSH
https://www.bsh.de/EN/TOPICS/Offshore/Maps/_Anlagen/Downloads/NorthSea_ContinentalShelf_EEZ.pdf?__blob=publicationFile&v=5

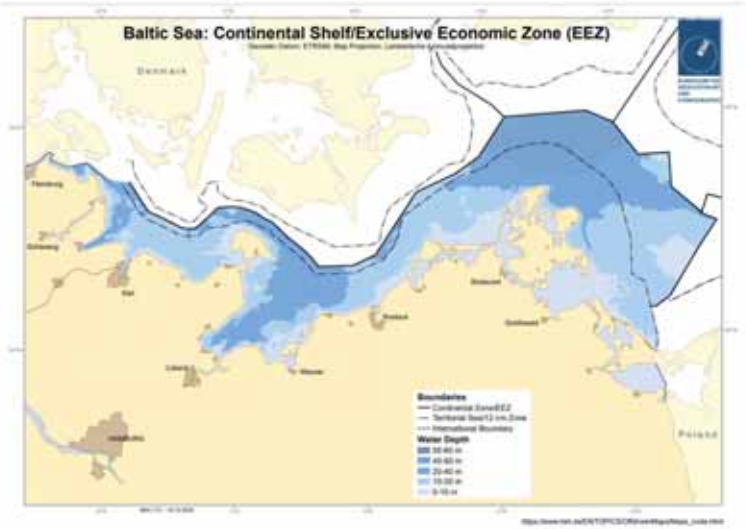

Figure 2/ Baltic Sea: Continental Shelf / EEZ
Source/ BSH
https://www.bsh.de/EN/TOPICS/Offshore/Maps/_Anlagen/Downloads/BalticSea_ContinentalShelf_EEZ.pdf?__blob=publicationFile&v=4

The spatial plans establish binding rules for the usage and development of the EEZ. As the EEZ is not part of the sovereign territory of the Federal Republic of Germany, the United Nations Convention on the Law of the Sea (UNCLOS) must be respected, including freedom of navigation and overflight as well as freedom to lay submarine cables and pipelines. The German marine spatial planning is therefore considered a "restricted spatial planning".

Marine spatial planning in the German EEZ is
- regulating the economic and scientific use
- ensuring safety and ease of shipping
- protecting the marine environment.

The spatial plans were drawn up by the Federal Maritime and Hydrographic Agency (BSH). In the first stage, an inventory of existing usage claims has been created. For this purpose, the BSH asked local authorities to list activities and utilizations currently taking place in the EEZ. Based on these findings, BSH did write a first draft which has been revised after discussions with stakeholders. On 26th September 2009 (EEZ in the North Sea) and on 19th December 2009 (EEZ in the Baltic Sea), the marine spatial planning came into force.

Germany's marine spatial planning comprises aims and principles for shipping, offshore wind energy, raw material extraction, pipelines and submarine cables, marine research, fisheries and the marine environment. The plan defines priority areas for shipping, wind energy, pipelines and submarine cables as well as marine research. Priority areas give particular importance to one function in case it is competing with another utilization purpose. Priority shipping areas are the foundation of Germany's marine spatial planning. These designated areas are off-limits for incompatible usage such as offshore wind which has its own priority areas. However, in order to achieve Germany's target to produce 25 gigawatts from offshore wind energy by 2030, it is permissible to construct offshore wind parks also outside their designated areas.

Since the publication of the first marine spatial plan, offshore wind projects in Germany have multiplied. In 2009, the "alpha ventus" test field was the first offshore wind farm under construction in the German EEZ. Today, there are 20 offshore wind farms in the North and Baltic Sea with a total of 1,167 wind turbines in operation –delivering an output of about 5.3 gigawatts. Four more wind farms are currently under construction (as of April 2018). In 2017, offshore wind farms were producing 17.4 terawatt hours (TWh) of electricity. Taking the electricity consumption of 12.1 TWh in Hamburg (2017) as a benchmark, offshore wind energy can approximately cover the electricity needs of one to two bigger cities in Germany.

Figure 3/ Marine spatial planning for the German exclusive economic zone (EEZ) (Raumordnungspläne für die deutsche AWZ)
Source/ BSH
https://www.bsh.de/EN/TOPICS/Offshore/Maritime_spatial_planning/maritime_spatial_planning_node.html

European marine spatial planning

In addition to Germany's national marine spatial planning, there are EU guidelines on marine spatial planning. They oblige all EU coastal nations to draw up marine spatial plans by 2021. The member states must ensure to coordinate national plans and consider cross-border issues. The individual spatial plans are intended to support the European strategy of "Blue Growth" through sustainable development of the marine and coastal economy/resources. It is in line with EU legislation on climate protection and expansion of renewable energies upholding a balanced marine environment while completing a European transport network, i.e. shipping routes.

In the North Sea region, all of Germany's neighboring countries besides Denmark have already drawn up and implemented their marine spatial plans.

In the Baltic Sea region, apart from Germany, only Lithuania has introduced a marine spatial plan. The other countries are at different stages of planning.

Due to the lack of EU competence for a standardized European spatial plan, the individual EU member states have to arrange themselves to achieve a cross-border marine spatial planning. The Baltic Marine Environment Protection Commission HELCOM and the Oslo-Paris Convention OSPAR are two intergovernmental bodies to pursue aims for the entire Baltic and North Sea. HELCOM intends to further expand cross-sectoral cooperation in the areas of maritime transport, marine spatial planning and integrated coastal zone management. In the North Sea, OSPAR is currently leading international cooperation for marine environmental protection in the North-East Atlantic.

When the "Bundesamt für Seeschifffahrt und Hydrographie" (BSH) was drawing up spatial planning in 2008, it conferred with Germany's immediate neighbors, the Netherlands, Denmark, Sweden and Poland. BSH presented the first draft of Germany's marine spatial plan to them and gave them the opportunity to submit comments and suggestions. In addition to these international consultations on marine spatial planning in the North and Baltic Seas, the BSH has been a partner in Inter-European projects on marine spatial planning since 2009 with a focus on energy, shipping and environmental protection.

In conclusion, marine spatial planning led to important new findings especially for the construction of offshore wind farms and cable laying. Long-term spatial plans are now being drawn for the sectors of energy, fishing and nature conservation. Future spatial planning will be based on the creation of new national and international legal frameworks, the ongoing cooperation between European neighbors, and a broad data base created in the last 15 years.

This article is provided by Bundesamt für Seeschifffahrt und Hydrographie (BSH) and summarized and translated by German Institute Taipei.

Germany's Marine Related Agencies and Maritime Policy

Yi-Kai Chen (Associate Professor, Department of Law, National Cheng Kung University)
Translated by Linguitronics
Keywords: marine agency, German maritime policy

An effective marine policy requires an effective institutional structure. In Germany, however, duties and responsibilities are segregated in terms of both the formulation and implementation of laws and regulations due to a political system structure that is subject to hierarchical responsibility; specifically, in Germany, each of the fields involved in maritime policy are under the jurisdiction of different agencies. As such, Germany lacks a common political authority overseeing the protection and use of marine resources and living space in the Federation and the states. In conjunction with the European Union's adoption of the Integrated Maritime Policy, nevertheless, Germany has also introduced such an integrated policy [1], as illustrated in the following content on the "integrated maritime policy of Germany's exclusive economic zone and territorial sea" [2].

The administrative structure and jurisdiction of the German state organization

I. Germany is a federal state organization [3]

According to Article 20, Item 1 of "the Basic Law for the Federal Republic of Germany", Germany is a federal state. It can be derived from this federal state principle that, in Germany, authority, administrative structure and organizational structure are respectively assigned to the federation and the states. The highest organs of the Confederation are the Federal Parliament, the Federal Council, the Federal President, the Federal Constitutional Court, and the Federal Government. Furthermore, the people are entitled to representatives elected at the state level. These are the state parliaments of the 16 German states responsible for stipulating state laws and electing the states' minister presidents [3].

II. Legislative jurisdiction: Federal exclusive rights, co-opetition rights, framework legislative rights

In accordance with the organization of the federal state, legislative power is placed in each state in principle (Article 70, Item 1 of "the Basic Law"). On the other hand, the Federation has legislative powers in the following areas, and based on the necessity of unified regulations it enjoys exclusive legislative powers (Articles 71 and 73 of "the Basic Law") (powers exclusive to the federation), co-opetitive legislative powers (Articles 72 and 74 of "the Basic Law") (authority shared concurrently between the Federation and the states), and the framework legislative power (Article 75 of "the Basic Law") (The Federation only makes principled legislation, leaving it to the states to make supplementary legislation) [3].

III. Legislative jurisdiction in areas related to German maritime policy

The fields related to integrated marine policy include exclusive rights, co-opetition rights, and federal framework legislative powers; some areas of marine policy also fall under federal exclusive jurisdiction. National defense, air traffic, and federal rail traffic are exclusively federal legislative powers [1]. Meanwhile, "economic law" (including mining, industry, energy) and "agricultural law", "high seas fishing law", "offshore fishing law", "coastal protection law", "seabed law", "ship navigation law", "inland

river navigation law", "inland waterways law", "the Road Traffic Law" and "the Circular Economy Act" are all federal co-opetitive legislative powers [1]. Seaports and river ports are the exclusive legislative authority of each state. Cultural heritage and certain tourism matters are the exclusive right of each state. Areas that fall under federal framework legislation are: nature conservation, spatial order, and water supply protection.

IV. Executive jurisdiction of the German Federation and the states

In Germany, the implementation of administrative tasks belongs to each state in principle. Who enforces federal laws? Authority is divided into three types: implementation by the federation itself, federal law executed by the state as its own affairs, and federal law executed by the states as entrusted by the federation [3]. The enforcement of federal laws is mostly done by states. Accordingly, the powers of state administrations are categorized into enforcement of state laws, enforcement of federal laws, and federal entrusted administration. State administrations' power to execute federal laws in their own right is derived from Article 83 of "the Basic Law", and it is a principle case (principle situation), because unless the German constitution expressly stipulates that the federal government executes federal laws itself or the federal government entrusts such execution to the state administration, all federal laws are executed by the states; this is known as executing federal laws in their own right [3]. When such a state executes federal laws in its own right (the state implements federal laws), the state does not have to comply with the instructions of the federal government. The federal government can only supervise the legality of administrative actions within the framework of legal supervision. On the contrary, if the administration is entrusted by the federal government, all states must be subject to federal legal and professional supervision. Such fields are regulated in "the Basic Law" (fields of federally entrusted administration), including administration involving national road management [1].

V. Enforcement jurisdiction in areas related to Germany' maritime agenda

The implementation of areas related to the integrated maritime policy is assigned to the various types of administrative implementation mentioned above. The areas that belong to federal law executed by the federation itself concern administrative tasks for national defense, air traffic, federal rail traffic, navigation and waterways. Affairs executed by the states on federal commission include federal highway administration (states are entrusted by the federation to manage such highways). Other administrative execution tasks belong to the jurisdiction of each state, and each state executes federal laws in its own right or based on the execution of state laws. In particular, it should be pointed out that the special execution of administrative tasks in the exclusive economic zone is mainly assigned to federal administration. On the contrary, the administration of mining rights in the field of continental reefs is undertaken by the state mining bureaus of each state, which perform administration based on mining laws and regulations [1].

Administrative structure and jurisdiction in the coastal areas

Federal agencies: Marine affairs is divided based on the responsibilities of each department, and powers of execution are especially assigned to the "Federal Foreign Office," "Federal Ministry of the Interior," "Federal Ministry of Finance," "Federal Ministry of Economics and Technology," "Federal Ministry of Food and Agriculture," "Federal Ministry of Defense," "Federal Ministry of Transport, Building and Urban Development," "Federal Ministry of Environment, Nature Conservation, and Nuclear Safety", and "Federal Ministry of Education and Research." The federal government agencies and agencies responsible for maritime affairs include: "Federal Executive Administration," "Federal Coast Guard,"

"Federal Research Centre for Fisheries," "Federal Institute for Risk Assessment, Institute of Sea Fisheries under the Federal Office of Agriculture and Food," "Federal Institute of Hydrology," "Federal Maritime and Hydrographic Agency," "Federal Waterways and Shipping Administration," "Federal Agency for Nature Conservation," "Federal Office for Radiation Protection," and "Federal Environment Agency." The state ministries and government offices on the coasts close to the sea are responsible for various administrative tasks in the coastal waters. It should be emphasized that the state local government offices in charge of mining, energy, and geology located in Clausthal-Zellerfeld (in Niedersachsen) and Stralsund (in Mecklenburg-Vorpommern) are responsible for enforcing the Federal Mining Act on continental reefs [1].

The characteristics of decision-making for the maritime policy by the German federal government

Due to the lack of a dedicated agency for overall planning of maritime policy decisions in Germany, government units often act on their own, resulting in conflicts of mutual interests. For example, the position of coordinator created by the federal government is placed in the Ministry of Economic Affairs at the rank of Deputy Chief Executive (Staatssekretär), with jurisdiction covering only the marine economy [4]. In order to realize the EU Marine Directive, the "Federal Ministry of the Environment, Nature Conservation and Nuclear Safety" is not subject to the fishery policy represented by the "Federal Ministry of Food and Agriculture", and is also independent of the "navigation policy" enforced by the "Federal Ministry for Economic Affairs and Energy" for the purposes of policy implementation [4]. Even at the domestic level, the "Federal Ministry of Food and Agriculture" has also blocked the intervention of the "Federal Ministry of the Environment, Nature Conservation, and Nuclear Safety" in introducing regulations on the management of domestic marine protection, and firmly adheres to its own stances in terms of fisheries policies. The formulation of provisions of environmental protection rules was only advanced after several natural conservation organizations jointly complained [4]. Regarding deep-sea mining, offshore wind power, and other localized areas, all agencies act independently of each other in a similar manner. Various disagreements and inconsistencies arise from the major disagreements between the federal government's international maritime policy and domestic practices. Not only does Germany lack a balanced management plan for marine protected areas throughout the year, but is also unable to manage or control affiliated industries and recreational fisheries [4]. The import of fish and marine food may come from illegal sources, the production of plastic waste and other harmful substances, the excessive profitability of agriculture and transportation, the reduction of the social welfare system at sea, and many other aspects have highlighted the downfalls of this lack of administrative coherence [4].

An integrated maritime policy in Germany's exclusive economic zone and territorial waters

I. Integrated ocean policy

Germany's administrative structure and political structure exhibit the characteristics of very strong departmental differentiation. Germany's administrative structure and political structure are characterized by a very strong departmental differentiation. The goal pursued by each professional policy is mainly to optimize the professional purpose of a single subject. Germany needs a maritime policy with an integrated entry point, and the policy must be adopted at both the federal and state levels with each professional policy strongly taking into consideration spatial perspectives and

interaction with other professional policies [2]. Through discussions under the framework of an integrated ocean policy, all parties concerned gain an understanding of the importance of the ocean to the environment and economy of Europe and Germany, ultimately solidifying and reinforcing the ocean perspective. Particularly in the regional development of economic areas (such as Northern Germany) and the strong maritime research conducted by the North German coastal states, the integrated maritime policy drives participation by consolidating various professional policies into one unified maritime policy. From a macro perspective, an integrated ocean policy involves participation. This kind of participatory approach strengthens democratic thinking, including policy implementation [2].

II. Ocean development plan [5]

The strategic framework, purpose and focus of the German maritime policy is placed the maritime development plan. This is an integrated German maritime policy strategy, and this kind of development plan has existed since 2011 [5], constituting a political platform that includes state and non-state maritime actors in the decision-making process. The work structure and decision structure are as follows: Resource discussions, inter-agency working groups and maritime-related groups are networked and connected to the political aspects of Germany. Under this framework, coordination and control are carried out through the maritime development plan. In addition, dialogues on integrated ocean policies are carried out on an ongoing basis with various groups and organizations.

Hamburg Hafen, Germany
Image by Pride Advertising Agency Ltd.

The main purpose of the development plan is to pursue the following objectives:

- Strengthen the competitiveness of the German maritime economy and benefit the potential for employment.
- The North Sea and the Baltic Sea must reach good environmental conditions before 2020 AD, making them the cleanest and safest of oceans.
- Germany assumes joint responsibility for global ecological development and actively supports the fight against environmental changes [2].

III. Important cornerstones of Germany's integrated maritime policy: Marine spatial order

An important cornerstone of Germany's integrated maritime policy, especially considering the perspective of space, is marine spatial order. The introduction of marine spatial order has a significant impact on the use of the exclusive economic zones in the North Sea and the Baltic Sea in Germany. In particular, whether wind power parks, main navigation channels, and submarine cable pipeline routes is entitled priority for use of the sea surface is a topic of discussion. This marks the first time that all marine uses in the North Sea and the Baltic Sea are comprehensively observed, endowing use of the sea in the exclusive economic zone with a new level of transparency [2].

Marine spatial order in the exclusive economic zone of Germany reinforces the importance of ensuring reversibility of use of the sea area (i.e. intervention on the sea surface can be restored to its original state again). In this sense, the interests of the environment, navigation, and wind energy are coordinated and conflicts are resolved. Under the framework of establishing marine spatial order in the exclusive economic waters of the North Sea and the Baltic Sea, especially with regard to the conflicts between various actors, the conflicts between the promotion of wind energy and the traditional use of navigation within the context of the nation's climate policy are resolved by giving wind power priority use of the sea surface and determining main waterways [2].

In addition to measures at the federal level, Germany's integrated maritime policy is also implemented at the level of the maritime states in northern Germany, including: Bremen, Hamburg, Niedersachsen, Mecklenburg-Vorpommern, and Schleswig-Holstein. The integrated maritime policy is manifested by the maritime states of Germany, especially through the integration of maritime-related professional fields, and through the integration of land-related and ocean-related projects [2].

References

[1] Stefan Lütkes/Heike Holzfuß/ Wulf Hülsmann/ Thomas Bosecke (Redaktion), Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Hrsg.), Integriertes Küstenzonenmanagement in Deutschland, Nationale Strategie für ein integriertes Küstenzonenmanagement (Bestandsaufnahme, Stand 2006) , 2006.
[2] Bundesinstitut für Verkehr und digitale Infrastruktur (Hrsg.), Nutzen der Berücksichtigung räumlicher Belange in Fachpolitiken am Beispiel der integrierten Meerespolitik, MORO Forschung 2/2015.
[3] Peter Badura, Staatsrecht, 7. Aufl., 2018.
[4] Kai Kaschinski, Besser spät als nie, Transparenz, Partizipation und Kohäreny als Schlüsselaspekte einer internationalen Meerespolitik, in: Forum Umwelt und Entwicklung/ VENRO/ terre des hommes Deutschland/ Global Policy Forum/ Open Knowledge Foundation Deutschland (Hrsg.), Deutschland und die UN-Nachhaltigkeitsagenda, Noch lange nicht nachhaltig, 2016.
[5] Bundesministerium für Wirtschaft und Energie (Hrsg.), Maritime Agenda 2025, Für die Zukunft des maritimen Wirtschaftsstandortes Deutschland, 2017.

Germany Executive Agency for Marine Research - GEOMAR Helmholtz Centre for Ocean Research Kiel

Compiled by Jia-Lin Chen (Assistant Professor, Department of Hydraulic & Ocean Engineering, National Cheng Kung University), Shun-Yan Hsu, Ching-Yuan Liao, Sheng-De Tsai, Wen-Hsin Huang, Cheng-Chien Hou (Master Degree Students, Department of Hydraulic & Ocean Engineering, National Cheng Kung University)
Translated by Linguitronics
Keywords: Germany, GEOMAR Helmholtz Centre for Ocean Research Kiel, plate tectonics, sediment

Germany is located at the center of the European continent and is defined as part of Western or Central Europe in terms of regional classification, bordering Denmark to the north, Poland and the Czech Republic to the east, Austria to the southeast, Switzerland to the southwest, France, Luxembourg and Belgium to the west, and the Netherlands to the northwest. Most of its territory lies between 47 and 55 degrees north latitude and 5 to 16 degrees east longitude. Germany borders the North Sea to the north and the Baltic Sea to the north-northeast. The total length of the nation's coastline is 2,389 kilometers, which is about 1.5 times that of Taiwan. Most of the German coastline is however concentrated in the northern states of Schleswig-Holstein, Niedersachsen and Mecklenburg-Vorpommern, the only three states with coastlines within the entire country. Although most of Germany's industrial zones, large cities and major developed economic belts are located inland, the German coast has the world's largest installed capacity of ocean wind power; meanwhile, the unit output value of Germany's marine tourism industry ranks among the top European countries [1]. German citizens are known for their love of nature. The nation has an extremely high urban greening rate, and is also a major renewable energy country in Europe and a model for sustainable economic development that places great emphasis on environmental protection and natural ecological conservation.

Figure 1/ Geographical location of GEOMAR Helmholtz Centre for Ocean Research Kiel
Source/ Google Maps

Introduction to the research center and its talent cultivation policy

GEOMAR Helmholtz Centre for Ocean Research Kiel (referred to as GEOMAR) is one of Europe's three leading institutions in the field of marine science, and is a member of the "G3 group" of national marine research centers comprising the National Oceanography Centre (NOC) in neighboring UK and The French Research Institute for Exploitation of the Sea (IFREMER) located in France. GEOMAR is a large-scale marine research center that performs globally pioneering research. Located in Kiel, Germany, it was originally named the Leibniz Institute of Marine Sciences (Leibniz-Institut für Meereswissenschaften), and was jointly established by the state and federal governments in 2004. GEOMAR was originally under the jurisdiction of the Leibniz Institute. After withdrawing from the Institute in 2012, the entity merged into the Helmholtz Association and was given its current title. In addition, it also acts as the coordinator of participating parties in the FishBase Consortium. The institute is engaged in all ocean-related marine studies across the globe, and exhibits outstanding achievements in the fields of climate dynamics, marine ecology and biogeochemistry, as well as ocean bottom dynamics and circulation. The institute also jointly confers degrees with the University of Kiel, and operates the Aquarium GEOMAR and "Lithothek," the central hub for the investigation of sediment cores and rock samples [2]. Furthermore, with regard to the recent debate on wastewater released from the Fukushima Nuclear Power Plant into the ocean, a 2012 study conducted by GEOMAR has been widely cited and discussed. In the study, data simulation was used to track the dilution of ^{137}Cs, and the findings indicated that the entire Pacific Ocean suffered impact within 3 to 6 months [3][4].

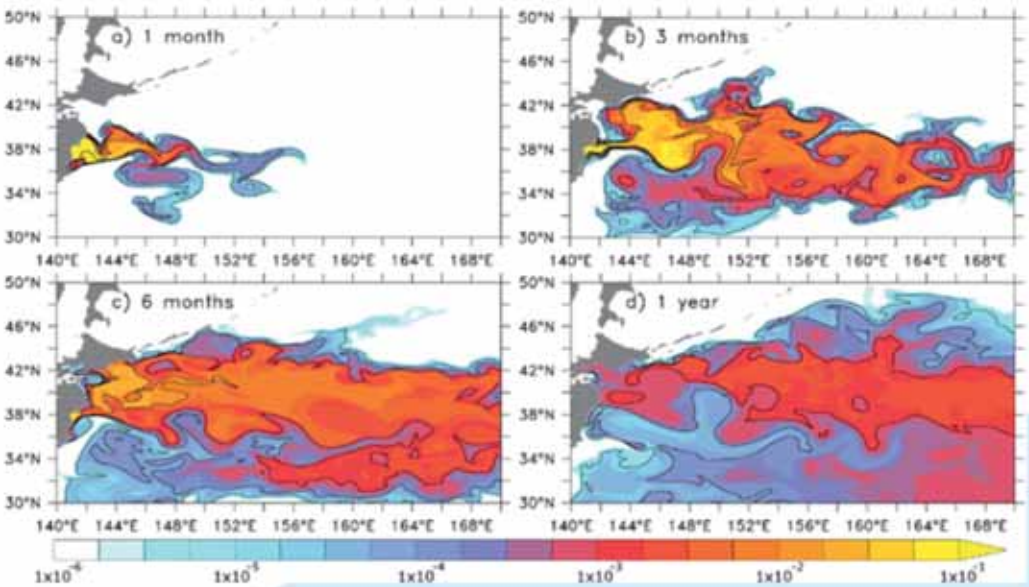

Figure 2/ Sequence of relative surface tracer concentration
Source/ Behrens, E., F.U. Schwarzkopf, J.F. Lübbecke and C.W. Böning, 2012 [4]

GEOMAR's marine research team is dedicated to studying physical, chemical, biological, and geological changes in the seabed, in the ocean, or at the edge of the ocean, as well as their interactions with the

atmosphere. It is also committed to narrowing the gap between fundamental science and practical applications, and leads the world in terms of the diversity of its research projects. GEOMAR is a public legal entity jointly funded by the German Federal Government (90%) and the State of Schleswig-Holstein (10%). In 2020, it had approximately 1,000 employees, and an annual budget of approximately €80 million. Through research spanning topics from seabed geology to marine meteorology, the purpose of this institution is to conduct cross-disciplinary research on all topics in modern marine science on a worldwide basis [5].

GEOMAR furthermore operates 3 oceanographic research vessels (ALKOR, LITTORINA and POLARFUCHS) equipped with advanced instruments and equipment, such as manned submersibles (JAGO) and autonomous underwater vehicles (KIEL6000, PHOCA and ABYSS). the Institute also features several research laboratories that run concurrently, and is equipped with extremely high-performance computer/computing equipment as well as a fascinating aquarium. At the end of 2017, GEOMAR additionally set up a scientific logistics station in the Cape Verdean Islands in the western waters of Africa, The Ocean Science Centre Mindelo (OSCM) [5].

Recent major research outcomes

I. Nature study finds transform faults play active role in shaping ocean floors [6]

Researchers from the GEOMAR Helmholtz Centre for Ocean Research Kiel in Germany published new study findings in the international journal Nature on March 17, 2021, pointing out that transform faults play an extremely important and previously unknown role in plate tectonics. The forces inside the earth push the crustal plates along the submarine mountains and mid-ocean ridges, forming new seabeds which in turn move around the continental plates. For millions of years, the powerful forces created by the movement of the Earth's interior have been constantly reshaping the shape of continents and ocean basins. Nevertheless, the continental drift hypothesis previously published by geophysicist and meteorologist Alfred Wegener in 1915 was not widely accepted by the masses until the 1960s. Today, however, it provides us with a unified view of the structure of our planet. It has taken so long for theory of plate tectonics to be recognized by the public for two simple reasons. First of all, the stratum is hidden deep in the deepest bottom of the sea, unpredictable but also fascinating. Furthermore, the force during its movement acts on the depths below the seabed, which is hidden from our field of vision and is as such difficult to observe. For these reasons, it is still difficult to clarify the details of many plate structures even to this day.

Recently, however, five scientists from the GEOMAR Helmholtz Centre for Ocean Research Kiel in Germany, Southern University of Science and Technology in Shenzhen, China, and GeoModelling Solutions GmbH in Switzerland published in the international scientific journal Nature a study in which Dr. Ingo Grevemeyer of GEOMAR pointed out that the basic assumption of plate tectonics is that transform faults are large offsets in the mid-ocean ridges. So far, these offsets have been assigned a purely passive role within plate tectonics. However, this research clearly shows that they play an active role in shaping the ocean floors.

A brief look at a global overview map of the seabed (Figure 3) will facilitate understanding of this study. It can be found that even in the case of insufficient map resolution, we can identify mid-ocean ridges tens of thousands of kilometers long and which represent the boundaries of the earth's plates. After the hot materials from the earth's mantle gushes out from the center of the boundaries between the plates, they rapidly cool to form a new oceanic crust and push around the old crust. This is the force that drives the movement of tectonic plates.

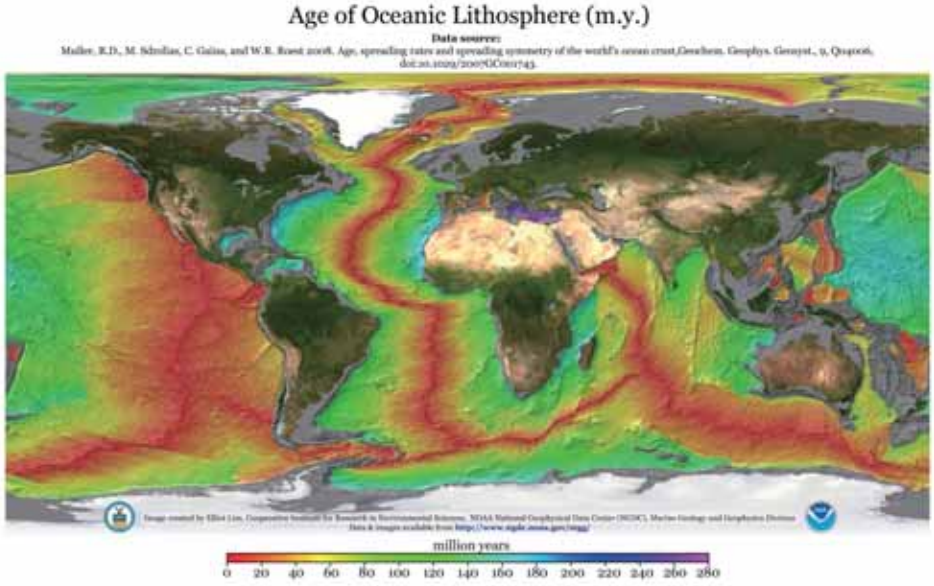

Figure 3/ 2008 global overview map of the seabed (colors indicate crustal age)
Source/ Mr. Elliot Lim, CIRES & NOAA/NCEI
https://www.ngdc.noaa.gov/mgg/image/crustalimages.html

However, the mid-ocean ridges do not form continuous lines, but are cut off by rift valleys at almost regular intervals. Each part of the ridge has a certain offset at the beginning and end of the section. Professor Lars Rüpke from GEOMAR indicated that these are the transform faults, and as the earth is a sphere, repetitive plate movement triggers the formation of transform faults, further causing these ridge offsets.

Earthquakes may occur at the transform faults, and they will leave long marks on the oceanic plates that are otherwise known as fracture zones. However, many studies so far have assumed that two plates only slide along the transform fault, and that the seabed is neither generated nor destroyed during the entire dynamic process. The authors of the current study have reviewed existing maps of 40 transform faults in all ocean basins, and Professor Colin Devey of GEOMAR, the co-author of this study, has stated that, "In all the examples, we can find that the transform valleys are much deeper than the adjacent fracture zones. In the past, the fracture zone has been simply regarded as a continuation of the transform valley." The research team even observed extensive traces of magma activity at the intersection of the transform valley (Figure 4) and the mid-ocean ridge [7].

In this regard, the research team used sophisticated numerical models to find a reasonable explanation for this phenomenon. According to the above, the plate boundary becomes increasingly tilted at depth along the transform fault, leading to materialization of the shearing effect. This will inevitably lead to the extension of the seabed, forming a deep transform valley. Subsequently, magmatism at the outer corners to the mid-ocean ridges fills up the valleys, causing the fracture zones to become shallower. For this reason, the oceanic crust formed at the corners is the only crust formed by two-stage volcanism. The effect this has on the composition of the earth's crust, for example, the distribution of metals, is as yet unknown. Since transform faults are a fundamental type of plate boundary and one of the common phenomena at oceanic active plate boundaries, this new discovery not only enriches our theory of plate tectonics, but also has important significance for understanding our planet.

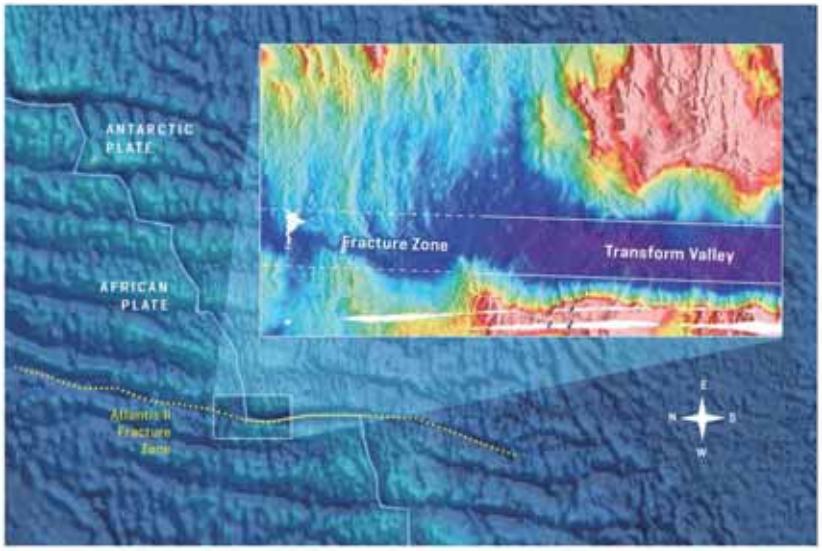

Figure 4/ Transform valley
Source/ https://www.geomar.de/en/news/article/ein-neuer-blick-auf-die- plattentektonik

II. Sediments are nutrient mediators in Arctic fjords [8]

Although algae and other phytoplanktons in the ocean are not large in size, they play an important role in the earth's climate system. Utilizing large amounts of carbon, they produce the oxygen that other species depend on. These phytoplanktons need the supply of light, carbon, nutrients, iron and other elements to survive, but as iron is rarely found in the ocean, phytoplanktons tend to thrive and reproduce well in places in the ocean that are rich in sources of iron.

In the Arctic Circle, glaciers that terminate in the sea are an important source of iron. In recent years, however, glaciers have been heavily impacted by climate change and are undergoing rapid changes, and the impact of these changes on the supply of nutrient iron and the growth of phytoplankton in the Arctic waters has always been a topic of concern. An international research team led by GEOMAR probed into this issue with Dr. Katja Laufer-Meiser of GEOMAR performing a study of several fjords on Svalbard. The results showed that not only is the glacier itself a source of iron, but the sediment at the bottom of the fjord is also a possible source of iron for use by phytoplanktons [9].

Although previous studies on this topic have shown that glaciers have a direct impact on the waters of the fjord and the adjacent ocean, Dr. Laufer-Meiser explained based on the research results that most of the iron entering the water from the glacier ice cannot be directly used by phytoplankton. Instead, it is initially deposited in crystalline form in the sediments at the bottom of the fjord before biochemical processes convert some of the deposited iron into the form of nutrients that are released back into the sea. Surprisingly, the study found in the sediments that the highest concentration of nutrient iron is not at the end of the glacier, but at a place further away from the fjord. This is contrary to the results generally expected in the academic world, and the phenomenon has never been discovered in the past. The research team observed this phenomenon by reducing the sedimentation rates in the outer fjord areas. Since the transformation of iron mainly occurs in the uppermost layer of the seabed, there is more time for younger substances to cover the iron. The process is shown in Figure 5. Therefore, the biotic and abiotic transformation processes in the outer fjords will be more obvious than those located near glaciers.

The study also shows that "sediment" is an important factor that potentially contributes to biochemical effects. In addition, the retreat of glaciers to land not only changes the direct supply of nutrients from the glaciers, but also indirectly affects the internal reactions of sediments. As we all know, the retreat of glaciers will affect phytoplankton growth, thus reducing the productivity of the entire fjord ecosystem. Now, this study additionally shows the retreat of glaciers also changes the biochemical characteristics of fjord sediments. The results of the study concluded that with less potentially bioavailable iron reaching the upper sediment layers, another negative feedback mechanism is formulated that will indirectly amplify the effects of climate change.

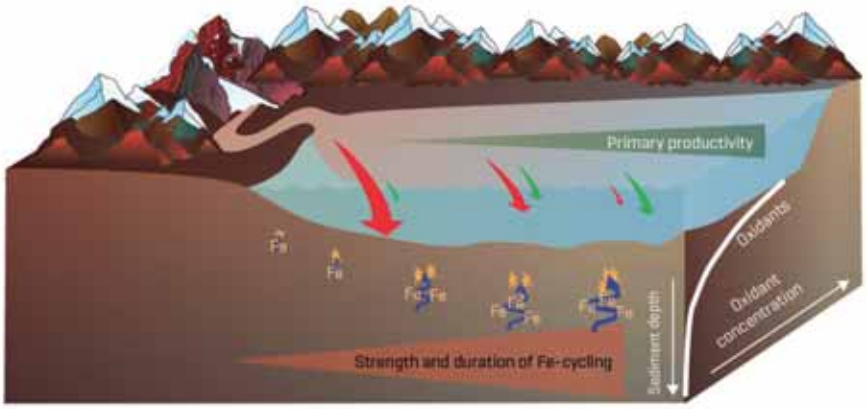

Figure 5/ Iron conversion diagram
Source/ https://www.geomar.de/en/news/article/sedimente-als-naehrstoff-vermittler-in-arktischen-fjorden

Conclusion

The GEOMAR Helmholtz Centre for Ocean Research Kiel is also an active member of many international organizations, such as the German Alliance for Marine Research (DAM), the German Marine Research Consortium (KDM), the German Climate Association (German Climate Consortium, DKK), European Marine Board, and Partnership for Observation of the Global Oceans (POGO). GEOMAR and the University of Kiel also work together to cultivate future marine scientists while cooperating with other universities around the world. The institute's research outcomes and approaches to international cooperation are worthy of reference by Taiwan's ocean research institutes as we strive to spark public interest in marine research. This will enable Taiwan's communities to gain a deeper understanding of the interrelationships between geophysical processes as we continue on our journey of discovering new knowledge and invaluable ocean resources.

References

[1] https://www.klbase.com/news/585334.html
[2] https://zh.wikipedia.org/wiki/%E5%9F%BA%E5%B0%94%E4%BA%A5%E5%A7%86%E9%9C%8D%E5%85%B9%E6%B5%B7%E6%B4%8B%E7%A0%94%E7%A9%B6%E4%B8%AD%E5%BF%83
[3] 自由時報，〈福島核廢水確定排入海 德國研究：57天內恐汙染大半太平洋！〉，2021年4月13日
https://news.ltn.com.tw/news/world/breakingnews/3498435
[4] Behrens, E., F.U. Schwarzkopf, J.F. Lübbecke and C.W. Böning, 2012: Model simulations on the long-term dispersal of ^{137}Cs released into the Pacific Ocean off Fukushima. Environmental Research Letters, 7
http://dx.doi.org/10.1088/1748-9326/7/3/034004
[5] https://www.geomar.de/en/centre/about-geomar
[6] Grevemeyer, I., L. H. Rüpke, J. P. Morgan, K. Iyer, C. W. Devey (2021): Extensional tectonics and two-stage crustal accretion at oceanic transform faults. Nature
https://doi.org/10.1038/s41586-021-03278-9
[7] https://www.geomar.de/en/news/article/ein-neuer-blick-auf-die-plattentektonik
[8] Laufer-Meiser, K., A. B. Michaud, M. Maisch, J. M. Byrne, A. Kappler, M. O. Patterson, H. Røy & B. B. Jørgensen (2021): Potentially bioavailable iron produced through benthic cycling in glaciated Arctic fjords of Svalbard. Nature Communications 12, 1349 (2021)
[9] https://www.geomar.de/en/news/article/sedimente-als-naehrstoff-vermittler-in-arktischen-fjorden

Germany's "Federal Spatial Planning Act" and Maritime Spatial Planning

Chen-Ju Chen (Associate Professor, Department of Law, National Chengchi University)
Translated by Linguitronics
Keywords: Federal Spatial Planning Law, Maritime Spatial Planning, EU Directive for Maritime Spatial Planning

Due to the multiple roles played by the ocean in the economic, social and environmental aspects, the use of sea areas often entails conflicts of interest among users. "Maritime spatial planning" has the effects of balancing the competitive relationships of different interest, coordinating the interests of different sea users as a forward-looking planning tool. This is also true in Germany.

Germany's main coastal system is located in the two regional oceans of the North Sea and the Baltic Sea. In the North Sea, internal waters and territorial waters comprise an area of approximately 12,500 square kilometers, while the Exclusive Economic Zone is approximately 28,500 square kilometers; within the Baltic Sea, internal and territorial waters are approximately 10,900 square kilometers while the Exclusive Economic Zone has an area of approximately 4,500 square kilometers [1]. Compared to other European coastal countries, Germany is not a traditional maritime country. The nation rarely engages in traditional uses of the sea. As the sea was not originally used for large-scale industrial development, it remains open and pristine. However, with industrial development, technological advancement, economic demand and other factors beginning to escalate, the entire ocean expanse ranging from territorial waters within 12 nautical miles to the entire Exclusive Economic Zone within 200 nautical miles has become a target of development. Under this premise, Germany's maritime spatial planning can be divided into two parts, which are described as follows.

Domestically, within the scope of internal waters and territorial waters

Germany's internal waters and territorial waters are mainly located in the three coastal states, including: Niedersachsen, Mecklenburg-Vorpommern, and Schleswig-Holstein. The local governments of these states engage in the spatial planning of inland waters and territorial waters in accordance with the general specifications of the "Federal Spatial Planning Act" (Raumordnungsgesetz), and integrate their respective sea areas into their overall policies for land use and spatial planning. Spatial planning for the sea areas of these three states can be analyzed as follows:

The Schleswig-Holstein State Development Plan (Schleswig-Holstein Landesentwicklungsplan), as a spatial planning plan, covers the objectives and principles of land and sea spatial planning, and is legally binding. Guided by sustainable spatial development, the aim of the plan is to balance the social and economic needs of space and its ecological functions. Different uses of coastal areas should also be adapted to each other to achieve a balance; as such, an integrated coastal management plan plays a crucial part of the process. The state's development plan came into effect in 2010, and the latest revision was made in 2019. Under the framework of this state development plan, which is regarded as having "Dachplan" status, 5 regional projects (Regionalpläne) have been formulated which are expected to be adjusted to 3 regional projects in the future with the main considerations being the different development traits of each district. Principles and goals are set through spatial planning, and then weighed by the regional planning authority. The aforementioned state development plans and regional

plans are formulated by the state planning authority through public participation and consultation procedures, including the participation of the State Planning Committee (Landesplanungsrat), and finally approved by the State Council (Landtag). In terms of zoning, sea areas are categorized into three types, priority areas (Vorrangsgebieten), reserve areas (Vorbehaltssgebieten) and suitable areas (Eignungsgebieten), just as sea areas for wind power generation, water resources protection, or nature and leisure are distinguished from each other. Priority areas refer to areas used for a specific, spatially important function or purpose, and other uses that are incompatible with its priority function or purpose should be excluded; reserve areas mean that, when the area has important functions or uses, special attention should be paid to these important functions or uses of the area if there is a conflict of multiple uses; in terms of suitable areas, if specific suitable areas are designated for related uses in the spatial planning, other areas in the spatial planning shall exclude use for these purposes [2].

As for the Mecklenburg-West Pomerania State Development Plan, plans for sea areas within the scope of 12-nautical mile territorial waters were made between 2003 and 2005 and formally adopted in 2005. Further amendments were made between 2013 and 2015, and adopted in 2016. This plan is evaluated every 5 years, and a monitoring system is also being established [3].

The Lower Saxony State Development Plan comprises primarily relevant provisions on wind power generation, nature conservation, offshore power transmission and shipping. Regarding its coastal areas and territorial waters, it emphasizes the application of relevant principles, including: sustainable development, due consideration of the views of different stakeholders, and the adoption of reversible measures. To date, this plan has undergone numerous revisions and has different versions. As the plan also involves international factors, negotiations with the Netherlands were also necessary so in addition to domestic public participation and consultation [4].

Internationally, within the scope of the Exclusive Economic Zone

Maritime spatial planning in the Exclusive Economic Zone is under the jurisdiction of the federal government, and the German Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie, BSH) is responsible for the implementation of the Germany' maritime spatial planning in the North Sea and Baltic Sea Exclusive Economic Zones. The legislative basis for the maritime spatial planning of German Exclusive Economic Zone is still the "Federal Spatial Planning Act," which was amended in 2004 to extend the scope of application to the Exclusive Economic Zone. Another amendment was made in 2017 in response to the framework promulgated under the 2014 EU Directive for Maritime Spatial Planning (2014/89/EU).

Compared with its internal waters and territorial waters, the German Exclusive Economic Zone is not entirely within the country's jurisdiction. As Exclusive Economic Zones essentially belong to international waters, spatial planning for this sea area must be made in accordance with the UN Convention on the Law of the Sea. For example, in accordance with Article 58(1) of the Convention, it is necessary to ensure that relevant countries still enjoy the freedom of the seas in the Exclusive Economic Zones of coastal states, including: freedom of navigation and overflight, freedom to lay submarine cables and pipelines, and other international lawful uses of the ocean related to these freedoms, such as those related to the operation of ships and aircraft and the use of submarine cables and pipelines as well as others uses that comply with other provisions of this Convention. Therefore, spatial planning in the Exclusive Economic Zone should entail only "limited spatial planning" (eingeschränkte Raumordnung), as the specifications and uses of this sea area are primarily limited to related economic and scientific uses, ensuring the safety and convenience of navigation, and protecting the marine environment [5].

As early as 2009, the German Federal Ministry of the Interior (Bundesminister des Innern, für Bau und Heimat, BMI) began to carry out maritime spatial planning for this sea area with the assistance of the German Federal Maritime and Hydrographic Agency. Relevant amendments were performed in 2019 in response to the aforementioned "EU Directive for Maritime Spatial Planning," which requires all coastal Member States to complete maritime spatial planning by 2021. Under this normative framework, Germany's maritime spatial planning for its Exclusive Economic Zone is also being established in an extensive consultation process which includes incorporating the opinions of relevant authorities, associations or private sectors into the different stages of the planning process for evaluation. As of today, new versions of the plan are still under revision.

In the German Exclusive Economic Zone, plans can be divided into two types depending on the location of the sea area, including: 1. Spatial Planning for the Germany' Exclusive Economic Zone in the North Sea (Raumordnung in der deutschen ausschließlichen Wirtschaftszone in der Nordsee, AWZ Nordsee-ROV); 2. Spatial Planning for the Germany' Exclusive Economic Zone in the Baltic Sea (Verordnung über die Raumordnung in der deutslichen aus Wirtschaftszone in der Ostsee, AWZ Ostsee-ROV). In terms of planning, 10 major uses have been identified, covering both other new uses and traditional sea use, including shipping, non-living resources development, pipelines and submarine cables, marine scientific research, energy production (especially wind energy), fisheries and mariculture, marine environment, military use, leisure and tourism, and ammunition storage sites and sediment deposition sites. In the Baltic Sea, passage between Denmark and Germany through the Fehmarn Belt (Fehmarnbelt) constitutes another form of sea use. Through planning and the formulation of a framework, clear goals and principles are established. Among them, it is believed that offshore wind power is conducive to the country's strategy of sustainable use and protection of the ocean; therefore, it is in Germany's interest to reconcile the conflict between this new use of the ocean and other traditional uses. These plans not only emphasize extensive domestic public participation, negotiations with neighboring countries are also indispensable due to the highly internationalized nature of the region. These negotiations include informing the intention of maritime spatial planning, providing written information for negotiation of relevant drafts, and convening international consultative conferences. These gestures even extend to engaging in negotiation procedures for strategic environmental impact assessments based on the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), including understanding the negative impacts on the marine environment of neighboring countries, especially protected areas. Ultimately, the plans will serve as the basis of relevant regulations for license issuance and project permits as well as provide geographic coordinates for relevant maps and zoning [6][7].

Draft maritime spatial plans for EEZ in the North and Baltic Seas (2020)
Source/ BSH
https://www.bsh.de/DE/THEMEN/Offshore/Meeresraumplanung/Fortschreibung/_Anlagen/Downloads/Entwurf_Raumordnungsplan.pdf?__blob=publicationFile&v=8

Conclusion

From the above descriptions, we can derive a clear picture of the characteristics of German maritime spatial planning, including:

I. Determination of boundaries: Since the 1960s and 1970s, Germany has successively completed the delimitation of maritime overlapping areas with neighboring countries, including Denmark, the Netherlands, Sweden, Poland and the United Kingdom, thus delineating the outer boundary of its Exclusive Economic Zone and facilitating maritime governance by eliminating the possibility of maritime disputes in these aspects.

II. Single legislation: The "Federal Spatial Planning Act" applies to German internal waters and territorial waters, and is further extended to its Exclusive Economic Zones. This approach to legislation can also serve as a reference for other countries. The advantage is that administrative agencies are familiar with the relevant legal system. When the plans then are extended to the further sea area, the implementation can thus be accelerated. Yet, this may due to that the German Exclusive Economic Zone is not as vast as that of other maritime countries. In addition, in terms of the distinction between central and local governmental jurisdictions, internal waters and territorial waters closely related to human activities are placed under local governmental jurisdiction. This approach echoes the spirit of integrated land-sea management.

III. Adoption of Conventional zoning: Following the development process and logic of the "Federal Spatial Planning Act," Germany's maritime spatial planning only distinguishing between internal waters/territorial waters and Exclusive Economic Zones enables Germany to take into account the spirit of integrated management while incorporating the frameworks provided by the Conventions.

IV. Giving due consideration to functional zoning and the priority of each area: In Germany's maritime spatial planning, the design of functions and uses as well as due consideration of the priority of application help to formulate a hierarchical framework and system.

V. Valuing domestic and foreign public participation: Throughout the entire process, plans were formed by professional agencies then placed under public participation and consultation procedures, showing that Germany values the participation and negotiation of the public and private sectors. The plans are then deliberated and approved by the chambers of parliament, thus realizing the principles of democracy. When plans involve international factors, Germany also conducts negotiation procedures with neighboring countries.

In sum, the aforementioned characteristics of German maritime spatial planning are worthy of reference when we carry out maritime spatial planning for Taiwan.

References

[1] European MSP Platform (2021). Germany
https://www.msp-platform.eu/countries/germany (Apr. 15, 2021)
[2] Schleswig-Holstein (2021). Landesentwicklungsplan Fortschreibung
https://www.schleswig-holstein.de/DE/Landesregierung/Themen/PlanenBauenWohnen/Fortschreibung_LEP/Projekt/projekt_node.html (Apr. 15, 2021); European MSP Platform (2021). Maritime Spatial Plan for the Territorial Sea of Schleswig – Holstein
https://www.msp-platform.eu/practices/maritime-spatial-plan-territorial-sea-schleswig-holstein (Apr. 15, 2021)
[3] Mecklenburg-Vorpommern (2021). Aktuelles Programm
https://www.regierung-mv.de/Landesregierung/em/Raumordnung/Landesraumentwicklungsprogramm/aktuelles-Programm/ (Apr. 15, 2021)
[4] European MSP Platform (2021). The Spatial Planning Programme for the Territorial Sea of Lower Saxony
https://www.msp-platform.eu/practices/spatial-planning-programme-territorial-sea-lower-saxony (Apr. 15, 2021)
[5] Bundesamt für Seeschifffahrt und Hydrographie, Meeresraumplanung
https://www.bsh.de/DE/THEMEN/Offshore/Meeresraumplanung/meeresraumplanung_node.html (Apr. 15, 2021)
[6] European MSP Platform, Maritime Spatial Plan of the German EEZ in the North Sea
https://www.msp-platform.eu/practices/maritime-spatial-plan-german-eez-north-sea (Apr. 15, 2021); Bundesministerium der Justiz und für Verbraucherschutz, Bundesamt für Justiz, Verordnung über die Raumordnung in der deutschen ausschließlichen Wirtschaftszone in der Ostsee (AWZ Ostsee-ROV), BGBl. I 2009, Nr. 78, S. 3861 vom 18. Dezember 2009, S. 1 – 31.
[7] European MSP Platform, Maritime Spatial Plan of the German EEZ in the Baltic Sea
https://www.msp-platform.eu/practices/maritime-spatial-plan-german-eez-baltic-sea (Apr. 15, 2021); Bundesministerium der Justiz und für Verbraucherschutz, Bundesamt für Justiz, Verordnung über die Raumordnung in der deutschen ausschließlichen Wirtschaftszone in der Nordsee (AWZ Nordsee-ROV), BGBl. I 2009, Nr. 61, S. 3107 vom 25. September 2009, S. 1 – 34.

國際海洋資訊

12 June 2021 雙月刊 Bimonthly

International Ocean Information

發行：海洋委員會

地址：806610高雄市前鎮區成功二路25號4樓

電話：(07)3381810

E-mail：master@oac.gov.tw

網址：https://www.oac.gov.tw/

執行：財團法人台灣經濟研究院

地址：104222臺北市中山區德惠街16-8號7樓

電話：(02)2586-5000分機888

傳真：(02)2595-7131

網址：http://www.tier.org.tw/

發 行 人：李仲威

副發行人：蔡清標、周美伍

總 編 輯：劉國列

編輯委員：黃向文、邱永芳、謝亞杰、沈建中、許啓業、王茂城、黃世偉、陳裕興、林麗英、陳致延、賴依雯

編輯顧問：高家俊、王毓正

執行主編：鍾嘉雯、陳璋玲

執行編輯：黃釋緯、洪承豐、李茗家、謝惠子

美編設計：不賴的廣告

電話：(02)2783-0978

傳真：(02)2783-3033

Published by Ocean Affairs Council

Address：4F., No. 25, Chenggong 2nd Road, Qianzhen District, Kaohsiung City 806610, Taiwan

Telephone：(07)3381810

E-mail：master@oac.gov.tw

Website：https://www.oac.gov.tw/

Executive：Taiwan Institute of Economic Research

Address：7F., No. 16-8, Dehuei St., Jhongshan District, Taipei City 104222, Taiwan

Telephone：(02)2586-5000 Ext.888

Fax：(02)2595-7131

Website：http://www.tier.org.tw/

Publisher：Chung-Wei Lee

Associate Publisher：Ching-Piao Tsai, Mei-Wu Chou

Editor-in-Chief：Kuo-Lieh Liu

Editorial Board：Hsiang-Wen Huang, Yung-Fang Chiu, Ya-Chieh Hsieh, Chien-Chung Shen, Chad C.Y. Hsu, Mao-Chen Wang, Shin-Wei Huang, Yu-Hsing Chen, Li-Ying Lin, Chih-Yen Chen, Yi-Wen Lai

Reviewer：Chia-Chuen Kao, Yu-Cheng Wang

Managing Editor：Chia-Wen Chung, Chung-Ling Chen

Executive Editor：Shi-Wei Huang, Cheng-Li Hung, Ming-Chia Lee, Hui-Tzu Hsieh

Designed by Pride Advertising Agency Ltd.

Telephone：(02)2783-0978

Fax：(02)2783-3033

讀者意見回饋，請來電(02)2586-5000分機888或E-mail至d11743@tier.org.tw

國際海洋資訊

12
June 2021
Bimonthly

International Ocean Information

封面：德國漢薩帆船節於Warnemünde港舉辦；封底：臺灣浮臺式洋流發電機組

中華民國110年6月出版（每雙月出版）
中華民國108年8月創刊
ISSN 2706-638X （紙本）
ISSN 2706-6398 （電子）
中華郵政高雄雜字第236號執照登記為雜誌交寄
高雄郵局許可證 高雄字第2084號

線上全文

海洋委員會 Ocean Affairs Council 發行

台灣經濟研究院 Taiwan Institute of Economic Research 編印

贈閱