

Rock or Island? It Was an UNCLOS Call: The Legal Consequence of Geospatial Intelligence to the 2016 South China Sea Arbitration and the Law of the Sea

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“Life is an island. . . an island whose rocks are hopes.” —Kahlil Gibran

I. INTRODUCTION: A LITTORAL GAME OF STONES

On July 12, 2016, the International Arbitral Tribunal (Tribunal), duly convened under Annex VII of the 1982 United Nations Convention on the Law of the Sea (UNCLOS),^{1,2} issued a unanimous and extensive Award decision³ in *In The Matter of the South China Sea Arbitration*. The Republic of the Philippines (hereinafter, “Philippines”) had initiated arbitration proceedings against the People’s Republic of China (hereinafter, “China”) seeking arbitral resolution on the legal validity of the following: China’s expansive claims within its “nine-dash line,”⁴

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1. In this article, the term ‘the Law of the Sea’ (LOS) encompasses the body of laws which includes both the customary Law of the Sea (CLOS) and the 1982 United Nations Convention on the Law of the Sea (UNCLOS).

2. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS]. 168 States have ratified UNCLOS. See U.N. DIV. FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, *Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements*, http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm (Jun. 1, 2017) [hereinafter UNCLOS Ratifications].

3. The South China Sea Arbitration (Phil. v. China), Perm. Ct. Arb. Case No. 2013-19, Award of July 12, 2016. [hereinafter Award]; see also PERMANENT COURT OF ARB., *Case View: The South China Sea Arbitration*, <http://www.pcacases.com/web/view/7> [hereinafter PCA Case Repository].

4. This line encompasses a very large area (approximately 1.56 million square miles) over which China asserts what may be called imperious claims. See Award *supra* note 3, at 67 n.131. The Tribunal described the ‘nine dash line’ as referring “to the dashed line depicted on maps accompanying the Note Verbale from the Permanent Mission of the People’s Republic of China to the United Nations to the Secretary-General of the United Nations . . . The Tribunal’s use of the term ‘nine-dash line’ is not to be understood as recognizing any particular nomenclature or map as correct or authoritative. The Tribunal

the legal status of disputed maritime features in the Spratly Islands⁵ and at the Scarborough Shoal,⁶ and whether China had violated international law and UNCLOS by, *inter alia*, failing to protect and preserve the marine environment.

Both the Philippines and China are States Parties to UNCLOS.⁷ Part XV of UNCLOS provides a well-established framework for the resolution of disputes, and binding arbitration is an enumerated method under UNCLOS Article 287(1)(c). In accordance with UNCLOS Article 287(3), a State party to UNCLOS is deemed to have accepted arbitration as a means of dispute resolution unless the state has made a declaration to choose an alternative means of resolution. Neither China nor the Philippines had previously made any declaration for a different mode of dispute resolution, so arbitration was the appropriate mechanism to address the claims made by the Philippines.⁸

The Arbitration Tribunal's comprehensive Award decision (Award) was particularly remarkable because it:

1. demonstrated judicial precision in rendering legal determinations while avoiding the question of sovereignty of such features;
2. illustrated the Tribunal's impartiality despite the non-appearance of China;⁹

observes that different terms have been used at different times and by different entities to refer to this line . . . some commentators have referred to it as the 'Cow's Tongue' and 'U-Shaped Line.'" *Id.* (internal citations omitted).

5. While there is an abundance of literature discussing the Spratly Islands, there has never been a uniformly accepted definition of what comprises "the Spratly Islands." One source states the Spratly Islands "consist of more than 100 small islands or reefs surrounded by rich fishing grounds – and potentially by gas and oil deposits." See CIA, *The World Fact Book: Spratly Islands*, https://www.cia.gov/library/publications/the-world-factbook/geos/print_pg.html (Mar. 22, 2017). Another source states, "The Spratly Islands contain several hundred scattered small islets, sandbars, shoals, banks, atolls, cays, and reefs in the South China Sea." COOPERATIVE MONITORING IN THE SOUTH CHINA SEA: SATELLITE IMAGERY, CONFIDENCE-BUILDING MEASURES, AND THE SPRATLY ISLANDS DISPUTES 17 (John C. Baker & David G. Wiencek eds., 2002).

6. Claimed by both China and the Philippines, Scarborough Shoal (Reef) is described as a large atoll with a lagoon area of 150 square kilometers located approximately 124 miles from the Philippines. See Robert C. Beckman & Clive H. Schofield, *Defining EEZ Claims from Islands: A Potential South China Sea Change*, 29 INT'L J. MARINE & COASTAL L. 193, 229 (2014). Scarborough Shoal is geomorphically not part of the Spratly Islands. *Id.*; see also Michael McDevitt, *Analysis: Is it Time for the U.S. to Take a Position on Scarborough Shoal?*, USNI NEWS, (Jul. 19, 2016, 2:54 PM), <https://news.usni.org/2016/07/19/take-position-scarborough-shoal>.

7. The Philippines ratified UNCLOS on May 8, 1984, and China ratified UNCLOS on June 7, 1996. See UNCLOS Ratifications, *supra* note 2.

8. The South China Sea Arbitration (Phil. v. China), Perm. Ct. Arb. Case No. 2013-19, Award on Jurisdiction and Admissibility of Oct. 29, 2015, ¶ 109 [hereinafter Award on Jurisdiction and Admissibility].

9. See John E. Noyes, *United Nations Convention on the Law of the Sea - Jurisdiction and Admissibility - Nonparticipation of a Party - South China Sea Claims, Activities, and Maritime Features*, 110 AM. J. INT'L L. 102, 107 (2016).

3. concluded that there was no legal basis for China to claim ‘historic rights’¹⁰ to resources within the sea areas falling within the controversial ‘nine-dash line’;¹¹
4. represented the first time an international tribunal had “thoroughly examined the definition of an island¹² in a dispute under [UNCLOS] relating specifically to the definitional problem of when an island is a rock¹³ [under UNCLOS Article 121(3)];”¹⁴ and
5. reflected the legal consequence of “geospatial intelligence” (GEOINT),¹⁵ an intelligence discipline¹⁶ that enabled the Tribunal to make accurate findings of fact and declarations of law by analyzing satellite and airborne imagery, nautical charts,¹⁷ and sailing directions.¹⁸

10. The term ‘historic rights’ does not appear in the entire text of UNCLOS, and the Tribunal noted that “China has never expressly clarified the nature or scope of its claimed historic rights.” Award, *supra* note 3, ¶ 180.

11. Press Release, Permanent Court of Arbitration, The South China Sea Arbitration, *The Tribunal Renders Its Award* (Jul. 12, 2016), <http://www.pcacases.com/web/sendAttach/1801>.

12. UNCLOS defines an island as “a naturally formed area of land, surrounded by water, which is above water at high tide.” UNCLOS, *supra* note 2, at Art. 121(1).

13. Under UNCLOS Art. 121(1), rocks are like islands in that they are “naturally formed area[s] of land, surrounded by water, which is above water at high tide. . . .” *Id.* However, in accordance with UNCLOS Art 121(3), rocks are unlike islands in that rocks “cannot sustain human habitation or economic life of their own. . . .” UNCLOS, *supra* note 2, at Art. 121(3). The challenge of adjudicating the distinction between islands and rocks is discussed in scholarly writing. See, e.g., Marius Gjetnes, *The Spratlys: Are They Rocks or Islands?*, 32 OCEAN DEV. & INT’L L. 191 (2001); Roberto Lavallo, *Not Quite a Sure Thing: The Maritime Areas of Rocks and Low-Tide Elevations Under the UN Law of the Sea Convention*, 19 INT’L J. MARINE & COASTAL L. 43 (2004) (examining how the Tribunal used GEOINT products to make the factual determination that none of the disputed features in the South China Sea Arbitration met the criteria for fully-fledged islands under UNCLOS Art. 121(3)).

14. See S. JAYAKUMAR, TOMMY KOH, & ROBERT L. BECKMAN, *THE SOUTH CHINA SEA DISPUTES AND LAW OF THE SEA 70* (2014). Scholars have commented on the value of remote sensing to better understand the geopolitical and environmental consequences arising from the difference between ‘rocks’ and ‘islands.’ See Youna Lyons, *Prospects for Satellite Imagery of Insular Features and Surrounding Marine Habitats in the South China Sea*, 45 MARINE POL’Y 146, 155 (2014).

15. GEOINT consists of imagery, imagery intelligence, and geospatial information. A more complete definition is analyzed *infra*, in Part II of this article.

16. Intelligence disciplines are well-defined areas that involve specific categories, collections, and analysis with emphasis on technical or human resources capabilities. U.S. JOINT CHIEFS OF STAFF, *Joint Publication 2-0, Joint Intelligence*, at B-1. (Oct. 22, 2013).

17. The International Hydrographic Organization (IHO) Dictionary defines a nautical chart as “A chart specifically designed to meet the requirements of marine navigation, showing [depths] of water, nature of bottom, elevations, configuration and characteristics of coast, dangers and aids to navigation. May be a paper chart, electronic navigational chart (ENC) or a raster navigational chart (RNC). Also called marine chart, hydrographic chart, or simply chart.” IHO HYDROGRAPHIC DICTIONARY, *Nautical Chart*, http://hd.iho.int/en/index.php/nautical_chart (May 31, 2017).

18. Sailing Directions are defined as “A descriptive book for the use of mariners, containing detailed information of coastal waters, harbor facilities, etc. of an area . . . Sailing directions, as well as light lists, provide the information that cannot be shown graphically on the nautical chart and that is not readily available elsewhere.” NATHANIEL BOWDITCH, *THE AMERICAN PRACTICAL NAVIGATOR: AN EPITOME OF NAVIGATION* 824 (2002).

While the first four attributes of the South China Sea (SCS) Arbitration Award mentioned above justify scholarly review on their own, this article concentrates on the fifth attribute, the legal consequence of GEOINT products and analysis to the Tribunal's ability to: 1) determine whether China's activities may have violated provisions of UNCLOS; and 2) whether the disputed features were islands, rocks, or low-tide elevations (LTEs) under the Convention.

Why was it so critical to classify dispersed maritime features that mariners have called *dangerous ground*¹⁹ and avoided for centuries? This classification matters enormously due to the hierarchy of entitlements that UNCLOS grants to maritime features based upon their geospatial characteristics. For example, UNCLOS entitles an Article 121 island to the following: a territorial sea (TS),²⁰ a contiguous zone (CZ),²¹ an exclusive economic zone (EEZ),²² and a continental shelf (CS).²³ In contrast, UNCLOS Article 121(3) precludes a rock from having its own EEZ or CS.²⁴ UNCLOS Article 13 describes an LTE in two parts:

19. Since the 18th century, mariners have described the waters around the Spratly Islands as "Dangerous Ground" due to the numerous hazards to navigation and insufficient charting. See Jeff Himmelman, *A Game of Shark and Minnow*, N.Y. TIMES (Oct. 27, 2013), <http://www.nytimes.com/newsgraphics/2013/10/27/south-china-sea/>; see also NAT'L GEOSPATIAL-INTELLIGENCE AGENCY, PUB. 161 SAILING DIRECTIONS (ENROUTE), SOUTH CHINA SEA AND THE GULF OF THAILAND 3 (2017) http://msi.nga.mil/MSISiteContent/StaticFiles/NAV_PUBS/SD/Pub161/Pub161bk.pdf.

20. UNCLOS defines the territorial sea as "that zone which extends from the baseline up to a limit not to exceed 12 nautical miles in which the sovereignty of a coastal State extends (subject to other provisions of UNCLOS and other rules of international law) beyond its land territory and internal waters." UNCLOS, *supra* note 2, at Art. 2, 3. The normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognized by the coastal State. UNCLOS, *supra* note 2, at Art. 5.

21. The CZ is that "zone contiguous to the territorial sea in which the coastal State exercises control necessary to prevent or punish infringement of its customs, fiscal immigration or sanitary laws and regulations within its territory or territorial sea. The contiguous zone may not extend beyond 24 nm from the baselines from which the breadth of the territorial sea is measured." UNCLOS, *supra* note 2, at Art. 33.

22. UNCLOS Part V defines the EEZ as "an area beyond and adjacent to the territorial sea" which extends no further than 200 miles from the baseline and within which the coastal state is accorded specified sovereign rights to the use of living and non-living resources within that zone. UNCLOS, *supra* note 2, at Art. 55-77. The baseline is a key concept under the LOS, as it is the reference line from which territorial sea, CZ, EEZ, and CS are measured.

23. UNCLOS Art. 76 defines the continental shelf as comprising the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance. *Id.* at Art. 76.

24. *Id.* at Part VIII, Art. 121(3). Note, UNCLOS does not define what "rocks" are. This reflects a recognized ambiguity in the language of UNCLOS Art.121. Rocks are part of the set of Art. 121(1) 'islands,' but 'islands' are more than 'rocks.' At least one commentator suggests it is possible for a "rock" to be able to "sustain human habitation or have economic life of its own." See Gjetnes, *supra* note 13, at 194. However, a more dependable interpretation is that although rocks are a subset of islands (*i.e.*, both meeting the conditions in Art. 121(1)), the classification of islands and rocks are mutually exclusive, meaning that an Art. 121(1) feature that can sustain human habitation and have an economic life of its own is an 'island' and not a 'rock.'

- (1) An LTE is a naturally formed area of land which is surrounded by and above water at low tide but submerged at high tide. Where an LTE is situated wholly or partly at a distance not exceeding the breadth of the territorial sea from the mainland or an island, the low-water line on that elevation may be used as the baseline for measuring the breadth of the territorial sea;
- (2) Where an LTE is wholly situated at a distance exceeding the breadth of the territorial sea from the mainland or an island, it has no territorial sea of its own.²⁵

Thus, an LTE does “not form part of the land territory of a State” in the legal sense and “cannot be appropriated.”²⁶

For China, a *de jure* recognition of features it occupies as UNCLOS islands (and not rocks nor LTEs) would have resulted in extensive sovereign rights to living and non-living resources within the EEZs of these features. However, the Tribunal ruled otherwise. In response, China’s rejection of the arbitration process, and its accelerated artificial island construction efforts have demonstrated China’s preference for a littoral *Game of Stones* to transform LTEs and rocks into a ring of fortified, military outposts to achieve *de facto* control of large parts of the SCS.²⁷

Therefore, the Arbitration was essential to classify the disputed features and to proclaim how UNCLOS would govern them. In the arbitration process, the Tribunal examined satellite and airborne imagery, reviewed testimony as to the interpretation of that imagery, and deliberated over more traditional GEOINT products such as nautical charts and sailing directions. A review of the Tribunal’s Award decision shows that GEOINT was the *sine qua non* which enabled the Tribunal to describe and assess the maritime features central to the dispute. GEOINT played a crucial role in the Tribunal’s determination that no maritime feature in the dispute met the conditions to be an ‘island’ under UNCLOS Article 121, entitled to a TS, a CZ, an EEZ and a CS.

The 2016 SCS Arbitration demonstrated the use of *internationalized* GEOINT by governments as well as *democratized* GEOINT by non-governmental organizations (NGOs). For example, the Philippines’ use of satellite and airborne imagery reflects relatively recent GEOINT *internationalization*, that is, the use of GEOINT by nations other than the United States. In contrast, international cooperation in hydrography²⁸

25. UNCLOS *supra* note 2, at Art. 13.

26. Award, *supra* note 3, ¶ 309; *see also, id.* ¶ 308 (“*Ipso facto*, if a low-tide elevation is not entitled to a territorial sea, it is not entitled to an exclusive economic zone or a continental shelf”).

27. OFFICE OF THE SEC’Y OF DEF., ANNUAL REPORT TO CONGRESS: MILITARY AND SECURITY DEVELOPMENTS INVOLVING THE PEOPLE’S REPUBLIC OF CHINA 12 (2017).

28. Hydrography is defined as “the branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas, coastal areas, lakes and rivers, as well as with the prediction of their change over time, for the primary purpose of safety of navigation and in support of all other marine activities, including economic development, security and defence, scientific research, and

and cartography²⁹ represents institutionalized GEOINT *internationalization* going back decades. GEOINT *democratization* is epitomized by the proliferation of satellite imagery analysis by NGOs reporting on geopolitical activities such as China's massive dredging operations and construction of militarized outposts in the SCS.

The 2016 SCS Arbitration demonstrates the legal value of GEOINT in providing both historical and existing geospatial facts to judicial bodies, especially when the Tribunal (1) needs to see archival imagery of a feature in its natural state, or (2) is unable to conduct *in situ* observation of the subject of the dispute. The article concludes that GEOINT, in all of its forms, is an essential resource for international institutions striving to achieve the peaceful use of the seas, consistent with UNCLOS.³⁰

This article is organized as follows: [Section II](#) defines key terms, examines GEOINT as a creation of domestic U.S. law, and discusses the internationalization and democratization of GEOINT beyond a United States Intelligence Community (IC) discipline. [Section III](#) provides background information on the 2016 SCS Arbitration. [Section IV](#) examines how the 2016 SCS Tribunal evaluated and used GEOINT in order to make sound legal determinations. [Section V](#) concludes that GEOINT will continue to be important to promote a rules-based order in the maritime domain despite China's rejection of the Tribunal's Award decision.

II. GEOSPATIAL INTELLIGENCE: KEY CONCEPTS AND EVOLUTION

A. *Geospatial Intelligence (GEOINT) and Other key concepts*

Defining key conceptual terms such as geospatial intelligence (GEOINT), imagery, imagery intelligence, geospatial information, and maritime domain awareness is essential to understanding the legal consequence of GEOINT to the 2016 SCS Arbitration and to the Law of the Sea. This section will examine the definitions in United States law in relation to international usage.

Geospatial Intelligence

'Geospatial intelligence' (GEOINT) is an intelligence discipline, defined in United States statute³¹ as "the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and

environmental protection." INTERNATIONAL HYDROGRAPHIC ORGANIZATION, *Definition of Hydrography*, https://www.iho.int/srv1/index.php?option=com_content&view=article&id=299&Itemid=289&lang=en (May 8, 2017).

29. Cartography is defined by the International Hydrographic Organization as "The art and science of expressing graphically, by maps and charts, the known physical features of the earth, or of another celestial body. Often includes the works of man and his varied activities." IHO HYDROGRAPHIC DICTIONARY, *Cartography Definition*, <http://hd.iho.int/en/index.php/cartography> (Mar. 21, 2017); see also MERRIAM-WEBSTER.COM, *Cartography*, <https://www.merriam-webster.com/dictionary/cartography> (defining cartography as "the science or art of making maps") (Mar. 21, 2017).

30. See UNCLOS, *supra* note 2, at Preamble; *id.* at Art. 301.

31. 10 U.S.C. § 467(5) (2017).

geographically referenced activities on the earth. Geospatial intelligence consists of imagery, imagery intelligence, and geospatial information.”³²

The same statute defines imagery, imagery intelligence, and geospatial information as follows:

The term ‘imagery’ means...

a likeness or presentation of any natural or man-made feature or related object or activity and the positional data acquired at the same time the likeness or representation was acquired, including:

- (i) products produced by space-based national intelligence reconnaissance systems; and
- (ii) likenesses or presentations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means.³³

“The term ‘imagery intelligence’ means the technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials.”³⁴

“The term ‘geospatial information’ means information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth and includes: (A) statistical data and information derived from, among other things, remote sensing, mapping, and surveying technologies; and (B) mapping, charting, geodetic data, and related products.”³⁵

Closer reading of these definitions reveals that imagery, imagery intelligence, and geospatial information may be considered GEOINT individually or in any combination with each other. For example, imagery of a maritime feature may also contain geospatial information. The statutory definition of imagery recognizes a contemporaneous fusion of necessary information to geolocate an image of a feature or activity. Therefore, this definition of imagery connects the “what” of the image with the “where” and the “when” the image was taken. Imagery, therefore, is the *geospatially and temporally* referenced depiction of the feature or the activity in question.

“Imagery intelligence” is the process and product of deriving technical, geographic, and intelligence information from imagery and collateral materials. Likewise, as “geospatial information” includes mapping, charting, geodetic data, and related products, such products are often the result of imagery, imagery intelligence, or systematic data collection and evaluation to georeference³⁶ the

32. *Id.*

33. 10 U.S.C. § 467(2)(A). Not every picture meets the statutory definition of imagery. For example, a handheld picture taken by or on behalf of a human intelligence organization is excluded from the statutory definition under Section 467(2)(B).

34. 10 U.S.C. § 467(3).

35. 10 U.S.C. § 467(4).

36. Georeferencing is the process of “[a]lligning geographic data to a known coordinate system so it can be viewed, queried, and analyzed with other geographic data.” See ESRI, *GIS Dictionary*,

‘geospatial information’ to reduce or eliminate error. It is not tautological to conclude that imagery, imagery intelligence, and geospatial information are GEOINT in and of themselves or in any combination thereof; rather, this understanding reflects that imagery, imagery intelligence, and geospatial information are usually interrelated and provide a geospatial reference to the information depicted in either pictorial, graphical, or textual form.

Maritime Domain Awareness and the Maritime Domain

The United States defines ‘maritime domain awareness’ (MDA) as “the effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment of the United States.”³⁷ MDA is an internationally recognized concept.³⁸ For example, the International Maritime Organization (IMO)³⁹ defines MDA as: “[t]he effective understanding of any activity associated with the maritime environment that could impact upon the security, safety, economy or environment.”⁴⁰ However, the United States definition of MDA is more encompassing because it includes encompasses *features* as well as *activities*. Later, this article examines how GEOINT enabled what may be called the *judicial* MDA⁴¹ that the Tribunal needed to make accurate and equitable conclusions on the UNCLOS status of the disputed features and the legality of China’s alleged activities in relation to those features.

Defining MDA requires some understanding of what is meant by the “maritime domain.” The United States defines the maritime domain quite expansively as “. . . all areas and things of, on, under, relating to, adjacent to, or bordering on a sea, ocean, or other navigable waterway, including all maritime-related activities, infrastructure, people, cargo, vessels, and other conveyances.”⁴² Although the term “maritime domain” does not appear anywhere in the entire text of UNCLOS,⁴³ there can be little doubt that UNCLOS applies to a significant portion of the maritime domain or that the Spratly Islands or Scarborough Shoals are part of the maritime domain.

Georeferencing, <https://support.esri.com/en/other-resources/gis-dictionary/term/georeferencing>, (last visited February 4, 2018).

37. THE WHITE HOUSE, THE NATIONAL MARITIME DOMAIN AWARENESS PLAN (NMDAP) FOR THE NATIONAL STRATEGY FOR MARITIME SECURITY 2 (2013) <https://www.hsdl.org/?view&did=747691>.

38. Christian Bueger & Amaha Senu, *Knowing the Sea: The Prospects and Perils of Maritime Domain Awareness*, PIRACY STUDIES.ORG (Jul. 8, 2016), <http://piracy-studies.org/knowing-the-sea-the-prospects-and-perils-of-maritime-domain-awareness/>.

39. The IMO is “the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.” Int’l Maritime Org. [IMO], *Introduction to IMO*, <http://www.imo.org/en/About/Pages/Default.aspx> (May 30, 2017).

40. See Int’l Maritime Org. [IMO], MSC.1/Circ.1367, *Amendments to The International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual* (May 24, 2010), http://www.imo.org/blast/blastDataHelper.asp?data_id=29093&filename=1367.pdf.

41. Elaborating upon the United States and IMO definitions of MDA, I suggest that *judicial MDA* is “the effective understanding of anything associated with the maritime domain that could impact the maintenance or advancement of the rule of law, domestic or international.”

42. NMDAP, *supra* note 37, at 2.

43. Ironically, UNCLOS does refer to the “Land Domain” in Article 7(3), when discussing requirements for straight baselines. UNCLOS, *supra* note 2, at Art. 7(3).

Even though there does not appear to be an official, international definition for “the maritime domain,” the term is nevertheless gaining increasing international usage and common understanding in Africa,⁴⁴ the European Union,⁴⁵ and Southeast Asia.⁴⁶

As this article will examine in Part IV, in the 2016 SCS Arbitration, the Tribunal required accurate GEOINT for the *judicial* MDA necessary to determine: (1) the legal status of disputed features at Scarborough Shoals and the Spratly Islands, and (2) whether China had violated UNCLOS vis-à-vis the protection and preservation of the marine environment.

In the following paragraphs, this article will review how GEOINT evolved from a military/intelligence instrument of the nation-state to an internationalized and democratized capability enabling institutions to advance a rules-based order and individuals to navigate in the global commons.

B. Evolution of Modern GEOINT

As stated above, GEOINT consists of imagery, imagery intelligence, and geospatial information.⁴⁷ Although the intentional collection, analysis, and application of geospatial information has been practiced for millennia,⁴⁸ and charts and maps have been used for centuries, the term “GEOINT” is a modern construct of leveraging geospatial information in the form of maps, charts, and descriptive text with imagery and imagery intelligence to help leaders “understand what is happening at any given place, at any given time, and to anticipate what may happen next.”⁴⁹

As an intelligence discipline, GEOINT evolved from the creation of The National Imagery and Mapping Agency (NIMA),⁵⁰ an agency resulting from the collaboration and compromise between executive branch agencies and the United

44. See AFRICAN UNION, 2050 AFRICA’S INTEGRATED MARITIME STRATEGY (2012), https://wedocs.unep.org/bitstream/handle/20.500.11822/11151/2050_aims_sstrategy.pdf.

45. See European Commission, *European Union Maritime Security Strategy: Responding Together to Global Challenges, A Guide for Stakeholders* (Aug. 17, 2016) https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/leaflet-european-union-maritime-security-strategy_en.pdf.

46. See Renato Cruz De Castro, *The Philippines Discovers Its Maritime Domain: The Aquino Administration’s Shift in Strategic Focus from Internal to Maritime Security*, 12 ASIAN SECURITY 111 (2016); see also Christian Bueger, *From Dusk to Dawn? Maritime Domain Awareness in Southeast Asia*, 37 CONTEMP. SE. ASIA 157 (2015).

47. See 10 U.S.C. § 467(5).

48. See *Joshua* 2:1 (King James) (“And Joshua the son of Nun sent out of Shittim two men to spy secretly, saying, ‘Go view the land, even Jericho...’”) (Demonstrating the value of understanding terrain prior to expeditionary activity).

49. See Jim Garamore, *Cardillo Discusses Importance of Geospatial Intel at Senate Hearing*, DOD NEWS, DEFENSE MEDIA ACTIVITY (Sep. 26, 2016), <https://www.defense.gov/News/Article/Article/957184/cardillo-discusses-importance-of-geospatial-intel-at-senate-hearing/>.

50. The National Imagery and Mapping Agency (NIMA) Act established NIMA as a Combat Support Agency with national missions. 10 U.S.C. § 441 *et seq.* (1996). The term geospatial intelligence (GEOINT) was legislatively established to re-designate The National Imagery and Mapping Agency as “The National Geospatial-Intelligence Agency.” National Defense Authorization Act for Fiscal Year 2004, Pub. L. 108–136, § 921, 117 Stat. 1568 (2003).

States Congress in the years following the 1991 Gulf War.⁵¹ During this time, leaders in the United States Department of Defense, the IC, and the Congress recognized the need to establish a single agency to provide timely, relevant, and accurate imagery, imagery intelligence, and geospatial information to support national security objectives. In a remarkably short period of time, the Congress and the Executive Branch drafted legislation and cooperated to enact The National Imagery and Mapping Agency Act of 1996.⁵² The Congressional Findings for the NIMA Act stated the following legislative intent:

There is a need within the Department of Defense and the Intelligence Community of the United States to provide a single agency focus for the growing number and diverse types of customers for imagery and geospatial information resources within the Government, to ensure visibility and accountability for those resources, and to harness, leverage, and focus rapid technological developments to serve the imagery, imagery intelligence, and geospatial information customers.⁵³

The goal of The NIMA Act of 1996 was to create a *single agency focus* to provide for the combat support and intelligence requirements of the nation-state. In 2003, Congress changed the name of the agency from The National Imagery and Mapping Agency to The National Geospatial-Intelligence Agency (NGA), giving congressional recognition to the GEOINT intelligence discipline.⁵⁴ The establishment of GEOINT was predicated on a governmental decision to consolidate and centralize GEOINT capabilities within the United States Government to produce GEOINT for federal purposes. However, the very nature of GEOINT was such that it would not for long solely be limited to government use.

C. GEOINT Internationalization and Democratization

i. Internationalization

GEOINT is global by definition, so it was inevitable that this intelligence discipline would expand in usage outside of the government of the United States. Congress recognized the existence and utility of international geospatial information data sharing when it established NIMA and made provision for the payment of licensing fees for,⁵⁵

51. For more on the Creation of the National Imagery and Mapping Agency (NIMA), see ANNE DAUGHERTY MILES, *THE CREATION OF THE NATIONAL IMAGERY AND MAPPING AGENCY: CONGRESS'S ROLE AS OVERSEER*, JOINT MILITARY INTELLIGENCE COLLEGE OCCASIONAL PAPER NUMBER NINE (2001).

52. 10 U.S.C. § 441.

53. National Imagery & Mapping Agency Act of 1996, Pub. L. 104–201, § 1101, 110 Stat. 2678.

54. Pub. L. 108–136, div. A, title IX, §921(a), (g), Nov. 24, 2003, 117 Stat. 1568, 1570, redesignated “The National Imagery and Mapping Agency of the Department of Defense is hereby redesignated as the National Geospatial-Intelligence Agency.”

55. See U.S.C. §453(b) (2017) (The Secretary of Defense may pay any NGA foreign data acquisition fee out of the proceeds of the sale of maps, charts, and other publications of the Agency, and those proceeds are hereby made available for that purpose).

or exchange⁵⁶ of, geospatial information with foreign countries. As the result of this statutory authority, NGA has entered into numerous bilateral, geospatial information exchange agreements with other nation-states.⁵⁷ Many of these bilateral agreements relate to hydrography and charting.

Other nations have followed the example of the United States by creating their own GEOINT organizations. For example, Australia created the Australian Geospatial-Intelligence Organization and developed its own definition of GEOINT based upon the U.S. statutory definition.⁵⁸

GEOINT *internationalization* has also evolved over the course of decades through the intentional efforts of multilateral institutions such as the following: The International Hydrographic Organization (IHO),⁵⁹ The Multinational Geospatial Co-production Program (MGCP),⁶⁰ and The Allied System for Geospatial Intelligence.⁶¹ All of these multilateral organizations are dedicated to applying cooperative GEOINT for international benefit.

GEOINT *internationalization* (in the form of imagery and imagery intelligence) has long been demonstrated by its use in diplomacy and international judicial proceedings. A memorable diplomatic usage occurred in the peak of the Cuban Missile Crisis of 1962; the United States dramatically and effectively used imagery and imagery intelligence during an emergency session of the United Nations to challenge the Russian ambassador as to the placement of intermediate

56. See 10 U.S.C. §454(a) (2017) (“The Secretary of Defense may authorize the National Geospatial-Intelligence Agency to exchange or furnish mapping, charting, and geodetic data, supplies and services to a foreign country or international organization pursuant to an agreement for the production or exchange of such data”).

57. These bilateral agreements are called Basic Exchange and Cooperative Agreements (BECAs). For an example of such a BECA, between the United States and the Republic of Korea, see Basic Exchange and Cooperative Agreement Concerning Geospatial Intelligence, S. Korea-U.S., Nov. 19 2010, KAV 9103, TEMP. STATE DEPT. No. 11-11, <https://www.state.gov/documents/organization/159462.pdf>.

58. Geospatial intelligence (GEOINT) is intelligence derived from the exploitation and analysis of imagery and geospatial information about features and events, with reference to space and time. This definition applies not only to products and services, but also to the process of conducting analysis. GEOINT is comprised of the following sub-disciplines: Imagery Analysis; Geospatial Analysis; and Geospatial Information and Services. AUSTRALIAN GOV'T DEP'T OF DEFENCE, *Geospatial Intelligence (GEOINT)*, <http://www.defence.gov.au/AGO/geoint.htm> (May 31, 2017).

59. The IHO is an intergovernmental and consultative organization with the mission “to create a global environment in which States provide adequate and timely hydrographic data, products and services and ensure their widest possible use.” See INTERNATIONAL HYDROGRAPHIC ORGANIZATION, <https://iho.int/srv1/index.php> (May 3, 2017). Hydrographic data is geospatial information and falls within the meta-set of GEOINT.

60. Peter de Selding, *32 Nations Sharing Satellite Imagery as Part of MGCP Network*, SPACE NEWS (Mar. 18, 2013), <http://spacenews.com/32-nations-sharing-satellite-imagery-as-part-of-mgcp-network/> (describing the value of MGCP to improve access to GEOINT through international technical standards and reductions in redundancies).

61. The Allied System for Geospatial Intelligence (ASG) is a “partnership that unifies the United States, Australia, Canada, New Zealand and the United Kingdom to advance the GEOINT mission . . . at the strategic, operational, and tactical levels.” NATIONAL GEOSPATIAL INTELLIGENCE AGENCY, NATIONAL SYSTEM FOR GEOSPATIAL INTELLIGENCE (2015), www.nga.mil/About/Documents/Brochure_061815.1.pdf.

ballistic missiles.⁶² From a judicial perspective, scholars have observed the increasing usage of imagery from earth observation satellites (EOS) in both domestic and international judicial proceedings.⁶³ Singapore was the first nation to use satellite radar imagery as documentary evidence in a Singaporean court, in a 1996 case involving an unlawful maritime oil discharge.⁶⁴ The United States also introduced earth EOS⁶⁵ imagery as well as aerial imagery at the International Court of Justice proceedings in the “Iran Platforms Case.”⁶⁶ Despite the technical sophistication of space-based reconnaissance systems, these judicial proceedings demonstrated that EOS imagery may be useful but not necessarily dispositive in itself.⁶⁷ Nevertheless, EOS imagery proved its relevance in (1) the International Criminal Tribunal for the former Yugoslavia and (2) the Permanent Court of Arbitration related to a border dispute between Eritrea and Ethiopia.⁶⁸ These cases show that EOS imagery is a form of GEOINT that judicial bodies continue to consider as potential forms of evidence.⁶⁹

ii. Democratization

GEOINT *democratization* reflects an evolutionary process as described by industry and intelligence professionals.⁷⁰ GEOINT *democratization* is also referred to as GEOINT *commercialization*, reflecting that the former government “monopoly” on GEOINT is yielding to a wave of higher quality, commercial, and publicly-available GEOINT.⁷¹ While nation-states have promoted GEOINT *internationalization*, GEOINT *democratization* is the inevitable result of market

62. Michael Dobbs, *The Day that Adlai Stevenson Showed ‘Em at the U.N.*, THE WASH. POST (Feb. 5, 2003), <https://www.washingtonpost.com/archive/lifestyle/2003/02/05/the-day-adlai-stevenson-showed-em-at-the-un/>; see also Alan Taylor, *50 Years Ago: The Cuban Missile Crisis*, THE ATLANTIC (Oct. 15, 2012), <https://www.theatlantic.com/photo/2012/10/50-years-ago-the-cuban-missile-crisis/100387/>.

63. RAY PURDY & DENISE LEUNG, EVIDENCE FROM EARTH OBSERVATION SATELLITES: EMERGING LEGAL ISSUES (2013) (A compilation of commentary on relevant legal issues associated with the expanding use of EOS imagery in legal systems).

64. *Id.* at 109.

65. Some writers use the acronym “EO” for Earth Observation satellites. This article uses “EOS” to distinguish from “Electro-optical” imagery from the visible spectrum.

66. Oil Platforms (Iran v. U.S.), Judgment, 2003 I.C.J. Rep. 161, 187 (Nov. 6).

67. *Id.* at 189.

68. PURDY, *supra* note 63, at 224; see also AM. ASSOC. FOR THE ADVANCEMENT OF SCI., *What can geospatial technologies do for the human rights community?* <https://www.aaas.org/page/what-can-geospatial-technologies-do-for-the-human-rights-community> (May 15, 2017) (Eritrea succeeded in using high resolution imagery, the only photographic evidence available for the area in question, in showing unlawful damage to homes, public buildings, and agriculture).

69. PURDY, *supra* note 63, at 238.

70. See MARK M. LOWENTHAL & ROBERT M. CLARK, THE 5 DISCIPLINES OF INTELLIGENCE COLLECTION 153 (2016); Matt Alderton, *Dark Skies, Bright Future: The next generation of commercial remote sensing has arrived, and GEOINT will never be the same*, TRAJECTORY, THE OFFICIAL MAGAZINE OF THE USGIF (Aug. 20, 2015), <http://trajectorymagazine.com/dark-skies-bright-future/> (quoting Robert D. Cardillo, Director of the National Geospatial-Intelligence Agency).

71. See PURDY, *supra* note 63, at 290; Phillip Swartz, *How the NGA is Learning to Stop Worrying and Love Open-Source Data*, SPACE NEWS (Dec. 19, 2016), <https://www.spacenewsmag.com/feature/how-the-nga-is-learning-to-stop-worrying-and-love-open-source-data/>.

forces and globalization.⁷² In addition, the IC played an important role in the initial commercialization of GEOINT by providing venture capital to a startup company named “Keyhole, Inc.,” which developed 3-D visualization software that was ultimately sold to the technology giant Google, leading to the creation of GoogleEarth.⁷³ Technology such as smart phones, which leverages GEOINT-enabled applications, generated unprecedented market demand by consumers, thus furthering GEOINT *democratization*. While nation-states will continue to lead the way with highly sophisticated, specialized, satellite capabilities, commercial imagery providers are improving resolution quality to meet requirements across numerous lines of business. Additionally, GEOINT *democratization* is advancing through the introduction of large numbers of *dove* micro-satellites which will provide higher “revisit”⁷⁴ frequency, albeit with lower resolutions.⁷⁵ These constellations of *doves* forecast a greater availability of lower cost GEOINT for commercial, environmental, or personal purposes.

GEOINT *democratization* not only involves a proliferation of geospatial information⁷⁶ and imagery but also the timely analysis of these, thus providing the public GEOINT analysis heretofore limited to nation-states and multinational organizations. An outstanding example of this democratization relative to the SCS conflict is the Asia Maritime Transparency Initiative (AMTI), a web-based, public service provided by the Center for Strategic and International Studies (CSIS). A stated objective of AMTI is “to promote transparency in the Indo-Pacific to dissuade assertive behavior and conflict and generate opportunities for cooperation and confidence building.”⁷⁷ AMTI and CSIS maintain neutrality, taking no position on sovereignty of disputed maritime features. In the case of the SCS disputes, AMTI provided the public with free, timely, and relevant GEOINT (imagery, imagery intelligence, and geospatial information) on maritime activity in the Asian maritime domain. In addition to AMTI, the Council on Foreign

72. See UNITED STATES GEOSPATIAL INTELLIGENCE FOUNDATION, 2016 STATE OF GEOINT REPORT 13 (2016) (“The availability of content coupled with associated ease of use and decreased cost of geospatial tools has resulted in a democratization of GEOINT. . .”) http://usgif.org/system/uploads/4510/original/2016_SoG_book.pdf [hereinafter GEOINT REPORT].

73. See CIA, *CIA’s Impact on Technology*, <https://www.cia.gov/about-cia/cia-museum/experience-the-collection/text-version/stories/cias-impact-on-technology.html> (May 6, 2017); *Google Acquires Keyhole Corp.*, GOOGLE NEWS (Oct. 27, 2004), <http://googlepress.blogspot.com/2004/10/google-acquires-keyhole-corp.html>.

74. *Planet’s satellites offer customers a new world view every day*, THE ECONOMIST (Feb. 16, 2017), <http://www.economist.com/news/business/21717110-analysing-images-space-could-be-big-business-planets-satellites-offer-customers-new-world>.

75. *Id.*

76. See GEOINT REPORT, *supra* note 72 at 26 (“Without argument, geospatial information services, location-based social media applications, and geospatial intelligence capabilities have exploded in use and acceptance in the last decade.”).

77. See ASIA MARITIME TRANSPARENCY INITIATIVE, *About AMTI*, <https://amti.csis.org/about/> (May 9, 2017).

Relations⁷⁸ and the *New York Times*⁷⁹ have expanded GEOINT *democratization* by publishing timely reporting on the SCS dispute between the Philippines and China. This transparency ensured that the SCS Arbitration would have a much more engaged global audience than previous maritime sovereignty claim disputes.⁸⁰ While commentators have recommended an international cooperative regime to monitor activities to enforce equitable norms in the SCS,⁸¹ it appears that NGOs will fill the vacuum left by lack of agreement by the littoral states in the SCS. This transparency has provided a degree of ground truth⁸² regarding the recordable actions of states such as China and the Philippines, with the resulting effect of either diminishing or reinforcing the perceived legitimacy of these actions.

III. BACKGROUND OF SOUTH CHINA SEA ARBITRATION

A. *Initiation of Arbitration Proceedings*

On January 22, 2013, culminating nearly two decades of dispute with China over features in the SCS,⁸³ the Philippines initiated arbitration proceedings against China pursuant to UNCLOS Articles 286⁸⁴ and 287.⁸⁵ The Philippines sought an arbitral award that would:

- declare the Parties' respective rights and obligations in regard to the waters, seabed and maritime features of the South China Sea are governed by UNCLOS, and that China's claims based on its "nine-dash line" are inconsistent with the Convention and therefore invalid;

78. See COUNCIL ON FOREIGN RELATIONS, *Info Guide Presentation, China's Maritime Disputes*, <http://www.cfr.org/asia-and-pacific/chinas-maritime-disputes#!/> (May 15, 2017) [hereinafter *China's Maritime Disputes*].

79. See Himmelman, *supra* note 19.

80. See ASIA MARITIME TRANSPARENCY INITIATIVE, *Arbitration 101: Philippines v. China*, <https://amti.csis.org/arbitration-101-philippines-v-china/> (May 9, 2017).

81. COOPERATIVE MONITORING, *supra* note 5, at 127-129.

82. "In the earth sciences, the facts that are confirmed in an actual field check is done at a location, specif. the determination of facts by examining the ground for patterns revealed by remote sensing or aerial photography." DICTIONARY.COM, *Ground Truth*, <http://www.dictionary.com/browse/ground-truth> (Jun. 2, 2017).

83. The territorial disputes over competing claims in the South China Sea are the subject of extensive literature. E.g. BOB CATLEY AND MAKMUR KELIAT, *SPRATLYS: THE DISPUTE IN THE SOUTH CHINA SEA* 101 (1997); BILL HAYTON, *THE SOUTH CHINA SEA: THE STRUGGLE FOR POWER IN ASIA* 86-88 (2014); ROBERT D. KAPLAN, *ASIA'S CAULDRON, THE SOUTH CHINA SEA AND THE END OF A STABLE PACIFIC* 126-127 (2014).

84. Article 286, Part XV, Section 2 provides: "Subject to section 3, any dispute concerning the interpretation or application of this Convention shall, where no settlement has been reached by recourse to section 1, be submitted at the request of any party to the dispute to the court or tribunal having jurisdiction under this section." UNCLOS, *supra* note 2, at Art. 286.

85. Article 287 governs the choice of Procedure for the settlement of disputes concerning the interpretation or application of this Convention. UNCLOS, *supra* note 2, at Art. 287.

- determine whether, under Article 121 of UNCLOS, certain of the maritime features claimed by both China and the Philippines are islands, low tide elevations or submerged banks,⁸⁶ and whether they are capable of generating entitlement to maritime zones greater than 12 nautical miles;⁸⁷ and
- enable the Philippines to exercise and enjoy the rights within and beyond its exclusive economic zone and continental shelf that are established in the Convention.⁸⁸

In its Notification and Statement of Claim, the Philippines clearly emphasized that it did not seek “a determination of which Party enjoys sovereignty over the islands claimed by both of them. . . [n]or does it request a delimitation of any maritime boundaries.” Instead, the Philippines strategically focused its request for arbitration, being “conscious of China’s Declaration of 25 August 2006 under Article 298 of UNCLOS, and has avoided raising subjects or making claims that China has, by virtue of that Declaration, excluded from arbitral jurisdiction.”⁸⁹

As required by UNCLOS Annex VII, Article 1, on January 22, 2013, the Philippines notified China of the initiation of arbitration by a *Note Verbale*⁹⁰ sent to the Chinese Embassy in Manila along with its Statement of Claim.⁹¹ China responded to the Philippines with its own *Note Verbale* on February 19, 2013, stating that China had “indisputable sovereignty over the Nanhai Islands⁹² and their adjacent waters” and that the Philippines Statement of Claim contained “grave errors both in fact and in law, and includes many false accusations.”

86. UNCLOS does not define the term “submerged bank,” but the term is understood to mean a maritime feature which is submerged all of the time. E.g., Macclesfield Bank is a submerged Bank. *See* Award, *supra* note 3, at Map 1, p. 9.

87. A nautical mile is the equivalent of 1,852 meters (~6076.11549 feet). Also called the ‘international nautical mile,’ this standard length was introduced in 1929 by the International Hydrographic Bureau (now the International Hydrographic Organization or IHO) and adopted by the United States on July 1, 1954. *See* BOWDITCH, *supra* note 18, at 780, 795; IHO HYDROGRAPHIC DICTIONARY *International Nautical Mile*, http://hd.iho.int/en/index.php/International_nautical_mile (Apr. 24, 2017).

88. Award, *supra* note 3, ¶ 28 (citing Notification and Statement of Claim of the Republic of the Philippines, 22 January 2013, ¶ 6).

89. Notification and Statement of Claim of the Republic of the Philippines, 22 January 2013, ¶ 7, <http://www.philippineembassy-usa.org/uploads/pdfs/embassy/2013/2013-0122-Notification%20and%20Statement%20of%20Claim%20on%20West%20Philippine%20Sea.pdf>.

90. A *note verbale* is a diplomatic communication prepared in the third person and unsigned: less formal than a note but more formal than an aide-mémoire. DICTIONARY.COM, *Note Verbale*, <http://www.dictionary.com/browse/note-verbale?s=t> (Apr. 14, 2017).

91. *Note Verbale* from the Dept. of Foreign Affairs of the Rep. of the Philippines to the Embassy of the People’s Republic of China in Manila, No. 12-0211 (Jan. 22, 2013) *Memorial of the Philippines, Vol. III, Annex 2*, <http://www.pcacases.com/pcadocs/The%20Philippines%27%20Supplemental%20Documents%20-%20Volume%20I%20%28Annexes%20607-667%29.pdf>.

92. “Nanhai” is the Chinese name for the South China Sea. *See* Simon Worrall, *Why Specks of Land in the South China Sea Are Fueling Tensions between Beijing and Its Neighbors*, NAT’L GEOGRAPHIC (Dec. 12, 2014), <http://news.nationalgeographic.com/news/2014/12/141211-south-china-sea-beijing-tensions-culture-world-ngbooktalk/>.

China rejected the legitimacy of arbitration, noting that “[a]t the core of the disputes between China and the Philippines in the South China Sea are the territorial disputes over some islands and reefs of the Nansha [Spratly] Islands . . .” noting that “[t]he two countries also have overlapping jurisdictional claims over parts of the maritime area in the South China Sea” and that both sides had agreed to settle the dispute through bilateral negotiations and friendly consultations.⁹³

The Arbitral Tribunal was constituted on June 21, 2013, met on July 11, 2013, and issued its first Procedural Order on August 27, 2013.⁹⁴ This Order identified the Permanent Court of Registry (PCA)⁹⁵ as the Official Registry for the Arbitration, established Rules of Procedure, and requested that the Philippines submit a Memorial by March 30, 2014, addressing “all issues including matters relating to jurisdiction, admissibility, and the merits of the dispute.”⁹⁶

B. The Philippines’ 15 Submissions Seeking Declaration

The Philippines complied with the terms of the PCA’s Procedural Order No. 1 and submitted its Memorial documentation itemizing the following 15 submissions, listed *verbatim* below, on which it requested the Tribunal to adjudicate and declare the following:

1. China’s maritime entitlements in the South China Sea, like those of the Philippines, may not extend beyond those permitted by the United Nations Convention on the Law of the Sea (“UNCLOS” or the “Convention”);
2. China’s claims to sovereign rights and jurisdiction, and to “historic rights”, with respect to the maritime areas of the South China Sea encompassed by the so-called “nine-dash line” are contrary to the Convention and without lawful effect to the extent that they exceed the geographic and substantive limits of China’s maritime entitlements under UNCLOS;
3. Scarborough Shoal generates no entitlement to an exclusive economic zone or continental shelf;

93. *Note Verbale* from the Embassy of the People’s Republic of China in Manila to the Department of Foreign Affairs of the Rep. of the Philippines, No. (13) PG-039 (Feb. 19, 2013) *Mem. of the Philippines, Vol. III, Annex 3*, <http://www.pcacases.com/pcadocs/The%20Philippines%27%20Supplemental%20Documents%20-%20Volume%20I%20%28Annexes%20607-667%29.pdf>.

94. *Phil. v. China*, Perm. Ct. Arb. Case No. 2013-19, Procedural Order No. 1, Aug. 27, 2013, <http://www.pcacases.com/web/sendAttach/1804> [hereinafter Proc. Order No. 1].

95. The PCA is “an intergovernmental organization established by the 1899 Hague Convention on the Pacific Settlement of International Disputes.” The PCA is headquartered at the Peace Palace in The Hague, the Netherlands, and “facilitates arbitration, conciliation, fact-finding and other dispute resolution proceedings among various combinations of States, State entities, intergovernmental organizations, and private parties.” Press Release, Permanent Court of Arbitration, The South China Sea Arbitration, *Arbitral Tribunal Establishes Rules of Procedure and Initial Timetable* (Aug. 27, 2013) <http://www.pcacases.com/web/sendAttach/227>.

96. Proc. Order No. 1, *supra* note 94, at 3.

4. Mischief Reef, Second Thomas Shoal and Subi Reef are low-tide elevations that do not generate entitlement to a territorial sea, exclusive economic zone or continental shelf, and are not features that are capable of appropriation by occupation or otherwise;
5. Mischief Reef and Second Thomas Shoal are part of the exclusive economic zone and continental shelf of the Philippines;
6. Gaven Reef and McKennan Reef (including Hughes Reef) are low-tide elevations that do not generate entitlement to a territorial sea, exclusive economic zone or continental shelf, but their low-water line may be used to determine the baseline from which the breadth of the territorial sea of Namyit and Sin Cowe, respectively, is measured;
7. Johnson Reef, Cuarteron Reef and Fiery Cross Reef generate no entitlement to an exclusive economic zone or continental shelf;
8. China has unlawfully interfered with the enjoyment and exercise of the sovereign rights of the Philippines with respect to the living and non-living resources of its exclusive economic zone and continental shelf;
9. China has unlawfully failed to prevent its nationals and vessels from exploiting the living resources in the exclusive economic zone of the Philippines;
10. China has unlawfully prevented Philippine fishermen from pursuing their livelihoods by interfering with traditional fishing activities at Scarborough Shoal;
11. China has violated its obligations under the Convention to protect and preserve the marine environment at Scarborough Shoal and Second Thomas Shoal;
12. China's occupation and construction activities on Mischief Reef
 - (a) violate the provisions of the Convention concerning artificial islands, installations and structures;
 - (b) violate China's duties to protect and preserve the marine environment under the Convention; and
 - (c) constitute unlawful acts of attempted appropriation in violation of the Convention;
13. China has breached its obligations under the Convention by operating its law enforcement vessels in a dangerous manner causing serious risk of collision to Philippine vessels navigating in the vicinity of Scarborough Shoal;

14. Since the commencement of this arbitration in January 2013, China has unlawfully aggravated and extended the dispute by, among other things:
 - (a) interfering with the Philippines' rights of navigation in the waters at, and adjacent to, Second Thomas Shoal; preventing the rotation and resupply of Philippine personnel stationed at Second Thomas Shoal; and
 - (c) endangering the health and well-being of Philippine personnel stationed at Second Thomas Shoal; and
15. China shall desist from further unlawful claims and activities.⁹⁷

On May 19, 2014, China responded with a *Note Verbale*, restating its position that it did not accept the arbitration initiated by the Philippines.⁹⁸ The Tribunal required China to submit a Counter-Memorial before December 15, 2014;⁹⁹ China did not submit a Counter-Memorial. Instead, on December 7, 2014, China published a 93-paragraph *Position Paper*¹⁰⁰ stressing the following points: (1) the Tribunal lacked jurisdiction to determine sovereignty over maritime features; (2) the Philippines had breached its obligations under international law by initiating arbitration because it had previously agreed to bilateral settlement with China; and, (3) the subject matter of the dispute involved maritime delimitation between two parties, which China excluded from compulsory arbitration through its August 25, 2006 Declaration¹⁰¹ under UNCLOS.¹⁰² On December 8, 2014, China deposited a *Note Verbale* with the PCA that announced the publication of China's *Position Paper* and requested that the PCA distribute it to the members of the Tribunal. The *Note Verbale* also stressed that China's "Position Paper shall not be regarded as China's acceptance of or its participation in the arbitration."¹⁰³

UNCLOS Annex VII on Arbitration authorizes arbitral proceedings to continue even if "one of the parties to the dispute does not appear before the arbitral

97. Award on Jurisdiction and Admissibility, *supra* note 8 at, ¶ 101 (listing the Philippines' final submissions).

98. *Phil. v. China*, Perm. Ct. Arb. Case No. 2013-19, Procedural Order No. 2, Jun. 2, 2014 at 2 <http://www.pccases.com/web/sendAttach/1805>.

99. *Id.* at 3.

100. See MINISTRY OF FOREIGN AFFAIRS, CHINA, *Position Paper of the Government of the People's Republic of China on the Matter of Jurisdiction in the South China Sea Arbitration Initiated by the Republic of the Philippines*, (Dec. 7, 2014) http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1217147.shtml.

101. See U.N. Division for Ocean Affairs and The Law of the Sea, Declarations and Statements, http://www.un.org/depts/los/convention_agreements/convention_declarations.htm#China%20after%20ratification (Apr. 17, 2017).

102. *Phil. v. China*, Perm. Ct. Arb. Case No. 2013-19, Procedural Order No. 4, Apr. 21, 2015, at 3-4 <http://www.pccases.com/web/sendAttach/1807> [hereinafter Procedural Order No. 4].

103. Press Release, Permanent Court of Arbitration, The South China Sea Arbitration, The South China Sea Arbitration, *The Arbitral Tribunal Sets Dates for Hearing on Jurisdiction and Admissibility 1* (Apr. 22, 2015) <http://www.pccases.com/web/sendAttach/1298>.

tribunal or fails to defend its case.”¹⁰⁴ However, an arbitral tribunal convened under Annex VII “must satisfy itself not only that it has jurisdiction over the dispute but also that the claim is well founded in fact and law.”¹⁰⁵ Annex VII to UNCLOS requires an arbitral tribunal to assure that each party has a full opportunity to be heard and to present its case.¹⁰⁶ The Tribunal decided to move ahead with arbitral proceedings, despite China’s objections, having determined that China’s *Position Paper* and other writings “effectively constitute[d] a plea concerning the Arbitral Tribunal’s jurisdiction.”¹⁰⁷ The Tribunal bifurcated proceedings to first hold a hearing on Jurisdiction, with substantive hearings to follow if the Tribunal concluded affirmatively as to the question of jurisdiction.¹⁰⁸

C. The Jurisdiction Hearing

The Tribunal held non-public jurisdictional hearings during July 7-13, 2015. China refused to participate. Considering the interests of neighboring states, the Tribunal permitted small delegations from the Governments of Japan, Malaysia, the Republic of Indonesia, the Socialist Republic of Viet Nam, and the Kingdom of Thailand to observe the jurisdictional hearing.¹⁰⁹

On October 29, 2015, the Tribunal issued a unanimous, 150-page Award on Jurisdiction and Admissibility. The Tribunal affirmed its authority to proceed with a hearing on the merits because the arbitration was not instituted to determine sovereignty nor the delimitation of maritime boundaries; rather, the arbitration was seeking a determination on the interpretation and application of UNCLOS.¹¹⁰ Of the 15 matters the Philippines had originally submitted to the Tribunal for legal determination, the Tribunal found it had jurisdiction to consider the Philippines Submissions Nos. 3, 4, 6, 7, 10, 11, and 13.¹¹¹ The Tribunal deferred consideration on the Philippines Submissions Nos. 1, 2, 5, 8, 9, 12, and 14 to a hearing on the merits because such a determination “would involve consideration of issues that do not possess an exclusively preliminary character.”¹¹² The Tribunal directed the Philippines to clarify and narrow the

104. UNCLOS, *supra* note 2, at Annex VII, Art. 9.

105. *Id.*

106. UNCLOS, *supra* note 2, at Annex VII, Art. 5.

107. Procedural Order No. 4, *supra* note 102, ¶ 1.1.

108. *Id.* at p. 5-6.

109. Press Release, Permanent Court of Arbitration, The South China Sea Arbitration, The Arbitral Tribunal Concludes Hearing on Jurisdiction and Admissibility (Jul. 13, 2015) <http://www.pcacases.com/web/sendAttach/1304>.

110. Press Release, Permanent Court of Arbitration, The South China Sea Arbitration, The Tribunal Renders Award on Jurisdiction and Admissibility; Will Hold Further Hearings 1-2, (Oct. 29, 2015) <http://www.pcacases.com/web/sendAttach/1503> [hereinafter Seventh Press Release].

111. *Id.* at 8 (finding that the Tribunal has jurisdiction to consider the Philippines’ Submissions No. 3, 4, 6, 7, 10, 11, and 13, subject to the conditions noted in paragraphs 400, 401, 403, 404, 407, 408, and 410 of the Award on Jurisdiction and Admissibility.)

112. Award on Jurisdiction and Admissibility, *supra* note 8, ¶ 413.

scope of its 15th submission¹¹³ which had originally requested the Tribunal to declare that “China shall desist from further unlawful claims and activities.”¹¹⁴

The Tribunal announced that it would schedule a non-public hearing on the merits to “provide an opportunity for the Parties to present oral arguments and answer questions on the merits of the Philippines’ claims and any remaining issues deferred from the jurisdictional phase.”¹¹⁵ The Tribunal indicated its willingness to make “appropriate adjustments to the schedule if China decided to participate.”¹¹⁶ China continued its active non-participation in the arbitration by issuing a statement on the Award of Jurisdiction and Admissibility in which China rejected the result as “null and void” with no binding effect on China because “the Arbitral Tribunal manifestly has no jurisdiction over the arbitration initiated by...the Philippines....”¹¹⁷ China continued to reassert its “indisputable sovereignty over the South China Sea and the adjacent waters” without providing any explanation as to how its claims could exceed or survive pre-emption of those rights established under UNCLOS.¹¹⁸

D. The Merits Hearing

Prior to the Merits Hearing, the Philippines had requested and were granted leave to present for examination two experts: Professor Clive Schofield¹¹⁹ and Professor Kent Carpenter.¹²⁰ The Tribunal held two rounds of extensive hearings on the Merits during the period November 24-30, 2015.¹²¹ Although China refused to participate in the hearing, the Tribunal made every effort to keep China informed of all proceedings. On November 30, 2015, the Agent for the Philippines presented its Final Submissions to the Tribunal in which it amended Submissions 11 and 14 and clarified Submission 15.¹²²

E. The Award

The Tribunal issued its unanimous, comprehensive, and cogent Award decision on July 12, 2016. The Award decision is summarized in Part X, the

113. *See id.*

114. *See Award, supra* note 3, ¶ 1183.

115. Seventh Press Release, *supra* note 110, at 8.

116. Award, *supra* note 3, ¶ 61.

117. *Id.*

118. *Id.*

119. Professor Clive Schofield is a world-recognized expert on maritime boundary issues. He serves as an IHO nominated Observer on the Advisory Board on The Law of the Sea and as director of research at the Australian National Centre for Ocean Resources and Security at the University of Wollongong in Australia. *See* UNIV. OF WOLLONGONG AUSTL., *Professor Clive Schofield*, <http://ancors.uow.edu.au/staff/UOW076788.html> (Apr. 26, 2017).

120. Professor in Biological Sciences at Old Dominion University in Norfolk, Virginia. He also serves as manager of the Marine Biodiversity Unit and Global Marine Species Assessment of the International Union for Conservation of Nature. *See* OLD DOMINION UNIV., *Kent Carpenter*, <https://www.odu.edu/directory/people/k/kcarpent> (May 24, 2017).

121. The Merits Hearings generated 651 pages of Transcripts which reflect the deliberate manner in which the Tribunal undertook the adjudication of the dispute. *See* PCA Case Repository, *supra* note 3.

122. Award, *supra* note 3, ¶ 112.

Dispositif,¹²³ in which the Tribunal made the following *Declarations* and *Findings*:

Regarding Philippine Submissions Nos. 1 and 2, the Tribunal **Declared** that as between the Philippines and China: (1) UNCLOS defines scope of maritime entitlements in the SCS which may not be extended;¹²⁴ (2) China's claims to historic rights, or other sovereign rights or jurisdiction within the 'nine-dash line' are contrary to UNCLOS and without lawful effect; and (3) UNCLOS superseded any of China's aforementioned claimed rights in excess of the limits imposed by UNCLOS;¹²⁵

Regarding Philippine Submissions Nos. 3-7 (requesting judicial determination of the disputed features), the Tribunal **Found** that:

The Tribunal had sufficient information about the tidal conditions in the SCS to be able to render a factual determination on Submissions Nos. 4 and 6;

Scarborough Shoal, Gaven Reef (North), McKennan Reef, Johnson Reef, Cuarteron Reef, and Fiery Cross Reef are, in their natural state, naturally formed areas of land, surrounded by water which are above water at high tide, within the meaning of UNCLOS Article 121(1);¹²⁶

Subi Reef, Gaven Reef (South), Hughes Reef, Mischief Reef, and Second Thomas Shoal, are LTEs, within the meaning of UNCLOS Article 13;¹²⁷

With regard to the status of others features in the SCS: none of the high-tide features in the Spratly Islands, in their natural condition, are capable of sustaining human habitation or economic life of their own within the meaning of UNCLOS Article 121(3)¹²⁸ and therefore, these features cannot generate entitlements to EEZs or CSs,¹²⁹

Therefore, there is no entitlement to an EEZ or a CS generated by any feature claimed by China that would overlap the entitlements of the Philippines in the area of Mischief Reef and Second Thomas Shoal;¹³⁰

Further, regarding Philippine Submissions Nos. 3-7 (requesting judicial determination of the disputed features), the Tribunal **Declared** that:

123. *Id.* ¶¶ 1202–1203.

124. *Id.* at Dispositif § (B)(1), at 473.

125. *Id.* at Dispositif § (B)(2), at 473.

126. *Id.* at Dispositif § (B)(3)(b), at 473.

127. *Id.* at Dispositif § (B)(3)(c), at 473.

128. *Id.* at Dispositif § (B)(3)(a), at 473. Ironically, this means that none of the Spratly Islands are UNCLOS 'islands.'

129. *Id.* at Dispositif § (B)(7)(b), at 474.

130. *Id.* at Dispositif § (B)(7)(c), at 474.

As LTEs, Mischief Reef and Second Thomas Shoal are incapable of appropriation and unable to generate entitlements to a TS, an EEZ, or a CS.¹³¹ Mischief Reef and Second Thomas Shoal are located within the EEZ and the CS of the Philippines.¹³²

As LTEs, Subi Reef, Gaven Reef (South), and Hughes Reef are LTEs incapable of appropriation and unable to generate entitlements to a TS, an EEZ, or a CS; however, Subi Reef, Gaven Reef (South), and Hughes Reef may be used as the baseline for measuring the breadth of the TS of those high-tide features located at a distance not exceeding the breadth of the TS;¹³³

Scarborough Shoal, Gaven Reef (North), McKennan Reef, Johnson Reef, Cuarteron Reef, and Fiery Cross Reef, in their natural condition, are rocks unable to sustain human habitation or economic life of their own within the meaning of UNCLOS Art. 121(3); therefore, these features generate no respective EEZs nor CSs.¹³⁴

Regarding Philippine Submissions Nos. 8 and 9 (requesting judicial determination on the alleged acts of China), the Tribunal **Declared** that China breached its obligations under UNCLOS Art. 77 with respect to the sovereign rights of the Philippines over the non-living resources of its CS in the area of Reed Bank¹³⁵ by operating its marine surveillance vessels which interfered with Philippine survey operations by the M/V Veritas Voyager on March 1-2, 2011.¹³⁶ In addition the Tribunal **Declared** that:

China breached its obligations under UNCLOS Art. 56 with respect to the sovereign rights of the Philippines over the living resources of its EEZ by imposing a 2012 moratorium on fishing in the SCS, which included waters within the EEZ of the Philippines;¹³⁷ and

China breached its obligations under UNCLOS Art. 58(3) to show due regard for the sovereign rights of the Philippines by knowingly tolerating Chinese flagged vessels to engage in fishing within the Philippines' EEZ at Mischief Reef and Second Thomas Shoal.¹³⁸

Regarding Submission No. 10 (requesting declaration of China's interference with traditional fishing activities), the Tribunal **Declared** that China, through the operation of its official vessels unlawfully prevented fisherman from the

131. *Id.* at Dispositif § (B)(4), at 474.

132. *Id.* at Dispositif § (B)(7), at 474.

133. *Id.* at Dispositif § (B)(5), at 474.

134. *Id.* at Dispositif § (B)(5), at 474.

135. The Tribunal described Reed Bank as “an entirely submerged reef formation that cannot give rise to maritime entitlements” located within the EEZ of the Philippines. *See id.* ¶ 693.

136. *Id.* at Dispositif § (B)(8), at 474.

137. *Id.* at Dispositif § (B)(9), at 474.

138. *Id.* at Dispositif § (B)(10), at 475.

Philippines from engaging in traditional fishing at Scarborough Shoal. This declaration was based upon the Tribunal's *Finding* that Scarborough Shoal has been a traditional fishing ground for fishermen of many nationalities.¹³⁹

Regarding Philippine Submission No. 11 (requesting judicial determination of the alleged acts of China regarding protection and preservation of the marine environment in the SCS), the Tribunal *Declared* that China breached its obligations to protect and preserve the marine environment under UNCLOS Article 192 and failed to take such measures pursuant to UNCLOS Article 194(5) to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened, or endangered species and other forms of marine life. The Tribunal based this declaration on the findings that: China was aware of, tolerated, and protected fisherman from Chinese flagged vessels who harvested endangered species on a significant scale and harvested giant clams in a manner severely destructive to the coral reef ecosystem.¹⁴⁰

Further, regarding Philippine Submission No. 11 (requesting judicial declaration that China failed to protect and preserve the marine environment in the SCS), the Tribunal *Declared* that China breached its obligations under UNCLOS Articles 123,¹⁴¹ 192,¹⁴² 194(1),¹⁴³ 197,¹⁴⁴ and 206¹⁴⁵ based upon the following *Findings*

China's 'land reclamation' and construction of artificial islands, installations, and structures at Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, Subi Reef, and Mischief Reef has caused severe, irreparable harm to the coral reef ecosystem;

China has not cooperated or coordinated with the other States bordering the SCS concerning the protection and preservation of the marine environment concerning such activities; and

139. *Id.* at Dispositif § (B)(11), at 475.

140. *Id.* at Dispositif § (B)(12), at 475.

141. UNCLOS Article 123 requires "Cooperation of States bordering enclosed or semi-enclosed seas" in the exercise of their rights and in the performance of their duties under this Convention. UNCLOS, *supra* note 2, at Art. 123.

142. UNCLOS Article 192 imposes a general duty upon states to protect and preserve the marine environment. *Id.* at Art. 192.

143. UNCLOS Article 194(1) requires states to take "all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source." *Id.* at Art. 194(1).

144. UNCLOS Article 197 requires states to cooperate on a global or regional basis...for the protection and preservation of the marine environment. *Id.* at Art. 197.

145. UNCLOS Article 206 requires states to having "reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment. . .shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205." *Id.* at Art. 206.

China failed to communicate an assessment of the potential effects of such activities on the marine environment, within the meaning of UNCLOS Article 206.¹⁴⁶

Regarding Philippine Submission No. 12 (requesting a declaration on China's artificial island-building activities at Mischief Reef) the Tribunal **Declared** that China breached UNCLOS Articles 60¹⁴⁷ and 80¹⁴⁸ because Mischief Reef is an LTE within the EEZ and CS of the Philippines, and China thereon engaged in construction of artificial islands, installations, and structures without the authorization of the Philippines.¹⁴⁹

Regarding Philippine Submission No. 13 (requesting a declaration that China dangerously operated its law enforcement vessels in the vicinity of Philippine vessels), the Tribunal **Declared** that China breached its obligations under UNCLOS Art. 94¹⁵⁰ based upon findings that China operated its law-enforcement vessels on April 28 and May 26, 2012, in a hazardous manner and violated six specific rules from the 1972 Convention on the International Regulations for Preventing Collisions at Sea (COLREGS).^{151,152}

Regarding Philippine Submission No. 14(d)¹⁵³ (requesting declaration that China unlawfully aggravated and extended the suit), the Tribunal **Declared** that China breached its obligations pursuant to UNCLOS Articles 279,¹⁵⁴

146. Award, *supra* note 3, at Dispositif § (B)(13), at 475.

147. UNCLOS Article 60 recognizes that within its EEZ, a coastal state has the exclusive right to construct and to authorize and regulate the construction, operation and use of artificial islands, installations, and structures. UNCLOS, *supra* note 2, at Art. 60.

148. UNCLOS Article 80 states "Article 60 applies *mutatis mutandis* to artificial islands, installations and structures on the continental shelf." *Id.* at Art. 80.

149. Award, *supra* note 3, at Dispositif § (B)(14), at 476.

150. UNCLOS Article 94 requires a state take such measures for ships flying its flag as are necessary to ensure safety at sea with regard, inter alia, to the use of signals, the maintenance of communications, and the prevention of collisions. In addition, each State is required to conform to generally accepted international regulations promoting safe operation and navigation of vessels. UNCLOS, *supra* note 2, at Art. 94

151. Award, *supra* note 3, at Dispositif § (B)(15), at 476.

152. The COLREGS are the internationally standardized "rules of the road" which mariners follow to avoid or minimize the risk of collisions. See Int'l Maritime Org. [IMO], *Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)*, <http://www.imo.org/en/About/conventions/listofconventions/pages/colreg.aspx>. The Tribunal based its decision in part upon expert reports provided by the Philippines' appointed expert and the Tribunal's appointed expert. Award, *supra* note 3, ¶ 1084.

153. The Tribunal found that it did not have jurisdiction to address Submissions 14(a) through 14(c) because these submissions regarded military activities excluded pursuant to UNCLOS Article 298(1)(b) and China's exclusion decision made by its August 2006 Declaration. Award, *supra* note 3, ¶¶ 1153–1162.

154. UNCLOS Article 279 establishes the duty of states to resolve disputes by peaceful means in accordance with Articles 2 and 33 of the Charter of the United Nations. UNCLOS, *supra* note 2, at Art. 279.

296,¹⁵⁵ 300,¹⁵⁶ and general international law to abstain from “any measure capable of exercising a prejudicial effect in regard to the execution of the decisions to be given. . .” based upon the Tribunal’s *Findings* that China:

built a large artificial island on Mischief Reef, an LTE located in the EEZ of the Philippines;

caused by its dredging, land reclamation, and construction activities, irreparable harm to the coral reef ecosystem at Mischief Reef, Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, and Subi Reef;

permanently destroyed evidence of the natural condition of Mischief Reef, Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, and Subi Reef; and

aggravated the Parties’ Dispute concerning the following: their respective rights and entitlements in the area of Mischief Reef; the Protection and Preservation of the marine environment at Mischief Reef, Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, and Subi Reef; and the status of maritime features in the Spratly Islands and their capacity to generate entitlements to maritime zones.¹⁵⁷

The Tribunal did not provide *Findings or Declarations* with Regard to Philippine Submission No. 15 concerning the future conduct of the parties. The Tribunal deemed this submission as “not being necessary or appropriate” on the rationale that the Parties were already “obliged to comply” with UNCLOS, including those “provisions regarding the resolution of disputes” and to respect each party’s respective rights and freedoms.¹⁵⁸

IV. THE LEGAL CONSEQUENCE OF GEOINT TO THE SOUTH CHINA SEA ARBITRATION

A. *GEOINT* was Necessary to Judicially Describe and Assess the Features in the South China Sea Arbitration

i. Low-Tide Elevations or High-Tide Elevations

The 2016 SCS Arbitration was a complex legal matter¹⁵⁹ involving the interpretation and application of UNCLOS to 15 particular submissions of the

155. UNCLOS Article 296 provides that “[a]ny decision rendered by a court or tribunal having jurisdiction under this section shall be final and shall be complied with by all the parties to the dispute.” *Id.* at Art. 296.

156. UNCLOS Article 300 requires States Parties to fulfil in good faith the obligations under UNCLOS and to exercise UNCLOS rights, jurisdiction and freedoms in a manner which would not constitute an abuse of right. *Id.* at Art. 300.

157. Award, *supra* note 3, at Dispositif § (B)(16), 476.

158. Award, *supra* note 3, ¶¶ 1182–1201.

159. The South China Sea Arbitration involved proceedings occurring over three plus years and produced thousands of pages of documents including Philippine Memorial submissions, Procedural Orders, Hearing Transcripts, and Award Opinions. See PCA Case Repository, *supra* note 3.

Philippines, ten of which required the application of GEOINT for resolution.¹⁶⁰ These ten submissions required what may be called *judicial MDA*,¹⁶¹ necessitating the use of GEOINT to make coherent conclusions on these issues. For example, Submissions Nos. 3 through 7 involved questions of geospatial fact, such as whether a feature was an island, rock, LTE, or part of the EEZ of the Philippines.¹⁶² This was perhaps the most complex aspect of the arbitration; the analysis consumed 142 pages of the Award opinion.¹⁶³ Distinguishing between rocks and islands was the most challenging of all because this process required a geospatial determination as to whether the high-tide feature could “sustain human habitation or have economic life of its own” necessary for the feature to be a fully-entitled island under UNCLOS.¹⁶⁴ In addition, Submissions Nos. 9 through 13 involved questions of whether alleged Chinese activities violated provisions of UNCLOS or interfered with Philippine rights under international law. Submission No. 14(d) involved the question of whether China had unlawfully aggravated and extended the dispute by conducting dredging, artificial island-building and construction activities at seven disputed features. These submissions required GEOINT and will be discussed further below.

While Submissions Nos. 1, 2, 8, and 13 involved issues worthy of scholarly discussion, further analysis of the Tribunal’s resolution of these submissions is left for another article.

Submissions Nos. 3, 4, 5, 6, and 7 were those in which GEOINT was necessary to adjudicate the status of the maritime features at the core of the SCS dispute.¹⁶⁵ The Tribunal grouped these submissions into three thematic bins: Low-tide Elevations, Rocks, and Location within the Philippines’ EEZ and CS. Submissions Nos. 4 and 6 asked the Tribunal to declare that Mischief Reef, Second Thomas Shoal, Subi Reef, Gaven Reef and McKennan Reef (including Hughes Reef) were LTEs not generating “any independent entitlement to maritime zones.”¹⁶⁶ Submissions Nos. 3 and 7 asked the Tribunal to declare that Scarborough Shoal, Johnson Reef, Cuarteron Reef, and Fiery Cross Reef were all “rock” high-tide elevations generating neither EEZ nor CS.¹⁶⁷ Submission No. 5 sought a declaration that Mischief Reef and Second Thomas Shoal are part of the EEZ and CS of the Philippines.

160. These were Submissions Nos. 3, 4, 5, 6, 7, 9, 10, 11, 12, and 14(d).

161. MDA is maritime domain awareness. See NMDAP, *supra* note 37; Bueger & Senu, *supra* note 38.

162. Award, *supra* note 3, ¶ 112.B, at 41.

163. Award, *supra* note 3, at 119-261.

164. See JAYAKUMAR, KOH, & BECKMAN, *supra* note 14, at 94-96. This text emphasizes that UNCLOS Article 121(3) was a contentious issue, having been opposed by many states at the UNCLOS III Conference, that has been “subject to copious comment,” and was more or less the result of “grey compromise,” meaning that intentional ambiguity was necessary to achieve consensus to include the provision in the Convention.

165. For listing of submissions, see *supra*, Part III(B) at 524-26.

166. Award, *supra* note 3, ¶ 281.

167. Award, *supra* note 3, ¶¶ 112(B)(3), 112(B)(7).

Prior to analyzing the Philippines' specific claims regarding the disputed features, the Tribunal provided a descriptive *Factual Background* on each of the features, giving the geographical coordinates, the distance from the baselines of China and the Philippines, and the alternative names for each feature.¹⁶⁸ The geo-location, descriptions, and assessments were relevant to determine whether a feature would naturally fall within the 200-nautical mile EEZ of either party.¹⁶⁹

The Tribunal's assessment of the disputed features necessitated the use of historical GEOINT products because the Tribunal needed to evaluate the features in their respective natural conditions. The Tribunal stated, "[a]s a matter of law, human modification cannot change the seabed into a low-tide elevation or a low-tide elevation into an island. A low-tide elevation will remain a low-tide elevation under the Convention, regardless of the scale of the island or installation built atop it."¹⁷⁰

The Tribunal then reviewed the question of whether the five features named in Submissions Nos. 4 and 6 were in fact LTEs. The Philippines supported its claim that these features were LTEs based upon two kinds of satellite imagery evidence: "multi-band Landsat imagery" and imagery and analysis provided by the EOMAP, a company specializing in providing satellite-based monitoring of the marine environment.¹⁷¹ The Philippines asserted that the satellite imagery demonstrated that all five features were LTEs "completely and without the slightest ambiguity."¹⁷² The Tribunal weighed the Philippines' claim by considering the testimony provided by Professor Clive Schofield, the expert witness requested by the Philippines, and by examining the satellite imagery with an objective GEOINT analysis. Professor Schofield presented testimony of his findings regarding a total of forty-nine features requested by the Tribunal. Of these forty-nine features, Professor Schofield concluded that: twenty-two features were definitely Article 121(1) high-tide elevations but 'rocks' under Article 121(3); eighteen features were Article 13 LTE's; two features were submerged; and

168. *Id.* ¶¶ 284–290. This was GEOINT in its most rudimentary form, that is, basic geospatial information. N.B., even what appears to be simple geospatial information may be the product of complex geospatial operations such as hydrographic surveying and cartography.

169. Scarborough Shoal, Johnson Reef, McKennan Reef, Hughes Reef, Mischief Reef, and Second Thomas Shoal are all within the 200 nm EEZ of the Philippines. *Id.*

170. *Id.* ¶ 305.

171. *Id.* ¶ 293. Note, EOMAP is an excellent example of GEOINT *internationalization* and *democratization*. The web page for EOPMAP describes the company as "the leading global service provider of satellite-derived aquatic information in maritime and inland waters for the commercial offshore industry as well as a multitude of government agencies . . . EOMAP was founded in 2006 as a spin-off of the German Aerospace Center (DLR) and is headquartered in Castle Seefeld, just outside of Munich." EOMAP, *About EOMAP*, <http://www.eomap.com/expertise/> (June 4, 2017).

172. Award, *supra* note 3, ¶ 295 (quoting from Final Transcript of Day 2 of the Merits Hearing). Note, although this assertion was rejected by the Tribunal, the confidence in satellite technology was not without precedence. See Lyons, *supra* note 14, at 153 ("satellite imagery can usefully inform the discussion on the number and location of features in the SCS and whether they could qualify as a rock, an island or a low tide elevation through the provision of scientific, transparent and verifiable data).

seven were either LTE's or possibly contained some rocks above high-tide.¹⁷³ Professor Schofield testified that "analysis of best high-resolution satellite imagery of these features proved to be inconclusive in confirming whether any parts of these features indeed do emerge above the high-tide mark."¹⁷⁴

The Tribunal observed the complex nature of tides in general, noting that "high tide" is not a technical term and that neither UNCLOS nor the customary law of the sea mandates any particular tidal datum be used to measure whether a feature is an Article 13 LTE or an Article 121(1) island or rock.¹⁷⁵ The Tribunal recognized that the tides in the SCS have been described as "the most complex in the world."¹⁷⁶ Nevertheless, the Tribunal thoroughly analyzed the geospatial information reporting on SCS tides and concluded that the vertical tidal range in the SCS was comparatively small¹⁷⁷ and that the uncertainties related more to the *pattern and timing of tides* relative to the disputed features in the SCS.¹⁷⁸

In addition to the factors associated with tides, the Tribunal applied a sophisticated understanding of both the capabilities *and* the limitations of satellite imagery, including: image resolution, error ranges associated with satellite-derived bathymetry, and the uncertainties associated with a satellite's time-over-target in comparison to the pattern and timing of the tides.¹⁷⁹ The Tribunal concluded that in this arbitration, determining the status of a feature as either an LTE or a rock could not be determined "on the basis of satellite imagery alone."¹⁸⁰ Therefore, the Tribunal would need to rely on more traditional forms of GEOINT to describe and categorize the disputed features, particularly survey data, charts, and sailing directions.

The Philippines provided this traditional GEOINT in evidence in the form of navigational charts produced by the governments of China, Malaysia, Vietnam, the United Kingdom, and the United States as well as sailing directions from various authorities. The Tribunal noted the importance of these older forms of GEOINT products, especially in light of the Tribunal's inability to make *in situ observations* and the limitations of remote sensing to identify LTEs.¹⁸¹ The Tribunal accurately recognized that cartographic depictions or reports made from "older direct observations are thus not *per se* less valuable, provided they are

173. In the matter of an arb. under Annex VII of the U.N. Convention on the Law of the Sea (Phil. v. China), Perm. Ct. Arb. Case No. 2013-19, Final Transcript Day 3, Hearing on the Merits and Remaining Issues of Jurisdiction and Admissibility, 8-9 (Nov. 26, 2015) <http://www.pcacases.com/web/sendAttach/1549>.

174. *Id.*

175. Award, *supra* note 3, ¶¶ 310-313.

176. *Id.* ¶ 317 at n.306 (quoting a report by C. Schofield, J.R.V. Prescott & R. van der Poll); *see also* Lyons, *supra* note 14, at 150.

177. Award, *supra* note 3, ¶ 313.

178. *Id.* ¶ 319

179. *Id.* ¶¶ 322-326.

180. *Id.* ¶ 326.

181. *Id.* ¶ 327.

clear in content and obtained from a reliable source.”¹⁸² The Tribunal observed a certain paradox regarding the transition from physical navigation to satellite navigation: because mariners have increasingly relied upon electronic devices to provide precision positional information, there has been a decline in the quality of textual reporting and chart depictions describing reefs, rocks, and LTEs. Nevertheless, in this case, older textual reporting proved itself to be indispensable in the resolution of the arbitration.¹⁸³ Accordingly, the Tribunal “independently sought materials derived from British and Japanese surveys” and made qualitative assessments of the historic source material for the charts and sailing directions, comparing *fair charts*¹⁸⁴ of surveys created by British, Chinese, Japanese, and U.S. survey teams.¹⁸⁵ The surveys conducted in the nineteenth and twentieth centuries showed disciplined tradecraft that resulted in detailed descriptions, assessments, and visual depictions of the maritime features in the SCS.

As a result, from an evidentiary standpoint, these older forms of GEOINT, such as British *fair charts*, subsequent navigational charts, and sailing directions, proved to be more relevant and accurate than modern satellite imagery. The Tribunal meticulously reviewed survey data, accounts of survey data, finished charts, and sailing directions¹⁸⁶ to determine that Scarborough Shoal, McKennan Reef, Johnson Reef, Cuarteron Reef, Gaven Reef (North), and Fiery Cross Reef were high-tide features according to UNCLOS Article 121(1). An excellent example of the Tribunal’s use of vintage GEOINT was its objective analysis of charts and sailing directions to determine that Gaven Reef (North) was *in fact* a high-tide elevation under UNCLOS Art. 121(1). The Philippines had asserted that all of Gaven Reef was an LTE and did not distinguish Gaven Reef (North) as being an UNCLOS Art. 121(1) feature in contrast to Gaven Reef (South) as an UNCLOS Art. 13 LTE.¹⁸⁷

The Gaven Reefs are located on a larger reef system known as the Tizard Bank.¹⁸⁸ The Philippines based its assertion that the Gaven Reef(s) were LTEs upon its interpretation of survey data/charts by China, Japan, the United Kingdom, and the United States,¹⁸⁹ respectively, as well as sailing directions

182. *Id.* For example, the Tribunal relied on survey charts made by British hydrographic vessels even though the surveys were conducted in 1866. *Id.* ¶¶ 333, 340.

183. *Id.* ¶¶ 330–332

184. (British terminology). The final, carefully made plot of a hydrographic survey. In contrast to the field board (boat sheet in U.S. terminology) which is a work sheet plotted during field operations from preliminary field data, the *fair chart* is plotted from corrected data and represents the official permanent record of that particular survey. Also called fair sheet. It is called smooth sheet in U.S. terminology. *See* IHO HYDROGRAPHIC DICTIONARY, *Fair Chart*, http://hd.iho.int/en/index.php/fair_chart (May 22, 2017).

185. Award, *supra* note 3, ¶¶ 331–332.

186. *See id.* at 158–65, nn.352–360.

187. *Id.* ¶ 112(B)(6).

188. *Id.* ¶ 288.

189. The U.S. Chart was Defense Mapping Agency (DMA) Chart NO. 93044. The DMA was the predecessor organization to the National Imagery and Mapping Agency, and later the National Geospatial-

produced by the United States and China.¹⁹⁰ The U.S. sailing directions stated: “Gaven Reefs . . . is comprised of two reefs which cover at [high water] . . . The N[orth] of the two reefs is marked by a white sand dune about 2 [meters] high.”¹⁹¹ The Chinese sailing directions described Gaven Reefs as follows: “[d]uring high tide, these reef rocks are all submerged by seawater.”¹⁹² The Tribunal, however, did not simply rely upon the words in the U.S. and Chinese sailing directions but made a more thorough GEOINT analysis by comparing the various chart and sailing directions descriptions of the white sand dune (sandy cay) on Gaven Reef (North) to the tidal data in the vicinity. The Tribunal observed that even using the higher tidal information from the Japanese chart, the sandy cay (dune) at Gaven Reef (North) should still be a full meter above the highest high water.¹⁹³ Having completed a comprehensive GEOINT analysis of various hydrographic products, the Tribunal thus concluded that Gaven Reef (North) was a high-tide feature in accordance with UNCLOS Art. 121(1) whereas Gaven Reef (South) was an LTE pursuant to UNCLOS Art. 13.

ii. Rocks not Islands

“I am a rock. . . I am an island” – Paul Simon

GEOINT was necessary to enable the Tribunal to determine whether maritime features in Submissions Nos. 3, 5, and 7 were UNCLOS *rocks* or *islands*. With all due respect to Paul Simon’s poetic lyrics above, rocky formations are not islands under UNCLOS unless they: (1) are above water at high tide and (2) can, in their natural state, sustain human habitation or economic life on their own.¹⁹⁴ The Tribunal devoted a number of pages on judicial analysis of the construction of UNCLOS Article 121(3), concluding first that the term “rock” did “not limit the provision to features composed of solid rock,”¹⁹⁵ and that the size of a feature is relevant but not dispositive for the determination of whether an Article 121(1) feature is a fully-entitled island.¹⁹⁶ The Tribunal restated Article 121(3) in positive language: “an island that is able to sustain either human habitation *or* an

Intelligence Agency. See *NGA in History*, <https://www.nga.mil/About/History/NGAinHistory/Pages/NIMA.aspx>.

190. Award, *supra* note 3, ¶¶ 362–363.

191. NAT’L GEOSPATIAL INTELLIGENCE AGENCY, PUB. 161 SAILING DIRECTIONS (ENROUTE), SOUTH CHINA SEA AND THE GULF OF THAILAND 9 (13th ed. 2011).

192. NATIONAL GUARANTEE DEPARTMENT OF THE CHINESE NAVY HEADQUARTERS, CHINA SAILING DIRECTIONS: SOUTH CHINA SEA (A103) 177 (2011).

193. Award, *supra* note 3, ¶ 364.

194. Under UNCLOS Article 121(1), a rock and an island share the characteristics of being “a naturally formed area of land, surrounded by water, which is above water at high tide.” UNCLOS, *supra* note 2, at Art. 121(1). Therefore, “within Article 121, rocks are a category of island.” Award, *supra* note 3, ¶ 481. However, that is where the similarity ends, because under UNCLOS Article 121(3), “Rocks which cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf.” UNCLOS, *supra* note 2, at Art. 121(3).

195. Award, *supra* note 3, ¶ 540.

196. *Id.* ¶ 538.

economic life of its own is entitled to *both* an exclusive economic zone *and* a continental shelf (in accordance with the provisions of the Convention applicable to other land territory).¹⁹⁷ The Tribunal concluded that the “ability to sustain human habitation” means that “a feature be able to support, maintain, and provide food, drink, and shelter to some humans to enable them to reside there permanently or habitually over an extended period of time.”¹⁹⁸

The Tribunal also determined that the terms “economic life of their own” means that an Article 121(1) feature must be able to “support an independent economic life, without relying predominantly on the infusion of outside resources or serving as an object for extractive activities, without the involvement of a local population.”¹⁹⁹ The Tribunal remarked that because economic activity requires human participation, humans will rarely inhabit areas where no activity or economic activity is possible.²⁰⁰

The Tribunal stated that assessing the status of a feature to sustain human habitation or an economic life of its own must be done on the basis of the feature’s natural condition.²⁰¹ The Tribunal also recognized that “the capacity of a feature to sustain human habitation or an economic life of its own must be decided on a case-by-case basis....”²⁰² Such case-by-case analysis should examine the historical record for prior habitation to include duration and any causes leading to the cessation of habitation. Natural causes, rather than war or forced eviction, may lead to a conclusion that the feature was ultimately incapable of sustaining habitation. Therefore, it is recognized that habitability can be altered by either natural or human causation.

The Tribunal relied on GEOINT from photographs, sailing directions, and charts to determine that Scarborough Shoal, Johnson Reef, Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), and McKennan Reef are all rocks within the meaning of UNCLOS Art. 121(3) because these high-tide rocks were in their natural condition: (1) generally miniscule, (2) lacking vegetation, and (3) possessing no drinkable water.²⁰³ China’s massive construction efforts to create artificial islands or installations were legally irrelevant to the Tribunal’s conclusion because the status of a feature under UNCLOS Art. 121(3) is assessed on the natural condition of the feature regardless of human modification.²⁰⁴

197. *Id.* ¶ 496.

198. *Id.* ¶ 490.

199. *Id.* ¶ 500. For example, guano extraction would fail this test; likewise, extraction of corals or giant clams by non-resident fishermen would also fail this test.

200. *Id.* ¶ 497. Additionally, the Tribunal noted that a purely official military population, serviced from the outside, does not equate to evidence that a feature is capable of sustaining human habitation. *Id.* ¶ 550.

201. *Id.* ¶ 508; *see also Id.* ¶ 510 (“Accordingly, the Tribunal understands the phrase ‘cannot sustain’ to mean ‘cannot’ without artificial addition, sustain.”).

202. *Id.* ¶ 546.

203. *Id.* ¶¶ 554–570.

204. *Id.* ¶ 559.

As for other larger, high-tide features in the Spratly Islands, the Tribunal also relied on GEOINT in the form of historical reporting to determine that none of these larger features met the requirements to be an UNCLOS “island” in accordance with the conditions established in Article 121(3).²⁰⁵ The Tribunal reviewed historical reporting from British, Chinese, Japanese, and Taiwanese sources describing potable water, vegetation, soil and agriculture, the presence of fishermen, and commercial operations on these features. The Tribunal noted that while these larger features were not “barren rocks or sand cays, devoid of fresh water...uninhabitable by physical characteristics alone,” even the larger features such as Itu Aba and Thitu were not “obviously habitable” with distinctly limited capacity to enable human survival.²⁰⁶ With regard to economic activity, the historical record on the islands led the Tribunal to conclude that “all of the economic activity in the Spratly Islands” was extractive in nature for the economic benefit of people living elsewhere. This extractive nature of economic activity, the lack of a stable local community, and the lack of capacity to sustain long-term habitation justified the Tribunal’s conclusion that all the other high-tide features in the Spratly Islands, to include Itu Aba, are rocks, per UNCLOS Art. 121(3), which cannot sustain human habitation or economic life of their own and shall have no exclusive economic zone or continental shelf.²⁰⁷ Thus, following an extensive GEOINT analysis of imagery and geospatial information, the Tribunal concluded that there are no naturally formed UNCLOS *islands* in the Spratly Islands.²⁰⁸

B. GEOINT was Essential to Demonstrate China’s Failure to Protect and Preserve the Marine Environment

The Philippines Submissions Nos. 11 and 12(b) both alleged that China’s activities at Scarborough Shoals and other features in the SCS breached its obligations to protect and preserve the marine environment.²⁰⁹ The Philippines alleged these breaches resulted from China’s dredging/land reclamation activities, harmful fishing practices, and the harvesting of endangered species.²¹⁰

UNCLOS imposes a general duty upon States Parties to preserve and protect the marine environment, to include, *in alia*: taking measures to protect endangered species and other forms of marine life and cooperating bilaterally or

205. *Id.* ¶ 577 (citing use of historical materials from the United Kingdom Hydrographic Office and France’s Bibliothèque Nationale de France and Archives Nationales d’Outre-Mer).

206. *Id.* ¶ 616.

207. *Id.* ¶ 625. Regarding the interpretation of UNCLOS Article 121(3), the Tribunal noted that China had held a similar analysis when arguing that the Japanese-occupied, South China Sea, atoll Okono-tori-shima, was a rock under UNCLOS Article 121(3). *Id.* In its *Note Verbale* to the Secretary General of the United Nations, China emphasized that it “consistently maintains that, the rock of Oki-no-Tori, on its natural conditions, obviously cannot sustain human habitation or economic life of its own” and therefore under Article 121(3), the rock of Oki-no-Tori “shall have no exclusive economic zone or continental shelf.” *Id.* ¶ 457.

208. *Id.* ¶ 626.

209. *Id.* ¶¶ 112(B)(10), 112(B)(11).

210. *Id.* ¶ 818 *et seq.*

through competent international organizations to formulate and elaborate international rules, standards and recommended practices and procedures consistent with this Convention.²¹¹

i. China's Harmful Dredging and Construction Activities

The Tribunal employed experts in coral reefs and marine fisheries to report on environmental impacts to the littoral-reef ecosystems in the SCS and at Scarborough Shoals.²¹² The Tribunal also used publicly available GEOINT (imagery and imagery analysis) from the Asia Maritime Transparency Initiative to show how rapidly China had accelerated its artificial island building efforts since 2013,²¹³ coincidentally the same year in which the Philippines commenced arbitration proceedings. Satellite imagery proved more useful in resolving Submissions Nos. 11 and 12(b) (regarding protection and preservation of the marine environment) than it had in Submissions Nos. 3-7 (differentiating an LTE from a high-water feature) because EOS imagery could reveal gross changes such as reclaimed land and dredging plumes better than it was able to detect miniscule rocks above water at high tide.²¹⁴ For example, the Tribunal recognized that satellite imagery (and aerial photography) demonstrated massive environmental changes caused by Chinese dredging and construction at Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, Subi Reef, and Mischief Reef. The Tribunal's Award decision was based, in part, on commercial *before* and *after* imagery of various reefs, proof of how powerful such imagery can be to confirm geospatial change. Satellite imagery was also consequential to the 2016 *Ferse Report*, which found "up to 60 percent of the shallow reef habitat at the seven reefs has been directly destroyed."²¹⁵ The Tribunal relied on the *Ferse Report* (*supra n.* 215) to come to the conclusion that China had breached its obligations to protect and preserve the marine environment under UNCLOS Articles 192, 194, and 197.²¹⁶ The *Ferse Report* exemplifies the value of GEOINT because it exploited and analyzed imagery and geospatial information to describe, assess, and visually depict degraded physical features at the seven reefs caused by China's geographically referenced activities. For example, the *Ferse Report* remarked that even Chinese researchers had emphasized the need for conservation of the seven reefs and "that available satellite and aerial imagery provides little indication of effective mitigation measures"

211. See UNCLOS, *supra* note 2, at Arts. 192, 194, 197.

212. See SEBASTIAN FERSE, PETER MUMBY, & SELINA WARD, ASSESSMENT OF THE POTENTIAL ENVIRONMENTAL CONSEQUENCES OF CONSTRUCTION ACTIVITIES ON SEVEN REEFS IN THE SPRATLY ISLANDS IN THE SOUTH CHINA SEA (Apr. 26 2016) <https://www.pcacases.com/web/sendAttach/1809> [hereinafter FERSE REPORT].

213. Award, *supra* note 3, ¶ 854.

214. This demonstrates that optimal use of GEOINT requires understanding of the range conditions when remotely sensed satellite imagery may be preferable to *in situ* observation or the use of historical geospatial information.

215. Award, *supra* note 3, ¶ 978.

216. *Id.* ¶ 981 and 982.

following dredging.²¹⁷ In addition, the *Ferse Report* analyzed overhead imagery to conclude that, contrary to Chinese assertions, China's construction activities had occurred during both fish and coral spawning periods.²¹⁸

By using GEOINT in the form of satellite and aerial imagery, the Tribunal was able to find that China had breached UNCLOS Articles 192, 194(1), 194(5), 197, 123, and 206 through its artificial island-building activities at Cuarteron Reef, Fiery Cross Reef, Gaven Reef (North), Johnson Reef, Hughes Reef, Subi Reef and Mischief Reef.²¹⁹

ii. China's Harm to Endangered Species and Destructive Extraction of Giant Clams

In addition to the environmental damage caused by its dredging and land reclamation efforts, China also caused devastating and long-lasting harm to endangered species by harvesting both coral and living and fossilized giant clams at Scarborough Shoals and a number of the reefs in the Spratly Islands. Giant clams are highly prized in Asia for both their meat and their exotic shells.²²⁰ These marine megafaunae are fixed to their reef habitats and are therefore susceptible to overfishing.

The Tribunal evaluated satellite, aerial, and ground-based imagery GEOINT that was part of *in situ* reports from the Philippines and from environmental experts. This GEOINT documented the large-scale commercial activities that caused catastrophic harm to reefs in the Spratly Islands.²²¹ Based upon this evidence, the Tribunal was convinced that "Chinese fishing vessels have been involved in harvesting of threatened or endangered species," including endangered corals, sharks, giant clams, and turtles.²²² The Tribunal also based its finding on its review of satellite imagery, photographic and video evidence, contemporaneous press reports, scientific studies, and the materials provided by Professor John W. McManus, a coral reef expert.²²³ Professor McManus reported "that in recent years, Chinese fishing vessels had engaged in widespread

217. *Id.* ¶ 982.

218. FERSE REPORT, *supra* note 212, at 53-54.

219. Award, *supra* note 3, ¶ 993.

220. FERSE REPORT, *supra* note 212, at 11. The largest species of Giant Clam, *Tridacna gigas*, approaches 1.5 meters in size and their shells are highly coveted. *Id.*

221. Commercial activities are driven by the fact that a "high-end pair of the shells could sell for as much as a million yuan (\$150,000)." See Victor Robert Lee, *Satellite Imagery Shows Ecocide in the South China Sea*, THE DIPLOMAT (Jan. 15, 2016), <https://thediplomat.com/2016/01/satellite-images-show-ecocide-in-the-south-china-sea/>; see also Rupert Wingfield-Hayes, *Why are Chinese fishermen destroying coral reefs in the South China Sea?*, BBC (Dec. 15 2015), <http://www.bbc.com/news/magazine-35106631>.

222. Award, *supra* note 3, ¶¶ 951-952.

223. Professor McManus is a faculty member in the Department of Marine Biology and Ecology at the University of Miami, Rosenstiel School. See Camilo Mora, Iain R. Caldwell, Charles Birkeland, John W. McManus, *Dredging in the Spratly Islands: Gaining Land but Losing Reefs*, PLOS BIOL. 1/7 (Mar. 31, 2016). The Tribunal relied upon Dr. McManus's book. See JOHN W. MCMANUS, OFFSHORE CORAL REEF DAMAGE, OVERFISHING AND PATHS TO PEACE IN THE SOUTH CHINA SEA (2016).

harvesting of giant clams through the use of boat propellers to break through the coral substrate in search of buried clam shells.”²²⁴

This aspect of the arbitration demonstrated how satellite imagery can be probative when used in combination with expert analysis, hand-held photography, and textual reporting. This was an excellent example of how GEOINT *democratization* directly contributed to establishing objective facts upon which an international tribunal could render a cogent conclusion advancing the rule of law. Specifically, two pieces of journalism exemplified this GEOINT *democratization*: Victor Lee’s article in *The Diplomat*²²⁵ and Rupert Wingfield-Hayes’s article for the BBC.²²⁶ These articles provided independent imagery and imagery analysis of Chinese-sponsored harvesting/reef-destruction. These two articles were cited in the *Ferse Report* and informed the Tribunal’s conclusions as to Submissions Nos. 11 and 12(b). In fact, Mr. Lee’s article in *The Diplomat* was influential in two important ways: First, the article prompted the Tribunal to request Professor McManus, the Philippines’ expert, to revise his unpublished report.²²⁷ Second, Mr. Lee’s article provided the GEOINT to support the Tribunal’s determination that: (1) China was responsible for the more recent and widespread environmental degradation caused by propeller chopping for giant clams across the Spratlys; (2) satellite imagery showing scarring demonstrated that the giant clam harvesting took place in areas under control of Chinese authorities at a time and in locations where Chinese authorities were engaged in planning and implementing China’s island-building activities; and (3) the small propeller vessels involved in harvesting the giant clams were within China’s jurisdiction and control.²²⁸

As a direct result of using publicly available GEOINT (including imagery, expert analysis, and press reporting), the Tribunal concluded that China breached UNCLOS Articles 192 and 194(5) “through its toleration and protection of, and failure to prevent Chinese fishing vessels engaging in harmful harvesting activities of endangered species at Scarborough Shoal, Second Thomas Shoal and other features in the Spratly Islands.”²²⁹

224. Award, *supra* note 3, ¶ 953.

225. Lee, *supra* note 221.

226. Wingfield-Hayes, *supra* note 221.

227. Award, *supra* note 3, ¶ 89(b). Professor McManus’ revised report was based upon a revisit to a giant clam extraction site at Thitu. He reported “The thoroughness of the damage to marine life exceeded anything I had previously seen in four decades of investigating coral reef degradation. Interviews with local fishers, officials and military personnel indicated that this highly destructive PRC harvesting practice was now very widespread across the Spratly area.” Letter from Professor McManus to the Permanent Court of Arbitration (Apr. 22, 2016) <https://www.pcacases.com/web/sendAttach/1917>.

228. Award, *supra* note 3, ¶ 965.

229. *Id.* ¶ 992.

V. CONCLUSION

“This island’s mine. . .” — Caliban

William Shakespeare, *The Tempest*, Act I, Scene II

The SCS Dispute presents a sobering example of an apparently intractable conflict that challenges the peaceful use of the ocean at a geostrategic location.²³⁰ The irony is that rocks which had been ignored or avoided for centuries have generated a geopolitical tempest with attendant destruction to environmentally critical reef areas. Scarborough Shoals and the Spratly Islands represent a convergence zone where China’s expansive claims to “indisputable sovereignty” collide with the international rules-based order.²³¹ Despite the magnitude of this international conflict, the 2016 SCS Arbitration demonstrated that an international tribunal was the proper mechanism to arbitrate the issues of whether disputed maritime features were (1) LTEs incapable of appropriation, (2) rocks with territorial seas, or (3) UNCLOS recognized islands entitled to EEZs and CSs in addition to territorial seas. In addition, a neutral, international tribunal was necessary to make legal findings and declarations regarding China’s environmentally destructive activities associated with its aggressive artificial island-building and rapacious reef harvesting of endangered species. These fundamental questions of fact and law could not have been legitimately answered without the use of GEOINT, which enabled the Tribunal to “describe, assess, and depict physical features and geographically referenced activities on the earth.”²³² The Tribunal carefully used this GEOINT in the form best suited to provide probative value, using more historical GEOINT in the form of charts and sailing directions where earth observation satellite (EOS) imagery alone lacked the resolution to distinguish LTEs from high-water features. The 2016 SCS Arbitration also demonstrated that while new remote sensing technologies (such as constellations of lower-cost *dove* satellites) will make timely imagery more accessible, foundational GEOINT derived from hydrographic and seismic surveys, cartography, and observation-based sailing directions will remain indispensable to accurately understanding the maritime domain. This maritime domain awareness (MDA) is crucial to maintain freedom of navigation under the Law of the Sea and to adjudicate future disputes over whether newly contested features are governed under UNCLOS Articles 13 or 121.

Despite GEOINT’s legislative creation as a specific intelligence discipline to be used for the national security objectives of the United States, GEOINT *internationalization* and *democratization* have contributed to the international rule of law. Rather than being limited to requesting access to and analysis of national

230. The geospatial and economic importance of the SCS is widely reported. For an excellent overview, see *China’s Maritime Disputes*, *supra* note 78. See also KAPLAN, *supra* note 83, at 14, 20.

231. See Ely Ratner, *Course Correction: How to Stop China’s Maritime Advance*, 96 FOREIGN AFF. 4, 64, 68, (July/August 2017).

232. The quoted language is part of the definition of Geospatial Intelligence. 10 U.S.C. § 467(5).

satellite imagery, international tribunals now have access to a wide array of commercial and publicly available GEOINT. In the 2016 SCS Arbitration Award, the Tribunal cited AMTI GEOINT products more than ten times,²³³ and used GEOINT-based reporting from both the BBC and *The Diplomat*²³⁴ to support its findings and declarations. This publicly available GEOINT was necessary to prove the massive extent to which China failed to protect and preserve the marine environment at Scarborough Shoals and the Spratly Islands. In addition, within three hours of the PCA's publication of the Award Decision, AMTI published a GEOINT depiction of the legal effect of the Tribunal's Award. To do this, AMTI had created a series of depictions based upon a potential range of judicial outcomes.²³⁵

GEOINT was essential for supporting a rational Arbitration Award and will remain an indispensable capability for advancing a rules-based international order in the maritime domain. This is because the UNCLOS applies different rights and responsibilities to maritime features based upon the geolocation, physical characteristic, and capacity for human activity of the features.

China's refutation of the Tribunal's Award reflects a challenge to the Law of the Sea and an international order based upon international norms. China's behavior demonstrates an aggressive *realpolitik* emboldened by its burgeoning economic and military power.²³⁶ Democratized GEOINT, published by organizations such as AMTI, the Council on Foreign Relations, and the international news media, will continue to provide the transparency that exposes China's aggressive feature-occupation, island-building, and endangered-species exploitation – activities which the Tribunal concluded were contrary to international law.

Future GEOINT *democratization* can have a stabilizing effect on international relations. GEOINT from multiple sources and platforms focused on an area such as the SCS can better establish *ground truth* and challenge self-serving narratives by expansionist nation-states. The proliferation of commercial imagery capabilities through constellations of *dove* satellites with high *revisit* frequency will multiply the quantum of GEOINT available to governments and NGOs. Big Data analytics will assist GEOINT consumers select the most timely, relevant, and accurate GEOINT to solidify MDA. Such GEOINT *democratization* will enhance the reporting effectiveness of both international media and environmental NGOs. For example, continued revelations of China's actual activities might influence its leadership to moderate to a *Smarter Power*²³⁷ approach, one in which China

233. See Award, *supra* note 3, at nn.929, 930, 952, 962, 969–971, 982, 984, 989, 992, 996, 1215.

234. *Id.* at nn.1120, 1137.

235. Interview with Gregory B. Poling, Director of AMTI, at CSIS (June 7, 2017).

236. See Eleanor Albert, *Preserving a Rules-Based Order in the South China Sea: Council on Foreign Relations Interview of Andrew S. Erickson* (Jul. 12, 2016) <https://www.cfr.org/blog-post/can-china-finance-one-belt-one-road-without-jeopardizing-its-own-financial-stability>. See also Ratner, *supra* note 231, at 65.

237. 'Smart Power' is a concept articulated by scholar and author, Joseph Nye. Smart Power is that power which properly balances hard power (compulsive capability) and soft power (attractive

balances hard and soft power based upon a sage appreciation that territorial expansionism in violation of international law will ultimately undermine its legitimacy and influence as a rising world power.²³⁸

However, should China choose to pursue a *hard power* hegemony²³⁹ in the Western Pacific region by actualizing an Anti-Access/Area Denial²⁴⁰ strategy intended to reduce U.S. influence in the SCS, GEOINT will be even more critical to enable the international community to constructively balance China's destabilizing efforts to control the seascape of the SCS.²⁴¹ For example, foreign policy experts have discussed the need for the United States to conduct Freedom of Navigation Program operations (also called *FONOPS*)²⁴² to challenge China's excessive and legally insupportable territorial claims in the SCS.²⁴³ GEOINT will be essential to the lawful conduct of these *FONOPS* because the United States or allies must know the exact location of its vessels when conducting these potentially escalatory activities. Foundational GEOINT obtained through hydrographic surveys and cartography will be as important as EOS imagery because ships and submarines cannot safely navigate without accurate and updated nautical charts.²⁴⁴ Additionally, as the 2016 SCS Arbitration demonstrated, survey data,

capability). See Doug Gavel, *Joseph Nye on Smart Power*, HARV. KENNEDY SCH. BELFER CTR. BLOG (July 3, 2008) <http://www.belfercenter.org/publication/joseph-nye-smart-power>.

238. See Samuel Ramani, *Interview with Joseph Nye on China and the U.S. Rebalance to Asia*, THE DIPLOMAT (June 10, 2015) <http://thediplomat.com/2015/06/interview-joseph-nye/>.

239. See THOMAS J. WRIGHT, *ALL MEASURES SHORT OF WAR, THE CONTEXT FOR THE 21ST CENTURY & THE FUTURE OF AMERICAN POWER* 78-79 (2017) (defining China's intended sphere of influence in East Asia, and quoting Commander of U.S. forces in the Pacific, Admiral Harry Harris, USN, describing China's goal for Chinese "hegemony" in East Asia).

240. Anti-Access/Area Denial (A2/AD) is described as "intended to prevent an opponent – e.g., the United States – from intervening effectively in an armed Taiwan scenario or other military operations in East Asian waters." See BERNARD D. COLE, *CHINA'S QUEST FOR GREAT POWER* 91 (2016); ROBERT HADDICK, *FIRE ON THE WATER: CHINA, AMERICA, AND THE FUTURE OF THE PACIFIC* 83-84 (2014) (describing the strategy to use the land to control the seas adjacent to its shores). See also WRIGHT, *supra* note 239, at 86 (China uses "military capability to deny access to maritime regions . . . as way of undermining the credibility of U.S. security guarantees.").

241. Commentators recommend that the U.S. work with regional partners to counter China's efforts to achieve a regional hegemony. See Ratner, *supra* note 231, at 64, 69-70.

242. FONOPS are the activities by which the U.S. "exercise[s] and assert[s] its navigation and overflight rights and freedoms on a worldwide basis in a manner that is consistent with the balance of interests reflected in the Law of the Sea (LOS) Convention." See DEP'T OF STATE, *Maritime Security and Navigation*, <https://www.state.gov/e/oes/ocns/opa/maritimsecurity/>; Julian Ku, *U.S. Response to the South China Sea Arbitration and the Limits of the Diplomatic "Shamefare" Option*, LAWFARE BLOG (July 19, 2016, 10:22 AM) <https://lawfareblog.com/us-response-south-china-sea-arbitration-and-limits-diplomatic-shamefare-option> see also Ngo Di Lan, *The Usefulness of "Redundant" Freedom of Navigation Operations*, ASIA MARITIME TRANSPARENCY INITIATIVE BLOG (Jan. 26, 2018), <https://amti.csis.org/usefulness-redundant-fonops/> (emphasizing that "conducting frequent FONOPS will be necessary to let China know that the United States is determined to resist its expansion in the South China Sea.")

243. Albert, *supra* note 236. See also Franz-Stefan Gady, *South China Sea: US Navy Conducts Freedom of Navigation Operation*, THE DIPLOMAT, (Aug. 10, 2017) <https://thediplomat.com/2017/08/south-china-sea-us-navy-conducts-freedom-of-navigation-operation/>.

244. Commentators have remarked "sadly, we know more about the surface of the moon than the bathymetry of our oceans." See Jonathan Thar, *World the Ocean Day: Why Do We Currently Know More About the Moon than Our Own Oceans?* THE VANCOUVER SUN (Jun. 7, 2011) <http://vancouversun.com>.

charts, and sailing directions had more probative value than EOS imagery in the determination of whether a particular feature was an LTE or a high-tide feature, such as a rock or an island. Accordingly, nation-states should consider future GEOINT investment with a balanced approach, one that leverages developments in *dove* micro-satellites while continuing to carry out sea-based hydrographic and oceanographic surveys. Much of the ocean bottom remains unsurveyed, and melting ice in the Arctic will like expose more LTEs and high-tide features needing to be surveyed, categorized, and charted.²⁴⁵ The imperatives for safety of navigation and the protection and preservation of the environment are not only interdependent, they are both obligations under international law.

GEOINT will also be vital to support the MDA needed to advance the United States' Maritime Security Initiative²⁴⁶ and empower its "international network of interlinking and interdependent stakeholders" to ensure the peaceful use of the South China Sea.²⁴⁷

Territorial disputes and resource competition will continue in the SCS and also can be expected to develop in other sensitive maritime areas as well, such as the Arctic and the Southern Oceans.²⁴⁸ GEOINT supported MDA will be important, but it is not a 'magic fix' in of itself. Rather, GEOINT has the capability to provide actionable knowledge of geospatial features and potentially harmful activities in the maritime domain—providing notice to nations and institutions to respond through legal process, diplomacy, or other means supportable by international law.

In conclusion, the 2016 SCS Arbitration demonstrated the critical legal consequence of GEOINT to enable accurate factual determinations and sound judicial decisions interpreting UNCLOS. Time will tell whether China will alter its recalcitrant stance towards the SCS Arbitration and the Tribunal's Award. In the meantime, GEOINT can empower nations to reinforce a responsible, rules-based order and navigate those geopolitical hazards in the maritime domain which lie beyond the horizon.

com/news/community-blogs/world-oceans-day-why-should-we-know-more-about-the-moon-than-our-oceans.

245. Alexandros Maratos, *Hydrographic Challenges in the Arctic Ocean*, HYDRO INT'L (Dec. 19, 2011), <https://www.hydro-international.com/content/article/hydrographic-challenges-in-the-arctic-ocean>.

246. The Maritime Security Initiative was developed by the Obama Administration with the goal to build regional capacity to address a range of maritime challenges – including China's growing assertiveness in the South China Sea – through various means such as improving regional maritime domain awareness, expanding exercises, and leveraging senior-level engagements. See Prashanth Parameswaran, *America's New Maritime Security Initiative for Southeast Asia: A look at the Southeast Asia Maritime Security Initiative as it gets underway*, THE DIPLOMAT (Apr. 2, 2016), <http://thediplomat.com/2016/04/americas-new-maritime-security-initiative-for-southeast-asia/>.

247. See Harry Kresja, *The South China Sea: A Challenging Test of the International Order*, 1.2 NAT'L ASIAN SEC. STUD. PROGRAM ISSUE BRIEF 4, 8 (2016), <https://www.unsw.adfa.edu.au/sites/default/files/uploads/nassp-pdf/1.2%2C%20The%20South%20China%20Sea%20A%20Challenging%20Test.pdf>.

248. See OFFICE OF THE DIR. OF NAT'L INTELLIGENCE, *Global Trends – Paradox of Progress: The Arctic and the Antarctic*, <https://www.dni.gov/index.php/the-next-five-years/the-artic-and-antarctica> (Jun. 20, 2017).
