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ISSUE BRIEF

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Toward a Sustainable Peace in the South China Sea

Confidence, Dependence, and Meteorology

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The South China Sea (SCS) has been, and remains, an area rife with tension. Disputes among SCS states stem from unresolved issues relating to sovereignty, exclusive economic zones (EEZs), natural resources, and acceptable uses of the military. In the past two decades, fishing boats have been detained or damaged, fishermen and sailors arrested or killed, and artificial islands constructed for military purposes. These years of strife have led to the current SCS state of play: it is a vitally important region where competition is high and trust is low.

Yet, within this turmoil lies an opportunity. Although each SCS state encounters a unique array of challenges, they all face one common threat: the high probability of severe weather and natural disasters. Many natural disasters occur in the SCS and its surrounding states in East Asia each year, including typhoons, heavy rainfalls, earthquakes, tsunamis, and more. Recent examples include Taiwan's Typhoon Morakot in 2009 and Japan's Sendai earthquake and tsunami in 2011. On November 8, 2013, Typhoon Haiyan hit the Philippines. In that case, the severe storm caused more than 6,300 deaths, and affected more than 1.4 million families in the eastern part of the country.[1] As the climate continues to change, such extreme weather events are likely to be even more severe, last longer, and cover more ground than before. This makes it less likely for the littoral regions of SCS states to be resilient—especially in the growing seaside urban areas—and will prove a major hurdle for their navies and coast guards. By itself, no SCS state—regardless of its individual power—can mitigate the dangers posed by this weather. Together, though, these states can prepare for the coming storms. SCS states have an imperative to avert humanitarian disasters resulting from severe weather changes and work toward making the region one of greater mutual confidence and mutual dependence.

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Current Security Challenges: HA/DR Operations as Example

This issue brief argues that SCS countries need to work toward a "mutual confidence" (MC) and "mutual dependence" (MD) end state. In particular, the paper focuses on sharing meteorological data to support humanitarian assistance and disaster relief (HA/DR) operations, including search and rescue operations, foreign disaster relief goods delivery, and medical care. When disasters occurred, the disaster reduction units/organizations of the governments would usually coordinate the entire HA/DR operations to confirm the disaster situations, decide the projection of resilient forces, collect and distribute domestic/international donation and goods, and suggest better relief works preparing for further disasters. In the case of Typhoon Haiyan, one year after the disaster, the Philippines government announced a reconstruction plan of 3.8 billion USD that has been approved to design and rebuild the shattered typhoon belt during the next two

1 Government of Philippines, "Typhoon Yolanda: a Year Later," http://www.gov.ph/crisis-response/updates-typhoon-yolanda/.

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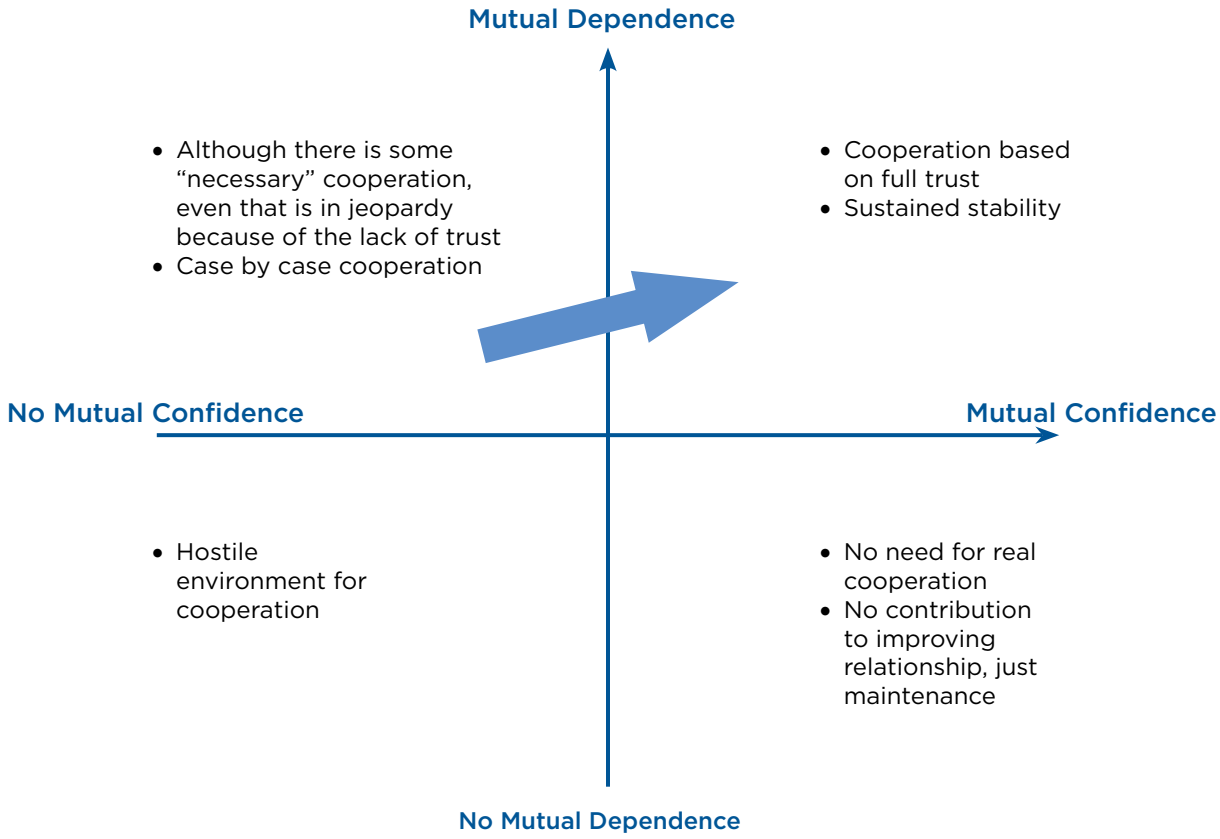


Graphic 1. Mutual Confidence and Mutual Dependence in the SCS

years. The government reported it has already spent 914 million USD on Haiyan relief. Yet, people are still waiting for long-term improvements such as storm-proof houses and durable highways.[2] Upon closer inspection, it is apparent that no single state may fully address the people's needs by means of budget or technology. These states are eager for regional countries' help that, should an MC/MD environment be achieved, would become more readily available and a norm among SCS states.

A MC/MD relationship between two SCS states would help mitigate regional conflicts or disputes, which in turn can help lead to a more peaceful region. Today, the SCS is best described as the scenario in the top-left quadrant of Graphic 1 (see above)—a region of mutual dependence but with little-to-no confidence among SCS states. The challenge for regional actors, then, is to move from the top-left to the top-right section—a region defined by MC/MD relationships among the area's actors.

Reaching this status quo in the SCS is of vital importance. Yet, past storms in the SCS continue to cause huge losses of life and property, and infrastructure damage. For example, Typhoon Feng-wong caused heavy rainfall and floods affecting more than half a million families in the northern Philippines in 2014, and then turned to Taiwan. This year, Typhoon Soudelor hit Taiwan, causing damages and casualties. In response, each state did its best to conduct search and rescue operations to save what it could, but all of them still lacked the requisite technological ability to monitor the dynamic and dangerous storm conditions. The lack of these capabilities precluded government officials from predicting, detecting, and tracking the weather, especially with regard to forecasting when and where the storms would hit lands. Barriers to formulating effective responses to severe weather and natural disasters in the SCS include:

- **Regional states do not efficiently and effectively operate in the SCS**. Encompassing an area of around 1.4 million square miles, the SCS is a vast maritime domain. However, the SCS has only eight weather stations, making it nearly impossible to understand dynamic changes in the weather (see table 1).[3] Compared

2 "Typhoon Survivors Wait on Aid from Manila," *Wall Street Journal*, A14, November 7, 2014; Readiness and Resilience: Lessons Learned One Year after Typhoon Haiyan, conference held by Center for Strategic and International Studies (CSIS), Washington, DC, November 19, 2014.

3 National Weather Service, National Oceanic and Atmospheric Adminis-

	Station names	WMO index number	Area	Surface observation	Upper-air observation
China	Xisha Dao	59981	Paracel	X	X
	Sanhu Dao	59985	Paracel	X	X
	Yongshujiao	59995	Spratly	X	-
Taiwan	Dongsha	46810	Pratas	X	X
	Nansha	46902	Spratly	X	X
Vietnam	Song Tu Tay	48892	Spratly	X	X
	Huyen Tran	48919	Spratly	X	-
	Truong Sa	48920	Spratly	X	X

Table 1. Weather Stations in the South China Sea

with the larger number of weather stations in the big cities and other areas, those on the ocean surface of the SCS are relatively low. The reason for the low number of weather stations is that the SCS has a sparse distribution of islands; sovereignty disputes impede the placement of more stations; and the costs of maintaining and updating these stations are too high. An increased number of large weather station systems, though, would provide critical data for the users and allow that information to be sent to regional meteorological centers, designated by the World Meteorological Organization (WMO), an agency of the United Nations (UN). The WMO is the UN's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces, and the resulting distribution of water resources.[4] According to the main standard times by the WMO, the weather data exchange mechanism shall include surface observations every six hours (12:00 a.m., 6:00 a.m., 12:00 p.m., and 6:00 p.m. Coordinated Universal Time (CUT)), and upper-air observations every twelve hours (12:00 a.m. and 12:00 p.m. CUT).[5] Therefore, people around the world can share the whole data set periodically. However, only three of the eight weather stations are currently operating at the requisite level due to a lack of maintenance (Xisha Dao, Dongsha, and Nansha can be examined by analyzing the surface weather charts[6]). Thus, the observation data are not sufficient to cover the entire SCS surface.

- **SCS states have let marine environment professionalism dwindle.** Due to a multitude of regional security issues, SCS states have long neglected the allocation of needed resources for properly managing the marine environment. SCS states have been more focused on issues regarding sovereignty, maintaining free and open sea lanes, counter-piracy and terrorism, as well as halting illegal immigration. Although tackling these challenges is important, the neglect of the natural maritime-domain problems has been costly. Today, much of the infrastructure of coastal cities in the SCS area is not well protected against potent storms. Furthermore, the massive area is not completely safe for one of the busiest and most important sea lanes for global maritime transportation that navigates the SCS.[7] SCS states continue to neglect these issues at their own peril.

- **Residents in the SCS states currently have little to protect themselves from severe weather.** Citizens worldwide are generally unprepared to deal with severe weather situations, and it is difficult to teach resilience against these storms. In the SCS specifically, the general unpreparedness is coupled with limited infrastructure to protect citizens from harsh weather. Thus, there is marginal utility in teaching outdated resiliency and survival courses to SCS populations structurally at risk, especially for those coastal residents facing tsunamis or typhoons from the sea. For example, when the 2011 Sendai tsunami hit Japan, the coastal infrastructure was too vulnerable to survive the flooding. After that, Japan invested in the construction of a

tration, http://www.nws.noaa.gov/tg/siteloc.php.
4 World Meteorological Organization, http://www.wmo.int/pages/about/index_en.html.
5 World Meteorological Organization, *Manual on the Global Observing System:, Volume 1-Global Aspects,* 2010 ed., updated 2013, https://drive.google.com/file/d/0BwdvoC9AeWjUV2dIQmlSUkpOYm8/edit.
6 Central Weather Bureau in Taiwan, "Current Weather Chart," http://www.cwb.gov.tw/V7e/forecast/fcst/104.htm.

7 Serena Dai, "A Map of the World's Shipping Lanes," *Atlantic Wire*, June 20, 2012, http://www.thewire.com/global/2012/07/see-map-worlds-shipping-lanes/54847/.

massive network of ocean bottom sensors and tidal gauges to improve the estimation of earthquakes. The seismic network can prevent missed estimates, and help answer some of the fault's behavior near the surface that is a missing gap in the numerical models.[8] Besides, this network's experience can provide more accurate early warnings, allowing SCS citizens to better prepare for disaster survival, and over time improve environmental education. Due to the large number of people in the region, this will require a massive undertaking by SCS state governments.

To sum up the challenges, the unreliability of marine environmental predictions and lack of bilateral and multilateral collaboration will reduce the effectiveness of SCS HA/DR operations. Therefore, it behooves SCS states capable of advanced technological development to join a regional framework to share environmental data. For the purpose of maximizing environmental observation, an array of buoys loading with automatic atmospheric, oceanographic, and seismographic instruments can be placed on the ocean surface, which can be connected with the current weather stations, filling the data gap. Moreover, the island-based weather radars, unmanned aerial/underwater systems, and international projects can be other options to improve the quantity and quality of observations. This would not only decrease the financial burden on individual SCS states, but it would also provide important information to ships and aircrafts navigating the area. For example, each SCS state needs tsunami early warning capabilities to produce viable contingency plans for those tsunamis caused by submarine earthquakes or volcanic eruptions. No SCS state can escape this possibility, as almost all of the region's states are geographically located on or near the earthquake belt in the Pacific. Precise observation and analysis requires further investment in vital (and expensive) equipment and technology, as well as their maintenance. These systems require more collaboration to be most effective. A joint-purchasing program would thus best suit SCS states.

Strategic Goals for the South China Sea

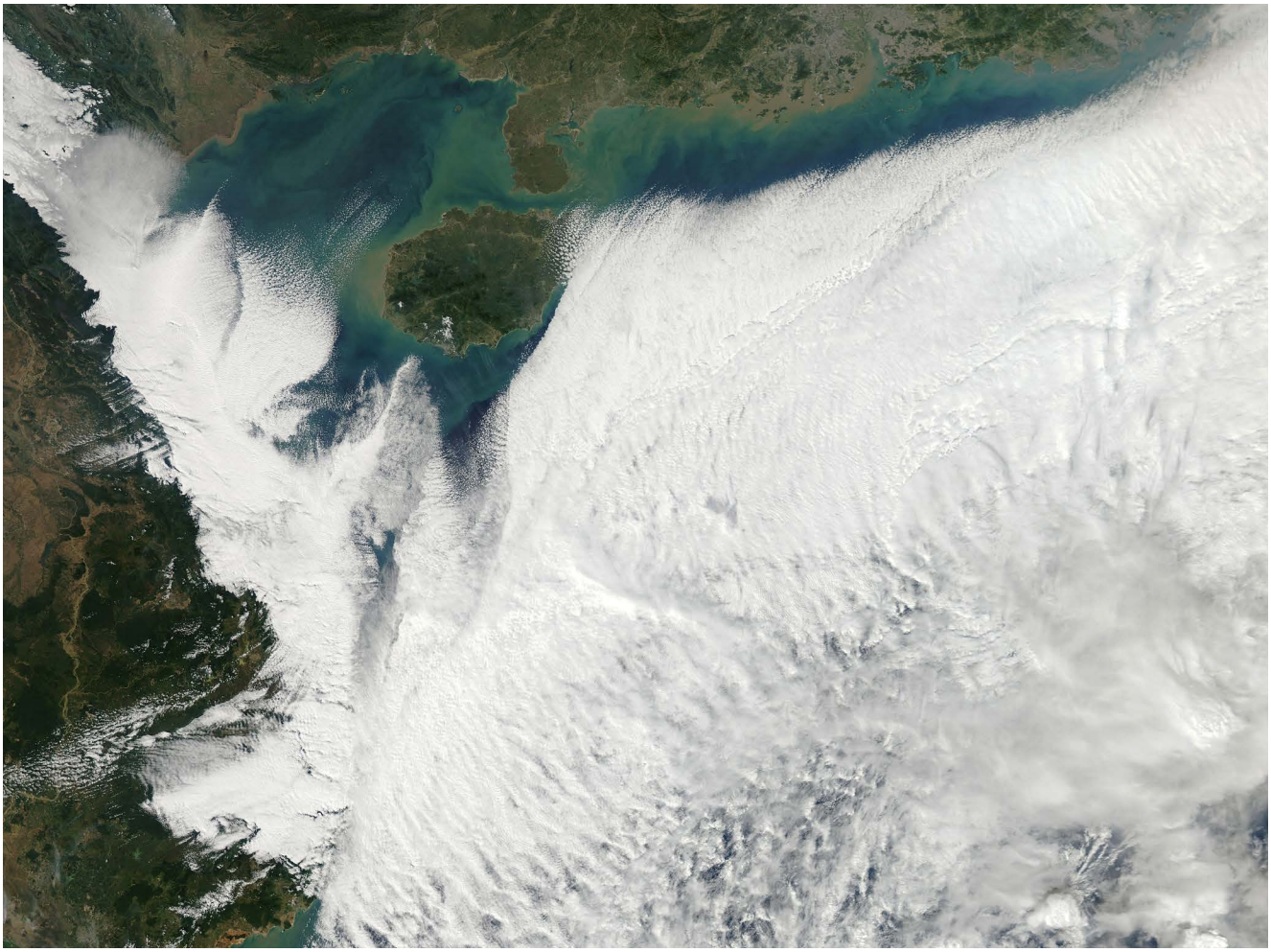
Leveraging the data-sharing of marine meteorological information would help prevent disasters and control damage, which may be a possible way to contribute toward a regional MC/MD end state. In order for SCS states to achieve a region characterized by MC/MD and effective use of meteorological information, they should implement three strategic imperatives:

- **Redesign environmental education.** Increasing civilians' training for, and understanding of, severe weather can improve their survival capabilities, as well as help others in the event of a natural disaster. People should be well-trained and possess the survival skills to adapt to environmental change. There is a need for high-quality formal classes and self-training programs to be accessible to companies, schools, families, and individuals. SCS states should provide these newly updated training courses to any citizen, but primarily to those who live in the coastal areas. Training sessions should focus on sharing previous experiences of dealing with environmental disasters, disseminating information, understanding weather warnings, providing assistance as a storm approaches, using foreign support, and helping with HA/DR operations after the disaster. These seminars would allow for both domestic and international awareness, understanding, and, ultimately, cooperation and confidence. Over time, trainees will realize that their regional safety is dependent on neighboring governments and individuals as well as on their own societies.

- **Update disaster contingency plans.** Renewing contingency plans used before and after disasters will help put in place the requisite security infrastructure and improve early warnings. Ensuring governments and publics are well prepared for dangerous and dynamic weather will ensure basic human needs are met quickly, especially the provisions of food, water, electricity, and communication networks. This also allows for HA/DR operations to proceed unabated. Furthermore, having the right plans and procedures in place will help commanders of relief troops to make well-informed decisions. Besides, SCS states should conduct multinational joint missions to test the performance of the data-sharing mechanisms. And, in the case of a major weather event, the most affected state should lead the coordination of HA/DR operations while working closely with regional partners, along with nongovernmental organizations, that can fill gaps in care.

- **Develop regional, multilateral agreements for data-sharing and HA/DR operations for natural events.** Developing regional, multilateral agreements for countries to conduct HA/DR operations and share

8 Becky Oskin, "Two Years Later: Lessons from Japan's Tohoku Earthquake," *LiveScience*, March 10, 2013, http://www.livescience.com/27776-tohoku-two-years-later-geology.html.



Tropical depression developing over the South China Sea in 2011. *Photo credit:* NASA.

data is vital for reaching a state of MC/MD. The collection and dissemination of environmental information would decrease the uncertainty involved in predicting environmental events and SCS states' plans for dealing with them. SCS states should work on creating an integrated data and early-warning system that adequately provides information to aid command and control. While SCS states have developed abilities over time to observe the environment, they can only collect, analyze, and use all pertinent data covering their occupied territory and surrounding area. An agreement that promotes and regulates data-sharing would encourage mutual dependence (because SCS states need each other to get the full picture) and mutual confidence (by having states work closely together to save lives). In addition, SCS states would have more precise data and save costs by sharing through a WMO-regulated system. Remote-sensing and weather-prediction systems could also be distributed to help improve forecasting during both normal and disaster periods.

The Role of Marine Meteorology

States surrounding the SCS should take responsibility for monitoring the environment in a regionally collaborative fashion. However, marine meteorology is not just used to provide daily weather reports. In addition to staying informed, SCS region citizens can leverage modern information technology to enhance the research and development of an informal data-exchange mechanism that meets international standards.

For marine meteorology to play its intended role, however, certain steps must first be taken. Luckily, there are some simple approaches to ensuring marine meteorological data can be shared, helping the region reach the desired MC/MD end state.

- All data should meet the standards regulated by the WMO to ensure the necessary quality and quantity of information, including the data's format and observation time.
- Data exchanges must focus primarily on severe weather. They should contain analysis and forecasts on atmospheric developments as well as ship and aircraft movements. This data can come from satellite and radar sensing as well as statistical predictions of meteorological and oceanographic events.
- Observed data should be made public for local government and private-citizen use.
- States outside the SCS area with mature severe weather observational capabilities should be invited to join the joint-monitoring missions for technical support.
- SCS states should take turns serving as leaders of joint-monitoring missions. All states, though, should share budgetary and financial risks, especially during periods of severe weather.

To ensure that meteorological data is successfully integrated into a shared system, limited resources must be appropriately allocated among SCS states. Within the first five years, investments should be used to ensure the data-sharing mechanism remains operational. Over time, weather stations will need upgrades in order to better observe the entire SCS. Furthermore, resources should be used to enhance international usage of technology, scientific education, and subject-matter expertise. After the initial five years, SCS states should work toward creating a sustainable quality and quantity of weather information via the data-sharing mechanism. This will lead to greater situational awareness of the SCS for years to come. Efficient administration of this massive amount of data will be needed, including the storage, capture, transfer, and maintenance of information privacy. Open data could be leveraged to provide easy access to the marine meteorological data network, thereby enhancing the advantages of regional communication and conflict avoidance.

Conclusion

In the past, the SCS area has witnessed terrible tragedies due to a lack of understanding of how to deal with natural disasters, such as people's misunderstanding or ignoring the warning information of severe weather, and deciding to stay in their homes in direct violations of the governments' security evacuation plans. With greater sharing of meteorological data and greater environmental-disaster education for the regional populations, the immense human and financial losses resulting from environmental disasters can be minimized.

For this to happen, SCS states must prioritize national and regional security over their disagreements and disputes. If they did so, these states would realize the effect of severe weather preparedness to their overall well-being. Currently, not all SCS states are willing to share comprehensive environmental information with regional state and nonstate actors. However, they can only face these challenges if they work together to build MC/MD through preparation for disasters and meteorological data-sharing.

The more methods SCS states have to build relationships with one another, especially during these tense times, the more regional and global security can be assured. Most importantly, it will help save the lives of SCS citizens placed in harm's way by nature's awesome power.

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