THE GEOPOLITICS OF POWER: UNDERSTANDING CHINA'S MILITARIZATION OF THE SOUTH CHINA SEA

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THE GEOPOLITICS OF POWER: UNDERSTANDING CHINA'S MILITARIZATION OF THE SOUTH CHINA SEA

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ABSTRACT

The South China Sea (SCS) has become an international focal point in recent years largely due to China's reclamation and militarization of island features in contested waters. Many pundits, journalists, analysts, and researchers distill the motivation behind China's activities, and the broader SCS international disputes, down to control of and access to resources—primarily fisheries and hydrocarbon reserves—and shipping routes. Most scholars and experts on the region agree that these factors play an important role; however, many also point to broader motivations for China's staunch defense of its "national sovereignty." Nonetheless, a key element is often lacking in many of the most thorough analyses of the SCS conflicts: the geographic perspective. A wide range of publicly-available spatial data makes such an assessment possible. This thesis examines the existing body of scholarly work on the SCS, its significance, and causes of conflict; assesses the main hypotheses for China's militarization of contested features in the SCS geographically; and ultimately places each hypothesis within the broader framework of China's practical and strategic considerations.

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CHAPTER I

CHINA'S MILITARIZATION OF THE SOUTH CHINA SEA

Introduction

In the years that followed World War II, China, Indonesia, Malaysia, the Philippines, and Vietnam rushed to occupy territory in the South China Sea (SCS). The SCS islands and other features,[1] including those classified under international law as rocks or low-tide elevations, have long been contested by regional states as well as external powers. While many of these features may at first appear to be little more than navigation hazards, their recognized possession can give their owners access to the surrounding marine territory and its resources. Around the 1990s, disputes between claimants turned from strictly territorial concerns to conflict based on resources.[2] As populations grew throughout East Asia, demand for seafood and hydrocarbons, particularly crude oil, increased drastically. Controlling maritime territory meant controlling these resources and others, such as phosphoric acid and lime mines on islands, metallic ores on the seafloor, and other potential seabed resources.[3] More recently, conflicts in the SCS have developed beyond access to territory and resources into a strategic rivalry between China with its growing military capabilities and the United

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[1] This thesis will refer to features as a broad term encompassing islands, rocks, low-tide elevations (including as rocks, shoals, reefs, and atolls submerged at high tide), and artificial islands and their structures.

[2] Leszek Buszynski, "The South China Sea: Oil, Maritime Claims, and the U.S.-China Strategic Rivalry," *The Washington Quarterly* 35, no. 2 (2012): 139, doi: http://dx.doi.org/10.1080/0163660X.2012.666495.

[3] Anders Corr, *Great Powers, Grand Strategies: The New Game in the South China Sea* (Annapolis: Naval Institute Press, 2018), 6.

States over its continued regional presence.[4] Concerns regarding this rivalry have fueled Chinese fears that the United States may impede the flow of trade in the SCS to punish China while many Western observers fear that existing conflicts in the SCS may disrupt global trade.

China's growing economic power has fueled its military expansion and while China has emphasized that its ascent is peaceful, its actions in the SCS indicate otherwise. In 2015, President Xi Jinping stated in a joint press conference with Barack Obama: "We're committed to respecting and upholding the freedom of navigation and overflight that countries enjoy according to international law. Relevant construction activities that China are [*sic*] undertaking...do not target or impact any country, and China does not intend to pursue militarization."[5] The relevant construction activities Xi referenced were China's island-building activities in the SCS, specifically in the Spratly Islands[6] in the eastern-central SCS. Although China lays claim to most of the SCS, China does not occupy all the features in the region but engages in ongoing disputes with its neighbors. Those features China claims and controls in the Paracel Islands (northwest SCS) and Spratly Islands are shown in Figure 1.

[4] Buszynski, "The South China Sea," 139-140.

[5] Xi Jinping, "Remarks by President Obama and President Xi of the People's Republic of China in Joint Press Conference," (press conference, Washington, DC, September 25, 2015), The White House, https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/remarks-president-obama-and-president-xi-peoples-republic-china-joint.

[6] The various SCS claimants refer to the islands and features in the SCS by many different names based on language and convention. This thesis will use the names referenced in English-language writings.

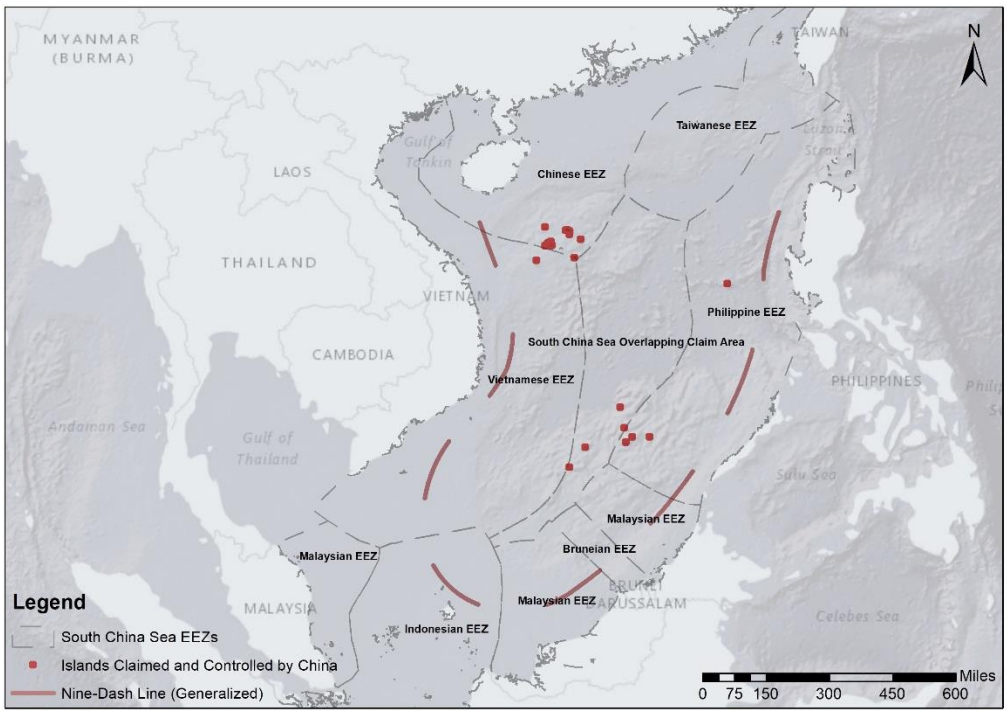

Figure 1. China's nine-dash line and territorial claims in the South China Sea and regional Exclusive Economic Zones.
Source: *Chinese Maritime Territory Claims* [map]. March 2019. 1:15,000,000; generated by the author using *ArcGIS* Version 10.6.

Some of China's island claims, including all of China's claims in the Spratly Islands, fall within hotly contested maritime space. China's declaration of a sweeping "nine-dash" line claim encompasses most of the SCS.[7] Likewise, Taiwan maintains the same claim as mainland China based on maps made by the Kuomintang (KMT) government of the Republic of China before it retreated to Taiwan.[8] The lines drawn by the KMT government were adopted by the Communist Party on subsequent maps once the Party came to power over the mainland in 1949.[9] In addition, Vietnam claims both the Spratly and Paracel islands;

[7] China's claims are referred to by many names, including the "dashed-line," the "dotted line," the "cow's tongue," the "U-shaped line," and the "nine-dash line." This thesis will refer to this claim as the nine-dash line, which is the most common term used in literature on the SCS maritime disputes.

[8] Peter Dutton, "Three Disputes and Three Objectives: China and the South China Sea," *Naval War College Review* 64, no. 1 (2011): 44, https://digital-commons.usnwc.edu/nwc-review/vol64/iss4/6.

[9] Dutton, "Three Disputes and Three Objectives," 44.

Malaysia claims features in the southern Spratlys; Brunei quietly maintains several claims in the southern SCS; and the Philippines claims much of the eastern Spratlys.[10]

The Chinese Government issued two *notes verbales* to the United Nations Secretary General in 2009 stating that China exercises "indisputable sovereignty" over the SCS islands and their adjacent waters, including sovereign rights and jurisdiction over these waters and the seabed, with an attached map to demonstrate these claims.[11] The attached map featured nine line segments, similar to those presented in Figure 1. Two years later, China issued another *note verbale* that added, "China's sovereignty and related rights and jurisdiction in the South China Sea are supported by abundant historical and legal evidence."[12] China's historical claims were found incompatible with international law—the 1982 United Nations Convention on the Law of the Sea (UNCLOS)—by the Permanent Court of Arbitration (PCA) in The Hague. In *The Republic of the Philippines v. The People's Republic of China*, the PCA sided with the Philippines, which brought the case against China to the international court. The PCA concluded in 2016 that, "to the extent China had historic rights to resources in the waters of the South China Sea, such rights were extinguished to the extent they were incompatible with the Exclusive Economic Zones (EEZs) provided for in the Convention [UNCLOS]."[13] China emphatically rejected the ruling. UNCLOS established EEZs as features

[10] Dutton, "Three Disputes and Three Objectives," 44.

[11] U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, *China: Maritime Claims in the South China Sea* (Washington, DC, 2014), https://www.state.gov/documents/organization/234936.pdf.

[12] U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, *China: Maritime Claims in the South China Sea*.

[13] Permanent Court of Arbitration, "Press Release: The South China Sea Arbitration (*The Republic of the Philippines v. The People's Republic of China*)" July 12, 2016, https://pca-cpa.org/wp-content/uploads/sites/6/2016/07/PH-CN-20160712-Press-Release-No-11-English.pdf.

of international law that grant coastal states rights to waters extending up to 200 nautical miles from their land territories, giving these states regulatory rights over economic activities within their EEZs.[14] These economic activities include fishing and hydrocarbon (oil and gas) exploration. Within the EEZ, states also have contiguous zones that extend 24 nautical miles from land that are considered international waters, and territorial seas that extend 12 nautical miles from land that are considered sovereign territory and include the airspace above and the seabed below these territorial waters.[15] UNCLOS notably does not grant coastal states the right to regulate foreign military vessel activity within their EEZs beyond their 12-nautical-mile territorial seas, although China and a minority of other states contest this protection for foreign vessels.[16] Under UNCLOS, all ships—both military and civilian—have rights to innocent passage through the territorial seas of other countries.[17] Innocent passage requires that vessels move through territorial seas directly; vessels are not required to provide advance notice or obtain permission to pass through these waters.[18] States' 24-nautical-mile contiguous zones and 200-nautical-mile EEZs are considered international waters in which free navigation, whether civilian or military, cannot be limited.[19]

While a state's shoreline grants it a territorial sea (12 nm), a contiguous zone

[14] Ronald O'Rourke, *China's Actions in South and East China Seas: Implications for U.S. Interests—Background and Issues for Congress*, CRS Report No. R42784 (Washington, DC: Congressional Research Service, 2019), https://crsreports.congress.gov/product/pdf/R/R42784.

[15] Eleanor Freund, "Freedom of Navigation in the South China Sea: A Practical Guide," Belfer Center for Science and International Affairs, Harvard Kennedy School, June 2017, https://www.belfercenter.org/publication/freedom-navigation-south-china-sea-practical-guide.

[16] O'Rourke, *China's Actions in South and East China Seas*.

[17] Freund, "Freedom of Navigation."

[18] Freund, "Freedom of Navigation."

[19] Freund, "Freedom of Navigation."

(territorial sea and 12nm in addition), and an EEZ (200 nm), maritime features classified as islands also grant rights to these same maritime zones.[20] Features classified as rocks generate a contiguous zone (24 nm total) and low-tide elevations generate no maritime zones.[21] These rights, however, only apply to naturally-formed features and not artificial ones; even an artificial island constructed on a low-tide elevation feature would still be considered a low-tide elevation under international law.[22]

China has used its nine-dash line to claim various features throughout the SCS, construct artificial islands, and install mixed-use civilian and military infrastructure on natural and man-made maritime features.[23] Significantly, China has not published the coordinates of its nine-dash line claim. Some Chinese maps indicate more than nine dashes (ten or eleven) with varied extents and locations. These discrepancies have produced inconsistent interpretations of China's claim.[24] Approximate calculations by the U.S. Department of State determined that the nine-dash line encompasses approximately 2 million square kilometers of maritime space and approximately 13 square kilometers of land area.[25] These 13 square kilometers include three groups of land features: the Paracel Islands, the

[20] Freund, "Freedom of Navigation."

[21] Freund, "Freedom of Navigation."

[22] Freund, "Freedom of Navigation."

[23] This thesis will use a broad definition of the term militarize to include: giving military characteristics, equipping with military forces and infrastructure, and adapting for military use or purposes.

[24] The nine-dash line visualized several times throughout this thesis is a generalization based on a Chinese map. Other Chinese maps, however, portray the nine-dash line as encompassing a greater portion of the SCS. Most estimates place China's claim as consisting of 80-90 percent of the SCS (though this is likely closer to 60 percent). China's cartographic inconsistencies make it difficult to understand China's claim in its entirety and the visualizations included herein should not be interpreted as definitive.

[25] U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, *China: Maritime Claims in the South China Sea.*

Spratly Islands, and Scarborough Shoal which China controls but has not yet built upon.[26] In the Spratly Islands alone, China added over 3,200 acres of land by late 2015 in the form of artificial islands on seven occupied features.[27] While President Xi claimed that same year that China was not pursuing SCS militarization, construction at these features included airfields, port and storage facilities, fighter-sized aircraft hangars, fixed-weapons positions, military barracks and administration buildings, and communications facilities.[28] More recently, China deployed additional military platforms to installations in the SCS including military aircraft and missile systems, expanding China's regional military capabilities and reach.[29]

China denies that its military actions amount to militarization, characterizing its activities as defensive in nature. Rather, this label is one largely assigned by Western sources and states that contest China's claims. In 2018, for example, a Chinese Foreign Ministry spokesperson stated that China's activities are "peace-building" and occur in "China's own territories, including national defense facilities," claiming that these actions are "necessary to safeguard China's sovereignty and security."[30] This thesis will use militarization as opposed to national defense as a general term to refer broadly to China's activities that are military-

[26] U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, *China: Maritime Claims in the South China Sea*.

[27] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2017," *U.S. Department of Defense*, May 15, 2017, 12, https://www.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

[28] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2017," 12.

[29] Asia Maritime Transparency Initiative, "China Lands First Bomber on South China Sea Island," Center for Strategic and International Studies, May 18, 2018, https://amti.csis.org/china-lands-first-bomber-south-china-sea-island/.

[30] Nike Ching, "US to China: 'Consequences' for Militarization of South China Sea," *Voice of America*, May 4, 2018, https://www.voanews.com/a/us-to-china-consequences-for-militarization-of-south-china-sea/4378134.html.

related, such as installing military infrastructure on artificial islands in the SCS, and expanding the scope of China's military power, such as placing long-range systems on SCS features.

While China is not the only claimant to territory beyond its EEZs and is not the only claimant to construct artificial islands and to develop these and other features, its military actions are viewed as unprecedented and provocative, leading journalists, scholars, and policymakers to question China's motivations. Many distill the primary motive to one of three major factors: control of fish stocks, control of hydrocarbons, or control of strategic sea lines of communication (SLOCs) in the SCS. This thesis analyzes the evidence for and merits of each idea, which, for the purpose of this inquiry, are labeled the fisheries, hydrocarbons, and SLOCs hypotheses. Before examining each individual hypothesis, this chapter first provides additional context for China's contested historical claims as well as the military development that has enabled China's actions in the SCS.

China's Historical Claims

In his press conference with Barack Obama, Xi Jinping firmly asserted China's position: "Islands in the South China Sea since ancient times are China's territory. We have the right to uphold our own territorial sovereignty and lawful and legitimate maritime rights and interests."[31] China's historical claims, however, carry little weight where international law is concerned. According to SCS scholar Leszek Buszynski of the Australian Strategic and Defence Studies Centre, China views this legal reality with resentment, considering international dismissal of historical claims as a degradation of its

[31] Jinping, "Remarks by President Obama and President Xi."

ancestral heritage.[32] From China's perspective, its claims predate UNCLOS and the Convention should be revisited to more fully recognize historical rights.[33] China's staunch defense of territory it regards as historically Chinese is underpinned by a strong sense of Chinese nationalism, stimulated by Xi Jinping who, upon his ascent to General Secretary of the Communist Party of China in 2012, charged: "Do not lose any territory we inherited from our ancestors."[34] According to Bill Hayton, a long-time reporter on Southeast Asia and fellow at the London-based Chatham House Asia-Pacific Programme, the SCS islands have meaning beyond territory and resource access; their possession symbolizes national pride and power.[35]

Anthropological studies of the Asia-Pacific reveal that the people who first discovered the SCS islands have no modern-day equivalent of an ethnic identity, much less a political state.[36] In more recent centuries, China has maintained documented contact with the SCS islands through "fishermen, traders, and the occasional government official."[37] Similarly, Vietnamese records document the same activities as China throughout the SCS, and the Philippines, Malaysia, and Indonesia have also used the islands to support and facilitate fishing and trade.[38] Use by all regional states made the SCS a historical commons

[32] Buszynski, "The South China Sea," 140.

[33] Buszynski, "The South China Sea," 140.

[34] John W. Lewis and Xue Litai, "China's Security Agenda Transcends the South China Sea," *Bulletin of the Atomic Scientists* 72, no. 4 (2016): 212, doi: http://dx.doi.org/10.1080/00963402.2016.1194056.

[35] Bill Hayton, *The South China Sea: The Struggle for Power in Asia* (New Haven: Yale University Press, 2014), xiii.

[36] Hayton, *The South China Sea*,7.

[37] Dutton, "Three Disputes and Three Objectives," 47.

[38] Dutton, "Three Disputes and Three Objectives," 47.

rather than territory exclusive to one state.[39]

While China's access to and use of the SCS varied over the centuries, China's territorial claims to the SCS emerged more recently in three 20th-century documents. The first was a 1947 location map released by the Nationalist government;[40] the second was the 1958 "Declaration of the Government of New China on the Territorial Sea;" and the third was the "1992 Law on Territorial Sea and Contiguous Zone."[41] Zheng Zhihua, an oceans law and policy scholar and director of the Joint Institute for Maritime Law and History at East China University, writes: "From the point of view of China, one of the world's oldest civilizations, the South China Sea is part of the traditional Asian order and, hence, it would be inappropriate to comprehend the Nine-Dash Line by relying solely on the Westphalian nation-state system."[42] Zheng articulates that the "so-called ambiguity" of China's nine-dash line claims stems from the "imperfection of UNCLOS," which rests on defective and non-standard international law on historic rights, and should be improved for greater clarity.[43]

Like Zheng and other scholars, Hayton places the development of China's claims in the 20th century. Hayton, however, argues that China's claims emerged in three distinct

[39] Dutton, "Three Disputes and Three Objectives," 47-48.

[40] The Nationalist or Kuomintang (KMT) government retreated to Taiwan at the end of the Chinese Civil War with the Communist Party of China in 1949.

[41] Zheng Zhihua, "Why Does China's Maritime Claim Remain Ambiguous?" Center for Strategic and International Studies Asia Maritime Transparency Initiative, June 12, 2015, https://amti.csis.org/why-does-chinas-maritime-claim-remain-ambiguous/.

[42] Zhihua, "Why Does China's Maritime Claim Remain Ambiguous?"

[43] Zhihua, "Why Does China's Maritime Claim Remain Ambiguous?"

episodes in response to domestic political crises for domestic audiences;[44] this produced a maritime geobody—that is, a "collective psychological attachment to offshore islands"—that appeared incrementally and developed into nationalist sentiments.[45] This viewpoint has led some scholars to consider that China's actions in the SCS are motivated by ideological factors including popular sentiments that China must reclaim its lost territories.[46] Furthermore, some posit that a nationalist vision, promoted by President Xi Jinping and spread throughout the Chinese nation, has spurred China's military development.[47] In addition to ideological factors, the rapid development and modernization of China's armed forces and military activities in the SCS are possibly motivated by China's desire to achieve great power status and to counter U.S. naval supremacy in maritime territory it views as sovereign.[48]

China's Military Development and Actions in the SCS

In 1978, China entered a period of greater openness and economic reform through its pivotal "Four Modernizations" plan, which included national defense. China increased

[44] Bill Hayton, "The Modern Origins of China's South China Sea Claims: Maps, Misunderstandings, and the Maritime Geobody," *Modern China* 45, no. 2 (2019): 128, doi: https://doi.org/10.1177/0097700418771678.

[45] Hayton, "The Modern Origins of China's South China Sea Claims," 164.

[46] For discussions of this perspective, see Johnathan Dixon, "East China Sea or South China Sea, They Are All China's Seas: Comparing Nationalism Among China's Maritime Irredentist Claims," *Nationalities Papers* 42, no. 6 (2014): 1053, doi: http://dx.doi.org/10.1080/00905992.2014.969693, and Luo Xi, "The South China Sea Case and China's New Nationalism: Putting Chinese Nationalism in Historical Context," *The Diplomat,* July 19, 2016, https://thediplomat.com/2016/07/the-south-china-sea-case-and-chinas-new-nationalism/.

[47] See, for example, Robert S. Ross, "Nationalism, Geopolitics, and Naval Expansionism: From the Nineteenth Century to the Rise of China," *Naval War College Review* 71, no. 4 (2018): 21, https://digital-commons.usnwc.edu/nwc-review/vol71/iss4/4/, and Bonnie S. Glaser and Matthew P. Funairole, "Xi Jinping's 19th Party Congress Speech Heralds Greater Assertiveness in Chinese Foreign Policy," Center for Strategic and International Studies, October 26, 2017, https://www.csis.org/analysis/xi-jinpings-19th-party-congress-speech-heralds-greater-assertiveness-chinese-foreign-policy.

[48] Ross, "Nationalism, Geopolitics, and Naval Expansionism," 22-23.

military expenditures following the 1995-1996 Taiwan Strait Crisis during which China conducted missile tests and military exercises in a show of force near Taiwan. As indicated in Figure 2, China's estimated military spending has increased steadily since the 1990s.

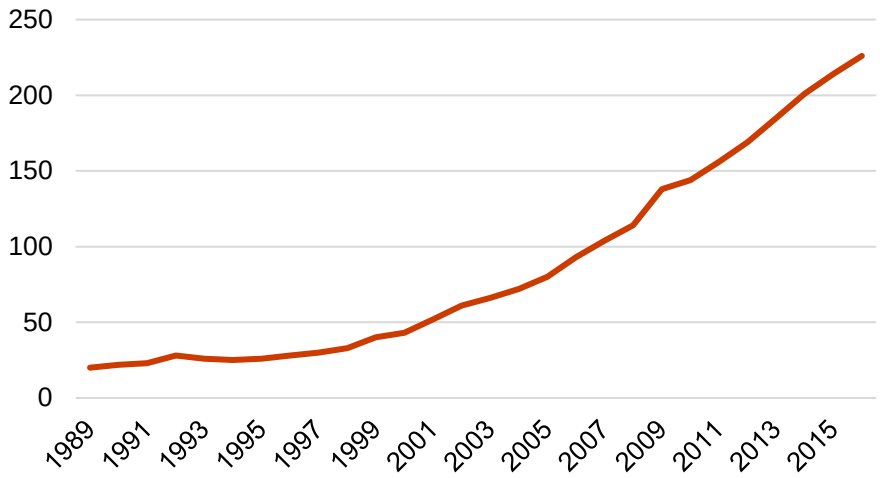

Figure 2. China's estimated military expenditures in billions of constant (2015) U.S. dollars from 1989-2016.
Source: Stockholm International Peace Research Institute, Military Expenditure Database (Stockholm: Stockholm International Peace Research Institute, 2017), https://www.sipri.org/databases/milex.

In 2015, China's military expenditures were estimated at $214 billion, compared to an estimate of $26 billion in 1995.[49] Sustained economic growth has spurred these increases in spending and Chinese President Xi Jinping's ability to modernize China's military.[50] China's estimated military expenditures have remained generally proportionate to China's

[49] Stockholm International Peace Research Institute, *Military Expenditure Database* (Stockholm: Stockholm International Peace Research Institute, 2017), https://www.sipri.org/databases/milex.

SIPRI defines military expenditures as "all current and capital military expenditure on: (a) the armed forces, including peacekeeping forces; (b) defence [*sic*] ministries and other government agencies engaged in defence [*sic*] projects; (c) paramilitary forces, when judged to be trained and equipped for military operations; and (d) military space activities." SIPRI's methodology for estimating China's expenditures can be found at https://www.sipri.org/databases/milex/sources-and-methods.

[50] Eric Heginbotham and Jacob Heim, "Deterring without Dominance: Discouraging Chinese Adventurism under Austerity," *The Washington Quarterly* 38, no. 1 (2015): 186, https://doi.org/10.1080/0163660X.2015.1038189.

gross domestic product (GDP); expenditures have averaged approximately 2% of GDP since 1990.[51] China's GDP in 1995 was approximately $735 billion in current U.S. dollars; by 2015, this figure had risen to over $11 trillion in current U.S. dollars.[52]

In 2013, Liff and Erickson recalled former U.S. Secretary of Defense Donald Rumsfeld's question regarding China's defense spending at the June 2005 Shangri-La Dialogue: "Since no nation threatens China, one must wonder: Why this growing investment? Why these continuing large and expanded arms purchases? Why these continued deployments?"[53] Liff and Erickson, however, concluded that the motivations behind China's military modernization and spending increases are less opaque when considered in aggregate, are largely focused on regional considerations, and are intended to compensate for inflation and prior neglect.[54] Several years into Xi's presidency, Erickson took a different tone regarding China's military capabilities, claiming that the People's Liberation Army's (PLA) power projection abilities are expanding in the Pacific and, that soon, "…Beijing will have very few peers in the increasingly expensive combination of quality and quantity that makes a truly great power military."[55]

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[51] Stockholm International Peace Research Institute, *Military Expenditure Database*.

[52] The World Bank Databank, *China-GDP in Current US$* (Washington, DC: The World Bank Group, 2017), https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=CN.

[53] Adam P. Liff and Andrew S. Erickson, "Demystifying China's Defence Spending: Less Mysterious in the Aggregate," *The China Quarterly*, 216 (2013): 805-806, doi: https://doi.org/10.1017/S0305741013000295.

[54] Liff and Erickson, "Demystifying China's Defence Spending," 826-827.

[55] Michael Forsythe, "Andrew S. Erickson on China's Military Goals and Capabilities." *The New York Times*, May 11, 2015, https://sinosphere.blogs.nytimes.com/2015/05/11/q-and-a-andrew-s-erickson-on-chinas-military-goals-and-capabilities/.

A key component of the "Chinese Dream," Xi's frequently-invoked slogan of national rejuvenation, is "building a powerful military" with modernized defense and armed forces.[56] Xi discussed these measures in his October 18, 2017, speech to the 19th National Congress of the Communist Party of China: "Historic breakthroughs have been made in reforming national defense and the armed forces…This represents a revolutionary restructuring…We have stepped up weapons and equipment development, and made major progress in enhancing military preparedness."[57]

The U.S. Department of Defense (DoD) has noted China's increasing ability to project power through "peacetime operations" as well as an "expanding capacity to contest U.S. military superiority in the event of a regional conflict."[58] With over 2.3 million military personnel, excluding the PLA reserves and paramilitary police force, China maintains the world's largest standing military;[59] China is also the world's second-highest military spender following the United States.[60] The DoD iterates that China's officially disclosed budget information as well as spending estimates are not precise measures of military investments due to China's "poor accounting transparency and incomplete transition to a market economy," and also that "China's published military budget omits several major

[56] Xi Jinping, "Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era," (speech, Beijing, October 18, 2017), *Xinhua*, 5, http://www.xinhuanet.com/english/download/Xi_Jinping's_report_at_19th_CPC_National_Congress.pdf.

[57] Jinping, "Secure a Decisive Victory," 5.

[58] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2017."

[59] Ian E. Rinehart, *The Chinese Military: Overview and Issues for Congress*, CRS Report No. R44196 (Washington, DC: Congressional Research Service, 2017), https://fas.org/sgp/crs/row/R44196.pdf.

[60] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2016," *U.S. Department of Defense*, April 26, 2016, 77, https://www.defense.gov/Portals/1/Documents/pubs/2016%20China%20Military%20Power%20Report.pdf.

categories of expenditure, such as R&D and the procurement of foreign weapons and equipment."[61]

China's State Council Information Office published China's military strategy in a 2015 white paper. This document only references the United States twice explicitly; however, indirect references to the U.S. military and its activity in the Asia-Pacific region permeate the document. The white paper references "threats from hegemonism, power politics and neo-interventionism" as well as "competition for the redistribution of power, rights and interests."[62] Additionally, the paper criticizes "external countries" for provocative behavior and "meddling in South China Sea affairs;" this document also calls for Chinese "work…to seize the strategic initiative in military competition."[63]

Chinese hostility in the SCS increased under the administration of former Chinese president Hu Jintao[64] in 2007 after several decades of intermittent conflict followed by relative stability. In 2007, China warned U.S. and other foreign oil and gas corporations to cease resource exploration with Vietnamese firms in the SCS, or face unspecified consequences.[65] Throughout several key incidents in the 1970s to 1990s, the United States maintained a neutral position under the condition that involved parties pursued peaceful

[61] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2016, " 77.

[62] "China's Military Strategy," State Council of the People's Republic of China, last modified May 27, 2015, http://english.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm.

[63] "China's Military Strategy," State Council of the People's Republic of China.

[64] Hu Jintao served as President of the People's Republic of China from 2003 to 2013 after rising to become General Secretary of the Chinese Communist Party in late 2002. In 2005, he also became Chairman of the Central Military Commission. This position is seen as more powerful than the presidential role, which is largely ceremonial.

[65] Dutton, "Three Disputes and Three Objectives," 43.

means of resolution.[66] Chinese attacks on Vietnamese forces in the Paracels in 1974 and the Spratlys in 1988, as well as China's military occupation of a reef claimed by the Philippines in the Spratlys in the 1990s, motivated China's neighbors to form the Association of Southeast Asian Nations (ASEAN) in political opposition to China's assertive posture.[67] Peter Dutton, director of China Maritime Studies Institute at the Naval War College, credits conflicts between China and Vietnam in the SCS during Jintao's administration as setting the stage for a more assertive and aggressive approach in the SCS.[68]

After Xi Jinping entered office in 2013, China continued pursuing greater military capabilities in the SCS through construction of artificial islands and military infrastructure. In 2015, under increasing international scrutiny, Deputy Chief of General Staff of the People's Liberation Army Admiral Sun Jianguo explicated China's strategies and policies. Sun emphasized the Chinese military's role in UN peacekeeping missions, including China's status as the largest force contributor to peacekeeping among the five permanent members of the UN Security Council.[69] Sun touted China's naval contributions to protecting Chinese and foreign ships in the Gulf of Aden from acts of piracy; Sun also noted China's increasing engagement with other militaries, stating that, "up to now [2015], the Chinese military has conducted over 100 joint military exercises and training activities with more than 50 countries."[70] Despite heightened focus on the SCS, Admiral Sun notably de-emphasized

[66] Dutton, "Three Disputes and Three Objectives," 43.

[67] Dutton, "Three Disputes and Three Objectives," 43.

[68] Dutton, "Three Disputes and Three Objectives," 44.

[69] Admiral Sun Jianguo, "Speech at the 14th Shangri-La Dialogue: Jointly Safeguard Peace and Build a Secure Asia-Pacific Region," (speech, Singapore, May 21, 2015), *China Military Online*, http://english.chinamil.com.cn/news-channels/china-military-news/2015-05/31/content_6515508.htm.

[70] Jianguo, "Speech at the 14th Shangri-La Dialogue."

China's territorial claims and military actions in the region. Wu Shengli, Commander of the Chinese Navy, vowed that China will "never give up halfway" in its construction of islands and that China is prepared to respond to provocations and infringements on its claims.[71] Figure 3 displays China's maritime claims, the locations of China's claimed and controlled islands, and China's military power projection capabilities in the SCS.

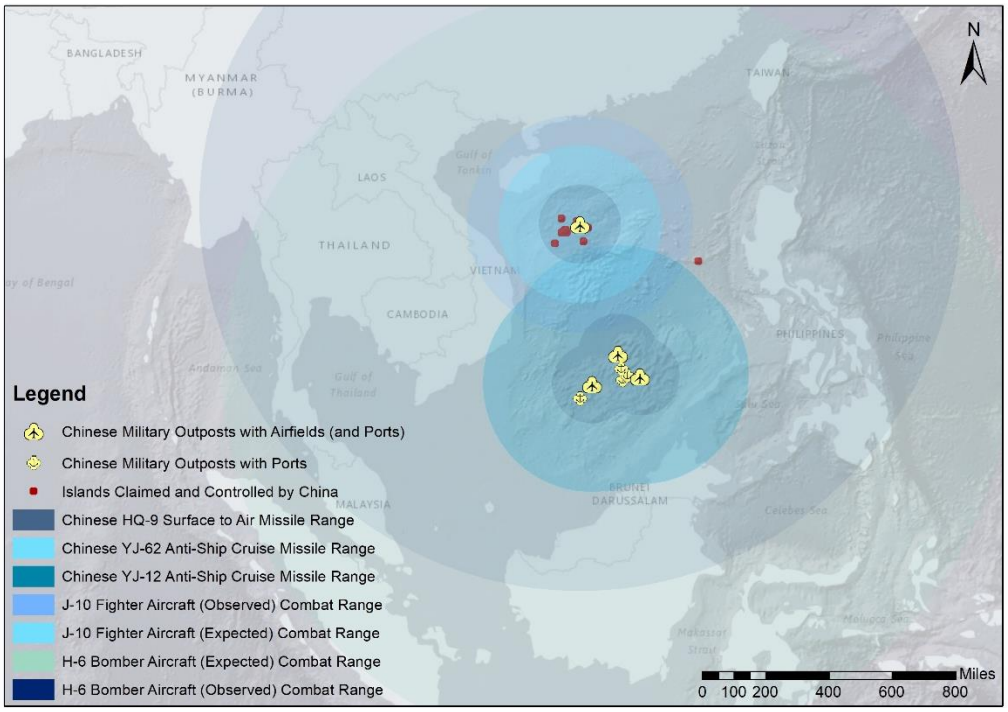

Figure 3. China's reported military power projection (aircraft and missile) capabilities in the South China Sea.
Source: *Chinese power projection in the South China Sea* [map]. April 2018. 1:20,000,000; generated by the author using *ArcGIS* Version 10.6.

Despite China's controversial actions in the SCS, Chinese leaders have emphasized peaceful development since President Xi Jinping assumed power. A 2013 white paper titled "The Diversified Employment of China's Armed Forces" stresses the following: an "independent foreign policy of peace and a national defense policy that is defensive in nature;" that China "opposes any form of hegemonism or power politics;" and that China will

[71] "Beijing 'will never' halt island work," *China Military Online*, July 19, 2016, http://english.chinamil.com.cn/news-channels/china-military-news/2016-07/19/content_7163182.htm.

"never seek hegemony or behave in a hegemonic manner, nor will it engage in military expansion."[72] It is the focus on upholding peace and maintaining national defense that Chinese officials underscore rhetorically with regard to the SCS despite actions that contradict these talking points.

Conclusion

China's prosperity in the 21st century has fueled Xi's nationalist Chinese Dream and the modernization and streamlining of China's military. China is expanding its ability to project power regionally through its maritime claims and military infrastructure in the SCS. China has also begun an aircraft carrier program; has made substantial advances in its missile forces, anti-ship and air defenses; and has increased independent and joint military exercises to expand its sphere of influence.[73] China's military investment, policy shifts, and priorities, particularly under the Xi Jinping administration, have enabled China to expand and defend its efforts in the SCS. The remainder of this thesis considers a variety of geographic considerations in a region characterized by ongoing power competition. Through the lens of geography and political science, the following chapters analyze the geopolitics of power in the SCS focusing on natural resources, maritime space, and territory to better understand China's behavior in the SCS.

Because a comprehensive geopolitical analysis of these factors has not yet been conducted, this writing fills a gap in existing literature on the SCS. This thesis adopts political geographer Ladis Kristof's working definition of geopolitics as "the study of

[72] "The Diversified Employment of China's Armed Forces," *State Council of the People's Republic of China*, April 2013, http://english.gov.cn/archive/white_paper/2014/08/23/content_281474982986506.htm.

[73] Ian E. Rinehart, *The Chinese Military: Overview and Issues for Congress*.

political phenomena (1) in their spatial relationship and (2) in their relationship with, dependence upon, and influence on, earth as well as on all those cultural factors which constitute the subject matter of human geography (anthropogeography) broadly defined."[74] This inquiry focuses heavily on the first portion of Kristof's definition—that is, the spatial relationships of political phenomena. While China's actions in the SCS amount to militarization, the motive for these actions is not plainly evident. The subsequent chapters examine the roles of fisheries, hydrocarbons, and sea lines of communication as possible explanations for China's military actions in the SCS.

[74] Ladis K. D. Kristof, "The Origins and Evolution of Geopolitics," *Journal of Conflict Resolution* 4, no. 1 (1960): 34, doi: https://doi.org/10.1177/002200276000400103.

CHAPTER II

THE SOUTH CHINA SEA'S FISHERIES

Introduction

One frequently cited factor behind China's militarization of the South China Sea (SCS) is China's goal of controlling fisheries in the region. For China and other littoral states in the Asia-Pacific, fishing is a core economic activity providing employment, livelihoods, food security, and products for trade.[75] According to the UN Food and Agriculture Organization (FAO), China's fishery sector provided employment for 14.6 million people in 2015.[76] Nearly 9.5 million people were employed in marine capture while the remainder were employed in aquaculture.[77] In 2015, associated services including input supply, processing, and marketing chains employed nearly 16 million people in addition to capture and aquaculture.[78] These substantial employment figures reflect China's position as the world's top fish and fishery products exporter.[79] In addition, studies on human nutrition in developing nations have labeled most of the SCS countries with enough available data as highly reliant on wild fish and most vulnerable to micronutrient malnutrition as fish catches

[75] Louise S. L. Teh et al., "What Is at Stake? Status and Threats to South China Sea Marine Fisheries," *Ambio* 46, no. 1 (2017): 57, doi: https://doi.org/10.1007/s13280-016-0819-0.

[76] "Fishery and Aquaculture Country Profiles: The People's Republic of China," The Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department, last modified December 2017, http://www.fao.org/fishery/facp/CHN/en#CountrySector-ProductionSector.

[77] "Fishery and Aquaculture," The Food and Agriculture Organization of the United Nations.

[78] "Fishery and Aquaculture," The Food and Agriculture Organization of the United Nations.

[79] "Fishery and Aquaculture," The Food and Agriculture Organization of the United Nations.

decline.[80]

The total tonnage of fish caught in the SCS has increased steadily from 1.2 million tons in 1950 to a high of 15 million tons in 2003 and 13.3 million tons in 2014, the most recent year for which this data is available.[81] In 2014, the estimated landed value for SCS catch was 20.6 billion USD (real 2010 value).[82] The highest landed value on record was in 2009 at 22 billion USD.[83] For every recorded year,[84] China has led all the countries that conduct fishing operations in the SCS (excluding the Gulf of Thailand) in fish catch as measured by value[85] and tonnage.[86] The majority of China's fish catch comes from within China's legal Exclusive Economic Zone (EEZ) followed by the South Korean, Russian, and Japanese EEZs.[87]

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[80] Christopher D. Golden et al., "Nutrition: Fall in Fish Catch Threatens Human Health," *Nature* 534, no. 7607 (2016): 318, doi: https://doi.org/10.1038/534317a.

[81] Sea Around Us Database, *Catches by Reporting Status in the Waters of Selected Regions* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/36,35?chart=catch-chart&dimension=reporting-status&measure=tonnage&limit=10.

[82] Sea Around Us Database, *Real 2010 Value (US$) by Reporting Status in the Waters of Selected Regions* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/36,35?chart=catch-chart&dimension=reporting-status&measure=value&limit=10.

[83] Sea Around Us Database, *Real 2010 Value (US$) by Reporting Status*.

[84] The figures cited include fish catch in the South China Sea and Gulf of Thailand large marine ecosystems (LMEs) based on reported and reconstructed data.

[85] Sea Around Us Database, *Real 2010 Value (US$) by Fishing Country in the Waters of South China Sea* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/36?chart=catch-chart&dimension=country&measure=value&limit=10.

[86] Sea Around Us Database, *Catches by Fishing Country in the Waters of South China Sea*, (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/36?chart=catch-chart&dimension=country&measure=tonnage&limit=10.

[87] Sea Around Us Database, *Catches by EEZ by the Fleets of China*, (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/fishing-entity/31?chart=catch-chart&dimension=eez&measure=tonnage&limit=10.

The combined populations of the SCS countries reached nearly 2 billion in 2015.[88] While these nations have grown in terms of population, they have concurrently developed economically and gained the status of some of the world's fastest growing economies.[89] Simultaneously, marine fisheries have depleted for decades under pressure from these growing populations and economies with estimated declines in fish stocks since the 1950s ranging from 70 to 95 percent.[90] By the mid-1990s, areas of the SCS had seen fish stocks decline to less than 10 percent of their levels in the 1960s.[91] As demonstrated in Figure 4, drawn from FAO data, most key fisheries in the SCS are depleted or overfished.

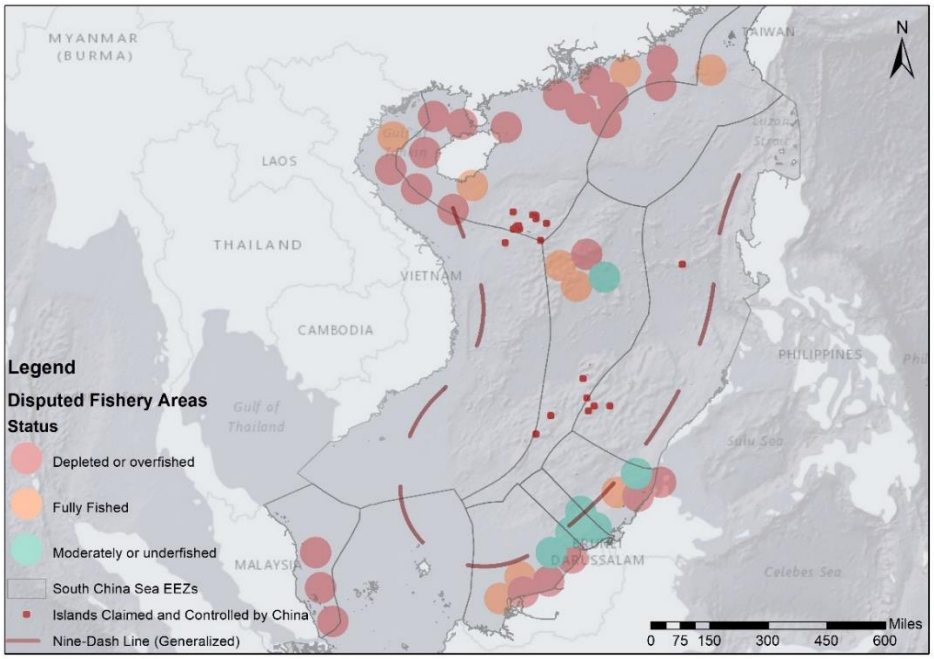

Figure 4. Fisheries in the South China Sea by FAO Stock Status.
Source: *Status of the South China Sea Fisheries* [map]. March 2019. 1:15,000,000; generated by the author using *ArcGIS* Version 10.6.

[88] Teh et al., "What Is at Stake?" 57.

[89] Teh et al., "What Is at Stake?" 57.

[90] Rashid Sumaila and William Cheung, "Boom or Bust: The Future of Fish in the South China Sea," Ocean Recovery Alliance, November 05, 2015, https://www.oceanrecov.org/news/ocean-recovery-alliance-news/boom-or-bust-the-future-of-fish-in-the-south-china-sea.html.

[91] Sumaila and Cheung, "Boom or Bust."

The degree to which control of the SCS fisheries motivates China's actions is a subject of debate. Some scholars claim that the competition for fish resources is the primary driver behind the broader SCS conflict. This chapter will examine this claim and its defenses, then consider the body of scholarship and data available to evaluate this assertion.

The Fisheries Hypothesis

Multiple scholars have posited that fisheries drive China's actions in the SCS, including the militarization of artificial islands. For the purposes of this thesis, this concept is referred to as the fisheries hypothesis. Greer summarized China's interests in the SCS as consisting of politics, petroleum, and proteins (fish), with competition for the SCS fisheries taking priority as the most consequential, and most overlooked, interest driving conflict.[92] Stephens also claimed that fisheries drive the SCS disputes, arguing that this aspect is easily overlooked in a region governed by power politics rather than international law, where the complexity of numerous disputes overshadows critical environmental considerations.[93] Bartley contended that China's fishing efforts drive the SCS disputes and constitute a fight for legitimacy and authority with broad implications for increased strategic confrontation.[94] Schofield, Sumaila, and Cheung summarized their collective research, arguing that while energy resources may motivate "policymakers, commentators, and the media" more powerfully than environmental degradation and biodiversity, fisheries and the marine

[92] Adam Greer, "The South China Sea is Really a Fishery Dispute," *The Diplomat*, July 20, 2016, https://thediplomat.com/2016/07/the-south-china-sea-is-really-a-fishery-dispute/.

[93] Tim Stephens, "The Collateral Damage from China's 'Great Wall of Sand': The Environmental Dimensions of the South China Sea Case" *Australian Yearbook of International Law* 34 (2016): 41-42, https://ssrn.com/abstract=2900567.

[94] Adam Bartley, "The Secret Driver of the South China Sea Disputes: China's Hunger for Fish," *The Diplomat*, November 17, 2016, https://thediplomat.com/2016/11/the-secret-driver-of-the-south-china-sea-disputes-chinas-hunger-for-fish/.

environment are the "real and immediate prizes" in the SCS.[95] Given China's unprecedented military activities in the SCS—including creating artificial islands, building major military infrastructure, and stationing military aircraft and missiles in and around the SCS—a detailed examination of the fisheries hypothesis is warranted.

Excluding strategic considerations—which are difficult to judge based on data alone—domestic demand and competition over dwindling fish stocks largely drive the race to access fisheries in the SCS. Political factors also fuel ongoing depletion. The Chinese government's support of fishing through subsidies contributes substantially, as does China's ability to assert its maritime claims through its fishing fleets. Sumaila and his colleagues have argued that China's high fishing subsidies have contributed to excessive over-fishing.[96] Asia leads the world in fisheries subsidies with Japan and China contributing most substantially.[97] The rate of fishery depletion has increased since the 1950s due to these subsidies as well as emphasis on large volume production over sustainability, technological advancements, and soaring demand.[98] Mallory found that in China, where the majority of subsidies are for fuel, about 95% of subsidies were harmful to fishery sustainability.[99] This finding shows a gap in Chinese policy—which has sought to manage fisheries responsibly due to declines—and demonstrates a lack of policy coherence. In the SCS specifically,

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[95] Clive Schofield, Rashid Sumaila, and William Cheung, "Fishing, Not Oil, is at the Heart of the South China Sea Dispute," August 15, 2016, https://theconversation.com/fishing-not-oil-is-at-the-heart-of-the-south-china-sea-dispute-63580.

[96] Rashid Sumaila et al., "Global Fisheries Subsidies: An Updated Estimate," *Marine Policy* 69 (2016): 189, doi: https://doi.org/10.1016/j.marpol.2015.12.026.

[97] Sumaila et al., "Global Fisheries Subsidies."

[98] Tabitha G. Mallory, "Fisheries Subsidies in China: Quantitative and Qualitative Assessment of Policy Coherence and Effectiveness," *Marine Policy* 68 (2016): 74, doi: https://doi.org/10.1016/j.marpol.2016.01.028.

[99] Mallory, "Fisheries Subsidies in China."

Schofield, Sumaila, and Cheung contend that domestic demand and state subsidies actually drive China's domination of the SCS through its fishing fleet capability.[100] Fishing vessels can serve the dual purposes of catching fish and asserting maritime claims in a proxy role.[101] States that subsidize fishing in the SCS often do so to assert their claims in the face of broader economic needs and geopolitical competitions.[102]

In the proxy context, China's fishing fleets have been dubbed maritime militias.[103] Fishing fleets and Chinese Coast Guard vessels often operate within other EEZs (but within China's declared claim to most of the SCS through its "nine-dash line"), effectively serving "hybrid civilian-naval" roles as they carry out coercive maritime diplomacy.[104] Vessels in the so-called maritime militia are outfitted by the Chinese military with equipment to enhance interoperability with the Coast Guard and Navy.[105] The fishermen themselves reportedly receive civil defense training and political indoctrination, with some also trained to confront foreign vessels in disputed maritime territory.[106] Nonetheless, Zhang and Bateman counter that this military-civilian role is overemphasized since all key SCS claimant states view

[100] Schofield, et al., "Fishing, Not Oil."

[101] Schofield, et al., "Fishing, Not Oil."

[102] Gregory Poling, "Illuminating the South China Sea's Dark Fishing Fleets," Center for Strategic and International Studies-Stephenson Ocean Security Project, January 9, 2019, https://ocean.csis.org/spotlights/illuminating-the-south-china-seas-dark-fishing-fleets/.

[103] See, for example, Andrew S. Erickson, "Exposed: Pentagon Report Spotlights China's Maritime Militia," *The National Interest*, August 20, 2018, https://nationalinterest.org/feature/exposed-pentagon-report-spotlights-china's-maritime-militia-29282.

[104] James Kraska and Michael Monti, "The Law of Naval Warfare and China's Maritime Militia," *International Law Studies* 91 (2015): 451-452, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1406&context=ils.

[105] Kraska and Monti, "The Law of Naval Warfare," 452.

[106] Kraska and Monti, "The Law of Naval Warfare," 453.

fishing fleets as means to assert their claims to disputed waters, not solely China.[107]

Chinese policies such as providing fuel subsidies and financing a maritime militia further China's political goals but undermine China's efforts to restrain overfishing.[108] Examining this conflict is critical to understanding the nuances of fishing activity in the SCS. China's fishing industry has a clear strategic significance and fishing activity in contested waters is one way to assert China's claims as it pursues maritime power status.[109] This, in turn, fuels conflict with China's regional neighbors; however, the claim that China's actions, including militarization of SCS, are based on control of SCS fisheries warrants deeper examination.

Evaluating the Fisheries Hypothesis

China's inferred goal of controlling the South China Sea's fisheries can be evaluated using various methods. These can include economic value and impact,[110] comparative valuation of the SCS relative to other large marine environments,[111] and qualitative reviews of China's motives and actions regarding the SCS fisheries.[112] This chapter primarily focuses on geographic tools and spatial data to assess the fisheries hypothesis, augmented by the

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[107] Hongzhou Zhang and Sam Bateman, "Fishing Militia, the Securitization of the South China Sea Dispute," *Contemporary Southeast Asia* 35, no. 2 (2017): 290, doi: https://doi.org/10.1355/cs39-2b.

[108] Hongzhou Zhang, "China's Fishing Industry: Current Status, Government Policies, and Future Prospects," in published conference papers from the CNA *2015 China as a Maritime Power Conference, CNA Conference Facility, Arlington, Virginia, July 28-29, 2015*, https://www.cna.org/cna_files/pdf/China-Fishing-Industry.pdf.

[109] Zhang, "China's Fishing Industry."

[110] See, for example, Teh et al., "What Is at Stake?"

[111] Rashid Sumaila, "Comparative Valuation of Fisheries in Asian Large Marine Ecosystems with Emphasis on the East China Sea and South China Sea LMEs," *Deep-Sea Research Part II: Topical Studies in Oceanography* (2018), doi: https://doi.org/10.1016/j.dsr2.2018.12.008.

[112] Zhang and Bateman, "Fishing Militia," 288-314.

above-mentioned means. The FAO, the Sea Around Us (SAU) Project at the University of British Columbia, and Global Fishing Watch (GFW) all provide spatially-referenced data that enable this analysis.

The SAU Project is based on FAO and reconstructed data for global fisheries catch and landed value dating back to 1950 that can be spatially refined by various units including EEZs and large marine environments (LMEs). Researchers cross-referenced and verified the accuracy of SAU data using national fisheries statistics from the SCS countries.[113] In addition to the FAO and national statistical data, SAU also includes reconstructed data for unreported catch based on Pauly and Zeller's estimation methodology.[114] The incorporation of reconstructed data for undocumented catch more than doubles catch levels in certain areas of the world. For example, in the Gulf of Thailand LME, close to half of fish catch in recent years was unreported, according to the SAU Project.[115] China's marine territory claims do not extend into the Gulf of Thailand. Roughly 70 to 80 percent of total catch was reported in the SCS LME; [116] China's fish catch reporting levels in its EEZs overall are consistently high, averaging over 90 percent.[117]

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[113] Teh et al., "What Is at Stake?" 62.

[114] These methods are the result of over a decade of scholarly research and are detailed here more recently: Daniel Pauly and Dirk Zeller, "Catch Reconstructions Reveal That Global Marine Fisheries Catches are Higher Than Reported and Declining," *Nature Communications* 7, article 10244 (2016), doi: https://doi.org/10.1038/ncomms10244.

[115] Sea Around Us Database, *Catches by Reporting Status in the Waters of the Gulf of Thailand* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/35?chart=catch-chart&dimension=reporting-status&measure=tonnage&limit=10.

[116] Sea Around Us Database, *Catches by Reporting Status in the Waters of the South China Sea* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/lme/36?chart=catch-chart&dimension=reporting-status&measure=tonnage&limit=10.

[117] Sea Around Us Database, *Catches by Reporting Status in the Waters of China* (Vancouver: Sea Around Us, 2016), http://www.seaaroundus.org/data/#/eez/156?chart=catch-chart&dimension=reporting-status&measure=tonnage&limit=10.

The Global Fishing Watch (GFW) website, databases, and code were created by Oceana, SkyTruth, and Google and funded by a variety of philanthropic foundations with the goal of increasing transparency in global fishing activity.[118] Oceana is an ocean conservation organization; SkyTruth is a nonprofit that provides free satellite imagery and remote sensing data to the public to inform and motivate environmental protection;[119] and Google Earth Outreach uses Google's data infrastructure to address environmental and humanitarian concerns.[120] Global Fishing Watch currently provides datasets for vessel tracking via ship-based Automatic Identification Systems (AIS) and Vessel Monitoring Systems (VMS); in addition, GFW also provides data from the U.S.-operated Visible Infrared Imaging Radiometer Suite (VIIRS) satellite sensor to display nighttime vessel light emissions.[121] VIIRS data is unique in that it can help account for fishing activity from vessels not broadcasting AIS or VMS. The National Aeronautics and Space Administration (NASA) provides Global Imagery Browse Services (GIBS) such as the Worldview client, through which users can access and view recent and historical VIIRS imagery in near-real time. This assessment, however, will focus on GFW's rendering of the same VIIRS data because it is optimized for viewing fishing activity. Before analyzing the relevance of these datasets to the fisheries hypothesis, a discussion of the datasets and their respective limitations for the purposes of this study is required.

[118] "Founding Partners," Global Fishing Watch, accessed February 20, 2019, https://globalfishingwatch.org/partners/.

[119] "About," Skytruth, accessed February 20, 2019, https://skytruth.org/about/.

[120] "Founding Partners," Global Fishing Watch.

[121] "Map and Data," Global Fishing Watch, accessed February 20, 2019, https://globalfishingwatch.org/map-and-data/.

Automatic Identification Systems

Long-range satellite-based AIS is a safety feature that provides situational awareness and is mandated by the International Maritime Organization (IMO) of the United Nations to avoid collisions under low-visibility conditions for vessels over 300 gross tons or carrying passengers.[122] Satellite AIS is not limited geographically like terrestrial AIS platforms and provides global maritime coverage.[123] These systems are self-reporting and provide static data, such as ship name, type, and dimensions; they also provide dynamic data including position, course, and speed.[124] Noncooperative ships, those not broadcasting AIS data, and noncompliant ships, those not meeting legal requirements, cannot be included in analyses based on AIS alone. Thus, alternative monitoring means such as the use of satellite imagery, are necessary to monitor fishing activity more fully. For example, the Chinese government funded research that was published in 2019 into using a fusion algorithm between image data from China's GF-4 satellite and AIS reports to better track ships with an emphasis on noncooperative targets.[125]

The following figures show fishing activity and vessel presence in the SCS from January to December 2016 using AIS data from Global Fishing Watch. AIS data points for known or possible commercial fishing vessels were collected by satellite and terrestrial

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[122] Enrico N. De Souza et al., "Improving Fishing Pattern Detection from Satellite AIS Using Data Mining and Machine Learning," *Public Library of Science (PLOS) One* 11, no. 7 (2016), doi: https://doi.org/10.1371/journal.pone.0158248.

[123] Yong Liu et al., "GF-4 Satellite and Automatic Identification System Data Fusion for Ship Tracking," *IEEE Geoscience and Remote Sensing Letters* 16, no. 2 (2019): 281, doi: https://doi.org/10.1109/LGRS.2018.2869561.

[124] Liu et al., "GF-4 Satellite," 281.

[125] Liu et al., "GF-4 Satellite," 281.

receivers and were classified by GFW's fishing activity detection algorithm as engaging in "apparent fishing activity" due to changes in vessel speed and direction (Figure 5).[126] The year-long period displays aggregated activity to avoid misrepresentation due to annual fishing bans implemented by China unilaterally since 1999 in the northwestern SCS to prevent overfishing.[127] For two to three months in the summer, China works to prevent nearly all types of fishing activity within its own EEZ and in contested waters. This ban was expanded in 2012 to include areas where the claims of China and the Philippines overlap.[128]

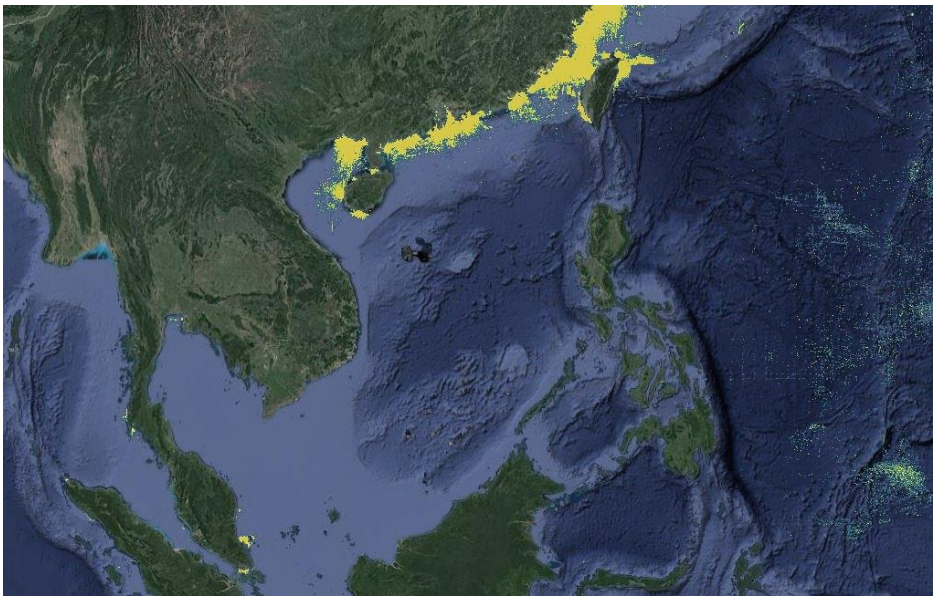

Figure 5. Cumulative fishing vessel activity based on AIS signals from January to December 2016.
Source: Data adapted from Global Fishing Watch (2019), accessed on February 20, 2019, https://code.earthengine.google.com/443e6a6067eda953101d77db3717446a.

[126] "Our Map-Fishing Effort," Global Fishing Watch, accessed February 20, 2019, https://globalfishingwatch.org/our-map/

[127] Hai Dang Vu, "A Bilateral Network of Marine Protected Areas Between Vietnam and China: An Alternative to the Chinese Unilateral Fishing Ban in the South China Sea?" *Ocean Development & International Law* 44, no. 2 (2013): 146, doi: https://doi.org/10.1080/00908320.2013.750984.

[128] Vu, "A Bilateral Network," 146.

Figure 6 shows all recorded vessel presence in 2016 as compared to strictly fishing vessel activity as categorized by GFW. A visual comparison of both figures indicates that most fishing activity, as well as overall vessel presence recorded by AIS over a one-year time period, is concentrated near China's shoreline and that the majority of vessel activity is fishing-related.

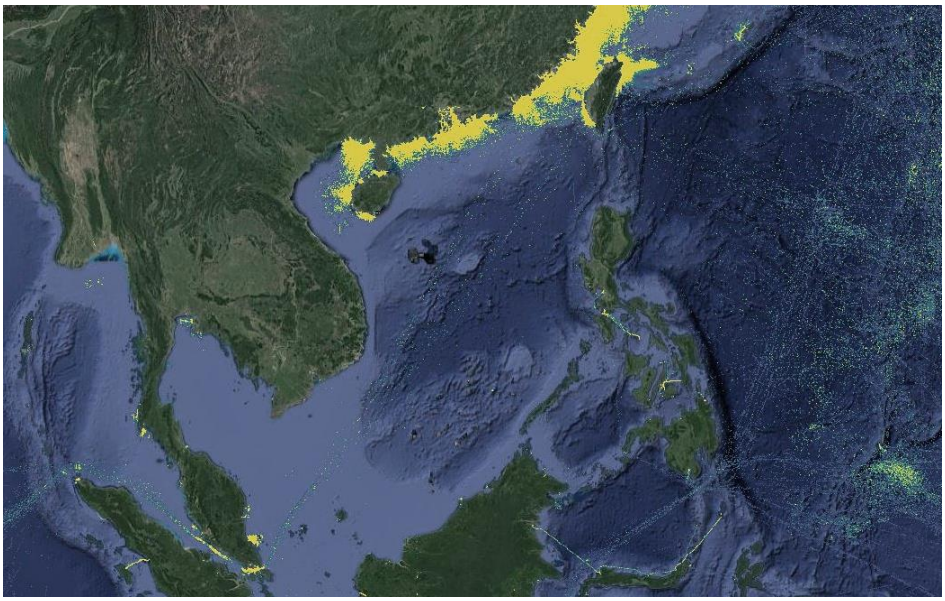

Figure 6. Cumulative vessel presence based on AIS signals from January to December 2016.
Source: Data adapted from Global Fishing Watch (2019), accessed on February 20, 2019, https://code.earthengine.google.com/3da7e980c09352963d5c3447646b4a68.

Vessel Monitoring Systems

Similar to AIS, VMS is another tracking tool that is permanently installed on commercial fishing vessels with a unique identifier that works with the Global Positioning System (GPS) or similar systems to calculate vessel position; VMS sends routine updates to authorities, thus enhancing the ability of regulatory agencies to monitor fishing activity.[129] As

[129] "Tracking Fishing Vessels Around the Globe, Issue Brief," Pew Charitable Trusts Ending Illegal Fishing Project, April 12, 2017, https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/04/tracking-fishing-vessels-around-the-globe.

of March 2019, the only nations that have provided VMS data to GFW for public use are Peru and Indonesia. In 2017 and 2018, hardly any Indonesian VMS fishing activity was recorded within the northeastern portion of the Indonesian EEZ area within the SCS—an area rich in fish stocks as well as oil and natural gas.[130] This area, near the Natuna Islands in the northeastern area of Indonesia's EEZ, is claimed by China within its nine-dash line. Chinese fishing in the waters around the Natuna Islands has resulted in confrontations between Chinese and Indonesian authorities,[131] although Indonesia maintains that it is not an official claimant in the SCS disputes. Indonesia announced plans in 2019 to open a fishing zone within and near the portion of its EEZ claimed by China to preserve national interests.[132]

Chinese officials have also pushed domestic use of VMS through China's Beidou satellite system, which Beijing touts as an alternative to the U.S. government's GPS satellite constellation. According to Chinese reports, vessels in the South China Sea have had VMS installed with 90% of the cost covered by the Chinese government.[133] In 2015, one-fourth of China's offshore fishing vessels were estimated to be equipped with VMS.[134] Government funding of VMS combined with substantial fuel subsidies aid fishermen as they pursue

[130] Rika Kurniarty et al., "Analysis on Traditional Fishing Grounds in Indonesia's Natuna Waters Under International Law," *IOP Conference Series: Earth and Environmental Science* 137 (2019), doi: https://doi.org/10.1088/1755-1315/137/1/012039.

[131] Kurniarty et al., "Analysis on Traditional Fishing Grounds."

[132] Prashanth Parameswaran, "What's in Indonesia's New Natuna Fishing Zone in the South China Sea?" *The Diplomat*, February 23, 2019, https://thediplomat.com/2019/02/whats-in-indonesias-new-natuna-fishing-zone-in-the-south-china-sea/.

[133] John Ruwitch, "Satellites and Seafood: China Keeps Fishing Fleet Connected in Disputed Waters," *Reuters*, July 27, 2014, https://www.reuters.com/article/us-southchinasea-china-fishing-insight/satellites-and-seafood-china-keeps-fishing-fleet-connected-in-disputed-waters-idUSKBN0FW0QP20140728.

[134] Xiaoxuan Wang, Qiaoling Zheng and S. Zhang, "Research of Voyage Extraction Based on Beidou Vessel Monitoring System Data," *2015 23rd International Conference on Geoinformatics, Wuhan, 2015*, doi: https://doi.org/10.1109/GEOINFORMATICS.2015.7378682.

fishing grounds further offshore toward and into contested waters.[135]

Following UN fisheries agreements in the 1990s, most regional fisheries management organizations (RFMO) require VMS for fishing vessels.[136] RFMOs are multilateral organizations that govern the majority of high seas and deep-sea fisheries but often suffer from inadequate governance and administration.[137] There is currently no RFMO for the SCS;[138] however, the Western and Central Pacific Fisheries Commission (WCPFC), which was created to conserve and manage migratory fish stocks, does cover the SCS if regulated or targeted fish stocks migrate to the SCS.[139] Nonetheless, its actual impact on SCS fisheries management is minimal.[140] China is a member of the WCPFC and, as such, is required to submit to the WCPFC a record of all fishing vessels with authorization to fish outside of China's jurisdiction and within the WCPFC convention area.[141] Of the 3,935 vessels within the WCPFC fishing vessel database, 628 sail under the Chinese flag.[142]

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[135] Ruwitch, "Satellites and Seafood."

[136] Tracking Fishing Vessels Around the Globe," Pew Charitable Trusts Ending Illegal Fishing Project.

[137] "Regional Fisheries Management Organizations and Deep-sea Fisheries," Food and Agriculture Organization of the United Nations Fisheries and Aquaculture Department, updated August 26, 2016, http://www.fao.org/fishery/topic/166304/en.

[138] Greer, "The South China Sea is Really a Fishery Dispute."

[139] Hongzhou Zhang, "Fisheries Cooperation in the South China Sea: Evaluating the Options," *Marine Policy* 89 (2018): 71, doi: https://doi.org/10.1016/j.marpol.2017.12.014.

[140] Zhang, "Fisheries Cooperation."

[141] "WCPFC Record of Fishing Vessels," Western & Central Pacific Fisheries Commission, last modified May 21, 2018, https://www.wcpfc.int/vessels.

[142] "WCPFC Record of Fishing Vessels Database," Western & Central Pacific Fisheries Commission, accessed March 3, 2019, https://www.wcpfc.int/record-fishing-vessel-database.

Visible Infrared Imaging Radiometer Suite

In a best-case scenario, authorities and researchers could collect and correlate both AIS and VMS data to monitor and understand fishing vessel activity. This would be particularly useful in instances of system malfunctions or outages, to detect activity patterns, and to determine unusual behavior and potential illegal activities. This ideal analysis is not possible in the SCS due to uneven system use and compliance; however, the National Oceanic and Atmospheric Administration (NOAA) and NASA's jointly-flown VIIRS satellite sensor provides one of the most informative geospatial data sources for understanding fishing activity. This data helps fill the gaps in AIS and VMS coverage since not all fishing vessels are outfitted with AIS or VMS or they simply do not comply with regulations, often to hide illegal, unreported, and unregulated (IUU) fishing activity.

VIIRS low-light imaging enables cloud detection for meteorological purposes using moonlight as opposed to sunlight for illumination.[143] The additional applications of VIIRS are numerous and valuable across the natural and social sciences from the unintended ability of this system and its precursor to detect Earth surface lighting.[144] VIIRS Day/Night Band (DNB) data also records non-electric light sources including lightning, burning biomass, and gas flares, for example.[145] VIIRS night-time light imagery products are created through a series of filtering processes and are available to view and download as gray-scale images, typically within three hours of overflight by the Suomi National Polar-orbiting Partnership

[143] Christopher D. Elvidge et al., "VIIRS Night-time Lights," *International Journal of Remote Sensing* 38, no. 21 (2017): 5861, doi: https://doi.org/10.1080/01431161.2017.1342050.

[144] Elvidge et al., "VIIRS Night-time Lights," 5861.

[145] Elvidge et al., "VIIRS Night-time Lights," 5862.

(SNPP) satellite.[146] Every 24 hours, the SNPP satellite collects a complete set of night-time images of Earth.[147] VIIRS data is particularly useful for understanding IUU fishing because even though VIIRS still detects non-fishing vessels at night such as commercial shipping vessels, many of those detected are commercial fishing vessels, often using bright lights to attract fish. The following figure displays cumulative VIIRS detections in 2018 as visualized by GFW and adapted by the author.

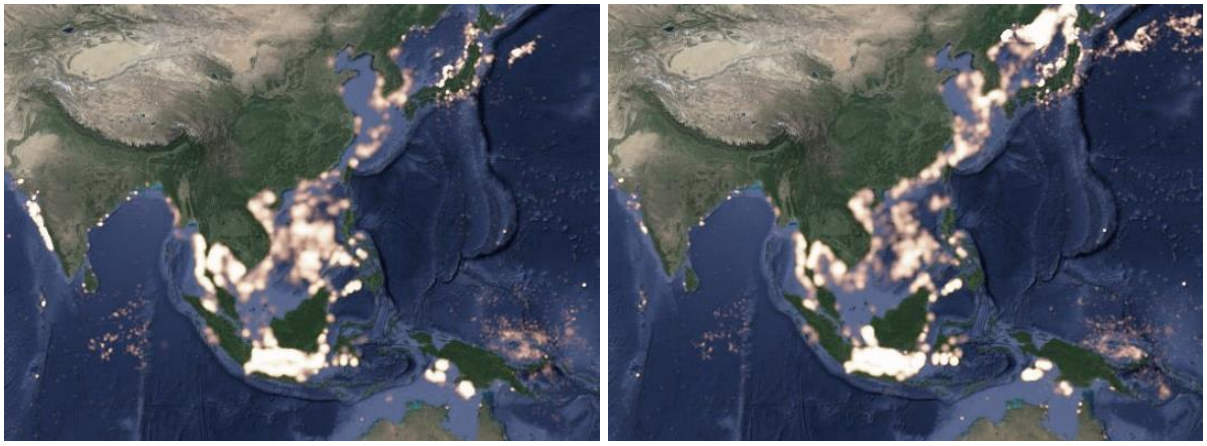

Figure 7. Cumulative regional VIIRS night-light vessel detections: January-June 2018 (left) and July-December 2018 (right).
Source: Data adapted from Global Fishing Watch (2019), accessed on February 20, 2019, https://globalfishingwatch.org/map/.

Synthetic Aperture Radar

SAR—unlike AIS and VMS, which require cooperative reporting by fishing vessels—is a type of radar that, like VIIRS, can be used to monitor vessels' positions regardless of reporting status.[148] SAR use for vessel detection and classification is well-

[146] Josh Blumenfeld, "Bringing Light to the Night: New VIIRS Nighttime Imagery Available through GIBS," National Aeronautics and Space Administration EARTHDATA, last modified April 5, 2019, https://earthdata.nasa.gov/viirs-dnb.

[147] Elvidge et al, "VIIRS Night-time Lights," 5871.

[148] Boris Snapir, Toby W. Waine, and Lauren Biermann, "Maritime Vessel Classification to Monitor Fisheries with SAR: Demonstration in the North Sea," *Remote Sensing* 11, no. 3 (2019), doi: https://doi.org/10.3390/rs11030353.

established,[149] but classification of SAR detections has only recently been applied to fishing vessels. In one study this approach correlated closely with Global Fishing Watch's fishing vessel presence data in the studied area.[150] SAR images are created with microwave signals sent from sensor platforms (aircraft or satellites) to the ground; backscattered waves then reflect directly to the receiver on the same platform.[151] This data sources is useful for understanding fishing vessel activity because SAR sensors function in all-weather types, penetrating cloud cover, during both day and night.[152]

SAR identifies metallic features, such as metal structures on fishing vessels, and can provide accurate counts of vessels down to six meters in overall length.[153] Few vessel types are excluded from SAR but exceptions do exist, including traditional indigenous banca boats in the Philippines, which are constructed of wood by native boat builders.[154] This means that while extensive fishing activity takes place around the Philippine Islands by Philippine fishermen, this activity appears minimal using geospatial data sources.

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[149] For an overview, see Urška Kanjir, Harm Greidanus, and Krištof Oštirc, "Vessel Detection and Classification from Spaceborne Optical Images: A Literature Survey," *Remote Sensing of Environment* 207 (2018): 1-26, doi: https://doi.org/10.1016/j.rse.2017.12.033.

[150] Snapir, Waine, and Biermann, "Maritime Vessel Classification to Monitor Fisheries with SAR."

[151] Robert K. Vincent, "RADAR – Synthetic Aperture Radar," in *Encyclopedia of Atmospheric Sciences*, edited by Gerald North, John Pyle, and Fuquing Zhang (Massachusetts: Academic Press, 2015), 470-476.

[152] Mattia Stasolla et al., "A Comparative Study of Operational Vessel Detectors for Maritime Surveillance Using Satellite-Borne Synthetic Aperture Radar," *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing* 9, no. 6 (2016): 2687, doi: https://doi.org/10.1109/JSTARS.2016.2551730.

[153] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[154] Glenn D. Aguilar, "The Philippine Indigenous Outrigger Boat: Scaling Up, Performance and Safety," *Marine Technology Society Journal* 40, no. 3 (2006): 49, doi: https://doi.org/10.4031/002533206787353277.

The Spratly Islands Case Study

Using several types of geospatial data, including those discussed previously, Gregory Poling of the Center for Strategic and International Studies worked with Vulcan, Incorporated's Skylight Maritime Initiative—which uses satellite and machine learning to promote maritime transparency—[155] to analyze the size and behavior of fishing fleets near the Spratly Islands in the SCS.[156] The Spratly Islands—an area that includes non-island features such as reefs and artificial islands—is hotly contested with claims by China, Malaysia, the Philippines, Taiwan, and Vietnam.[157] The CSIS report uses AIS, VIIRS, and SAR to monitor fishing activity around the Spratlys. According to the report, many fishing vessels in the SCS, particularly those originating in the Philippines and Vietnam do not feature AIS transceivers; these are often small or older vessels.[158] Still other vessels featuring AIS transceivers do not broadcast in order to mask activity.[159]

A sample of AIS signals mapped by CSIS for June 2018 featured heavy vessel traffic on the periphery of the Spratlys but almost no activity within the island groups.[160] In contrast, VIIRS boat detection products recorded significant fishing activity in the Spratlys from January 2013 to May 2018.[161] CSIS found that both satellite-based SAR and VIIRS returned

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[155] "Skylight Global: Company," Skylight Maritime Transparency, Vulcan, Incorporated, accessed March 3, 2019, https://skylight.global/company.

[156] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[157] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[158] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[159] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[160] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[161] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

similar findings in the Spratlys. In one example, CSIS detected 264 vessels in the Spratlys using SAR between September 30 and October 5, of which only eight were broadcasting AIS.[162] While the SAR data alone cannot classify individual ships, other satellite imagery sources do identify the majority of vessels in the Spratlys as Chinese fishing vessels.[163] Poling uses this data to make the case that the Chinese government is operating an extensive paramilitary force and that most vessels in the Spratlys are members of this maritime militia.[164] As noted by Asian security scholar Greg Austin, Poling connects overfishing by militia vessels to China's military occupation of the Spratlys, including the destruction of reef environments to construct artificial islands.[165] This connection may be problematic as it assumes China bears the greatest responsibility for overfishing in the South China Sea, basing this on statistics that reference the entire SCS rather than contested areas where fishing activity is comparatively minor.[166]

Conclusion

China's marine fisheries are an important component of China's primary economic sector providing employment and livelihoods, food security, and products for trade for coastal communities. As fish stocks dwindle under continued pressure, China's Bureau of Fisheries hopes to see unemployed fishermen seek work in aquaculture or processing; however, these sectors are less lucrative than fishing at sea—thus, interest for fishermen and

[162] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[163] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[164] Poling, "Illuminating the South China Sea's Dark Fishing Fleets."

[165] Greg Austin, "China's Assault on South China Sea Fisheries: Doing the Maths," Australian Strategic Policy Institute, February 7, 2019, https://www.aspistrategist.org.au/chinas-assault-on-south-china-sea-fisheries-doing-the-maths/.

[166] Austin, "China's Assault on South China Sea Fisheries."

boat owners to sell their vessels and seek alternative employment is low.[167] According to FAO estimates, close to 1.8 million fishing vessels operate in the SCS.[168] This figure is nearly half of the world's fishing vessels according to many estimates. The Philippines leads with the highest number of vessels operating in the SCS but the vast majority of these are small-scale vessels.[169] Vietnam has the second highest number of vessels followed by China according to available data; however, China's more capable fishing fleet dominates in terms of overall capacity in the region.[170] Some analyses of China's fleet size compare China's total number of fishing vessels to those of neighboring states, which is misleading. Comparing fleets that operate in the SCS specifically produces a more accurate representation given that many Chinese fishing vessels operate outside the SCS.

Approximately 86% of the total number of fishing vessels that operate in the SCS are small-scale vessels.[171] This implies that most fishing activity is confined to shallow nearshore coastal waters as opposed to the open sea. This relegates most vessels to coastal waters within their national EEZs. The visualizations of AIS and VIIRS data from GFW demonstrate this tendency, which is also corroborated by data from the SAU Project.

A geographic approach to analyzing the fisheries hypothesis as a possible motivation for China's militarization of the SCS produces unique insights often lacking in other

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[167] Fisheries and Aquaculture Department, "Fishery and Aquaculture Country Profiles: The People's Republic of China," *Food and Agriculture Organization of the United Nations,* December 2017, http://www.fao.org/fishery/facp/CHN/en.

[168] Simon Funge-Smith, Matthew Briggs, and Weimin Miao, "Regional Overview of Fisheries and Aquaculture in Asia and the Pacific 2012," Asia-Pacific Fishery Commission (APFIC) - FAO Regional Office for Asia and the Pacific, 2012, http://www.fao.org/3/i3185e/i3185e00.pdf.

[169] Funge-Smith, Briggs, and Miao, "Regional Overview of Fisheries and Aquaculture."

[170] Funge-Smith, Briggs, and Miao, "Regional Overview of Fisheries and Aquaculture."

[171] Funge-Smith, Briggs, and Miao, "Regional Overview of Fisheries and Aquaculture."

assessments. Refining data spatially helps avoid mischaracterizing information. The geospatial data provided in this thesis show that China's fishing activity is concentrated mostly within China's internationally-recognized EEZ and that China's summer moratorium appears to be well-enforced. However, FAO data and academic studies also make clear that these same fish stocks are dangerously overfished. The importance of these fisheries to communities that rely on the marine catch and processing sectors is significant given China's position as the world's largest fish processer and producer. This has resulted in several key structural changes in China's fishing industry including shifts to aquaculture, more offshore fishing, and more distant water fishing.[172]

In previous decades, China's fishery sector was dominated by catch production. By 2013, aquaculture instead accounted for 74% of China's fishery production, a full reversal from 1978 when inland and marine catch accounted for 74% of production.[173] Simultaneously, China's marine catch has moved from inshore to offshore fishing and China's distant-water fishing (DWF) fleet has grown to become the largest in the world;[174] however, this is only in terms of vessel number and not actual capacity.[175] China's DWF fleet expansion is driven by fish stock depletion close to home. The fleet operates in more than forty EEZs, the Pacific, Indian, and Atlantic Ocean high seas and, increasingly, the Antarctic Ocean.[176] Although China insists that its DWF fleet operates in conjunction with local

[172] Zhang, "China's Fishing Industry."

[173] Zhang, "China's Fishing Industry."

[174] Zhang, "China's Fishing Industry."

[175] Tabitha G. Mallory, "China's Distant Water Fishing Industry: Evolving Policies and Implications," *Marine Policy* 38 (2013): 101, doi: https://doi.org/10.1016/j.marpol.2012.05.024.

[176] Zhang, "China's Fishing Industry."

governments and enterprises and spurs local economic development, China has also been accused of contributing to fisheries depletion,[177] particularly in African waters where China is responsible for significant IUU fishing.[178]

Various trends and data elements, taken independently or out of context, can either support or contradict the fisheries hypothesis. The absence of comprehensive, geographically-informed assessments and a reliance on striking figures alone to prove a point contribute to unbalanced approaches to the SCS disputes. Often, assessments and assertions of the fisheries hypothesis omit important details, such as the observation using AIS that most legal fishing occurs in nearshore waters rather than contested areas. This is backed up by FAO analyses on vessel numbers, capabilities, and types. Arguments that point strictly to the maritime militia too often neglect to consider that confrontations exist both in an outside of contested waters, that the Chinese government cannot necessarily control Chinese fishermen, and that China does not typically aid fishermen who are detained or harassed by neighboring countries (rather, fishermen are often penalized for their actions upon return to China).[179]

Efforts to reduce pressure on fisheries are complicated by contradictory policies, such as China's substantial fuel subsidies and summer fishing moratoria. As fish stocks dwindle close to home, the fishing activity in contested waters will likely increase as many observers and scholars claim. However, attributing this to China's strategic goals alone ignores the simple fact that fishing further offshore and in distant waters is becoming an economic

[177] Zhang, "China's Fishing Industry."

[178] Mallory, "China's Distant Water Fishing Industry," 104.

[179] Zhang, "China's Fishing Industry."

necessity for fishermen seeking to preserve their livelihoods. While geographic information alone cannot sufficiently test the fisheries hypothesis, the contextualized data cited within this assessment can offer a more nuanced view of the complex role fisheries play in the broader SCS conflicts, and in motivating China's actions.

CHAPTER III

THE SOUTH CHINA SEA'S HYDROCARBONS

Introduction

An alternate explanation for China's militarization of the South China Sea (SCS) is the drive to access and control hydrocarbons beneath the seafloor.[180] For China, increasing domestic energy production is a high priority, stemming from concerns about high reliance on foreign energy to meet demand. In recent years, China became the world's fifth highest producer of oil (including crude oil, other petroleum liquids, and biofuels) at five percent of the global production; however, China was the world's second highest consumer of oil in 2016 with thirteen percent of global consumption.[181] Oil constitutes about twenty percent of China's energy consumption[182] and China surpassed the United States to become the world's largest crude oil importer in 2017.[183]

Overall, however, China depends heavily on coal for energy. Coal creates greater pollution than any other competing energy source and generates high amounts of waste. In 2012, coal comprised nearly 66 percent of China's energy consumption.[184] This high dependence on coal has cemented China's position as the world leader in energy-related

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[180] Hydrocarbons are organic compounds of hydrogen and carbon found in, for example, crude oil, natural gas, and coal. This thesis will use this term to refer in general to oil and gas in the South China Sea, making distinctions between types of hydrocarbons when necessary.

[181] "What Countries Are the Top Producers and Consumers of Oil?" U.S. Energy Information Agency, last modified December 3, 2018, https://www.eia.gov/tools/faqs/faq.php?id=709&t=6.

[182] "China Analysis," U.S. Energy Information Agency, May 14, 2015, https://www.eia.gov/beta/international/analysis.php?iso=CHN.

[183] "China Surpassed the United States as the World's Largest Crude Oil Importer in 2017," U.S. Energy Information Agency, February 5, 2018, https://www.eia.gov/todayinenergy/detail.php?id=34812.

[184] "China Analysis," U.S. Energy Information Agency.

carbon dioxide (CO_2) emissions. China has sought to reduce CO_2 emissions and associated pollution under its 2014 climate change plan by diversifying sources to include cleaner energy forms such as natural gas—which currently accounts for about five percent of China's energy consumption—and forms of renewable energy that do not raise CO_2 emissions levels.[185]

China's actions to assert control in the SCS impact other states involved in maritime jurisdiction disputes; however, competing territorial claims to islands and other features are mostly concentrated in areas with limited hydrocarbon potential. Still, each SCS claimant country has concerns regarding energy security. China, Malaysia, the Philippines, Taiwan, and Vietnam are all net importers of oil; both Taiwan and the Philippines rely almost entirely on imported oil.[186] Of the six official SCS territory claimants, only Brunei is a net oil exporter.[187] According to the International Energy Agency, the Philippines[188] and Vietnam[189]—the claimants most vocal against Chinese incursion—rely heavily on oil and minimally on natural gas proportionate to current national consumption. While Philippine and Vietnamese oil demand has increased, China has threatened force against these countries

[185] "China Analysis," U.S. Energy Information Agency.

[186] Nick A. Owen and Clive H. Schofield, "Disputed South China Sea Hydrocarbons in Perspective," *Marine Policy* 36, no. 3 (2012): 818, doi: https://doi.org/10.1016/j.marpol.2011.11.010.

[187] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 818.

[188] IEA Statistics Data Browser, *Total Final Consumption (TFC) by Source: Philippines 1990-2016* (Paris: The International Energy Agency, 2018), https://www.iea.org/statistics/?country=PHILIPPINE&year=2016&category=Energy%20consumption&indicator=TFCbySource&mode=chart&dataTable=BALANCES.

[189] IEA Statistics Data Browser, *Total Final Consumption (TFC) by Source: Viet Nam 1990-2016* (Paris: The International Energy Agency, 2018), https://www.iea.org/statistics/?country=VIETNAM&year=2016&category=Energy%20consumption&indicator=TFCbySource&mode=chart&dataTable=BALANCES.

and, reportedly, war if these countries explore and drill for oil in contested areas.[190]

Several key factors complicate an understanding of hydrocarbon-based conflict: a lack of reliable data, wide-ranging and contradictory resource and reserve estimates, and misuse of terminology. Without consistent, reliable, and current data, hydrocarbon potential in the SCS is difficult to estimate. The data cited in this chapter are commonly referenced by media and policy sources; however, many of these sources misinterpret, misuse, or conflate terms that are non-equivalent when referencing the data. The most authoritative hydrocarbon estimates are from the U.S. Geological Survey (USGS) and Energy Information Agency (EIA) and were published within the 2010-2015 timeframe.[191] Several more recent but less comprehensive Chinese sources will also be incorporated. In addition, satellite data yield insight into offshore drilling platforms in and outside of contested areas. This chapter seeks to clarify terminology used in the hydrocarbons hypothesis debate, to provide an overview of available data and literature on the SCS hydrocarbons and regional energy demands, and to contextualize the hydrocarbons hypothesis within a broad framework.

The Hydrocarbons Hypothesis

In a 2013 testimony to the U.S.-China Economic and Security Review Commission, former RAND Corporation analyst and Department of Defense senior executive appointee Lloyd Thrall asserted that natural resources—emphasizing hydrocarbons—are often cited as

[190] Carl Thayer, "Alarming Escalation in the South China Sea: China Threatens Force if Vietnam Continues Oil Exploration in Spratlys," *The Diplomat*, July 24, 2017, https://thediplomat.com/2017/07/alarming-escalation-in-the-south-china-sea-china-threatens-force-if-vietnam-continues-oil-exploration-in-spratlys/.

[191] Owen and Schofield, "Disputed South China Sea Hydrocarbons."

the primary drivers of conflict in the SCS, despite limited potential returns.[192] One example comes from energy markets analyst Tim Daiss who often connects Chinese aggression to hydrocarbons—particularly oil—in the SCS. Daiss claims that oil is the reason why "the world's newest super power and second largest economy" is willing "to jeopardize its reputation and standing with…its neighbors…and…[the] international community."[193] Daiss emphasizes that while China frames land reclamation, artificial island building, and aggressive and dangerous behavior within a popular national sovereignty narrative, the real cause for China's actions lies in "what's under the South China Sea, oil…"[194]

Scott Montgomery, a geoscientist and energy and international affairs analyst, similarly connects oil to Chinese militarization of the SCS. Montgomery notes that oil's necessity lies in its lack of alternatives: "…oil constitutes the one energy source with no alternatives…it powers nearly every vehicle in use…No modern economy and no military can exist without it."[195] Montgomery points out that while China's natural gas demand has grown, so has production due to vast domestic shale gas volumes.[196] China has also invested heavily in alternatives to coal and natural gas; however, oil demand presents a different

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[192] Lloyd Thrall, *The Relationship between Natural Resources and Tensions in China's Maritime Periphery* (Santa Monica, CA: RAND Corporation, 2013), https://www.rand.org/content/dam/rand/pubs/testimonies/CT300/CT385/RAND_CT385.pdf.

[193] Tim Daiss, "China is Ramping Up its Presence in the South China Sea—And it's All About Oil," *Business Insider*, March 15, 2018, https://www.businessinsider.com/china-is-ramping-up-its-presence-in-the-south-china-sea-because-of-oil-2018-3.

[194] Tim Daiss, "Why the South China Sea Has More Oil Than You Think," *Forbes*, May 22, 2016, https://www.forbes.com/sites/timdaiss/2016/05/22/why-the-south-china-sea-has-more-oil-than-you-think/#a62669add8fc.

[195] Scott L. Montgomery, "Opinion: Oil, History, and the South China Sea: A Dangerous Mix," *Global Policy Journal*, August 7, 2018, https://www.globalpolicyjournal.com/blog/07/08/2018/oil-history-and-south-china-sea-dangerous-mix.

[196] Montgomery, "Opinion: Oil, History, and the South China Sea."

concern due to rising demand and imports, combined with domestic production that plateaued between 2012 and 2015.[197]

Unlike Daiss and other contributors to the hydrocarbons hypothesis, Montgomery argues, like Thrall, that oil and other hydrocarbons are likely not overriding reasons for China's military actions.[198] Montgomery claims that he and other "informed sources" recognize that estimates from geologic studies are insufficient to justify Chinese risk of military conflict and breakdown of regional relations; rather, Montgomery contends that China's "strategically excessive" oil and gas estimates are distractions from other motives, "such as territorial control."[199] These two examples present contradictory views of the hydrocarbons hypothesis. This chapter evaluates the data and literature that informs the hydrocarbons debate to better understand the role of hydrocarbons in the SCS conflict.

Evaluating the Hydrocarbons Hypothesis

To appropriately evaluate the hydrocarbons hypothesis and avoid misunderstanding, it is important to define and discuss key terms and make several important distinctions. China and its regional neighbors rely heavily on nonrenewable sources of energy in the forms of coal, petroleum products from crude oil and natural gas liquids,[200] and natural gas. Coal is used primarily for electricity and manufacturing; oil is primarily used for transportation and

[197] Montgomery, "Opinion: Oil, History, and the South China Sea."

[198] Montgomery, "Opinion: Oil, History, and the South China Sea."

[199] Montgomery, "Opinion: Oil, History, and the South China Sea."

[200] The words petroleum and oil are often used interchangeably. Petroleum refers to both crude oil and petroleum products (or fuel types). Crude oil and other hydrocarbon compounds found in the SCS must be processed and refined, then becoming petroleum products such as motor gasoline. This chapter will refer to oil (petroleum fuels from crude oil) and petroleum products generally in order to maintain consistency with cited sources and to avoid confusion.

manufacturing; and natural gas primarily is used for electricity, manufacturing, and heating. Petroleum products from crude oil and natural gas are often grouped in reporting simply as energy; however, this generality does not consider the varied end uses of these resources.[201] Most states bordering the SCS have substantial reserves of natural gas but still depend heavily on imported oil to meet transportation needs due to the limited ability of gas to substitute for petroleum-derived fuels.[202]

Measuring, Locating, and Extracting Hydrocarbons

The standard volume unit for measuring crude oil is the 42-gallon barrel. Natural gas is measured in several ways, typically in volume at surface conditions or in thermal energy units. Standard cubic feet and meters are used at uniform conditions to measure natural gas, except for liquefied natural gas, which can be measured by volume because gas is compressible. Most natural gas estimates for the fields in the SCS are given in millions, billions, or trillions of cubic feet. These are standard measures for field reserves. Although the units for measuring oil and gas are distinct, gas reserves can be compared to oil based on energy content using barrels of oil equivalent (BOE).

There are several essential geologic elements necessary for hydrocarbon accumulation. The most basic elements are reservoir rocks, source rocks, and a seal. More specifically, hydrocarbon accumulation requires a porous, permeable sedimentary reservoir, an organic-rich source rock, and a low permeability seal or capping rock to retain hydrocarbons.[203] Over time and under certain conditions, organic matter (plant or animal

[201] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 811.

[202] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 811.

[203] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

remains) can alter into liquid or gaseous hydrocarbons in source rocks—typically shales or limestones. Hydrocarbons in the forms of crude oil and natural gas accumulate in reservoir rocks—such as limestones, dolomites, and sandstones—that allow hydrocarbon extraction because of their porosity and permeability. Lastly, hydrocarbons must be sealed by a very low permeability or impermeable capping rock. These are the basic components of hydrocarbon accumulation but are by no means comprehensive. It is important, however, to recognize the key factors and conditions that enable hydrocarbon accumulation in the SCS to understand where accumulations are and are not feasible.

Finally, there is a distinction between the terms reserve and resource. Owen and Schofield note that some reporting on the SCS mistakenly uses these words interchangeably and yields unrealistic estimate perceptions.[204] Defined simply, resources are hydrocarbons in situ whereas reserves are the proportion of those resources that can be extracted; typically, one-third of hydrocarbon resources can be technically extracted but only about one-tenth can be commercially extracted.[205] This distinction is critical. High resource estimates in the SCS may not be inaccurate strictly speaking; however, these include, for example, unconventional gas hydrates that cannot be technically extracted at present. Reserves, in contrast, are the fraction of resources that can be recovered "at the current market price with current technical capability."[206] Distinguishing between hydrocarbon resources and reserves allows for a more realistic estimate of hydrocarbon capacity in the SCS.

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[204] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

[205] Bill Hayton, *The South China Sea: The Struggle for Power in Asia* (New Haven: Yale University Press, 2014), 149.

[206] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

Estimating the South China Sea's Hydrocarbon Potential

To meet rising demand, Chinese companies are investing in new extraction techniques to sustain oil flows at major mature fields while simultaneously developing untouched reserves offshore and in China's western interior.[207] Most of China's crude oil production capacity is onshore; however, approximately twenty percent of production capacity is located in shallow offshore reserves.[208] Although the SCS is richest in natural gas, Chinese state-owned oil companies have discovered small oil fields near shore and are investing in deep-water discovery.[209] Significant deep-water exploration has been limited by ongoing disputes and clashes between China and other claimants in the SCS. Other impediments include weather. Since the SCS is very typhoon-prone, companies must install costly systems rather than cheaper rigid drilling and production platforms.[210] Furthermore, the SCS's bathymetry requires that producers install subsea pipelines in areas with submarine valleys as well as strong, deep water currents.[211]

The U.S. Geological Survey's World Petroleum Resources Assessment Project studied twenty-three hydrocarbon provinces in southeast Asia. Nine of these were in the SCS; eight were contested by one or more claimant state.[212] Nonetheless, most reserves in the

[207] "China Analysis," U.S. Energy Information Agency.

[208] "China Analysis," U.S. Energy Information Agency.

[209] "China Analysis," U.S. Energy Information Agency.

[210] Wendy Laursen, "South China Sea Offers Opportunities, Challenges," *Offshore*, September 2013, 46.

[211] Laursen, "South China Sea," 46.

[212] World Petroleum Resources Assessment Project, "Assessment of Undiscovered Oil and Gas Resources of Southeast Asia, 2010," United States Geological Survey, June 2010, https://pubs.usgs.gov/fs/2010/3015/pdf/FS10-3015.pdf.

SCS are found on the margins of the SCS in shallow water geologic basins.[213] Despite ongoing disputes, several examples of bilateral cooperation exist. For example, Malaysia and Brunei settled disputes to jointly explore offshore.[214] Both countries have limited onshore potential and, along with Vietnam, have invested heavily in offshore development.[215] Malaysia leads in terms of proved and probable reserves in the SCS with 5 billion barrels of crude oil and liquids reserves and 80 trillion cubic feet of natural gas; Brunei has 1.5 billion barrels of oil and 15 trillion cubic feet of natural gas; and Vietnam has 3 billion barrels of oil and 20 trillion cubic feet of natural gas.[216] China follows with 1.3 billion barrels of oil and 15 trillion cubic feet of natural gas.[217] Notably, Indonesia possesses 55 trillion cubic feet of natural gas reserves.[218]

Overall, the combined proved and probable reserves[219] in the SCS amount to 11.2 billion barrels of crude oil and 190 trillion cubic feet of natural gas (135 trillion cubic feet of which are owned by Malaysia and Indonesia in the southernmost portions of the SCS).[220]

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[213] "South China Sea," U.S. Energy Information Agency, last modified February 7, 2013, https://www.eia.gov/beta/international/regions-topics.php?RegionTopicID=SCS.

[214] "South China Sea," U.S. Energy Information Agency.

[215] "South China Sea," U.S. Energy Information Agency.

[216] "South China Sea," U.S. Energy Information Agency.

[217] "South China Sea," U.S. Energy Information Agency.

[218] "South China Sea," U.S. Energy Information Agency.

[219] In reporting, reserve estimates are given in probabilities in three categories: 1P, 2P, and 3P. 1P is the equivalent of proved reserves with 90 percent commercial extraction certainty. 2p is the sum of proved and probable reserves with 50 percent certainty of commercial extraction. Finally, 3P is the sum of proved, probable, and possible reserves with 10 percent certainty of commercial extraction. 3P reserves are generally optimistic estimates. 2P estimates, or proved and probable reserves, with 50 percent probability of recovery is a statistically appropriate way to report oil reserves.

[220] "South China Sea," U.S. Energy Information Agency.

Hydrocarbons may also exist in other areas but are not included in the figures for proved and probable reserves; these undiscovered resources amount to an estimated 12 billion barrels of oil and 160 trillion cubic feet of natural gas.[221] One-fifth of these undiscovered resources are estimated in contested areas of the SCS; however, these hydrocarbons are not considered commercially recoverable and extraction may not be feasible.[222]

Whether or not these resources prove extractable in the future, it is useful to compare these to other high estimations. For example, the USGS published its largest continuous oil and gas resource estimates in 2018 for the Wolfcamp Shale and Bone Spring Formation in west Texas and southeast New Mexico. In these areas, the USGS estimated over 46 billion barrels of oil, 281 trillion cubic feet of natural gas, and 20 billion barrels of natural gas liquids to be undiscovered and technically recoverable.[223] Compared to other major resource estimates, Chinese claims that the SCS presents a "second Persian Gulf" [224] in terms of hydrocarbon wealth appear exaggerated.

As of 2017, China produced under 5 million barrels of oil per day, consuming nearly 13 million barrels daily in 2016;[225] China imported 8.4 million barrels per day to meet this high consumption.[226] Overall, annual Chinese oil consumption amounted to approximately

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[221] "Contested Areas of South China Sea Likely Have Few Conventional Oil and Gas Resources," U.S. Energy Information Agency, April 3, 2013, https://www.eia.gov/todayinenergy/detail.php?id=10651.

[222] "Contested Areas of South China Sea," U.S. Energy Information Agency.

[223] National and Global Petroleum Assessment, "Assessment of Undiscovered Continuous Oil and Gas Resources in the Wolfcamp Shale and Bone Spring Formation of the Delaware Basin, Permian Basin Province, New Mexico and Texas, 2018," United States Geological Survey, December 2018, https://pubs.usgs.gov/fs/2018/3073/fs20183073.pdf.

[224] "CNOOC to Offer 9 blocks in S. China Sea for Joint Exploration," *Global Times*, June 6, 2012, http://www.globaltimes.cn/content/717464.shtml.

[225] "What Countries Are the Top Producers and Consumers of Oil?" U.S. Energy Information Agency.

[226] "China Surpassed the United States," U.S. Energy Information Agency.

4.7 billion barrels in 2016. Extrapolating from this, if China managed to unilaterally extract all the proved and probable oil reserves—which, to reiterate, were estimated at 11.2 billion barrels in the SCS with the majority within other states' territory—China would not even fuel its economy for 30 months at current consumption rates. Obviously, this theoretical situation would never occur. China could not extract all the estimated reserves in the SCS independently and already produces about 5 million barrels daily. However, this does demonstrate the limited ability of the SCS reserves to meet high demand. China will likely continue to be a net oil importer to meet demand for the foreseeable future.

Conflicting Estimates

Many hydrocarbon estimates for the SCS considered most authoritative are geology-based given the absence of well log data and seismic surveys typically used to produce these estimates.[227] This is due to the reality that exploration efforts have been impeded by competing claims in much of the SCS.[228] Furthermore, existing hydrocarbon estimates vary widely. As summarized by the EIA: Wood Mackenzie, an energy consultancy group, estimated 2.5 billion barrels of oil equivalent in proved (1P) oil and gas reserves; the EIA estimated approximately 11 billion barrels of oil and 190 trillion cubic feet of natural gas in proved and probable (2P) reserves; the USGS estimated a possible 5-22 billion barrels of oil and 70-290 cubic feet of natural gas in undiscovered, non-commercial resources; and finally, the Chinese National Offshore Oil Company (CNOOC) estimated 125 billion barrels of oil and 500 trillion cubic feet of natural gas in undiscovered resources.[229]

[227] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

[228] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

[229] "South China Sea," U.S. Energy Information Agency.

Chinese estimates are consistently higher than other available estimates and are often dismissed as unrealistic and overly optimistic.[230] A 2015 article by the China Institute of International Studies cited expert Chinese estimates of oil and gas reserves in the main basins of the SCS as amounting to nearly 71 billion tons.[231] Oil accounted for over 29 billion tons (of which 2 billion tons were proven to be extractable) and 58 trillion cubic meters of natural gas (of which 4 trillion cubic meters were proven to be extractable).[232] In standard barrels, the 29 billion ton estimate would amount to nearly 214 billion barrels. This would mean the SCS contains the world's third largest reserves capable of sustaining China for sixty years, when combined with the natural gas estimates, if the full estimated amount could be extracted.[233] The China Institute of International Studies report went on to cite USGS, EIA, and other Chinese estimates, acknowledging that estimates diverged "…slightly due to a lack of adequate prospecting."[234]

The Peace Research Institute in Oslo (PRIO) provides one of the most commonly-referenced, comprehensive, publicly-available geographic datasets on oil and gas deposits around the world, both on and offshore. These data include spatial information (latitude and longitude coordinates) based on the center point of known deposits, resource type (oil, gas, or both oil and gas), discovery and production dates (if known), petroleum basin name, and

[230] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 815.

[231] Li Guoqiang, "China Sea Oil and Gas Resources," China Institute of International Studies, May 11, 2015, http://www.ciis.org.cn/english/2015-05/11/content_7894391.htm.

[232] Guoqiang, "China Sea Oil and Gas Resources."

[233] Anders Corr, *Great Powers, Grand Strategies: The New Game in the South China Sea* (Annapolis: Naval Institute Press, 2018), 14.

[234] Guoqiang, "China Sea Oil and Gas Resources."

sources of information.[235] For context throughout this chapter, the PRIO offshore deposit data is displayed for the SCS; China's nine-dash line as generalized by the author based on Chinese maps, EEZs, and the SCS boundary extent (excluding the Gulf of Thailand) have been incorporated for reference.[236]

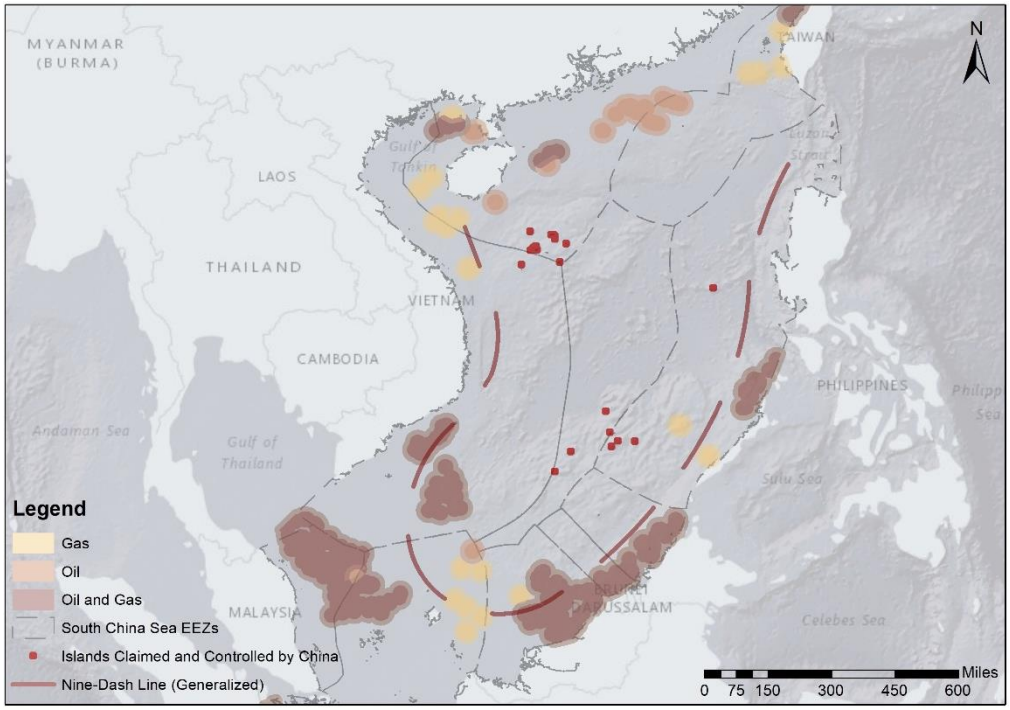

Figure 8. Oil and gas deposits in the South China Sea.
Source: *Offshore Petroleum Fields in the South China Sea* [map]. March 2019. 1:15,000,000; generated by the author using *ArcGIS* Version 10.6.

Oceanic crust stretching from southwestern Taiwan to the western Spratly Islands encompasses much of the central SCS and effectively rules out the possibility of hydrocarbon discovery.[237] Chinese government and national oil company (NOC) funded research agree

[235] Päivi Lujala, Jan Ketil Rød, and Nadia Thieme, "Fighting over Oil: Introducing A New Dataset," *Conflict Management and Peace Science* 24, no. 3 (2007): 239-256, doi: https://doi.org/10.1080/07388940701468526.

[236] The author added a transparent buffer of ten nautical miles around the deposit polygons. These buffer zones are provided to emphasize and help visually distinguish between deposit types. EEZs are clipped to the SCS boundary.

[237] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

that most deposits are located near the margins of the SCS in sedimentary basins. One such study on hydrocarbon accumulation in the southern SCS determined that the greatest recoverable oil and gas resources (2P recoverable and undiscovered resources) were located in four main sedimentary basins close to the coasts of Malaysia, Brunei, and Vietnam.[238] The boundaries of these basins as presented by the China National Petroleum Corporation (CNPC) researchers were mostly outside the extent of the nine-dash line. CNOOC researchers have published similar findings—that is, that most hydrocarbon-prone regions are on the continental margins of the SCS, but that exploration of more deep water areas could yield significant findings.[239] SCS reserves in millions of barrels of oil equivalent in the SCS are displayed in Figure 9.

[238] Yiping Wu et al., "Tectonic Evolution in the South of the South China Sea and Its Control Factors of Hydrocarbon Accumulation," *Ekoloji* 27, no. 106 (2018): 486-489, http://www.ekolojidergisi.com/download/tectonic-evolution-in-the-south-of-the-south-china-sea-and-its-control-factors-of-hydrocarbon-5364.pdf.

[239] Gongcheng Zhang, "Hydrocarbon Accumulation in the Deep Waters of South China Sea Controlled by the Tectonic Cycles of Marginal Sea Basins," *Petroleum Research 1*, no 1 (2016): 39, doi: https://doi.org/10.1016/S2096-2495(17)30029-7.

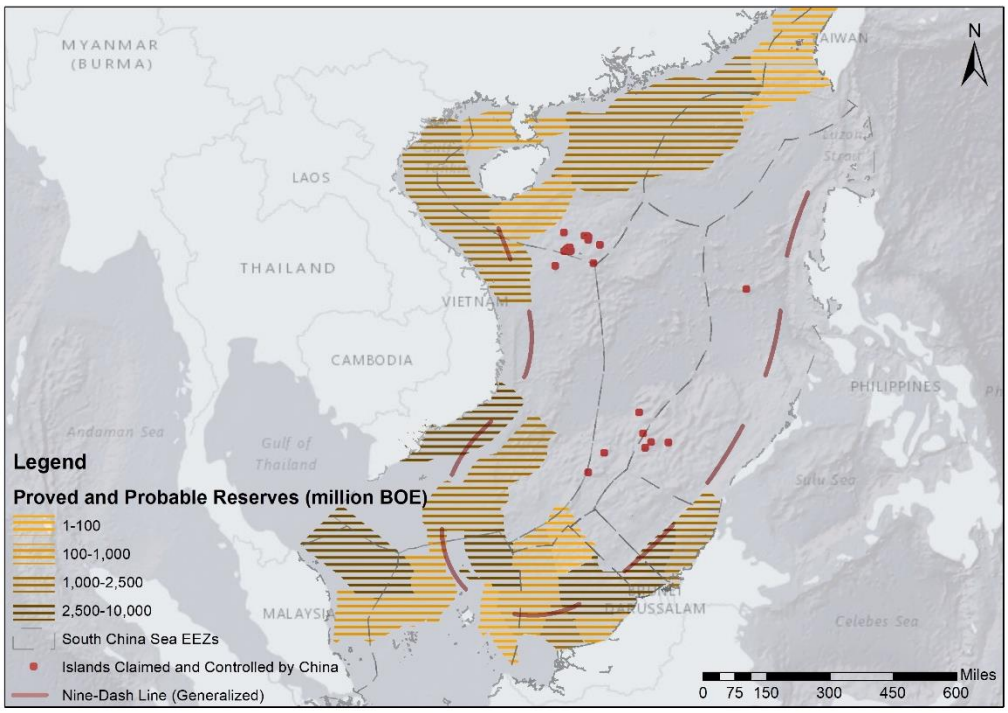

Figure 9. Proved and probable reserves of oil and natural gas in the South China Sea given in million barrels of oil equivalent.
Source: *South China Sea 2P Reserves* [map]. March 2019. 1:15,000,000; generated by the author using *ArcGIS* Version 10.6.

Notably, of the nine major known hydrocarbon provinces identified in the USGS report, only the Pearl River Mouth Basin (PRMB) is not subject to competing claims and is claimed only by China.[240] This area has been explored and developed by Chinese and foreign companies; most of its sedimentary environments and their hydrocarbon reserves and potential are well-understood. Significantly for China, the PRMB is considered the most petroliferous basin in the northern SCS.[241]

[240] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 813.

[241] Guang Hu et al., "Hydrocarbon Potential and Depositional Environment of the Lower Cretaceous Black Mudstones and Shales in the Coastal Guangdong Province, China," *Marine and Petroleum Geology* 99 (2019): 104, doi: https://doi.org/10.1016/j.marpetgeo.2018.10.008.

Offshore Drilling and Sovereignty in the South China Sea

As noted in the previous chapter, fishing vessels play a role in asserting maritime territorial sovereignty in the South China Sea. Offshore drilling platforms serve a similar purpose as more semi-permanent fixtures in maritime space. At the end of their production life, offshore platforms are typically removed by explosive or mechanical means but both Brunei and Malaysia notably convert some decommissioned platforms to artificial reefs to protect fish and invertebrates.[242] Other abandoned and active platforms near disputed boundaries can serve to fuel regional tensions.[243]

Opposition to offshore drilling from China, primarily from the Philippines and Vietnam, has ranged from Chinese pressure to expel foreign firms to threats of attack and war.[244] The last major attempt at trilateral cooperation was the Joint Marine Seismic Undertaking (JMSU), which began in 2005 and expired in 2008.[245] The JMSU was initiated by a circle of Filipino politicians, bureaucrats, and political insiders with mixed motivations ranging from improving energy security to obtaining Chinese investment and procuring profitable business deals with Chinese companies.[246] Vietnam eventually agreed to join the JMSU despite fierce domestic opposition, not wanting to be excluded from the initiative's discoveries.[247] Three national oil companies from China, Vietnam, and the Philippines

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[242] Ann Scarborough Bull and Milton S. Love, "Worldwide Oil and Gas Platform Decommissioning: A Review of Practices and Reefing Options," *Ocean & Coastal Management* 168 (2018): 274, doi: https://doi.org/10.1016/j.ocecoaman.2018.10.024.

[243] Scarborough Bull and Love, "Worldwide Oil and Gas Platform Decommissioning," 286.

[244] Montgomery, "Opinion: Oil, History, and the South China Sea."

[245] Hayton, *The South China Sea*, 134-135.

[246] Hayton, *The South China Sea*, 133.

[247] Hayton, *The South China Sea*, 134.

committed to cooperate on seismic surveys of approximately 140,000 square kilometers of maritime territory around the contested Spratly Islands.[248] CNOOC conducted surveys; PetroVietnam processed data along with an American company; and the Philippine National Oil Company organized analysis.[249] In the end, the JMSU fell apart largely due to corruption charges, popular opposition, and constitutional challenges in the Philippines. Since the expiration of the JMSU in 2008, no serious attempts at joint development have been made between three or more claimant states. Successful examples of bilateral cooperation since the collapse of the JMSU come from the southern SCS. In 2015, Malaysia and Brunei's NOCs announced the joint development of two oil fields on their maritime boundary.[250] This was possible as Malaysia and Brunei enjoy comparatively friendly relations in contrast to other SCS claimant states.[251]

The 2014 China-Vietnam Oil Rig Standoff Case Study

Since the failure of the JMSU to achieve lasting cooperation, Chinese fishing boats and law enforcement vessels have impeded Vietnamese seismic survey efforts by intimidating survey ships and severing their seismic cables.[252] Most controversially, CNOOC deployed a semisubmersible drilling rig, the *Hai Yang Shi You* (HYSY 981), to waters 120 nautical miles off Vietnam's east coast—solidly within Vietnam's 200 nautical mile EEZ—

[248] Emily Meierding, "Joint Development in the South China Sea: Exploring the Prospects of Oil and Gas Cooperation Between Rivals," *Energy Research & Social Science* 24 (2017): 66, doi: https://doi.org/10.1016/j.erss.2016.12.014.

[249] Hayton, *The South China Sea*, 134.

[250] Meierding, "Joint Development in the South China Sea," 66.

[251] Meierding, "Joint Development in the South China Sea," 66.

[252] Ian Forsyth, "Old Game Plan, New Game: China's Grand Strategy in the South China Sea," in *Great Powers, Grand Strategies: The New Game in the South China Sea*, ed. Anders Corr, 74-105 (Annapolis, Naval Institute Press, 2018), 85.

for three months in 2014.[253] The HYSY 981 deployment was 180 miles south of China's Hainan island province, falling within the maximum hypothetical EEZ entitlements of both Vietnam and China.[254] These overlapping rights have not been resolved between the two states.[255]

China's coordinated effort was planned well in advance of HYSY 981's deployment. The CNOOC chairman had declared the billion-dollar HYSY 981 a strategic weapon in the SCS for Beijing two years before the rig was deployed to Vietnamese-claimed territory,[256] also labeling it as a tool of "mobile sovereignty."[257] Although CNOOC was at first reluctant to expand into the SCS, it changed its position when other domestic NOC competitors obtained permits to explore the SCS in 2004.[258] Nonetheless, expansion was an uncertain venture for CNOOC which, as a publicly-listed corporation since 2001, had to take business interests into consideration before exploring in contested waters.[259] Such exploits would be too hazardous without strong state backing, especially given CNOOC's relative lack of

[253] James E. Fanell, "China's Maritime Sovereignty Campaign: Scarborough Shoal, the 'New Spratly Islands,' and Beyond," in *Great Powers, Grand Strategies: The New Game in the South China Sea*, ed. Anders Corr, 106-121 (Annapolis, Naval Institute Press, 2018), 109.

[254] Michael Green et al., "Counter-coercion Series: China-Vietnam Oil Rig Standoff," Center for Strategic and International Studies-Asia Maritime Transparency Initiative, June 12, 2017, https://amti.csis.org/counter-co-oil-rig-standoff/.

[255] In cases where EEZs would overlap—that is, if the EEZs in question extend from states' coastal baselines that are separated by less than 400 nautical miles—it is up to those states to delineate an agreed boundary. In most cases, areas within overlapping EEZ areas default to the state with the closest coastal baseline.

[256] Green et al., "Counter-coercion Series."

[257] Xue Gong, "The Role of Chinese Corporate Players in China's South China Sea Policy," *Contemporary Southeast Asia* 40, no. 2 (2018): 314, https://muse.jhu.edu/article/702068.

[258] Gong, "The Role of Chinese Corporate Players," 311.

[259] Gong, "The Role of Chinese Corporate Players," 311.

experience in deep water operations and speculative prospects in the SCS.[260] Ultimately, with both competition concerns and a growing need for market expansion under pressures of rising demand, CNOOC lobbied the Chinese government for SCS exploration support in the name of defending territorial sovereignty.[261] Ultimately, CNOOC was successful in its efforts to align its business interests with the state's maritime interests.[262]

While CNOOC explored for oil, the China Maritime Safety Administration provocatively declared that no ships could enter within a three-nautical-mile radius of HYSY 981.[263] This was an increase from a previous radius of one-nautical-mile. Standoffs and collisions between Vietnamese and Chinese vessels prompted China to expand its declared security cordon to five, 10, and 15 nautical miles while demonstrations and protests against China broke out in Vietnam.[264] China evacuated over 3,000 Chinese citizens from Vietnam after several were killed and more than 100 injured.[265] China's foreign ministry repeatedly claimed that Vietnam's attempts to interrupt drilling activities violated Chinese sovereignty.[266] In its 2015 annual report to Congress, the U.S. Office of the Secretary of Defense characterized HYSY 981 as a "sovereignty marker."[267] Ultimately, China's

[260] Gong, "The Role of Chinese Corporate Players," 311.

[261] Gong, "The Role of Chinese Corporate Players," 312.

[262] Gong, "The Role of Chinese Corporate Players," 314.

[263] Fanell, "China's Maritime Sovereignty Campaign," 109.

[264] Green et al., "Counter-coercion Series."

[265] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015," *U.S. Department of Defense*, April 7, 2015, 7, https://dod.defense.gov/Portals/1/Documents/pubs/2015_China_Military_Power_Report.pdf.

[266] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015," 7.

[267] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015," 7.

disregard for Vietnam's EEZ sent a clear message.[268] Nonetheless, CNOOC withdrew HYSY 981 a month ahead of schedule and returned to the northwestern SCS.[269] While CNOOC claimed the withdrawal of HYSY 981 was in accordance with previous plans and had "nothing to do with any external factor," it has not crossed to Vietnam's side of the disputed median line since 2014, causing some to declare the incident a major coercive failure on China's part.[270]

Hydrocarbon Exploration Activity in the South China Sea

The 2014 HYSY 981 incident serves as a prime example of Chinese sovereignty assertion and aggression in publications on the SCS. Overall, however, the extent of hydrocarbon exploration activity in the SCS is poorly known and estimates of offshore platforms in the SCS vary widely. Although countries engaged in offshore drilling, offshore energy producers, and platform producers are certainly aware of their own platforms, many do not make this information available to protect business and national security interests.[271] Chinese government-supported research used U.S., Chinese, and Japanese satellite imagery and data to determine the number of offshore platforms in the SCS.[272] This research aimed at clarifying the number of platforms in the SCS and their spatial distribution relying primarily on satellite data freely available online, including the U.S. Visible Infrared Imaging Radiometer Suite nighttime lights products and Landsat-8 imagery.[273]

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[268] Fanell, "China's Maritime Sovereignty Campaign," 109.

[269] Green et al., "Counter-coercion Series."

[270] Green et al., "Counter-coercion Series."

[271] Yongxue Liu et al., "Satellite Data Lift the Veil on Offshore Platforms in the South China Sea," *Scientific Reports* 6, no 33623 (2016): 1, doi: https://doi.org/10.1038/srep33623.

[272] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 9.

[273] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 2.

The study concluded that 1,082 offshore installations were located in the SCS, including the Gulf of Thailand and other areas outside China's nine-dash line.[274] These were primarily small installations for shallow-water production rather than large, billion-dollar, deep water drilling rigs like HYSY 981. Over 95 percent of platforms identified were in shallow water areas; the largest groupings of platforms were found in the Gulf of Thailand and the southern SCS outside the geographic extent of the nine-dash line.[275] Excluding non-claimant states, Malaysia had the most platforms (356) in or near the SCS followed by Brunei (166), Vietnam (91), China (76), and the Philippines (8).[276] The authors postulated that previous estimates of offshore platforms ranging from just under 1,300 to over 1,500—figures substantially higher than the 1,082 actually identified—were inaccurate largely due to data availability factors and inclusion of platforms located geographically outside the boundaries of the SCS.[277] Although the majority of platforms identified were outside of contested areas, the Chinese study found 90 platforms in areas with overlapping claims and predicted this number could rise to 120 by 2020 based on average increases per year, potentially exacerbating existing tensions.[278]

[274] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 2.

[275] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 2.

[276] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 2.

[277] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 2-5.

[278] Liu et al., "Satellite Data Lift the Veil on Offshore Platforms," 6.

Conclusion

This assessment of the hydrocarbons hypothesis as a possible explanation for China's militarization of the SCS exposes several important trends. First, China's demand for hydrocarbons is rising. Relying on imports is a major concern for China as it seeks to improve energy security by depending less on foreign sources. Chinese exploration in the SCS near and within contested waters is not altogether surprising. The combination of Chinese military infrastructure in the SCS and the nearby mainland make the SCS a strategic option for hydrocarbon development to meet domestic needs.[279] Second, while Chinese exploration of the SCS is understandable strategically, its potential may be limited. Uncontested coastal areas that already produce hydrocarbons contain the majority of proven reserves; hydrocarbon potential in contested, deep water areas is largely hypothetical.[280] Third, most scholars and analysts whose work has been considered herein do not propose the hydrocarbon hypothesis as a singular explanation for the SCS conflicts or for China's militarization of the SCS. Rather, this argument is made primarily by media sources and some think tanks. Nontechnical sources frequently overstate the significance of estimates, conflating 1P, 2P, and 3P estimates and often cite the sum of reserve and resource estimates.[281] This can be highly misleading. In comparison, most analysts and scholars conclude that hydrocarbon competition is not the dominant factor—if such a factor exists—behind the SCS disputes.[282]

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[279] Mercy A. Kuo, "The Geopolitics of Oil and Gas in the South China Sea: Insights from Eufracia Taylor and Hugo Brennan," *The Diplomat*, December 12, 2018, https://thediplomat.com/2018/12/the-geopolitics-of-oil-and-gas-in-the-south-china-sea/.

[280] Thrall, *The Relationship between Natural Resources and Tensions*, 2.

[281] Thrall, *The Relationship between Natural Resources and Tensions*, 2.

[282] Meierding, "Joint Development in the South China Sea," 66.

As Montgomery summarized pointedly: "…Chinese perception of the SCS as a security concern has led to an erosion of security in the region. One other point should be made in this regard: oil and gas resources in the SCS are not likely an overriding reason for China's actions. Continued focus on this idea in some quarters isn't warranted."[283] Assuming optimistic estimates for the SCS hydrocarbon reserves in terms of forecasted production rates, the SCS oil reserves do not have the capacity to significantly improve regional energy security and address China's concerns regarding import reliance.[284] In contrast, conventional gas reserves could benefit SCS countries in the medium to long term based on production rate forecast analyses.[285] As far as China is concerned, however, natural gas is a far less significant component of domestic energy needs than oil. Since oil is the essential fuel for the transportation sector, it is irreplaceable in the medium term—particularly as China's oil demand continues to grow.[286]

While debate over the hydrocarbons hypothesis will likely continue as competition intensifies and future exploration either supports or undermines major arguments, China's goals can be better understood by studying the role of hydrocarbons in the SCS disputes. The near absence of oil and gas reserves surrounding China's major militarized features implies that China has other objectives beyond accessing hydrocarbons.[287] According to hydrocarbon industry sources, the areas around the contested Spratly Islands likely contain almost no oil

[283] Montgomery, "Opinion: Oil, History, and the South China Sea."

[284] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 820.

[285] Owen and Schofield, "Disputed South China Sea Hydrocarbons," 820.

[286] Thrall, *The Relationship between Natural Resources and Tensions*, 2-3.

[287] See chapter 2 for a discussion of arguments that China's actions in the Spratly Islands are connected to accessing fisheries in the region.

and less than 100 billion cubic feet of natural gas while the areas around the Paracel Islands have no oil and even less natural gas.[288]

Although oil and natural gas exploration and the infrastructure that accompanies these efforts play significant roles in asserting sovereignty claims, China and other claimant states also have significant energy needs combined with competition. China's actions in the SCS cannot be viewed strictly as strategic moves since practical considerations of meeting energy demand also exist. Recognizing the multiple sides of hydrocarbon extraction efforts is critical to better understand the SCS conflicts and especially Chinese activity in the SCS.

[288] "Contested Areas of South China Sea," U.S. Energy Information Agency.

CHAPTER IV

THE SOUTH CHINA SEA'S SEA LINES OF COMMUNICATION

Introduction

Sea lines of communication (SLOCs) are the final possible motivation for China's militarization of the South China Sea (SCS) considered in this thesis. SLOCs are important maritime passageways that "facilitate heavy shipping traffic volumes and host the transportation of key maritime trades such as crude oil;" they are characterized "by the intensity of their use and narrow passages or 'chokepoints' that require ships to navigate cautiously when passing through…"[289] Incidents along SLOCs or near chokepoints can disrupt shipping traffic flows, impacting regional economic interests and global trade.[290] The SCS is home to some of the world's busiest shipping routes with an estimated one-third of global shipping passing through the SCS each year.[291] This includes over half the world's merchant ships by tonnage and half the world's oil tankers annually.[292] Overall, approximately 80 percent of global trade by volume is handled by maritime transport.[293] This

[289] Nazery Khalid, "Sea Lines Under Strain: The Way Forward in Managing Sea Lines of Communication," *IUP Journal of International Relations* 4, no. 2 (2012): 57, https://ssrn.com/abstract=2160761.

[290] Khalid, "Sea Lines Under Strain," 57.

[291] China Power Team, "How much trade transits the South China Sea?" China Power Project, Center for Strategic and International Studies, last modified August 2, 2017, https://chinapower.csis.org/much-trade-transits-south-china-sea/.

[292] David Rosenberg and Christopher Chung, "Maritime Security in the South China Sea: Coordinating Coastal and User State Priorities," *Ocean Development & International Law* 39 (2008): 51-52, doi: https://doi.org/10.1080/00908320701641602.

[293] United Nations Conference on Trade and Development, "Review of Maritime Transport 2015," October 14, 2015, https://unctad.org/en/PublicationsLibrary/rmt2015_en.pdf.

rises to 90 percent for developing countries.[294]

For China and other states that depend on the SCS SLOCs for trade, any disruption could be devastating to shipping. Shipping is a very competitive industry with small profit margins; longer trips would result in fewer annual voyages and higher fuel costs that could ruin shipping companies.[295] Alternative shipping routes that are more dangerous and pose greater risk result in higher insurance premiums.[296] Thus, the need for open and safe SLOCs through the SCS is significant, especially for those states whose economies are most dependent on the SCS. Already, commercial shipping in the SCS faces threats from extreme weather, complex submarine topography, and piracy and armed robbery.[297]

Analysis of data from the International Comprehensive Ocean Atmosphere Data Set (ICOADS) from the U.S. National Oceanic and Atmospheric Administration (NOAA)—which maintains the largest available set of historic to recent marine observations—reveals two major shipping routes that pass through the SCS.[298] One passes through the Taiwan Strait along China's southeastern coast to Hong Kong, a major commercial port city.[299] This route then turns southwest toward Singapore.[300] The other major route, which passes directly

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[294] United Nations Conference on Trade and Development, "Review of Maritime Transport 2015."

[295] Linda Paul, "The Need for Open Sea Lines of Communication in the South China Sea," PACNET Pacific Forum, August 21, 2018, https://www.pacforum.org/sites/default/files/tmp/180821_PacNet_59_0.pdf.

[296] Paul, "The Need for Open Sea Lines."

[297] Jiasheng Wang et al., "Safety Assessment of Shipping Routes in the South China Sea Based on the Fuzzy Analytic Hierarchy Process," *Safety Science* 62 (2014): 46, doi: http://dx.doi.org/10.1016/j.ssci.2013.08.002.

[298] Jau-Ming Chen et al., "Shipping Routes in the South China Sea and Northern Indian Ocean and Associated Monsoonal Influences," *Terrestrial, Atmospheric and Oceanic Sciences* 28, no. 3 (2017): 306, doi: http://dx.doi.org/10.3319/TAO.2016.09.08.01.

[299] Chen et al., "Shipping Routes in the South China Sea," 306.

[300] Chen et al., "Shipping Routes in the South China Sea," 306.

through the SCS, goes through the western Pacific on the eastern Taiwan coast; it then passes through the Bashi Channel or Luzon Strait between southern Taiwan and the northern Philippines and then southwest toward Singapore.[301] Both major routes then merge in the central SCS near 111°E, 11°N and then pass through the Singapore and Malacca Straits, into the Indian Ocean.[302] The Strait of Malacca is the most heavily-used entry point to the SCS and presents the most economical connection between the Indian and Pacific Oceans.[303] For reference, one year of shipping activity is provided in Figure 10 below to visualize the amount of shipping traffic passing through the SCS in comparison to the rest of the world.[304]

Figure 10. 2013 global shipping activity.
Source: *Cumulative Global Shipping Activity: 2013* [map]. March 2019. 1:100,000,000 (South China Sea inset 1:50,000); generated by the author using *ArcGIS* Version 10.6.

[301] Chen et al., "Shipping Routes in the South China Sea," 306.

[302] Chen et al., "Shipping Routes in the South China Sea," 306.

[303] China Power Team, "How much trade transits the South China Sea?"

[304] The data presented were adapted by the author from a database created to measure cumulative human impacts on the world's oceans. The dataset used (pressure_one_2013_shipping_mol.zip) to render this figure can be accessed here: Benjamin Halpern et al., *Cumulative Human Impacts: Pressure and Cumulative Impacts Data* (2015), published by Knowledge Network for Biocomplexity, https://knb.ecoinformatics.org/view/doi:10.5063/F15718ZN.

Other major routes into the SCS include the Sunda Strait between the Indonesian islands of Java and Sumatra, the Lombok Strait between the Indonesian islands of Bali and Lombok, or a long voyage around Australia.[305] If the Malacca and Sunda Straits closed, the estimated cost to reroute shipping traffic through the Lombok Strait for one week would be approximately $119 million.[306] Both the Sunda and Lombok Straits are near "currently active and very dangerous explosive volcanoes," which could impact insurance premiums and, potentially, navigability in the event of volcanic eruptions.[307] If, however, all major straits and other possible SLOCs in the region closed, shipping vessels would have to sail around Australia and then northward to the Philippine Sea with an estimated additional monthly cost of $2.8 billion.[308] This is a worst-case scenario, but one that necessitates consideration in case all other entries to the SCS are disrupted. This possible disruption—usually attributed to Chinese aggression and regional conflict—is the major concern proponents of the SLOC hypothesis raise, arguing that China's intention to control major shipping lanes has driven China's military actions in the SCS.

The Sea Lines of Communication Hypothesis

A "popular view" in SCS literature is that China is a threat to global trade, either through an outbreak of conflict that could render the SCS unnavigable for commercial shipping vessels or through China's potential to use its military infrastructure in the SCS to

[305] Paul, "The Need for Open Sea Lines."

[306] China Power Team, "How much trade transits the South China Sea?"

[307] Paul, "The Need for Open Sea Lines."

[308] China Power Team, "How much trade transits the South China Sea?"

"interdict commercial shipping."[309] Writing for the *New York Times*, journalist and international affairs analyst Max Fisher claims that while fisheries, oil, and natural gas contribute to the SCS's strategic importance, the greatest value the SCS presents is as a trade route, citing $5.3[310] trillion in overall goods passing through the SCS each year including $1.2 trillion of U.S. trade.[311] Fisher then notes a "core contradiction" in the SCS dispute: the dispute is driven by territorial competition while all countries involved want and rely upon open sea routes.[312] Each country benefits from the free flow of goods and each would suffer from disruption.[313] Factoring the United States into the equation, Fisher writes that the United States stresses free navigation and does not want to allow China the possibility of holding the "global economy hostage," acknowledging that China is unlikely to want to close off trade in the first place, but that China suspects the status quo is "engineered to serve Western interests first."[314]

Asian financial markets analyst Peter Pham, like Fisher, also mentions fisheries, oil, and natural gas in passing, but emphasizes the importance of trade to explain rising tensions in the SCS. Pham writes in response to the Trump administration's fourth freedom of navigation operation (FONOP) in the SCS, calling the operation the "latest activity in a

[309] Benjamin Herscovitch, "A Balanced Threat Assessment of China's South China Sea Policy," Cato Institute *Policy Analysis* 820 (2017): 7-8, https://object.cato.org/sites/cato.org/files/pubs/pdf/pa820.pdf.

[310] This figure has been found to be inflated in recent analyses, the findings of which are discussed later in this chapter.

[311] Max Fisher, "The South China Sea: Explaining the Dispute," *New York Times*, July 14, 2016, https://www.nytimes.com/2016/07/15/world/asia/south-china-sea-dispute-arbitration-explained.html.

[312] Fisher, "The South China Sea."

[313] Fisher, "The South China Sea."

[314] Fisher, "The South China Sea."

multi-dimensional chess game" where "the smallest miscalculation...could have huge consequences for trillions of dollars in trade and billions of lives, not just in the immediate vicinity but around the globe…"[315] Pham reiterates that conflict in the SCS is not a contemporary phenomenon; however, the new concern in the SCS is the impact military action will have on global trade.[316]

One final example of the SLOC hypothesis comes from Asian finance and politics writer Anthony Fensom. Fensom wrote that while China is the major beneficiary of free shipping routes in the SCS, other nations are similarly dependent and any escalation of conflict would lead to the breakdown of trade in "one of the world's last remaining regions of economic dynamism."[317] Like many others, Fensom wrote in response to the July 12, 2016 ruling against China at the Permanent Court of Arbitration (PCA) in The Hague, an international body constituted under the UN Convention on the Law of the Sea (UNCLOS). In the unanimous *The Republic of the Philippines v. The People's Republic of China* ruling, the tribunal found "no evidence" that China historically exerted exclusive control over the SCS waters and their resources, concluding that China has no legal basis to claim "historic rights to resources within the sea areas falling within the 'nine-dash line.'"[318] China's emphatic rejection of the ruling amplified concerns of conflict in the SCS that could disrupt

[315] Peter Pham, "Why Is Tension Rising in The South China Sea?" *Forbes*, December 19, 2017, https://www.forbes.com/sites/peterpham/2017/12/19/why-is-tension-rising-in-the-south-china-sea/#69cd6c171fa4.

[316] Pham, "Why Is Tension Rising."

[317] Anthony Fensom, "$5 Trillion Meltdown: What If China Shuts Down the South China Sea?" *The National Interest*, July 16, 2016, https://nationalinterest.org/blog/5-trillion-meltdown-what-if-china-shuts-down-the-south-china-16996.

[318] Permanent Court of Arbitration, "Press Release: The South China Sea Arbitration *(The Republic of the Philippines v. The People's Republic of China*)," July 12, 2016, https://pca-cpa.org/wp-content/uploads/sites/6/2016/07/PH-CN-20160712-Press-Release-No-11-English.pdf.

trade. With this understanding of the SLOC hypothesis and background information, the remainder of this chapter will evaluate this explanation for China's actions.

Evaluating the Sea Lines of Communication Hypothesis

Several key factors identified in literature on the SCS complicate an understanding of the SLOC hypothesis. To clarify these factors, this chapter evaluates several of the major perspectives on the current international order and international trade; considers statistics on trade volume in the SCS; examines China's energy security concerns and the Malacca Dilemma; and discusses the role of free trade agreements in the SCS region.

The World Order and Economic Interdependence

Scholars often reference a rules-based international liberal order (ILO) that originated toward the end of World War II and has since been led by the West, particularly the United States; this order is characterized by "economic openness, multilateral institutions, security cooperation and democratic solidarity."[319] It is primarily maintained through global organizations including the UN, the International Monetary Fund (IMF), the World Bank, and the World Trade Organization (WTO) that promote problem-solving, cooperation, and economic stability.[320] In the 20th century, the United States established itself as the hegemon in the Asia-Pacific though military and economic dominance and a system of alliances and partnerships.[321] More recently, China's rapidly growing economy and increasingly powerful military has initiated what international relations theorist G. John Ikenberry considers a

[319] G. John Ikenberry, "The End of Liberal International Order?" *International Affairs* 94, no. 1 (2018): 7-23, doi: https://doi.org/10.1093/ia/iix241.

[320] Michael J. Mazarr, Timothy R. Heath, and Astrid Stuth Cevallos, *China and the International Order* (Santa Monica, CA: RAND, RR-2423-OSD, 2018), https://doi.org/10.7249/RR2423.

[321] G. John Ikenberry, "Between the Eagle and the Dragon: America, China, and Middle State Strategies in East Asia," *Political Science Quarterly* 131, no. 1 (2016): 9, doi: https://doi.org/10.1002/polq.12430.

regional power transition.[322] Ikenberry writes that after long operating outside the ILO, China now works within it to dominate a region now interconnected through trade, investment, and multilateralism.[323] Nonetheless, some see China as a potential existential threat to the ILO. For example, in the United States, the White House has raised concerns that a reemergence of great power competition is driven by Russia and China as they seek to reshape the liberal order.[324] While the White House's National Security Strategy pointed to "revisionist powers" China and Russia that "want to shape a world antithetical to U.S. values and interests," [325] others point to rising nationalism, protectionism, and unilateralism in the West, including the United States, as factors that undermine the liberal order.

Many scholars and policy analysts view China as a beneficiary of the ILO. The debates over the extent to which China will further integrate into the ILO and the degree to which economic interdependence inhibits or encourages war are not the focus of this chapter; however, a general understanding of the prevailing views helps inform an analysis of the SLOC hypothesis. Some claim that there is little evidence to show that Beijing has joined "rules-based institutions in order to misbehave and undermine them," and that it is unlikely that Beijing would seek to overturn the organizations and laws to which it has either acceded or contributed.[326] Benjamin Herscovitch, a Beijing-based writer and policy analyst, claims

[322] Ikenberry, "Between the Eagle and the Dragon," 9.

[323] Ikenberry, "Between the Eagle and the Dragon," 9.

[324] Mike Pence, "Remarks by Vice President Pence on the Administration's Policy Toward China," (speech, Washington, DC, October 4, 2018), The White House, https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-administrations-policy-toward-china/.

[325] Donald Trump, "National Security Strategy of the United States of America," The White House, December 2017, https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf.

[326] Mazarr, Heath, and Cevallos, *China and the International Order*.

that China supports and abides by international institutions and norms in most arenas, such as global trade where China has demonstrated leadership in bilateral and multilateral free trade agreements and membership in the WTO.[327] Herscovitch asserts that notwithstanding "Beijing's behavior in the SCS, China is overall a strong supporter of the current international order."[328]

Furthermore, there is an ongoing debate regarding economic interdependence, which is a key issue for trading states who rely on the SCS for unimpeded export and import traffic. The most prominent view among world politics scholars is that trade is a pacifying force.[329] This perspective appears to undermine the SLOC hypothesis, or at the very least, appears incompatible with the notion that China would disrupt trade routes in the SCS. International relations scholar and theorist Dale Copeland summarized the liberal and realist views on the causes of war, claiming that economic interdependence is the only causal factor common to both views.[330] Liberals, according to Copeland, argue that economic interdependence lowers the likelihood of war; realists instead claim that high interdependence increases the likelihood of war.[331] Unsatisfied with the prevailing liberal and realist views, Copeland introduced the theory of trade expectations. This theory incorporates a new variable—expectations of future trade—that when combined with a state's level of dependence can be

[327] Herscovitch, "A Balanced Threat Assessment," 7.

[328] Herscovitch, "A Balanced Threat Assessment," 7.

[329] William Reed, "Information and Economic Interdependence," *Journal of Conflict Resolution* 47, no. 1 (2003): 54, doi: https://doi.org/10.1177/0022002702239511.

[330] Dale C. Copeland, "Economic Interdependence and War: A Theory of Trade Expectations," *International Security* 20, no. 4 (1996): 5, doi: https://doi.org/10.1162/isec.20.4.5.

[331] Copeland, "Economic Interdependence and War," 5-6.

used to determine the conditions under which high interdependence may lead to peace or war.[332] In Copeland's theory, high interdependence can induce peace if states anticipate high future trade levels; however, if a state is highly dependent at one point, but anticipates low future trade levels, conflict may appear more attractive if its "expected value is greater than peace."[333] Copeland introduced his theory in the mid-1990s but applied it more recently to great power conflict, including the example of the United States and China in his 2014 book *Economic Interdependence and War*. Ikenberry summarized Copeland's argument regarding China: China's leaders are confident that oil and trade flows will remain stable and open; however, this could change if the United States seeks to contain and economically coerce China.[334]

Trade Volume in the SCS

In terms of exports, China depended most heavily on the SCS with $874 billion in exports passing through the SCS in 2016 down from $901 billion in 2015.[335] In 2016, South Korea, Singapore, Thailand, and Vietnam followed China with $249, $214, $170, and $158 billion in exports transiting the SCS respectively, demonstrating the importance of these trade routes to Asian states.[336] In comparison, the United States' exports accounted for 2 percent of total SCS exports at $83 billion.[337] Export figures only reflect a portion of overall

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[332] Copeland, "Economic Interdependence and War," 17.

[333] Copeland, "Economic Interdependence and War," 17.

[334] G. John Ikenberry, "Book Review: Economic Interdependence and War by Dale C. Copeland," *Foreign Affairs*, August 13, 2015, https://www.foreignaffairs.com/reviews/2015-08-13/economic-interdependence-and-war.

[335] China Power Team, "How much trade transits the South China Sea?"

[336] China Power Team, "How much trade transits the South China Sea?"

[337] China Power Team, "How much trade transits the South China Sea?"

trade. In total, the estimated global amount of trade passing through the SCS was nearly $3.4 trillion in 2016, which is substantially lower than the frequently-cited figure of over $5 trillion.[338]

In imports, China also depended most on the SCS, reflecting the demand of the world's most populous country as well as China's integration into the global economy. China imported $598 billion in products in 2016 but when including Hong Kong,[339] this figure rises to $828 billion.[340] The Center for Strategic and International Studies (CSIS) China Power Project obtained the $3.4 trillion trade figure using commercial shipping routes, automatic identification system (data) from ships, and bilateral trade flows as well as statistics from the IMF Direction of Trade Statistics. This estimate stands in contrast to the often-cited $5.3 trillion figure with nebulous origins. Writing for *The Diplomat*, Ankit Panda claimed that the $5.3 trillion figure first appeared in 2010 in remarks by Admiral Robert F. Willard, then-U.S. Indo-Pacific Command Commander, and gradually entered common use, "becoming an important piece of conventional wisdom on the South China Sea, helping outline the region's geopolitical and economic salience."[341] In late-2011, Willard repeated his claim saying the SCS SLOCs carry $5.3 trillion in annual bilateral trade of which $1.2 trillion is U.S. trade, making the SCS sea lines a vital concern to the region, the United States, and U.S. partners

[338] China Power Team, "How much trade transits the South China Sea?"

[339] The CSIS report lists the People's Republic of China-Hong Kong Special Administrative Region separately from China.

[340] China Power Team, "How much trade transits the South China Sea?"

[341] Ankit Panda, "How Much Trade Transits the South China Sea? Not $5.3 Trillion a Year," *The Diplomat*, August 7, 2017, https://thediplomat.com/2017/08/how-much-trade-transits-the-south-china-sea-not-5-3-trillion-a-year/.

and allies.[342] Willard also emphasized that the United States has maintained its presence in the vicinity of those SLOCs to ensure security and stability in the SCS.[343] Although recent studies like the CSIS report have demonstrated the $5.3 trillion figure to be overinflated, the core idea that the SCS is of critical importance to regional and global economies remains.[344]

Energy Security

The previous chapter on hydrocarbons in the SCS underlined the economic importance of oil and natural gas. This significance makes energy security—the uninterrupted availability of energy sources at an affordable price—[345] the most important element of free navigation in the SCS for many countries. While global annual tanker trade, which includes crude oil and petroleum products, has declined marginally, crude oil comprised the largest portion of all international seaborne trade in 2014.[346] Crude oil trade destined for Asia and largely driven by Chinese demand increased in recent years; this was due in part to China's increasing capacity to refine crude oil.[347]

As a percentage of world market share in 2014, the Asia-Pacific region produced only 9 percent of oil while Western Asia and North America dominated at 43 and 19 percent respectively. In terms of consumption, the Asia-Pacific region led oil consumption at 35

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[342] "Press Briefing by NSA for Strategic Communications Ben Rhodes and Admiral Robert Willard, U.S. Pacific Command" (Honolulu, HI, November 13, 2011), The White House, https://obamawhitehouse.archives.gov/the-press-office/2011/11/13/press-briefing-nsa-strategic-communications-ben-rhodes-and-admiral-rober.

[343] "Press Briefing by NSA," The White House.

[344] Panda, "How Much Trade Transits the South China Sea?"

[345] "Energy Security," International Energy Agency.

[346] United Nations Conference on Trade and Development, "Review of Maritime Transport 2015."

[347] United Nations Conference on Trade and Development, "Review of Maritime Transport 2018," 2018, https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf.

percent overall, followed by North America at 23 percent.[348] While the region is heavily dependent on outside sources for crude oil, the Asia-Pacific notably led the world in oil refinery capacities at 35 percent.[349] Asia-Pacific natural gas consumption was also high in 2017 at 21 percent; the region's production as a share of the world market was also closer to its demand at 17 percent.[350] China's environmental agenda (discussed in the previous chapter), weather conditions, and stronger demand drove China's astonishing 2017 increase in natural gas imports of over 47 percent; the United Nations Conference on Trade and Development (UNCTAD) projects that China's future imports of natural gas will continue to rise.[351]

Regional and Chinese needs for energy security drive overall energy resource shipping, though reliance on the SCS SLOCs for energy shipments goes beyond the SCS territorial claimants. In 2016, 30 percent of global maritime crude oil trade passed through the SCS with 90 percent passing through the Strait of Malacca.[352] China was the top importer at 42 percent of this total crude oil trade followed by Japan at 20 percent and South Korea at 18 percent; the top five exporters with 59 percent of oil trade passing through the SCS in 2016 were all Middle Eastern states led by Saudi Arabia.[353] An even greater percentage of

[348] United Nations Conference on Trade and Development, "Review of Maritime Transport 2018."

[349] United Nations Conference on Trade and Development, "Review of Maritime Transport 2018."

[350] United Nations Conference on Trade and Development, "Review of Maritime Transport 2018."

[351] United Nations Conference on Trade and Development, "Review of Maritime Transport 2018."

[352] "More Than 30% of Global Maritime Crude Oil Trade Moves Through the South China Sea," Energy Information Agency, August 27, 2018, https://www.eia.gov/todayinenergy/detail.php?id=36952.

[353] More Than 30% of Global Maritime Crude Oil," Energy Information Agency.

global liquefied natural gas (LNG)[354] trade passed through the SCS in 2016 at nearly 40 percent.[355] Japanese LNG imports led with a high 42 percent followed by South Korea, China, and Taiwan at 22, 17, and 15 percent each.[356] Oman was the highest exporter of LNG through the SCS but was followed by SCS claimant Malaysia at 24 percent and regional power Australia at 10 percent.[357] More than two-thirds of China's and over 90 percent of Taiwan's LNG imports sailed through the SCS in 2016; total Chinese LNG imports more than doubled since 2011, though over half of this growth was destined for northern Chinese ports and did not pass through the SCS.[358] By 2040, China is projected to import as much LNG as Japan, currently the world's largest LNG importer.[359]

A 2000 RAND Corporation report assessed that China's foreign oil dependency and net oil importer status presented the Chinese government with a severe national security concern, and that China viewed the United States as its greatest threat to energy security.[360] The report concluded that even with proposed pipeline construction plans, China would still not obtain enough oil to match its needs in the next two decades—that is, by 2020—and that

[354] When transported via ship as opposed to pipeline, natural gas is liquefied and kept under specific temperature and pressure conditions. In liquid form, natural gas is easier to ship and store since it takes up less volume. Once delivered, LNG is treated at regasification plants and returned to gaseous form.

[355] "Almost 40% of Global Liquefied Natural Gas Trade Moves Through the South China Sea," U.S. Energy Information Agency, November 2, 2017, https://www.eia.gov/todayinenergy/detail.php?id=33592.

[356] "Almost 40% of Global Liquefied Natural Gas," U.S. Energy Information Agency.

[357] "Almost 40% of Global Liquefied Natural Gas," U.S. Energy Information Agency.

[358] "Almost 40% of Global Liquefied Natural Gas," U.S. Energy Information Agency.

[359] "China Leads the Growth in Projected Global Natural Gas Consumption," U.S. Energy Information Agency, October 25, 2017, https://www.eia.gov/todayinenergy/detail.php?id=33472.

[360] Erica Strecker Downs, *China's Quest for Energy Security* (Santa Monica, CA: RAND, MR-1244-AF, 2000), https://www.rand.org/pubs/monograph_reports/MR1244.html.

China would still rely on U.S.-protected sea-lanes for future energy security.[361] The RAND report's prediction that China would continue to depend on foreign oil held true. China is still a net oil importer and its economy has expanded rapidly since 2000. According to the World Bank, China's 2000 gross domestic product (GDP) was $1.2 trillion in current U.S. dollars; by 2017, that figure had risen to 12.2 trillion U.S. dollars.[362]

In 2017, Samir Tata, founder of International Political Risk Analytics, argued that energy security was Beijing's highest strategic priority.[363] Tata emphasized China's goal to connect via pipelines and land-based infrastructure with friendly hydrocarbon-producing countries to meet its needs to reduce its dependence on tanker imports traveling along SLOCs through chokepoints controlled by the U.S. Navy.[364] Tata claimed that a naval blockade to cut off energy imports would paralyze China's military, trigger an economic collapse, and reduce China to a "paper dragon."[365] Tata estimated that China would likely achieve energy security before 2040 through its strategy to bypass the global military commons through overland crude oil pipelines—commercial shipping routes—as a non-military solution to U.S. global naval dominance.[366] If this is achieved as projected, the SLOC hypothesis may weaken as an explanation for China's military actions in the SCS.

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[361] Downs, *China's Quest for Energy Security*.

[362] The World Bank Databank, *China-GDP in Current US$*.

[363] Samir Tata, "Deconstructing China's Energy Security Strategy," *The Diplomat*, January 14, 2017, https://thediplomat.com/2017/01/deconstructing-chinas-energy-security-strategy/.

[364] Tata, "Deconstructing China's Energy Security Strategy."

[365] Tata, "Deconstructing China's Energy Security Strategy."

[366] Tata, "Deconstructing China's Energy Security Strategy."

The Malacca Dilemma

China depends on foreign oil, including significant crude oil shipments from the Middle East and Africa that sail through the SCS, out of necessity. These key supply sources motivate China to maintain friendly relations with Saudi Arabia and Iran and while China has been criticized for "dragging its feet" on UN sanctions against Iran, China continues these ties nonetheless, underscoring its "pragmatic economic policies."[367] Oil from the Middle East and Africa is shipped through the Indian Ocean to the SCS via the Malacca or Lombok straits.[368] China views these routes as strategic vulnerabilities, particularly the Strait of Malacca.[369] According to the U.S. Energy Information Agency, approximately 80 percent of China's crude oil imports must pass through the strait.[370] In 2003, former Chinese president Hu Jintao claimed that "certain major powers" were working to control the Strait of Malacca.[371] Jintao's concerns about a "Malacca Dilemma" continue to resonate leaving China with three possible solutions identified by Ian Storey of the Institute of Southeast Asian Studies during the Jintao administration: reduce import dependence through energy efficiency and alternatives, construct pipelines that allow China to bypass the Strait of Malacca, or control China's SLOCs through increased naval power and capabilities.[372] To

[367] Abbās Varij Kāzemi and Xiangming Chen, "China and the Middle East: More Than Oil," *European Financial Review* (2014), 41, https://www.researchgate.net/publication/277816073_China_and_the_Middle_East_More_Than_Oil.

[368] Ian Storey, "China's 'Malacca Dilemma,'" The Jamestown Foundation, April 12, 2006, https://jamestown.org/program/chinas-malacca-dilemma/.

[369] Storey, "China's 'Malacca Dilemma.'"

[370] "China Analysis," U.S. Energy Information Agency.

[371] Storey, "China's 'Malacca Dilemma.'"

[372] Storey, "China's 'Malacca Dilemma.'"

varying degrees, China has pursued each of these strategies under current Chinese president Xi Jinping.

China is working to improve its energy security through efforts to reduce demand and expand supply. China has sought to control its oil demand by setting energy use reduction targets and diversifying its energy mix.[373] By expanding national oil companies, diversifying sources and routes for oil supply, and strengthening the Chinese naval forces to better protect critical SLOCs, China has improved its energy security since Jintao's administration. Simultaneously, however, Chinese demand for foreign energy sources has increased. Xi's Belt and Road initiative for infrastructure and trade development uses government loans and state-owned or backed enterprise investments to develop linkages between China, other Asian states, the Middle East and Africa, and Europe.[374] These include deep-water ports and oil and gas pipelines funded through loans that developing economies cannot always repay; these loans have been termed a form of debt-trap diplomacy whereby China leverages its creditor role to coerce other states into "ceding control over strategically important ports, resources, and commercial routes."[375]

China's first major pipeline project opened in Myanmar in 2017. Myanmar is not a major oil producer—rather, the pipeline allows China to bypass the Strait of Malacca. This project allows crude oil tankers from the Middle East and Africa to offload their shipments at a man-made island on Myanmar's coast in the Bay of Bengal.[376] The oil is then piped across

[373] ZhongXiang Zhang, "China's Energy Security, the Malacca Dilemma and Responses," *Energy Policy* 39, no. 12 (2011): 7613, doi: https://doi.org/10.1016/j.enpol.2011.09.033.

[374] Steven Stashwick, "China's Security Gambit in the Indian Ocean," *The Diplomat,* May 11, 2018, https://thediplomat.com/2018/05/chinas-security-gambit-in-the-indian-ocean/.

[375] Stashwick, "China's Security Gambit in the Indian Ocean."

[376] Stashwick, "China's Security Gambit in the Indian Ocean."

Myanmar into western China ending in China's Yunnan province.[377] In addition, China has also increased cooperation with Russia on energy. Russia is a top producer of natural gas, following the United States, and Beijing's focus on reducing pollution from its high use of coal has prompted increasing demand for natural gas. Currently, Russia's Power of Siberia natural gas pipeline is nearing completion and may bring gas to China by the end of 2019. The pipeline project's 30-year contract between Russian and Chinese state-owned corporations stipulates that Russia will supply 38 billion cubic meters of gas annually to China.[378] Although the Malacca Dilemma is often discussed in writings on China's energy security and the SCS SLOCs, it is also important to recognize some of the steps China is taking—such as investment in overland pipelines—to counterbalance the risks associated with heavy dependence on SLOCs and their chokepoints.

Free Trade Agreements

One final important factor to consider when assessing SLOCs as a motivating factor for China's militarization of the SCS is China's use of free trade agreements, in particular, the ASEAN-China Free Trade Agreement (ACFTA).[379] ACFTA is, by volume, the world's third largest free trade agreement, following the European Union and North American Free Trade Areas.[380] In 2001, China initiated the agreement to strengthen a sense of regionalism, a

[377] Stashwick, "China's Security Gambit in the Indian Ocean."

[378] Information Directorate, Gazprom, "Alexey Miller: Russia and China Signed the Biggest Contract in the Entire History of Gazprom," Gazprom, May 21, 2014, http://www.gazprom.com/press/news/2014/may/article191451/.

[379] This agreement is also known and referenced as the China-ASEAN Free Trade Agreement (CAFTA). This thesis will refer to ACFTA to prevent confusion given the existence of the Central American Free Trade Agreement, which is also known as CAFTA or CAFTA-DR.

[380] John F. T. Diaz, "Volatility Dynamics in the ASEAN-China Free Trade Agreement," *Journal of Emerging Market Finance* 17, no. 3 (2019): 288, doi: https://doi.org/10.1177/0972652718797812.

stark contrast to China's prior policies of economic isolation that dominated much of the 20th century.[381] The Association of Southeast Asian Nations (ASEAN)[382] is China's fourth-largest trading partner; China is ASEAN's second-largest trading partner.[383] Some of the chief threats to ASEAN unity revolve around security concerns, the most significant of which is defining a joint response to China's rise.[384] Overlapping maritime claims in the SCS have proven the "biggest irritant" among ASEAN's member states, according to Eleanor Albert of the Council on Foreign Relations.[385]

ASEAN has been unable to reach a consensus in its efforts to address China, needing to achieve a delicate balance due to collective and individual states' ties to China. In the midst of security concerns, ASEAN states have invested in military modernization; both the Philippines and Vietnam have increased their military cooperation with the United States.[386] This has resulted in divided ties between China and the United States, leaving ASEAN claimants to SCS maritime space without consensus in the form of an ASEAN-China code of conduct for the SCS.[387] This is perhaps the most obvious example of ASEAN's inability to achieve consensus on security issues, despite the association's ability to agree on free trade with China and one another.

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[381] Diaz, "Volatility Dynamics," 288.

[382] The member states of ASEAN are: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

[383] Diaz, "Volatility Dynamics," 288.

[384] Eleanor Albert, "Backgrounder: The Association of Southeast Asian Nations," Council on Foreign Relations, November 1, 2017, https://www.cfr.org/backgrounder/asean-association-southeast-asian-nations.

[385] Albert, "Backgrounder."

[386] Albert, "Backgrounder."

[387] Albert, "Backgrounder."

Open SLOCs in the SCS are critical to ACFTA's continued economic success. In 2017, the total import-export volume between ASEAN and China reached a record high of nearly $515 billion.[388] Chinese researchers Zhang, Chen, and Li studied the geospatial associations that exist among urban centers and ports around the SCS to better understand the regional, internal development of ACFTA using automatic identification signal (AIS) data from commercial vessels to construct marine traffic flows, analyze their spatial hierarchies, and assess internal differences in urban agglomeration.[389] Through their work, these researchers provide a spatial basis for evaluating the development and levels of cooperation among cities on the SCS and regional economic interconnectedness, enabling a better understanding of the maritime transport that makes ACFTA a successful multi-billion dollar undertaking. For example, the most marine traffic-intense route identified was the Hong Kong-Singapore route.[390]

Zhang, Chen, and Li identify linkages between geographic communities as demonstrating a "clear geographic agglomeration phenomenon;" these communities are divided into the Chinese coastal, Taiwan, ASEAN, and Philippine communities.[391] Among these, Singapore's strategic geographic location is key to its economic significance; China's SCS port cities have "relatively complete infrastructure" and economic conditions; and Philippine cities are clustered due to their similar economic strengths, and mutual influence

[388] Xianzhe Zhang, Yanming Chen, and Manchun Li, "Research on Geospatial Association of the Urban Agglomeration around the South China Sea Based on Marine Traffic Flow," *Sustainability* 10, no. 9 (2018): 4, doi: https://doi.org/10.3390/su10093346.

[389] Zhang, Chen, and Li, "Research on Geospatial Association," 1.

[390] Zhang, Chen, and Li, "Research on Geospatial Association," 7.

[391] Zhang, Chen, and Li, "Research on Geospatial Association," 13.

and promotion.[392] Furthermore, the ASEAN community includes 41 cities—or nearly 40 percent of all coastal cities in the SCS—reflecting ASEAN's "significant role…in building [ACFTA]" and developing regional trade.[393]

Conclusion

ACFTA provides a strong example of the importance of open SLOCs in the SCS; however, proponents of the SLOC hypothesis maintain that China may seek to leverage its growing military power to inhibit free trade flow. Many scholars counter this argument such as Greg Austin, an Asian security scholar, who argues that the "heat being generated outside China about its putative threat to commercial shipping…is becoming tiresome…It is not clear who invented the 'China SLOC threat'…but it does not stand close scrutiny."[394] Austin writes that the SLOC hypothesis emerged as the PLA Navy paid closer attention to SLOCs and discussed risks to shipping more frequently in strategic documents; Austin claims that China's leaders have no expectation that military control of the SCS will enhance military power projection capabilities enough to confront the United States and its allies over shipping safety.[395] Gregory Poling of the CSIS Asia Maritime Transparency Initiative similarly dismissed the SLOC hypothesis. According to Poling, the hypothesis is misguided and rests on inaccurate statistics and irrelevant logic, arguing during a panel on U.S.-China geopolitics in the SCS:

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[392] Zhang, Chen, and Li, "Research on Geospatial Association," 13.

[393] Zhang, Chen, and Li, "Research on Geospatial Association," 13.

[394] Greg Austin, "Four Reasons Why China is No Threat to South China Sea Commerce," *The Diplomat*, May 22, 2015, https://thediplomat.com/2015/05/4-reasons-why-china-is-no-threat-to-south-china-sea-commerce/.

[395] Austin, "Four Reasons Why China is No Threat."

> …it's [the SLOC hypothesis] irrelevant, as far as I'm concerned with the South China Sea. The Chinese are not going to cut off commercial trade through the South China Sea. They're also relying on it…We're [the United States] not [going to] do it. There's this notion…of the Malacca dilemma. The Chinese have been terrified that we or our allies might close the Strait to choke them off in some future conflict. But imagine that…we're willing to cut off 60% of Japanese oil and gas shipments to damage the Chinese. We're already in World War III…There is no reasonable level, at which, you can kind of cap that kind of escalation.[396]

In contrast, Poling argued that fish, oil, and gas resources were more significant economic drivers of conflict for claimant states, but that these were not relevant on a global level.[397]

The hypothetical SLOC threat, nonetheless, creates grounds for concern. As discussed, the SCS links the Indian and Pacific Oceans and any diversion would add significant global shipping costs to an industry where cost increases can be disastrous. If China did militarily control the SCS, it could potentially "capture the increased shipping costs through transit taxes," constricting regional economies including Taiwan, Japan, and South Korea.[398] When considering China's overarching international engagement policies in recent decades—such as China's initiation of ACFTA—China's incentives to initiate conflict and disrupt trade and resource flows would be self-defeating.[399] This assessment, however, is predicated on China's "continued access to the resources necessary for further development

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[396] Gregory Poling, "Program Transcript: The U.S., China, and the Geopolitics of the South China Sea," (panel presentation at Richard Nixon Presidential Library and Museum, Yorba Linda, CA, February 21, 2018), https://www.nixonfoundation.org/2018/04/program-transcript-u-s-china-geopolitics-south-china-sea/.

[397] Poling, "Program Transcript."

[398] Anders Corr, *Great Powers, Grand Strategies: The New Game in the South China Sea* (Annapolis: Naval Institute Press, 2018), 17.

[399] David Pak Yue Leon, "Economic Interdependence and International Conflict: Situating China's Economic and Military Rise," *Asian Politics and Policy* 9, no. 1 (2017): 10, doi: https://doi.org/10.1111/aspp.12300.

and growth by means of trade or acquisition, which also serves as a linchpin of domestic regime stability."[400] With this condition in mind, political scientist David Pak Yue Leon deduces that it is too soon to know if tensions in the SCS signify a policy reorientation; rather, while China is rising within the current international system successfully, the possibility of military escalation or confrontation should not be dismissed.[401] Still, from a practical standpoint, there is little room for debate over China's dependence on uninterrupted commercial shipping in the SCS; China depends on maritime trade not only for energy, but for numerous goods such as agricultural products, of which China is the world's largest importer.[402]

This balance between valid possibilities, practical considerations such as economic interdependence and free trade agreements, and widespread uncertainty regarding the ultimate direction of China's SCS policies complicates an understanding of the SLOC hypothesis. Accusations that China is undertaking a wholesale effort to undermine the world order through potential means, such as disrupting trade, contradict both China's past actions and policies as well as China's measurable needs. While this analysis appears to indicate that the SLOC hypothesis is one of the weaker arguments for China's militarization of the SCS, valid concerns, such as the uncertain nature of economic interdependence, require that this hypothesis is not dismissed altogether.

[400] Pak Yue Leon, "Economic Interdependence and International Conflict," 10.

[401] Pak Yue Leon, "Economic Interdependence and International Conflict," 11-12.

[402] Herscovitch, "A Balanced Threat Assessment," 8.

CHAPTER V

CONCLUSION

Introduction

China's island-building and subsequent construction and installation of military infrastructure has brought heightened attention to the South China Sea both regionally and around the world. At the core, disputes in the SCS are concerned with basic political questions of who receives what, when, and how, but occur within the context of overarching geopolitical and strategic factors. Three hypotheses for China's military actions in the SCS—control of and access to fisheries, hydrocarbons, and sea lines of communication—dominate most discussions of the SCS by policy and media sources. While some scholars also argue that one or more of these factors are most significant, many take a more nuanced approach, pointing to both China's practical concerns driven largely by economic needs as well as broader considerations.

Fisheries

In its second chapter, this thesis discusses the critical role of fisheries for coastal states in the Asia-Pacific region. Many developing nations in the region rely heavily on fishing and its associated industries for food and economic security. In China, a majority of those employed in the fishery sector work in marine capture, although a growing number work in aquaculture. Offshore, Chinese fishing vessels serve a dual purpose of both fishing and asserting China's claims to territory beyond the maritime boundaries delimited by the UN Convention on the Law of the Sea. This has led some scholars and analysts to argue that China is operating a maritime militia of fishing vessels outfitted by the Chinese military to

assert and defend China's territorial claims. While evidence on the extent of these activities is inconclusive, satellite data reveals that the vast majority of fishing activity is confined to near-shore waters within the SCS claimant states' respective territory. Data on fishing vessel types in the SCS corroborates these findings, demonstrating that most vessels are small-scale and are not capable of deep-water fishing. China has led efforts to reduce dangerous degrees of overfishing in the SCS by announcing annual fishing bans—albeit without the consent of its neighbors—both within and beyond its UNCLOS-established territory. China has also invested in expanding its distant-water fishing fleet, becoming the world's largest in terms of vessel numbers. This enables China to operate beyond its periphery in waters that do not suffer from the same high degrees of fish stock depletions as its near-shore waters. Simultaneously, China has increased its aquaculture production to reduce pressure on these depleted stocks.

While conflicts over fishing in the SCS are unlikely to settle any time soon as regional states struggle to manage high demand against dwindling supply, the evidence in support of the fisheries hypothesis is mixed. China is working to reduce its own pressure on the SCS fisheries through significant structural changes in its fishery sector; however, China also maintains contradictory policies such as oil subsidies for fishing vessels, which contribute to further depletion. Allegedly, China operates an extensive maritime militia to protect its claims in the South China Sea. Furthermore, satellite data and imagery document Chinese fishing activity in areas contested by multiple claimants; many vessels observed on imagery were not broadcasting identification signals. The complexity of fisheries issues in the SCS cannot be fully appreciated in this limited analysis; however, the inclusion of geographic considerations offers valuable insight into evidence that both supports and

counters the fisheries hypothesis. These contradictions indicate that independently, the fisheries hypothesis is not a sufficient justification for China's militarization of the SCS.

Hydrocarbons

The role of oil and gas in prompting conflict is well-documented. It is unsurprising that this factor is brought up regularly in writings on the SCS. Despite its frequent appearance, particularly in media sources, the hydrocarbons hypothesis—like the fisheries hypothesis—is characterized by mixed supporting evidence. China demonstrably depends heavily on oil. While natural gas is a substantially smaller component of China's energy mix than oil, its importance is increasing as Beijing works to develop cleaner sources of energy to combat pollution and climate change due to high CO_2 emissions. China's need for hydrocarbons—in the face of rising demand and plateauing production levels—is evident. What is less clear is the ability of hydrocarbons in the SCS, if successfully accessed and extracted, to accommodate China's needs.

Based upon the geology of the SCS, it is unlikely that the most contested areas of the SCS—including the Spratly and Paracel island groups—feature significant amounts of hydrocarbons. Satellite data indicates that offshore drilling in contested areas of the SCS by any claimant state is limited. The most infamous incident of such activity—China's deployment of a drilling rig in waters also claimed by Vietnam—ended with China retreating from its efforts ahead of schedule. This deployment, as stated by Chinese officials, served both to expand offshore exploration and to assert China's maritime claims. While offshore platforms in contested space serve strategic purposes, they also expand states' understanding of resource potential as they seek to improve their energy security. Nonetheless, a comprehensive understanding of the SCS's energy production potential is limited by wide-

ranging estimates and limited cooperation between regional states to explore this potential. Despite acknowledged limitations, there is compelling evidence that the most contested areas of the SCS, including China's militarized features, likely have little potential to produce hydrocarbons if China or another claimant attempt to explore these areas. This assessment was consistent in both Western and Chinese literature and resource and reserve estimates, although overall estimates of SCS hydrocarbon potential varied significantly. Analyzing the SCS hydrocarbons geographically—rather than in terms of overall resource or reserve estimated capacities and values—improves understanding of hydrocarbons' geopolitical dimensions in the SCS, and also prompts consideration of other possible explanations for China's militarization of the SCS due to the limited ability of hydrocarbons to account for China's actions.

Sea Lines of Communication

Every year, trillions of dollars in trade pass through the SCS along sea lines of communication. Although previous estimates are demonstrably inflated, the significance of the SCS to regional and global trade is well-established and understood more clearly through analysis of geospatial data. While the United States has played a dominant role in the region through a powerful naval presence, China's naval investment—likely intended to counter both U.S. hegemony and ability to control strategic chokepoints—has sparked concerns that China may soon be able to inhibit shipping through the Sea in the event of conflict.

While China's naval power is growing, it is unclear how China would benefit from restricting commercial shipping traffic. China's economic power depends heavily on commercial shipping both to import foreign goods and to export its products to foreign markets. China has over a dozen free trade agreements in effect and others currently under

negotiation. These are primarily bilateral agreements; however, in the early 2000s, China initiated the ASEAN-China Free Trade Agreement and ASEAN is China's fourth-largest trading partner. These examples of economic interdependence may serve to reduce the risks of militarized conflict. Furthermore, the SCS is a key route for global oil and liquefied natural gas shipments. Countries from which China receives the bulk of its oil and gas shipments not only rely on the Chinese market but also depend on the SCS for a fast shipping route to other markets in and beyond East Asia. China depends on open trade routes that maximize efficiency and minimize transportation costs for energy security, as does the rest of the world. In addition, rather than seeking solely to compete with U.S. military strength, China is investing in pipelines to enhance its energy security. Impeding shipping in the SCS would not only damage the economies of other claimants and the many states around the world that rely on the SCS shipping routes but would also cause immense harm to China's own economy. While the possibility of China cutting off commercial trade in the SCS appears minimal from a practical standpoint, the risks to commercial trade in the event of escalating territorial disputes or conflict with the United States could have grave regional and global economic consequences. Conflating SLOCs with Chinese militarization of the SCS obscures broader economic realities.

Why China is Militarizing the South China Sea

This thesis examines three hypotheses for China's militarization of the SCS. These actions specifically refer to China's decisions to place military infrastructure and tools of power projection on maritime features within contested territory, as well as China's expansion of military capabilities to more effectively control its periphery. While China emphasizes that its actions occur within sovereign territory, citing historic claims, these claims developed primarily in the 20th century and are not clearly defined geographically.

Furthermore, the analysis presented in the three central chapters of this thesis calls into question the actual strategic importance of China's island claims and militarization. This does not account for the significance of China's bases in the SCS to China's status as a rising power that will soon be capable of contesting the United States' hegemony in the region. Southeast Asia historian Alfred McCoy claims that military bases are "iconic markers for both geopolitical dominion and imperial transition."[403] McCoy explicates that rapid technological change has made the persistent importance of military bases perplexing, writing that bases are vulnerable in times of conflict but are also vital to the "aspirations of any hegemonic power."[404] Despite their vulnerability, McCoy assesses that China's bases transform the SCS into "de facto territorial waters" enabling both access to and effective control over fisheries, hydrocarbons, and SLOCs while extending China's "penumbra of hegemony." This emphasis connects with the claims presented in this thesis that East Asia is undergoing a regional power transition driven by China after decades of U.S. hegemony. In contrast, tensions and conflicts between China and other claimant states are driven by territorial nationalism, connected by resource nationalism and historical animosities;[405] however, these factors are not the focus of this discussion.

Based on the consistently mixed evidence for each hypothesis studied in this thesis, there is no clear consensus that fisheries, hydrocarbons, or sea lines of communication are individually responsible for motivating China's militarization of the SCS. Analysis of

[403] Alfred W. McCoy, "Circles of Steel, Castles of Vanity: The Geopolitics of Military Bases on the South China Sea," *Journal of Asian Studies* 75, no. 4 (2016): 978, doi: https://doi.org/10.1017/S0021911816001601.

[404] McCoy, "Circles of Steel," 978.

[405] Min Gyo Koo, "Belling the Chinese Dragon at Sea: Western Theories and Asian Realities," *Ocean Development and International Law* 48, no. 1 (2017): 54, doi: http://dx.doi.org/10.1080/00908320.2017.1265365.

geospatial data and incorporation of geographic considerations makes the nuances of each possible motivator more apparent. Furthermore, power transition and hegemonic power projection as well as territorial nationalism are likely overarching factors that influence, prolong, and exacerbate tensions. Across the Pacific, China's actions have gained increasing attention in recent years fueling significant alarm. Political scientist Graham Allison's question of whether China and the United States are on a path to conflict has brought heightened attention to the SCS. Allison posits in *Destined for War: Can America and China Escape Thucidides's Trap?* that China and the United States are on a collision course—desired by neither country—due to a pattern of structural stressors that develop as rising powers challenge dominant hegemons.[406] Allison does not argue that this war is inevitable but points to historic evidence that demonstrates the propensity for war under conditions such as those the United States and China face today.

If major conflict were to occur between China and the United States, or between China and another claimant that would involve the United States, the effects would be disastrous. Speculations to these points often neglect China's incentives to avoid conflict, including those discussed in the previous chapter on SLOCs. Claims that war in the SCS is brewing or that China is working to undermine or overthrow the international liberal order often cite China's militarization in the SCS as evidence. An examination of the fisheries, hydrocarbons, and sea lines of communication hypotheses finds no substantial evidence that any of these adequately explain China's actions. In and of themselves, each explanation for China's militarization of the SCS is incomplete. China's overarching considerations of

[406] Graham Allison, *Destined for War: Can America and China Escape Thucydides's Trap?* (Boston: Houghton Mifflin Harcourt, 2017), 384.

asserting its role as a growing regional power in the face of a significant U.S. military presence, as well as defending territory viewed as sovereign, are additional considerations that likely factor into China's actions. This thesis has used geographic tools and information that, to date, have remained largely neglected in geopolitical studies of the SCS disputes. This addition informs each hypothesis, finding evidence that both supports and undermines each common claim. While neither the fisheries, nor hydrocarbons, nor SLOCs hypotheses stand close scrutiny independently, their significance becomes clear when these factors are combined. Future studies would do well to avoid oversimplifying the complexities of the situation in the SCS, many of which are beyond the scope of this analysis. However, the findings presented herein offer value to future studies as the SCS disputes continue to develop, demonstrating the criticality of recognizing both China's immediate and practical concerns, as well as recognizing the broad scope of China's strategic and long-term goals.

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BIOGRAPHY

Evelyn Burch was raised on the East Coast by her parents, Lt. Colonel Michael Burch and Katherine Burch. Evelyn graduated *summa cum laude* from Angelo State University in May 2019 with a Bachelor of Arts in political science and minors in geoscience-geography and French language with Highest University Honors. Evelyn was a member of the Phi Kappa Pi and Alpha Chi honors societies as well as the Alpha Mu Gamma foreign language and Pi Sigma Alpha political science honors societies.

Evelyn spent one semester interning on Capitol Hill for U.S. Representative K. Michael Conaway through the Department of Political Science and Philosophy. Through the Honors Program, Evelyn represented ASU at foreign affairs conferences held at the U.S. Military and Naval academies and conducted research through the Honors Program as a Presidential Fellow with the Center for the Study of the Presidency and Congress. In 2019, she was named the Robert A. Kilmarx award winner for her CSPC research and her work was published in the CSPC *Fellows Review*. Evelyn also presented several papers and posters at Great Plains Honors Council conferences in 2016, 2017, and 2019 as well as the 2017 and 2018 at National Collegiate Honors Council conferences. Twice, she won the Dennis Boe Award for undergraduate research from the Great Plains Honors Council and was the first two-time winner. At ASU, Evelyn was selected the Honors Program Director's Award recipient in 2018.

In 2019, Evelyn was named the Presidential Award winner as the top student of her graduating class. Following graduation, Evelyn will return to the U.S. Department of Defense where she worked as an intern since 2017 before beginning graduate studies at Johns Hopkins University in geospatial intelligence.