

The Impact of Satellite Data Used by High International Courts Like the ICJ (International Court of Justice) and ITLOS (International Tribunal for the Law of the Sea)

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Abstract

In the author's paper presented during the IAC in Cape Town 2011¹, it was demonstrated that the use of satellite data before the International Court of Justice (ICJ) is of utmost importance especially:

for mostly territorial delimitation questions - to state environmental impacts - to prove the existence of populations in wide areas - to prove installation of military equipments - to implement law - or to help to implement an ICJ judgment. Along these identified areas, the existing judgments of the ICJ will now be analyzed especially under the angle of the impact of these satellite images for the ICJ decisions. Moreover, the analysis is based on the recent judgment of International Tribunal for the Law of the Sea (ITLOS) which in September 2011 for its first time took satellite data into account during its deliberations (dispute concerning delimitation of the maritime boundary between Bangladesh and Myanmar in the Bay of Bengal).

The following article is meant to give a comprehensive overview about all existing ICJ and ITLOS cases in which satellite images were of importance.

Introduction

Since quite a long time, satellite data are used in proceedings before the International Court of Justice (ICJ) in The Hague (NL) and recently also before the International Tribunal for the Law of the Sea (ITLOS) in Hamburg (D). Thanks to this widely acceptance of satellite data throughout this high court on international level, a considerable ICJ jurisprudence has been developed. The analysis of it shows that satellite data are used for different types of cases.

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1 Annette Froehlich, IAC-11.E7.3.1., Space related data: From justice to development.

Even if they are widely used for territorial delimitation questions, satellite data were used to state environmental impacts which in the future will have a large impact (for instance the Kyoto Protocol, UNESCO Convention for the protection of world heritage and biosphere areas).

The analyses of these ICJ judgments related to satellite data show the area in which satellite data were accepted by the ICJ (for example in human rights issues, changes in military equipment installations, etc.). They highlight its future potentials (as for example control of peace treaties like in the Darfur case) and have shown to be a valuable tool to prove the existence of populations in wide areas. In some cases satellite data were even very useful to implement an ICJ judgment which otherwise could not have been implemented due to the dimension of the concerned territorial area. Moreover, in some particular cases satellite data were of utmost importance for the application of the legal concept as such to a concrete situation (delimitation of sea level) enabling the parties to apply existing rules fixed in former agreements.

The analyses of these ICJ and ITLOS judgements should serve as source of inspiration and point of reference for other parties to use satellite data in litigations as well as they can help to get a better overview of the situation in certain circumstances.

ICJ Territorial Dispute Cases

Judgments of the ICJ in which satellite data were used are generally related to territorial disputes. Very often these litigations arose because boundary demarcations were based on inaccurate maps of the past or frontier lines that were defined by natural frontiers like rivers which have changed in the past. Additionally, these cases can be subdivided in different sub groups which will be analysed in the following.

Satellite Data to Prove Historical Evolution via Series of Satellite Imagery

One of the earliest cases which relied on satellite images was the case *Kasikili/Sedudu Island between Botswana and Namibia*² to prove the historical evolution of the “main channel” of a river. The images were needed to resolve further territorial questions.

Kasikili Island, or Sedudu Island is an island in the on the border between and³. The dispute arose because of the imprecise wording of the agreement concerning the northern boundary between the colonial powers of (for the present country of Namibia, former German Southwest Africa) and the (for the currently called country Botswana) which settled their geographic interests in a treaty signed on July 1, 1890. Unable to reach a conclusion on the question, a joint team of technical experts from Namibia and Botswana recommended recourse to the peaceful settlement of the dispute on the basis of the applicable rules and principles of international law. At the Summit Meeting held in Harare, Zimbabwe, on 15 February 1995, President Masire of Botswana and President Nujoma of Namibia agreed

² *Kasikili/Sedudu Island (Botswana/Namibia)*, I.C.J. Reports 1999.

³ Kasikili is the Namibian name, Sedudu the Botswana name for the island.

to submit the dispute to the International Court of Justice for a final and binding determination. Following article I of their Special Agreement the Court was asked to determine, on the basis of the Anglo-Germany Treaty of 1st July 1890 and the rules and principles of international law, the boundary between Namibia and Botswana around Kasikili/Sedudu Island and the legal status of the island. According to the text of the 1890 Treaty, Great Britain and Germany located the dividing line between their spheres of influence in the “main channel” of the Chobe River. The real dispute between the countries concerned the location of that “main channel”, with Botswana contending that it was the channel running north of Kasikili/Sedudu Island and Namibia saying the channel ran south of the island. Since the Treaty does not define the notion of “main channel”, the Court itself proceeded to determine which is the main channel of the Chobe River around the Island.

To do so, the Court took into consideration the depth and the width of the channel, the flow (i.e., the volume of water carried), the bed profile configuration and the navigability of the channel. After considering the figures submitted by both parties, as well as surveys carried out at different periods, the Court concluded that the boundary between Botswana and Namibia around Kasikili/Sedudu Island followed the line of deepest soundings in the northern channel of the Chobe and that the Island formed part of the territory of Botswana. For that Botswana stated that its arguments are based on the scientific evidence⁴ as it is scientific evidence “that the northern channel, by reason of the greater depth, width and bed profile, is the navigable channel capable of carrying the greater flow, and hence is the main channel of the Chobe River in the vicinity of Kasikili/Sedudu Island. Botswana’s case is supported by all the official surveys carried out on the spot, and by scientific evidence based on geomorphology, hydrology and fieldwork, as well as the 70-year series of aerial photographs taken between 1925 and 1997, and the satellite imagery of 1975, 1995 and 1996.”⁵ This is why the case is of particular importance as “much of this material is either new or was previously inaccessible. Scientists play an increasingly important role in the resolution of disputes, even at international level”⁶ and some of these scientific sources were these satellite data.

Another ICJ case during which satellite images were used to prove the geographical evolution of the disputed area is the case *Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)*⁷.

On 8 December 1999, Nicaragua instituted proceedings at the International Court

4 Case concerning Kasikili/Sedudu Island (Botswana/Namibia), Reply of Botswana, Vol. 1, Nov. 1998, Chap. 6 “The Scientific Evidence”, pt. B, Botswana’s Case based on the Scientific Evidence, pt. 298, <www.icj-cij.org/docket/files/98/8584.pdf>.

5 Case concerning Kasikili/Sedudu Island (Botswana/Namibia), Reply of Botswana, Vol. 1, Nov. 1998, Chap. 6 “The Scientific Evidence”, pt. B, Botswana’s Case based on the Scientific Evidence, pt. 298, <www.icj-cij.org/docket/files/98/8584.pdf>.

6 W.J.R. Alexander, Science, history and the Kasikili Island dispute, <http://webworld.unesco.org/water/wwap/pccp/cd/pdf/educational_tools/course_modules/reference_documents/sharinginternwatercases/sciencehistory.pdf>.

7 *Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)*, I.C.J. Reports 2007.

of Justice against Honduras. Among other contentious issues, the Court was asked to adjudge on sovereignty over the four islands located in the disputed area. In its judgment of 8 October 2007, the International Court of Justice found unanimously that Honduras, not Nicaragua, has sovereignty over the four disputed islands (Bobel Cay, Savanna Cay, Port Royal Cay and South Cay) in the Caribbean Sea.

During the proceedings, Honduras showed a “set of satellite photos of the river mouth in seven different years from 1979 to 2011”⁸ proving the migration of the islands. “It is hard to see how Nicaragua could provide evidence of that in light of the satellite images over almost a 30-year period. The fact is that in any given year the river mouth - and we normally think of river mouths as being marked by the headlands on the mainland - that the river mouth changes - it may face east, may tilt a bit to the north of east, it may tilt a bit to the south of east but mostly it faces east and it will change its characteristics every year.”⁹ “As we shall see, when we look at the satellite images, these sediment islands - and they are sediment islands, they are sand shoals really, that build up in the river mouth - they build up in the river routinely, they disappear routinely, and they often end up attaching themselves to one bank or the other on either side of the principle arm of the Rio Coco.”¹⁰ Based on these satellite images it became obvious that the islands have formed in the mouth of the Rio Coco, as the river drops its sediment where it reaches the sea, those islands have become connected to the mainland on either side of the river, over time.

A further case in which satellite data revealed a geographical change over the time is the *Case Concerning the Frontier Dispute*¹¹, a border dispute between Mali and Burkina Faso. The controversy emerged because the riverbed had geographically shifted from where the border was set during colonial period. During the proceedings satellite imagery were presented and the parties agreed to consult three experts to assist in demarcation.

This is a good example to show the benefits of satellite imagery as the riverbed would normally change its position slowly over decades without any significant difference for the inhabitants along the river borders. Consequently, they felt justified in maintaining that their village has always been on the riverside as from the ground a change in the riverbed could not be recognized, especially in wide areas with low infrastructure.

Satellite imagery can thus provide factual data on the whole situation, and compiled in a data base, it even allows analysing gradual change of the topography

8 ICJ, Public sitting 15 March 2007 in the case concerning Maritime delimitation between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras), Verbatim record, p. 48, pt. 4 (a).

9 ICJ, Public sitting 15 March 2007 in the case concerning Maritime delimitation between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras), Verbatim record, p. 50, pt. 46.

10 ICJ, Public sitting 15 March 2007 in the case concerning Maritime delimitation between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras), Verbatim record, p. 43 f, pt. 19.

11 Case Concerning the Frontier Dispute, ICJ Report 1986.

of the area concerned. Both, old and new data together enable a better evaluation of the circumstances in border litigations and delimitations. More justice also means more development as modern satellite imagery can give a more reliable picture of the situation and with people learning to increasingly trust in satellite data fewer conflicts will emerge.

Satellite Data to Resolve Geographical Questions

Very often satellite data play a decisive role in conflicts that are related to geographical questions. These cases are mainly related to the status of islands like in the following ICJ case.

In the earlier ICJ case *Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)*¹², introduced in 1991 by the Government of the State of Qatar, the judgment was intended to resolve the sovereignty dispute over the Hawar islands, sovereign rights over the shoals of Dibal and Qit'at Jaradah and the delimitation of the maritime areas of the two States.¹³ Both parties have used satellite imagery to emphasize the legitimacy of their claims.

In the Memorial of Qatar¹⁴, reference is made to a Landsat satellite photo which concerns the status of the "Hawar Islands"¹⁵ and the "Janan Island"¹⁶ to allege that the claim of Bahrain is unfounded. In the reply of the State of Qatar of 30 May 1999¹⁷, satellite imagery are presented to the Court concerning the "physical and legal nature of the so-called "features" situated between Bahrain's main island and the Qatar peninsula, i.e. south of the closing line between Muharraq and Ras Rakan."¹⁸ Qatar expressed that "while the legal concepts are clear, their actual application to the situation in the area is not always easy."¹⁹ It became obvious that further evidence was needed to outline the claims and the problems. It followed an analysis of different areas. Among them, two (Fasht Al Azm and Qit'at Jaradah) relied on satellite imagery.

Concerning Fasht Al Azm²⁰, Qatar stated: "What is important to emphasize in the circumstances is the fact that former mapping of the area shows that there

12 *Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)*, I.C.J. Report 2001.

13 Cf. *Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)*, Memorial submitted by the State of Qatar on 10 February 1992, pt. 1.01.

14 Memorial submitted by the State of Qatar (merits), vol. 1, 30 September 1996.

15 Part III "The Hawar Islands and other territorial questions, Chap. IV, "The Geography of the Hawar Islands, Sec. 2. Geology and Geomorphology, p. 51, pt. 3: "A satellite photo (Landsat thematic mapper image, prepared by Barringer, Golden, Colorado); "Qatar", 1:100,000, Doha, Edition of 1982 (Sheet 1540); "The State of Bahrain", 1:50,000, 1986, Sheet 3, Edn. 2. A copy of each of these documents is being deposited with the Registry of the Court".

16 Chap. VII Janan Island, Sec. 3. Bahrain's Claim is unfounded, p. 184.

17 Reply of the State of Qatar, 30 May 1999.

18 Reply of the State of Qatar, 30 May 1999, pt. 7.17.

19 Pt. 7.17.

20 Pt. 7.17 (n).

was a separation between the low water line of Fasht Al Azm and the low water line of the mainland. The Fasht was not joined naturally to Sitrah. There was already a water passage before reclamation was made in 1981-1982. This has already been explained in the Qatar Counter-Memorial, and further proof is to be found in Landsat Satellite photography dating from 25 January 1973, a copy of which is being deposited with the Registry. Fasht Al Azm is thus a series of low tide elevations, naturally unconnected with Sitrah Island”²¹. In regards to Qit’at Jaradah²², Qatar then reasoned that the disputed island was in fact not an island and drew information based on a Landsat satellite image taken on 30 December 1984 to prove that the shoal was covered at high tide²³. In this ICJ case satellite data were produced to get a better accuracy in measuring the sea-level in order to apply rules of delimitation fixed in former agreements. Qatar cautiously pointed out that even if the legal concept of delimitation in maritime issues is clear, it might be problematic to deal with it in concrete circumstances or to apply the existing rules to the situation as the position as such cannot be defined. One of these situations is the measuring of sea-level rise. Maps established in former time could be less accurate /reliable as the sea-level could not be defined in an accurate way.²⁴ Satellite data, however, can give a higher accuracy²⁵ and grants more certainty/reliability.

21 Pt 7.17 (n).

22 Pt 7.17 (p).

23 Pt 7.17 (p).

24 Cf. *Jared Hestetune*, *The Invading Waters: Climate Change Dispossession, State Extinction, and International Law*, California Western School of Law, 15 January 2010, p. 9, fn. 34,

<http://works.bepress.com/cgi/viewcontent.cgi?article=1000&context=jared_hestetune&sei-redir=1#search=%22Maritime%20Delimitation%20Territorial%20questions%20between%20qatar%20bahrain%20satellite%22> (date accessed: 9.9.2011). “The uncertainty stems mainly from the different instruments used historically and those used currently in measuring sea-level rise. Relatively recent use of satellite altimetry to observe sea-level rise provides more accurate figures, since it mostly eliminates the land movement variables to which tidal gauge measurements were prone. The longer-used tidal gauges seem to suggest some similar decadal variability in the mid- to late-20th century, but the reliability of such measurements may be questionable” and p. 10, fn. 41: “assessments of contributions to sea level rise from the Antarctic Ice Sheet are less certain, especially before the advent of satellite measurements”.

25 “The objectivity of the equidistance line is geometric, and arises from its definition: a line every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial sea of the respective parties is measured. Conceived as such, the equidistance line is a mathematical construct that is drawn in accordance with cartographic standards and practices; these days the precise location of coastal features can be ascertained from generally accessible satellite observations”, *Bernard H. Oxman*, *The Barbados /Trinidad & Tobago arbitration, The Law of Maritime Delimitation: Back to the Future*, p. 6, <www.law.miami.edu/facadmin/pdf/oxman-barbados-trinidad-arbitration.pdf> (date accessed: 9.9.2011).

Another case in which satellite images were produced for an illustration of the position of an island is *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*²⁶.

On September 16, 2004, after unsuccessful bilateral negotiations, Romania brought the case against Ukraine before the ICJ “concern[ing] the establishment of a single maritime boundary between the two States in the Black Sea, thereby delimiting the continental shelf and the exclusive economic zones”²⁷ of Romania and Ukraine. This delimitation gained especially importance as oil and natural gas deposits were discovered under the seabed. The geographic position of the Snake Island was hereby of utmost importance as its status dramatically affects the maritime frontier line between the two countries in accordance with international law. Giving Snake Island the status of an island, would mean that the continental shelf around Snake Island has to be considered as Ukrainian water. Otherwise, if Snake Island is only a cliff, then the maritime boundary between Romania and Ukraine should be drawn without taking into consideration the isle location. Therefore the dispute centered around the “use of Serpents’ Island as a basepoint for the drawing of an equidistance line.”²⁸ Romania argued (among others) on the basis of a publicly available satellite image²⁹ that “Serpents’ Island is a small, uninhabitable feature which is in no sense integrated with the mainland coast, from which it lies at more than 20 nm. Eloquent in this respect is the satellite picture of the area included on page 142 of this Reply and also reproduced on page below, which shows Serpents’ Island lying out at sea, by no means integrated with the mainland.”³⁰

Another dispute around the legal regime of an island is the case of *Sovereignty over Pedra Branca/Pulau Batu Puteh, Middle Rocks and South Ledge (Malaysia/Singapore)*³¹. This between Singapore and Malaysia concerns several islets at the eastern entrance to the , namely (previously called Pulau Batu Puteh and now Batu Puteh by Malaysia), and . The dispute began in 1979 and was largely resolved by the ICJ in 2008, which opined that Pedra Branca belonged to Singapore and Middle Rocks belonged to Malaysia.

26 *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*, I.C.J. Reports 2009.

27 Application instituting proceedings filed in the Registry of the Court on 16 September 2004, *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*, Pt. I.I.1. “Subject of the dispute”.

28 Cf. Case concerning *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*, Reply submitted by Romania, 22 December 2006, Chap. 8: Delimitation line, A.8.2, <www.icj-cij.org/docket/files/132/14701.pdf>.

29 “Satellite picture of the Danube Delta, publicly available on the Internet site <<http://earth.jsc.nasa.gov/sseop/EF5/lores.pl?PHOTO=NASA7-720-6>>. As clearly seen from the picture, Serpents’ Island, which, because of its tiny size, can hardly be seen in the image, is not integrated with the Ukrainian mainland.” Reply by Romania Pt. 18.8.”

30 Reply by Romania Pt. 8.18.

31 *Sovereignty over Pedra Branca/Pulau Batu Puteh, Middle Rocks and South Ledge (Malaysia/Singapore)*, I.C.J. Reports 2008.

While Singapore argued that the legal status of Pedra Branca was that of *terra nullius*, Malaysia maintained that it had an original title to Pedra Branca of long standing. Thus, an arising question was whether Malaysia has established its claim over the island. In this respect, a principal issue relates to the question whether the Sultanate of Johor - a predecessor of Malaysia - had sovereignty over Pedra Branca. Therefore satellite images were produced by Singapore to successfully prove that the Island of Pedra Branca does not form part of the "Romania Island group"³² geographically. "Pedra Branca lies 7.7 nautical miles from Point Romania on the Malaysian mainland and forms an independent feature, well separated from the Romania group. This is also abundantly apparent from a perusal of the satellite photograph"^{33, 34}

Another case around the status of islands is the dispute *Sovereignty over Pulau Ligitan and Pulau Sipadan (Indonesia/Malaysia)*³⁵ which concerns two very small islands in question, Ligitan and Sipadan, located off the north-east coast of Borneo approximately 15.5 nautical miles apart. While Ligitan is uninhabited, Malaysia developed Sipadan into a tourist resort for scuba diving in the 1980s. In order to back up its claims, Malaysia referred to satellite data in its memorial: "The location of Ligitan and Sipadan, and their relation to the other places mentioned here, can be seen from the satellite images of the region"³⁶. In its judgment from December 17, 2002, the International Court gave sovereignty over the islands to Malaysia.

Satellite Data to State Environmental Impacts

In several ICJ cases, satellite images were used to underline the parties' arguments and claims concerning territorial disputes linked to (harmful) environmental impacts as this is the case for the ongoing process of *Certain Activities Carried out by Nicaragua in the Boarder Area*³⁷ a territorial conflict between Costa Rica and Nicaragua. In this process, the applicant, the Republic of Costa Rica instituted proceedings against the Republic of Nicaragua concerning different matters as the "incursion into, occupation of and use by Nicaragua's Army of Costa Rican territory."³⁸ Nicaragua allegedly occupied the territory of Costa Rica while constructing a canal across Costa Rican territory which "seriously affects the flow of water to the Colorado river of Costa Rica, and

32 Cf. Counter-Memorial of Singapore, p. 83, pt. 5.29; p. 97, pt. 5.65.

33 Source: IKONOS, Date: 15 October 2004.

34 Cf. Counter-Memorial of Singapore, p. 82ff, pt. 5.29.

35 *Sovereignty over Pulau Ligitan and Pulau Sipadan (Indonesia/Malaysia)*, I.C.J. Reports 2002.

36 Case concerning sovereignty over Pulau Ligitan and Pulau Sipadan, Memorial of Malaysia, 2.11.1999, p. 19, pt. 3.22, <www.icj-cij.org/docket/files/102/8560.pdf>, furthermore reply of Malaysia, 2.3.2001, p. 13, pt. 2.14, fn. 34, <www.icj-cij.org/docket/files/102/8566.pdf>.

37 *Certain Activities Carried out by Nicaragua in the Boarder Area (Costa Rica v. Nicaragua)*, 2011.

38 Application of the Republic of Costa Rica instituting proceedings, 18 November 2010, pt. 1.

will cause further damage to Costa Rican territory, including the wetlands and national wildlife protected areas located in the regions.”³⁹ In return Costa Rica accused Nicaragua of seeking to divert the flow of the San Juan River by cutting a canal.⁴⁰ During the first incident, Costa Rica stated that Nicaragua was “felling trees and depositing sediment from the dredging works on Costa Rican territory” and during the second “Nicaraguan troops entered Costa Rican territory and established a camp.”⁴¹ Additionally, Costa Rica accused Nicaragua of causing serious impacts on the environment, habitat and especially on the wetlands as a result of its activities. For this Costa Rica referred “to a report of 4 January 2011 drawn up by the Operational Satellite Applications Programme of the United Nations Institute for Training and Research (“UNITAR/UNOSAT report”) relating to the geomorphological and environmental changes likely to be caused by Nicaragua’s activities in the border region.”⁴² Contrarily, Nicaragua stated that the activities took place on Nicaraguan territory without any irreparable harm⁴³ and were necessary due to the maintenance of the river bed.⁴⁴ Even though it is a territorial conflict, it is actually the subject of the clean-up operation and its environmental impact which so far has been evidenced by various maps and satellite photographs.

Another environment related case, in which satellite data gave access to information which later served as important evidence, was “*Oil Platforms*” (*Islamic Republic of Iran v. United States of America*)⁴⁵. This case is of particular interest not only because one party presented satellite images to prove the transfer of military equipment but also to show that the environment was adequate to host arms installations.

This litigation was presented to the Court in 1989 by Iran against the United States after actions of the United States of America against three Iranian offshore oil platforms on 19 October 1987 and 18 April 1988. By attacking them, Iran claimed that the United States had violated freedom of commerce between the territories of the Parties. The United States argued in a counter-claim that it was Iran who violated the 1955 Treaty by attacking vessels in the Gulf and otherwise engaging in military actions that were dangerous and detrimental to commerce and navigation between the United States and Iran. The US attacked the oil platform due to Iran’s use of platforms in attacks against shipping upon US and other neutral shipping in the Gulf during the Iran-Iraq War. During the proceedings before the ICJ, the US exposed satellite images to demonstrate Iranian HY-2 cruise missile attacks from the Faw area⁴⁶. “The evidence shows how

39 Nr. 5.

40 Nr. 6.

41 Nr. 3.

42 Nr. 33.

43 Nr. 36.

44 Nr. 38 and nr. 40.

45 “*Oil Platforms*” (*Islamic Republic of Iran v. United States of America*), I.C.J. Reports 2003.

46 An Iranian controlled area along the Iraqi-Iranian Boarder, along the Shatt al Arab-river.

Iran carried out deadly armed attacks on U.S. vessels. Eyewitness accounts of Iran's missile attack on the U.S.-flag tanker *Sea Isle City* on 16 October 1987, analysis of missile fragments, and satellite imagery help to demonstrate Iran's responsibility for that attack.⁴⁷ Additionally satellite images were presented by the US to prove that Iran maintained missile sites in the Faw area⁴⁸. "On 9 September 1987, just days after three Iranian missile launches from the Faw area, U.S. reconnaissance satellites photographed a missile staging site in the Faw area. On 16 October 1987 - only four hours following the missile attack on *Sea Isle City* - U.S. reconnaissance satellites again photographed the same Faw area missile site. Both sets of photographs reveal an active cruise missile staging facility composed of missile launchers, missile crates, and missile transporters."⁴⁹ Furthermore, a satellite imagery expert was presented by the United States and explained during the oral proceedings the substance of this evidence to the Court. In relation to that the US stated in its counter-memorial that this "photographic evidence and expert testimony will squarely refute Iran's claim that it did not maintain missile sites in the Faw area, including its claim that the Faw was composed "almost entirely" of marshland, and was therefore incapable of sustaining missile sites."⁵⁰

To summarize, satellite images were not only presented in this case to demonstrate the use of weapons, but also to analyse the geographical constitution of an area which was presented by one party as inappropriate for the positioning of cruise missiles due to its natural consistence.

Satellite Data to Implement Law

The case "*Land and Maritime Boundary between Cameroon and Nigeria*"⁵¹ (a dispute over the Bakassi peninsula and its vast oil resources) is of special interest in regards to the increased use of satellite imagery before the court. Satellite imagery was presented during the proceedings but remained of importance after the ICJ had delivered its judgment on 10 October 2002 (based principally on the Anglo-German agreements, the ICJ saw that sovereignty over Bakassi belonging to Cameroon). As the ICJ judgment seemed difficult to implement, a Cameroon-Nigeria Mixed Commission⁵² was established with the assistance of the United Nations to ensure a peaceful implementation of this judgment.

In this context the existence of straddling settlements between Cameroon and Nigeria must be considered here. Although these settlements did not constitute

47 Counter-memorial and counter claim submitted by the United States of America, 23 June 1997, pt. 1.05.

48 Counter-memorial and counter claim submitted by the United States of America, 23 June 1997, Sec. 2, Iran Maintained Missile Sites in the Faw area.

49 Pt. 1.75.

50 Pt. 1.75.

51 *Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea Intervening)*, I.C.J. Report 2002.

52 Cameroon-Nigeria Mixed Commission, for detailed information: <www.dawodu.com/un2.htm> (date accessed: 9.9.2011).

a central part of the boundary dispute between both States, the just implementation of the Court's judgment in relation to straddling villages has to be mentioned,⁵³ especially as this topic is becoming increasingly important for the work of international courts.

In the case of Cameroon and Nigeria, which share a common border of about 1700 kilometers (boundary extends from Lake Chad in the north to the Bakassi Peninsula in the south), their coastlines are adjacent and washed by the waters of the Gulf of Guinea. Water variation over the time leads to changes of settlements as they follow the receding waters and cultivate the arable land it leaves behind. During the work of this Mixed Commission, satellite data revealed that both countries have villages which spread across the newly delimited boundary lines as the judgment did not take into consideration the lives and circumstances of people, a situation to which the Mixed Commission were asked to find a solution in order to avoid further conflicts. Satellite images were also acquired by UN cartographic experts to draw up the final demarcation maps.⁵⁴

ITLOS Territorial Dispute Cases

The recently issued ITLOS judgment is the first in which satellite images have ever been used. The images were necessary during the case to precisely prove the dimension of a territory, which in return had a severe impact on the legal regime.

Satellite Images to Prove Dimension of a Territory Impact on Its Legal Regime

In the case "*Dispute concerning delimitation of the maritime boundary between Bangladesh and Myanmar in the Bay of Bengal*"⁵⁵ which opposes Bangladesh to Myanmar, the St Martin's Island plays a vital role in the delimitation of the boundary beyond the territorial sea. The dispute concerned the delimitation of the territorial seas, exclusive economic zones and continental shelves of these two states in the Bay of Bengal. The judgement is important in a number of ways. From the space related point of view the main question at stake is if

53 Cf. *Gbenga Oduntan*,

The Demarcation of Straddling Villages in Accordance with the International Court of Justice Jurisprudence: The Cameroon–Nigeria Experience, *Chinese Journal of International Law*, 2006, Vol. 5, Issue 1, pp. 79-114, <<http://chinesejil.oxfordjournals.org/content/5/1/79.full>> (date accessed: 9.9.2011).

54 "The Nigerian Boundary Commission reported that, as of January 2006, implementation of the ICJ judgment was progressing. 'Both countries [have] secured the technical assistance of the UN to undertake the field work ... [and] have secured the latest satellite imagery of the border area 30 km in Nigeria and 30 km in Cameroon.' With satellite mapping, a technical team of Nigerian, Cameroonian, and UN officials reportedly commenced intense cartographic demarcation work in the field in accordance with the judgment." *Aloysius P. Llamzon*, *Jurisprudence and Compliance in Recent Decisions of the International Court of Justice*, *EJIL* 2007, p. 838, <www.ejil.org/pdfs/18/5/250.pdf> (date accessed: 9.9.2011).

St Martin's Island should be taken into account or not in the delimitation.⁵⁶ Bangladesh argues for that St Martin's Island should be included in the delimitation and given "full effect in delimiting the boundary beyond 12 miles"⁵⁷. To underline its argumentation Bangladesh presented (among others) satellite photos to show the dimension and extent of St Martin's Island as Myanmar argued that if St Martin's Island is taken into account than the May Yu Island as well. By showing these satellite photos Bangladesh underlined that "Myanmar's attempt to equate May Yu Island to St Martin's is difficult to take seriously. This satellite photo at the same scale is located at tab 7.11. May Yu is 1/400th the size of St Martin's. That is 0.25 %, a quarter of one per cent. Next to May Yu, Serpents' Island is a monster. This diagram compares the sizes of these islands. We start with May Yu in the lower right corner; using the same scale, we add Serpents', which is eight times larger than May Yu; then we add St Martin's which is 50 times bigger than Serpents'. (...) Mr President, when it comes to islands: size matters."⁵⁸ In this case satellite images were used to prove the dimension of a territory which has a decisive impact on its legal regime and further consequences for its sovereignty meaning to which state it belongs.

Conclusion

Especially the last case indicates clearly that satellite images are now accepted and found their way to the different international tribunals. Indeed, satellite data can help to monitor compliance with international law and the enforcement of the same. Ensuring compliance with international environmental law is a matter of increasing concern. Some recent cases in the field of environmental protection as well as boarder litigations have shown that conflicts can be

55 International Tribunal for the Law of the Sea (ITLOS), Public sitting on 22 September 2011, Dispute concerning delimitation of the maritime boundary between Bangladesh and Myanmar in the Bay of Bengal, Verbatim Record, <www.itlos.org/fileadmin/itlos/documents/cases/case_no_16/PV_11-13_22_09_11_E_final.pdf>.

56 Moreover this judgment is of particular interest as it is the first time that ITLOS decided about a dispute concerning maritime boundary delimitation. Additionally, "it is the first judgment of an international court or tribunal which directly addresses the delimitation of the continental shelves beyond 200 nautical miles", International Law Observer, 15.3.2012, <www.internationallawobserver.eu/2012/03/15/judgment-in-bangladesh-myanmar-maritime-boundary-dispute/>.

57 International Tribunal for the Law of the Sea, Public sitting on 22 September 2011, Dispute concerning delimitation of the maritime boundary between Bangladesh and Myanmar in the Bay of Bengal, p.5 http://www.itlos.org/fileadmin/itlos/documents/cases/case_no_16/PV_11-13_22_09_11_E_final.pdf.

58 International Tribunal for the Law of the Sea, Public sitting on 22 September 2011, Dispute concerning delimitation of the maritime boundary between Bangladesh and Myanmar in the Bay of Bengal, p.10-11 <www.itlos.org/fileadmin/itlos/documents/cases/case_no_16/PV_11-13_22_09_11_E_final.pdf>.

resolved when satellite based data are admissible to provide judges with the opportunity to get a better understanding of the situation, especially concerning vast areas of limited accessibility and unreliable information. This should persuade other parties in conflicting situations to use them as well to gain a better understanding of the overall situation. Satellite data can be of utmost importance as they open up new ways of monitoring^{59, 60}.

The detailed presentation of some of these cases should therefore encourage parties to identify violation of environmental rules⁶¹ or the non-compliance with international law. Nowadays their violation can be proven by satellite data of almost any location on Earth, at almost any time (even in real time). Court proceedings can be instituted by more constructive means to fight for a better environment.

59 For example, the European Commission rules give member states the possibility to use satellite data to monitor compliance by farmer with agriculture related rules, see further: Commission Regulation (EC) No 796/2004 of 21 April 2004 laying down detailed rules for the implementation of cross-compliance, modulation and the integrated administration and control system provided for in of Council Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers (OJ L 141, 30.4.2004, p. 18).

60 *Ray Purdy*, Using Earth Observation Technologies for Better Regulatory Compliance and Enforcement of Environmental Laws, *Journal of Environmental Law*, 2010, pp. 59-87, <www.envirosecurity.org/events/HELFP_Meeting/RayPurdy.pdf> (date accessed: 10.09.2011).

61 “The extent and frequency of that type of pollution [*operational* oil discharges] in the Adriatic Sea have been confirmed by an analysis performed from 1999 onwards by the Sensors, Radar Technologies and Cybersecurity Unit, DG Joint Research Centre of the European Commission. Analysis of images obtained through special satellite technology (satellites equipped with Synthetic Aperture Radar, SAR) has demonstrated the occurrence of enhanced spill concentrations along major maritime routes. An analysis made for the Adriatic Sea detected an average of between 200 and 250 of such possible illegal oil spills from ships each year, for the period from 1999 to 2002. These studies, carried out under the auspices of the European Commission, have provided the first accurate statistical mapping of oil discharges from ships in the Adriatic Sea. The studies also proved that such activity is underway on a large scale here –despite the Special Area status of the entire Mediterranean Sea, including the Adriatic, under MARPOL Annex I, whereby the discharge of oil and oily waste is prohibited”, *Davor Vidas*, The UN Convention on the Law of the Sea, the European Union and the Rule of Law: What is going on in the Adriatic Sea? 2008, Fridtjof Nansen Institute, Norway, p. 6, <www.fni.no/doc&pdf/FNI-R1208.pdf> (date accessed: 9.9.2011).