

SPACE RELATED DATA: FROM JUSTICE TO DEVELOPMENT

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ABSTRACT

Recent judgments of the International Court of Justice (ICJ) in The Hague demonstrate how satellite data can be a source of justice and consequently a source of peace and development. Indeed, satellite data can help to monitor compliance with international law and enforcement of the same (Human Rights Treaties, Environmental Treaties, Peace Agreements, Disarmament and Arms Control Treaties). Some recent cases in the field of environment protection as well as border litigations have shown that conflicts can be resolved when satellite based data are admissible to provide judges with the possibility to have an overview of the situation, especially concerning vast areas of limited accessibility and unreliable information which may be the case for many regions of the African continent.

The analyses of these judicial decisions in which satellite data were accepted by the International Court of Justice (ICJ) may serve as an example for African countries and parties involved in conflicting situation or environmental litigations (destruction of rainforests, pollution of water, etc.) as well.

INTRODUCTION

An increasing number of satellite data are being used during proceedings at the International Court of Justice (ICJ) in The

Hague. The following analysis of ICJ precedent cases in which satellite imageries were involved identifies the different types of litigation cases where satellite data can be useful. This should persuade other parties in conflicting situations to use them as well to gain a better understanding of the overall situation. Especially in territorial litigations but also in the growing field of environmental¹ issues satellite data can be of utmost importance as they open new ways of monitoring^{2,3}.

Ensuring compliance with international environmental law is a matter of increasing concern. The detailed presentation of some of these cases should therefore also encourage parties to identify violation of environmental rules⁴ or the non-compliance with international law (for instance the Kyoto Protocol, UNESCO Convention for the protection of world heritage and biosphere areas). Their violation can be proven nowadays by satellite data. Satellite data have advantage over traditional methods of data collection in that they allow a rapidly collection of almost any location on Earth, at almost any time (even in real time). Court proceedings can be instituted and it would advantageous to give indigenous groups, regional groups or NGOs more constructive means to fight for a better development of the country and continent.

SATELLITE DATA related ICJ CASES

Starting in the 90ies, the use of satellite data before the ICJ concerned mostly territorial delimitation questions. But satellite data were also used to prove the existence of populations in wide areas, the installation of military equipment or to help to implement an ICJ judgment.

Satellite data to state environmental impacts

Even though most satellite data related cases deal with territorial delimitation litigations, the satellite data used within these proceedings nevertheless, very often play a role for other questions such as the (harmful) impact of certain actions on the environment. This has also been recently demonstrated by the case “*Certain Activities Carried out by Nicaragua in the Border Area*”⁵, a territorial conflict between Costa Rica and Nicaragua. In this ongoing 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”⁶. The background of this claim was two separate incidents concerning Nicaragua. During these activities, Nicaragua occupied the territory of Costa Rica in connection with the construction of a canal across Costa Rican territory from the San Juan River to Laguna los Portillos and certain related works of dredging on the San Juan River⁷ which “seriously affect the flow of water to the Colorado river of Costa Rica, and will cause further damage to Costa Rican territory, including the wetlands and national wildlife protected areas located in the regions”⁸. Moreover, Costa Rica accused Nicaragua of seeking to divert the flow of the San Juan River by cutting a canal.⁹ During the first incident, Costa Rica states 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”¹⁰. 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”¹¹.

On the other side, Nicaragua stated that the activities took place on Nicaraguan territory without any irreparable harm.¹² The activities in the channel were necessary because the natural channel had become obstructed over the years by the progressive sedimentation of its bed. The dredging and cleaning operations were necessary to make it more navigable for small vessels, also an international obligation for the sovereign of the river^{13/14}.

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 case in which satellite data observed the environment is the case “*Oil Platforms*” (*Islamic Republic of Iran v. United States of America*)¹⁵. 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 the installation of the 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

which violated the 1955 Treaty by attacking vessels in the Gulf and otherwise engaging in military actions that was 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 area (an Iranian controlled area along the Iraqi-Iranian Boarder, along the Shatt al Arab-river). "The evidence shows how 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."¹⁶ Additionally satellite images were presented by the US to prove that Iran maintained missile sites in the Faw area¹⁷. "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."¹⁸ These images were presented in the Annex of the Counter-Memorial and the US took the caution to note well that "the missile site photographs annexed at Exhibit 94 were produced from original photographic data captured by U.S. reconnaissance satellites. As will be explained during the Court's oral proceedings, U.S. analysts based their assessment of Iran's Faw area missile facilities on the original photographic data, which provided the analysts with greater detail and clarity than can be seen in the photographs that

accompany this submission. National security considerations preclude the United States from submitting the original photographic data to the Court. To allow for their submission to the Court, and ultimately, dissemination to the public in a manner consistent with national security guidelines, the United States reduces the resolution of the original images using computer image processing techniques. Although this process reduced the visual clarity of the original images, it did not affect their integrity with respect to the depiction of the equipment observed on the ground"¹⁹.

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"²⁰.

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

One of the first cases where satellite imageries were presented to the ICJ was the case "*Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain)*"²¹, introduced in 1991 by the Government of the State of Qatar against the Government of the State of Bahrain "in respect of certain existing disputes between them relating to sovereignty 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"²². In this case both parties used satellite

imageries to underline their well-founded allegations.

In the Memorial of Qatar²³, reference to a Landsat satellite photo is made concerning the status of the “Hawar Islands”²⁴ and concerning the “Janan Island”²⁵ to allege that the claim of Bahrain is unfounded. In the reply of the State of Qatar of 30 May 1999²⁶, satellites imageries 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”²⁷. Qatar expressed that “while the legal concepts are clear, their actual application to the situation in the area is not always easy. In the gulf between Qatar and Bahrain, the waters are traditionally described as shallow and dangerous for maritime navigation; in view of the scarcity of maritime surveys, the difference in the choice of mean sea level datum and the variations in tidal heights, it is not always easy to distinguish, in actual fact, between low-tide elevations, rocks and reefs. The situation from south to north, excluding the Hawar islands, is as follows”²⁸. It follows an analysis of different areas. Among them, two (Fasht Al Azm and Qit'at Jaradah) are of special interest as satellite imageries are involved.

Concerning Fasht Al Azm²⁹, Qatar stated: “What is important to emphasize in the circumstances is the fact that former mapping of the area shows that there 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”³⁰.

Concerning Qit'at Jaradah³¹, Qatar mentioned: “This shoal is described by the Bahrain Counter-Memorial as a low-tide elevation (..) and as an island (..). This latter characterization is contested by Qatar which has brought ample evidence in Appendix 5 to its Memorial that it is a low-tide elevation. With regard to Qit'at Jaradah the Bahrain Counter-Memorial uses only the passages from that Appendix that are in favour of its thesis and carefully conceals the fact that the British authorities were never convinced that Qit'at Jaradah was anything other than an artificial island. This fact is proven today by photographs taken on the spot which have been appended to the Qatar Memorial. The allegation by Bahrain that this statement of fact is the result of a removal of the land by Qatar during the incidents in 1986 is disproved by the fact that the return to the status quo ante was implemented by an outside contractor under international GCC supervision.

Furthermore a Landsat satellite image taken on 30 December 1984 shows that the shoal was covered at high tide”³².

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 can't 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.³³ Satellite data can give a higher accuracy³⁴ and certainty/reliability.

A further case, also in the context of territorial delimitation is “*Land and Maritime Boundary between Cameroon and Nigeria*”³⁵.

After military confrontation at the end of 1993, Cameroon brought the case of the

border dispute between the two countries to the ICJ, which contained a dispute over the Bakassi peninsula and its vast oil resources.

This case is of special interest as satellite imageries were not only presented during the proceedings, but were of utmost importance after the ICJ 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 Commission³⁶ 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 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 mentioned³⁷ especially as this topic is becoming increasingly importance for the work of international courts.

In the case of Cameroon and Nigeria, which share a common border 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 lead 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 didn't take into consideration the lives and circumstances of people, a situation to which the Mixed Commission were asked to find a solution to avoid further conflicts. Satellite images were also acquired by UN cartographic experts to draw up the final demarcation maps³⁸.

CONCLUSION

Most of the cases show that litigation arose because boundary demarcations were based on inaccurate maps of the past. The same happened in the "*Case Concerning the Frontier Dispute*"³⁹, a border dispute between Mali and Burkina Faso. The controversy emerged because the riverbed had geographically shifted from when the border was set during colonial period. During the proceedings satellite imageries were presented and the parties agreed to three experts to assist in demarcation.

This is a good example to show the benefits of satellite imageries as the riverbed would normally change its position slowly over decades without any significant difference for the habitants 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 imageries can thus provide factual data on the whole situation and thanks to satellite data banks also over situations in the past, both enabling a better evaluation of the circumstances. More justice also means more development as modern satellite imageries can give a more reliable picture of the situation and with people learning to increasingly trust in satellite data fewer conflicts will emerge.

¹ The European Union and the European Space Agency are establishing together GMES (Global Monitoring for Environment and Security) to develop satellite derived information to monitor environmental conditions and processes, see further: <http://www.gmes.info/> (date accessed: 10.09.2011).

² 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).

³ Ray Purdy, Using Earth Observation Technologies for Better Regulatory Compliance and Enforcement of Environmental Laws, *Journal of Environmental Law*, 2010, pp. 59-87, http://www.envirosecurity.org/events/HELFF_Meeting/RayPurdy.pdf (date accessed: 10.09.2011).

⁴ “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, <http://www.fni.no/doc&pdf/FNI-R1208.pdf> (date accessed: 9.9.2011).

⁵ Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), 2011.

⁶ Application of the Republic of Costa Rica instituting proceedings, 18 November 2010, pt. 1.

⁷ Certain Activities Carried out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Request for the indication of provisional measures, 8 March 2011, nr. 3.

⁸ Nr. 5.

⁹ Nr. 6.

¹⁰ Nr. 3.

¹¹ Nr. 33.

¹² Nr. 36.

¹³ Nr. 38.

¹⁴ Nr. 40.

¹⁵ “Oil Platforms” (Islamic Republic of Iran v. United States of America), I.C.J. Reports 2003.

¹⁶ Counter-memorial and counter claim submitted by the United States of America, 23 June 1997, pt. 1.05.

¹⁷ 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.

¹⁸ Pt. 1.75.

¹⁹ Counter-memorial and counter claim submitted by the United States of America, 23 June 1997, fn. 125-2.

²⁰ Pt. 1.75.

²¹ Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain), I.C.J. Report 2001.

²² 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.

²³ Memorial submitted by the State of Qatar (merits), vol. 1, 30 September 1996.

²⁴ 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”.

²⁵ Chap. VII Janan Island, Sec. 3. Bahrain's Claim is unfounded, p. 184.

²⁶ Reply of the State of Qatar, 30 May 1999.

²⁷ Reply of the State of Qatar, 30 May 1999, pt. 7.17.

²⁸ Pt. 7.17.

²⁹ Pt. 7.17 (n).

³⁰ Pt. 7.17 (n).

³¹ Pt. 7.17 (p).

³² Pt. 7.17 (p).

³³ 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&seiredir=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”.

³⁴ “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, <http://www.law.miami.edu/facadmin/pdf/oxman-barbados-trinidad-arbitration.pdf> (date accessed: 9.9.2011).

³⁵ *Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea Intervening)*, I.C.J. Report 2002.

³⁶ *Cameroon-Nigeria Mixed Commission*, for detailed information: <http://www.dawodu.com/un2.htm> (date accessed: 9.9.2011).

³⁷ 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).

³⁸ “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*, *Jurisdiction and Compliance in Recent Decisions of the International Court of Justice*, *EJIL* 2007, p. 838, <http://www.ejil.org/pdfs/18/5/250.pdf> (date accessed: 9.9.2011).

³⁹ *Case Concerning the Frontier Dispute*, ICJ Report 1986.