

9-1-1981

## In Search of a Legal Framework for the Remote Sensing of the Earth from Outer Space

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### Recommended Citation

Stephen P. Krafft, *In Search of a Legal Framework for the Remote Sensing of the Earth from Outer Space*, 4 B.C. Int'l & Comp. L. Rev. 453 (1981), <http://lawdigitalcommons.bc.edu/iclr/vol4/iss2/6>

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# RECENT DEVELOPMENT

## In Search of A Legal Framework for the Remote Sensing of the Earth from Outer Space

### I. INTRODUCTION

Remote sensing by satellite<sup>1</sup> is a new technology for detecting natural resources and conditions on the Earth from space.<sup>2</sup> This outer space science is still in its infancy, but it has been compared to the microscope in its potential for revolutionizing science.<sup>3</sup> Remote sensing is already credited with a number of accomplishments.<sup>4</sup> In all, more than one hundred countries have used remote sensing data,<sup>5</sup> and within a few years, remote sensing will become a major industry.<sup>6</sup>

This Comment analyzes the legal and political problems related to remote sensing and suggests an approach to them. The author first traces the growth

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1. "Remote sensing by satellite" is the "acquisition of information about objects or phenomena in the surficial environment (including land, oceans and atmosphere) through the use of sensory devices at positions separated from (remotely situated) the subject under study; involves measurements of electromagnetic radiation, acoustical energy, force fields, or nuclear radiations." N. SHORT, P. LOWMAN, JR., S. FREDEN & W. FINCH JR., *MISSION TO EARTH: LANDSAT VIEWS THE WORLD* 449 (1976) [hereinafter cited as SHORT & LOWMAN]. Remote sensing by satellite is further defined in § II *infra*. In this article, the terms "remote sensing," "remote sensing by satellite," "resource sensing," and "teledetection" are used interchangeably.

2. Hopkins, *Legal Implications of Remote Sensing of Earth Resources By Satellite*, 78 MIL. L. REV. 57 (1978) [hereinafter cited as Hopkins].

3. DeSaussure, *Remote Sensing By Satellite: What Future For an International Regime?*, 71 AM. J. INT'L L. 707 (1977) [hereinafter cited as DeSaussure].

4. Ifft & Doyle, *Scientific and Legal Aspects of International Cooperation in Remote Sensing*, in PROCEEDINGS OF THE TWENTY-FIRST COLLOQUIUM ON THE LAW OF OUTER SPACE 271, 273 (M. Schwartz ed. 1979) [hereinafter cited as Ifft & Doyle]. Many nations have benefitted from remote sensing. Bangladesh has used remote sensing to pinpoint land accretion in the Bay of Bengal. *Id.* Egypt relied on the "eye in space" to prospect for iron ore deposits. *Id.* Iran employed the satellite to monitor urban growth in the vicinity of Teheran. *Id.* Thailand now manages its forests with the aid of teledetection techniques. *Id.* The Sudan uses information provided by remote sensors to construct the Jonglei Canal water project and Norway is developing hydroelectric power with the assistance of remote sensing data. *Id.* Australia uses satellite images to map its reefs and shoals. *Id.* For other examples, see Hopkins, *supra* note 2, at 65.

5. Ifft & Doyle, *supra* note 4, at 273.

6. Vlastic, *Remote Sensing of the Earth by Satellites*, in I MANUAL ON SPACE LAW 303, 306 (N. Jasentuliyana and R. Lee eds. 1979) [hereinafter cited as Vlastic].

of teledetection.<sup>7</sup> He then examines the legal issues involved in remote sensing and considers the disputes arising between sensing<sup>8</sup> and sensed<sup>9</sup> nations because of this technology. This examination includes the controversy surrounding the dissemination of satellite-gathered data, and the efforts made in the United Nations to reach a multilateral agreement. The author finally considers the political aspects of the controversy, and suggests an incremental approach to developing a legal framework for remote sensing.

## II. REMOTE SENSING SATELLITES

Remote sensing by satellite is "a methodology to assist in characterizing the nature and/or condition of phenomena on, above or below the Earth's surface by means of observations and measurements from space platforms. Specifically at present, such methods depend on the emission and reflection of electromagnetic radiations."<sup>10</sup> The technical aspects of remote sensing systems are beyond the scope of this Comment.<sup>11</sup> In basic terms, however, nations deploy a sensing device in an orbiting satellite. The device uses electromagnetic radiation to gather data on conditions on Earth.<sup>12</sup> The device then transmits the data down to ground stations for computer processing and analysis. Sixteen such ground stations presently exist on Earth.<sup>13</sup>

The United States launched the first remote sensing satellite (Landsat) in 1972.<sup>14</sup> Since that time, the United States has launched several additional Landsats.<sup>15</sup> Landsat D, due to be launched by the National Aeronautics and Space Administration (NASA) in 1981, will orbit the Earth fourteen times daily at an altitude of approximately 570 miles.<sup>16</sup> This satellite will have the ability to detect objects on Earth as small as thirty meters across.<sup>17</sup> This capability is an improvement over current satellites, which are capable of a ground resolution of between 50 and 80 meters.<sup>18</sup>

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7. For an example of the use of the term *teledetection* in connection with remote sensing, see Galloway, *Teledetection of Earth Resources by Satellites*, in PROCEEDINGS OF THE SIXTEENTH COLLOQUIUM ON THE LAW OF OUTER SPACE 90 (M. Schwartz ed. 1974).

8. "Sensing" nations have remote sensing equipment. The United States is a sensing nation. Vlasic, *supra* note 6, at 305.

9. "Sensed" nations are the subjects of scanning and detection activities conducted from space. *Id.*

10. Bourély, *Remote Sensing of Earth Resources from Outer Space — A European Approach to Its Legal Implications*, 23 NETHERLANDS INT'L L. REV. 180, 183 (1976) [hereinafter cited as Bourély].

11. For a cogent scientific explanation of the operation of a remote sensing system, see SHORT & LOWMAN, *supra* note 1, at 437-41.

12. DeSaussure, *supra* note 3, at 707. See also SHORT & LOWMAN, *supra* note 1, at 1-3.

13. Ifft & Doyle, *supra* note 4, at 271.

14. Hopkins, *supra* note 2, at 59.

15. Vlasic, *supra* note 6, at 305.

16. *Id.* NASA Activities, Feb. 1979, at 16.

17. *Id.*

18. Characteristics and Capabilities of Sensors for Earth Resources Surveys, 32 U.N. GAOR, Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC 105/204, at 15 (1977). This

The Soviet Union also operates survey devices in space.<sup>19</sup> These devices are mounted on the manned Soyuz-Salyut orbital stations, in contrast to American remote sensing satellites, which are free sailing.<sup>20</sup> The United States had an earlier start in both military and civil applications of these devices,<sup>21</sup> and in 1976 a Staff Report of the United States Senate Committee on Aeronautical and Space Sciences asserted that the Russians lagged behind in remote sensing technology.<sup>22</sup> Though the Soviet Union has launched a large number of satellites (approximately 100 per year),<sup>23</sup> "technologically U.S. [*sic*] satellites are more sophisticated and reliable (*e.g.*, longer lifetime in orbit) than Soviet systems. Consequently, the U.S. needs to launch many fewer satellites than do the Soviets."<sup>24</sup>

France is another major power interested in remote sensing. The French government plans to launch "Satellite Probative d'Observation de la Terre" (SPOT) in 1983.<sup>25</sup> By the time it reaches orbit, SPOT may be the world's most advanced teledetection device.<sup>26</sup>

### III. LEGAL PROBLEMS CREATED BY REMOTE SENSING

#### A. Overview

Laws relating to remote sensing come from several sources.<sup>27</sup> In a study of remote sensing regulation, however, one commentator concluded that all ex-

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information is contained in Table I ("Sensor Parameters"), *id.* at 14-15. The term "resolution" when used in connection with remote scanning commonly appears in the phrases "ground resolution" or "spatial resolution." It means "the minimum distance between two or more adjacent features or the minimum size of a feature that can be detected and separated from its surrounding features." SHORT & LOWMAN, *supra* note 1, at 448.

19. Vlastic, *supra* note 6, at 304.

20. *Id.*

21. STAFF OF SENATE COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES, 94TH CONG., 2D SESS., I SOVIET SPACE PROGRAMS, 1971-1975, OVERVIEW, FACILITIES AND HARDWARE, MANNED AND UNMANNED FLIGHT PROGRAMS, BIOASTRONAUTICS, CIVIL AND MILITARY APPLICATIONS, PROJECTIONS OF FUTURE PLANS, 377 (1976).

22. *Id.* at 367.

23. *Oversight: President's Civilian Space Policy: Hearing Before the Committee on Science and Technology, United States House of Representatives*, 96th Cong., 1st Sess. 6 (1979) (statement of Dr. Frank Press, Director, U.S. Office of Science and Technology Policy).

24. *Id.*

25. The French SPOT system will research terrestrial vegetation, coastal pollution, and mineral resources. SPOT will have a resolution of 10 to 20 meters, superior to that of the American Landsats. DeSaussure, *supra* note 3, at 721.

26. *Id.*

27. One source of remote sensing regulation is the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *done at* Moscow, London and Washington, Jan. 27, 1967. T.I.A.S. No. 6347, 610 U.N.T.S. 205 [hereinafter cited as Outer Space Treaty]. The Outer Space Treaty provides some very broad guidance in the area of remote sensing. *See* § III.D *infra*, notes 44-46. U.N. resolutions affirming the right of each nation to sovereign control over its own natural resources have been considered basic propositions from which more controversial theories concerning a nation's right to control information about its natural resources have been advanced. In addition, the Legal Sub-Committee of the U.N. Committee On The Peaceful Uses Of Outer Space has formulated a

isting law is general and fails to address the problems posed by teledetection.<sup>28</sup> The present legal structure is deficient, and this deficiency has contributed to growing disagreement and concern over resource satellites and their future.<sup>29</sup> With the entry of more nations into the remote sensing debate, the problems are likely to grow more acute.<sup>30</sup>

#### B. *Use of Data Collected Through Remote Sensing*

Remote sensing involves the flow of data through four distinct phases: collection, processing, interpretation, and dissemination.<sup>31</sup> The primary legal difficulties concerning teledetection relate to data interpretation and dissemination.<sup>32</sup> The interpretation of material gathered through sensing is not of great concern to developed nations with sophisticated computers and personnel trained in dealing with satellite data; however, the unrestricted interpretation and dissemination of remote sensing information is a vital issue for the developing countries.<sup>33</sup> These nations have rich deposits of natural resources, but lack the means to decode valuable satellite data. This concern is fundamental, but "a more reasonable definition of that concern might reasonably be expressed as an anxiety that others, whether governments, corporations or individuals, may be able through superior technology to learn more about the resources of a country than can the government or the people of that country."<sup>34</sup>

#### C. *Remote Sensing as a Violation of Territorial Sovereignty*

Less developed nations fear that the sovereign right to control their own natural resources may be threatened by countries with precise data on the resources of the Third World.<sup>35</sup> The Indian representative to the Twentieth Colloquium on the Law of Outer Space<sup>36</sup> expressed this anxiety when he

set of draft principles intended to govern the operation of remote sensing systems. *See* § III F *infra*.

28. Hopkins, *supra* note 2, at 95.

29. *Id.*

30. *See* Hopkins, *supra* note 2, at 94-95.

31. DeSaussure, *supra* note 3, at 707.

32. "Of all the issues raised during examination of the legal implications of remote sensing thus far, the most interest, whether legal, political, economic, or technical, and the most diversity of opinion have focused on questions of how data and information from remote sensing should be disseminated and handled." Stowe, *The Development of International Law Relating to Remote Sensing of the Earth From Outer Space*, 5 J. SPACE L. 101, 105 (1977) [hereinafter cited as Stowe].

33. Hopkins, *supra* note 2, at 81.

34. Stowe, *supra* note 32, at 107.

35. Hopkins, *supra* note 2, at 81-82.

36. The Colloquia on the Law of Outer Space are held yearly under the auspices of the International Institute of Space Law of the International Aeronautical Federation. During these sessions, space scientists and scholars from around the world discuss legal and technical issues relevant to space exploration. Twenty-one colloquia have been held since the first in 1958.

warned his colleagues from the wealthier, more advanced states that

data collected by remote sensing can be used by countries, big corporation(s), and cartels as a tool for economic exploitation. The powerful trusts, the large companies controlling natural resources and consumer goods, can use information provided by remote sensors and direct not only their buying and selling policies, but also use their power over foreign energy and mineral sources and force them to grant development rights under financial pressure applied to certain sectors — for instance, by means of loans to foreign countries where the natural resources have been detected. This could eventually lead to “servitude” among nations.<sup>37</sup>

As a matter of international law, a nation has the right to control its own resources; they are “subject to the sovereignty of the State in which they are found.”<sup>38</sup> Nevertheless, nations disagree as to the right of each nation to control sensitive information about its own natural resources or wealth.<sup>39</sup> This controversy is central to the debate over the use of earth remote sensing satellites.<sup>40</sup>

#### D. *The Rights of Sensed States vs. the Rights of Sensing States*

##### 1. The Restrictive Theory

Two basic positions have evolved with respect to the use of processed satellite data: the restrictive and the “open data” positions. The Soviet Union, along with France, Argentina and Brazil,<sup>41</sup> has maintained that only the sensed nation may determine if and how information gathered about it

37. Andhyarujina, *Remote Sensing of Earth Resources — Whether A Tool for Financial Intervention And Exploitation*, in INT'L INST. OF SPACE L. OF THE INT'L ASTRONAUTICAL FED'N 520, 521 (M. Schwartz ed. 1978) [hereinafter cited as Andhyarujina].

A servitude is a right held by one state to the use of the territory of another, or a restriction on a state's use of its own territory enforceable by another state. D. GRIEG, *INTERNATIONAL LAW* 145 (1970).

38. Moore, *Earth Resources Satellites, A Puzzle for the United Nations*, 16 HARV. INT'L L. J. 648, 650 (1975). The proposition is drawn from traditional ideas of sovereignty, and has been endorsed by the General Assembly of the United Nations. See G.A. Res. 626, 7 U.N. GAOR, Supp. (No. 20) 18, U.N. Doc. A/2361 (1952); Permanent Sovereignty Over Natural Resources of Developing Countries and Expansion of Domestic Sources of Accumulation For Economic Development, G.A. Res. 2692, 25 U.N. GAOR, Supp. (No. 28) 63 U.N. Doc. A/8028 (1971).

39. Polter, *Remote Sensing And State Sovereignty*, 4 J. OF SPACE L. 99, 106-07 (1976) [hereinafter cited as Polter].

40. *Id.* at 107. Polter remarks that “what is really at stake is the *right of disposal* of information concerning natural resources, with widely divergent interpretations of state sovereignty at the center of the controversy.” *Id.* See also note 48, *infra*, for a discussion of conceptions of sovereignty in the Space Age.

41. Vlastic, *supra* note 6, at 319-20. For changes in the Brazilian position see Hahn, *Developments Toward a Regime for Control of Remote Sensing from Outer Space*, 12 J. OF INT'L L. & ECON. 421, 441-42 (1978) [hereinafter cited as Hahn]. See also § V *infra*.

may be disseminated;<sup>42</sup> the “prior consent” of the sensed nation would be required before the sensing state could disseminate any data obtained by satellite.<sup>43</sup> Proponents of this restrictive position, however, cannot rely on the broad principles of the Outer Space Treaty of 1967<sup>44</sup> as support for a legal regime on remote sensing responsive to the desires of sensed states. The Outer Space Treaty mandates freedom of exploration in space,<sup>45</sup> but does not cover resource surveys or their effects.<sup>46</sup> The Outer Space Treaty is therefore an in-

42. Vlastic, *supra* note 6, at 319-21. This position is presented in two separate documents. France and the Soviet Union produced “Draft Documents Governing the Activities of States in the Field of Remote Sensing of Earth Resources by Means of Space Technology,” 29 U.N. GAOR, Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/AC. 105/C.2/L.99 (1974) [hereinafter cited as Franco-Soviet Draft Documents]. The Franco-Soviet draft provides that “[the sensing nation] should not give publicity to [remote sensing] information, [or] pass the information to other countries or international organizations without clear consent of the country which possesses these natural resources and should not use the information in any other way harmful to the state.” Bordanov, *Practical Use of Space Vehicles in the Light of the Principle of State Sovereignty Over Natural Resources*, in PROCEEDINGS OF THE SIXTEENTH COLLOQUIUM ON THE LAW OF OUTER SPACE 103, 105 (M. Schwartz ed. 1974) [hereinafter cited as Bordanov].

Argentina and Brazil jointly issued a draft “Treaty on Remote Sensing of Natural Resources by Means of Space Technology,” 29 U.N. GAOR, Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/C. 1/1047 (1974). The Argentina-Brazil draft is virtually identical to the Franco-Soviet document, except that the Argentinians and Brazilians seek control not only over the dissemination of gathered remote sensing data, but also purport to control whether their territories are to be sensed in the first place. Vlastic, *supra* note 6, at 319-20.

43. Vlastic, *supra* note 6, at 319-20. Put simply, “prior consent” means that the state operating the remote sensing satellite must obtain the permission of a nation which is to be its target before the resulting data are disseminated. *Id.*

44. Outer Space Treaty, *supra* note 27. The Outer Space Treaty was concluded in 1967 with the objectives of preserving freedom of exploration in outer space, denying claims of national sovereignty over the moon and other celestial bodies and encouraging international cooperation in such matters as the protection and safe return of astronauts.

Article I, paragraph 2 of the Outer Space Treaty provides that “outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.” *Id.* art. I, para. 2.

Article II states that “outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means or use or occupation, or by any other means.” *Id.* art. II.

Article III binds States to the provisions of the Charter of the United Nations and well-settled international law in their trips into space. *Id.* art. III.

Article V assures that astral explorers will be returned safely to their homelands when they return to earth. *Id.* art. V. There is no indication that these broad principles were intended to govern remote sensing in space. Gorove, *Earth Resources Survey Satellites and the Outer Space Treaty*, 1 J. OF SPACE L. 80-81, 84 (1973) [hereinafter cited as Gorove, *Outer Space Treaty*]. Teledetection equipment was still on the drawing boards in 1967 when the Outer Space Treaty was signed. Landsat A made its debut in 1972. *Id.* at 81.

45. Outer Space Treaty, *supra* note 27, art. I, para. 2, *quoted in* note 44, *supra*.

46. Gorove, after a thorough analysis of the Outer Space Treaty and the arguments for its application to remote sensing, concludes that “not only does the use of such resources survey satellites seem permissible with no indication that any sovereign rights are violated, but there equally appears no stipulation prohibiting the use and dissemination of the data collected.” Gorove, *Outer Space Treaty*, *supra* note 44, at 85.

adequate body of law for the regulation of remote sensing, and restrictive theorists have concentrated instead on the concept of state sovereignty as a means of limiting the conduct of the sensing states.<sup>47</sup> Vereshetin, a prominent Russian spokesman, has stated that “[f]reedom of outer space should not be interpreted as an unrestricted right to any space activities. . . . Freedom of outer space should not be used as a pretext for violating sovereign rights of states on the earth.”<sup>48</sup>

## 2. The Open Data Theory

The United States and the industrialized nations of England and West Germany share a different view of satellite-obtained data.<sup>49</sup> These nations believe that all states, the sensing as well as the sensed, should be free to make use of any information gathered by remote sensing units.<sup>50</sup> They maintain that international law allows them to conduct their present research, and, for support, point to the absence of remote sensing regulation in the Outer Space Treaty.<sup>51</sup> Thus, proponents argue that nations may use Earth-oriented satellite programs to sense other nations and may disseminate freely the data thus obtained.<sup>52</sup> Proponents also urge the “open data” position on technical grounds, both scientific (*e.g.*, the fact that no place on Earth is ever constant in relationship to space beyond the atmosphere<sup>53</sup>) and legal (*e.g.*, the fact that the Outer

47. Vereshchetin, *On the Principles of State Sovereignty in International Space Law*, in II ANNALS OF AIR AND SPACE LAW 429, 436 (N. Matte ed. 1977) [hereinafter cited as Vereshchetin].

48. *Id.* Advocates of the restrictive view of remote sensing regulation also assert that states have a sovereign right to control all information pertaining to their natural resources. See Stowe, *supra* note 32, at 105; Polter, *supra* note 39, at 106-07; Vlastic, *supra* note 6, at 319-21.

Old claims of sovereignty over outer space itself have now been abandoned since all nations have consented to the flight of space objects over their territories. Gorove, *Sovereignty and the Law of Outer Space Re-Examined*, in II ANNALS OF AIR AND SPACE LAW 311, 313 (N. Matte ed. 1977) [hereinafter cited as Gorove, *Sovereignty*].

Under ancient Anglo-Saxon doctrine of *usque ad coelum*, territorial sovereignty was thought to extend upward to infinity. Hopkins, *supra* note 2, at 77. The development and deployment of space technology steadily eroded this doctrine and Article II of the Outer Space Treaty specifically rejects claims of sovereignty over space. See Outer Space Treaty, *supra* note 27, quoted in note 44, *supra*. Scientific evidence also acted to deflate the *usque ad coelum* theory. Hopkins, *supra* note 2, at 77-78. As a result of the evolving examination of sovereignty in space, “traditional aspects of territorial sovereignty . . . have been abolished in relation to outer space.” The fact remains, however, that “functional aspects of sovereignty, the exercise of sovereign rights and similar manifestations continue to be recognized.” Gorove, *Sovereignty*, *supra* note 46, at 321. Those opposed to the unrestricted expansion of remote sensing activities rely, therefore, not upon theories of sovereignty over space but on the principle of territorial sovereignty on earth. This explains their insistence that resource survey satellites are not engaging in outer space exploration but performing earth-related functions from space. *Id.* at 434-36.

49. Polter, *supra* note 39, at 106.

50. *Id.* at 105-06.

51. Vlastic, *supra* note 6, at 307.

52. *Id.*

53. Hopkins, *supra* note 2, at 77-78. See also the statement of United States Ambassador W. Tapley Bennet, Jr. before the First Committee (Political & Security) of the United Nations Gen-



Space Treaty provides that outer space "is not subject to national appropriation by claim of sovereignty"<sup>54</sup>). According to some experts, any attempt to restrict satellites either through assertions of unlimited upward territorial sovereignty or limitations on data dissemination would force the dismantling of existing remote sensing programs, or so reduce their value as to render them worthless.<sup>55</sup>

The United States has done more than merely assert that its data gathering activities fall within its rights under customary international law or applicable multilateral treaties. It has made the world-wide availability of remote sensing capability a top priority of the American teledetection program,<sup>56</sup> and has indicated its willingness to share its data interpretation technology with the rest of the world.<sup>57</sup> This commitment has already resulted in free distribution of all interpreted data, and in the training of others to interpret information, particularly in the developing countries.<sup>58</sup>

#### E. *Multilateral Treaty Efforts in the United Nations*

##### 1. Chronology

Whether a sensing nation needs the consent of a sensed one before it may interpret and disseminate data on the sensed nation's natural resources and

eral Assembly, October 13, 1975 [hereinafter cited as Bennet] cited in Vlasic, *supra* note 6, at 322, that "[t]he natural swath of the satellite sensors commonly cuts across many national boundaries."

54. Outer Space Treaty, *supra* note 27, art. II, quoted in note 44, *supra*. But note that the definition of "outer space" is not yet agreed upon. See Hopkins, *supra* note 2, at 76-80.

55. Hopkins, *supra* note 2, at 97-98. Vlasic also suggests that "strong espousal by the United States of the policy of open access to data may well be dictated by the requirements of the [U]nited [S]tates Freedom of Information Act [5 U.S.C.A. § 552 (1977)]. Given the broad scope of this Act, the United States government might find it extremely difficult, if not impossible, to accept an international agreement which would tend seriously to abridge the freedom of American nationals to obtain data on natural resources gathered by a tax-supported American space enterprise." Vlasic, *supra* note 6, at 323.

56. Hahn, *supra* note 41, at 438-42.

57. *Id.* at 442.

58. *Id.* The United States has been "the only space power that [has] ever shared openly the information received from space activities. Indeed, this openness [has] extended to financing and training others, particularly the developing countries, so that they also could make optimum use of remote sensing technology." *Id.* American aid in this area has even extended to efforts to help India develop an independent remote sensing capability. See MEMORANDUM OF UNDERSTANDING BETWEEN THE DEPARTMENT OF SPACE OF THE GOVERNMENT OF INDIA AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION CONCERNING THE FURNISHING OF LAUNCHING AND ASSOCIATED SERVICES FOR INDIAN NATIONAL SATELLITE SYSTEM-I SPACECRAFT, July 18, 1978, 30 U.S.T. 1751, T.I.A.S. No. 9285; MEMORANDUM OF UNDERSTANDING BETWEEN THE NATIONAL REMOTE SENSING AGENCY (NRSA), GOVERNMENT OF INDIA AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), January 3, 1978, 29 U.S.T. 4688, T.I.A.S. No. 9074.

For more general information on the transfer of American remote sensing technology and training to other nations, see Ifft & Doyle, *supra* note 4.

other sovereign properties remains unsettled.<sup>59</sup> Arguments continue as to whether the 1967 Outer Space Treaty was intended to govern remote sensing programs.<sup>60</sup> Buffeted by conflicting national claims, the United Nations has struggled to formulate general guidelines reconciling the restricted and unrestricted remote sensing positions.<sup>61</sup>

The United Nations first became interested in the legal ramifications of remote sensing in the late 1960's.<sup>62</sup> A 1969 U.N. General Assembly Resolution<sup>63</sup> called for sharing of teledetection technology and international cooperation in remote sensing efforts.<sup>64</sup> At the outset of the 1970's, the Working Group of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)<sup>65</sup> concerned itself primarily with the technical and scientific aspects of resource surveying.<sup>66</sup> However, in 1971 the COPUOS Working Group began to consider differing national views on the uses of remote sensing,<sup>67</sup> and by 1975 the Committee had turned its attention toward the solution of relevant legal problems.<sup>68</sup> The General Assembly instructed the Legal Subcommittee of COPUOS to examine the legal implications of remote sensing of the Earth from space. The Committee was to consider the various national views on the subject, and was to include proposals for draft international

59. Hopkins, *supra* note 2, at 101. *See also* notes 42-43, *supra*.

60. Gorove, *Outer Space Treaty*, *supra* note 44. *See also* § III.D *supra*; Hopkins, *supra* note 2, at 101.

61. Vlastic, *supra* note 6, at 303, 325.

62. *Id.* at 312-13; Hopkins, *supra* note 2, at 92. As early as 1968, at the U.N.-sponsored International Conference on the Exploration and Peaceful Uses of Outer Space, held at Vienna, Austria, the United Nations recognized that a sound political and legal environment was needed if remote sensing was to develop into a program capable of benefitting all interested nations. Vlastic, *supra* note 6, at 312. Dr. Vikram Sarabhai, Vice-President and Scientific Chairman of the Conference stated:

As these programmes develop, it will clearly be of the utmost importance to give serious and timely consideration to the international implications and to the setting up of suitable organizational arrangements, possibly through the United Nations or specialized agencies, to ensure that the interests of all nations are safeguarded, and that they can obtain maximum benefit from such programmes irrespective of political, ideological or economic differences.

*Id.* For a thorough chronology of United Nations actions in the area of remote sensing, *see id.* at 312-18.

63. G.A. Res. 2600, 24 U.N. GAOR, Supp. (No. 30) 11, U.N. Doc. A/7630 (1969).

64. Vlastic, *supra* note 6, at 313-14.

65. The U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) was formed *ad hoc* on December 13, 1958 by General Assembly Resolution 1348 (XIII). It was made permanent the following year. G.A. Res. 1472, 14 U.N. GAOR, Supp. (No. 16) 5, U.N. Doc. A/4354 (1959). In 1973 the number of participating members was increased from 28 to 37. The latest expansion occurred in 1977, when the membership was increased to 47. *See* G.A. Res. 32/1968, 32 U.N. GAOR, Supp. (No. 45) 62, U.N. Doc. A/32/45 (1977).

66. Vlastic, *supra* note 7, at 313. *See also* G.A. Res. 2733C, 25 U.N. GAOR, Supp. (No. 28) 20, U.N. Doc. A/8028 (1970).

67. *Id.*

68. *Id.* at 314.

agreements.<sup>69</sup> The Legal Sub-Committee considered proposals for such instruments in sessions held in 1976,<sup>70</sup> 1977,<sup>71</sup> and 1978.<sup>72</sup> The Committee neither received nor considered any new proposals in 1979.<sup>73</sup> By the close of the Legal Sub-Committee meetings of 1980, committee members had proposed seventeen draft principles relating to remote sensing of the Earth from space.<sup>74</sup> The Committee had reached tentative agreement on eight of these principles.<sup>75</sup>

## 2. The Work of the Legal Sub-Committee of COPUOS at its Nineteenth Session (1980)

The Legal Sub-Committee of COPUOS tentatively agreed upon draft principles<sup>76</sup> including several directives to states. The states are to carry out their remote sensing activities "for the benefit and in the interests of all countries";<sup>77</sup> to conduct their researches in accordance with international law;<sup>78</sup>

69. G.A. Res. 3234, 29 U.N. GAOR, Supp. (No. 31) 14, U.N. Doc. A/9631 (1974).

70. G.A. Res. 3388, 30 U.N. GAOR, Supp. (No. 34) 14, U.N. Doc. A/10034 (1975). Pursuant to this resolution, the Working Group of COPUOS was instructed to initiate the "drafting of principles in regard to those particular areas of the subject where common elements in the views of States are identified." *Id.* at 14. Five such principles (discussed in detail, § III.E.2 *infra*) were formulated during the May, 1976 session of the Working Group. Vlasic, *supra* note 6, at 315.

71. Six additional draft principles (discussed in detail, § III.E.2 *infra*) were produced by the Working Group of the Legal Sub-Committee of COPUOS during its session of March 14 through April 8, 1977. *Id.* at 317.

72. At the conclusion of the Legal Sub-Committee session on April 7, 1978, seventeen draft principles (discussed in detail, § III.E.2 *infra*) on remote sensing had been formulated. COPUOS, *Report of the Legal Sub-Committee on the Work of its Seventeenth Session*, Annex III, U.N. Doc. A/AC 105/218 (1978).

73. COPUOS, *Report of the Legal Sub-Committee on the Work of its Eighteenth Session*, Annex I and Annex IV, Sec. A, U.N. Doc. A/AC 105/240 (1979).

74. COPUOS, *Report of the Legal Sub-Committee on the Work of its Nineteenth Session*, Annex II and Annex II Appendix, U.N. Doc. A/AC 105/271 (1980) [hereinafter cited as Nineteenth Session U.N. Report].

75. *Id.* Annex I, at 1.

76. Before complete formal consensus is accorded any principle, it must have a final reading in COPUOS. No principle has gone through this procedure. See Mossinghoff & Fuqua, *United Nations Principles on Remote Sensing: Report on Developments 1970-1980*, 8 J. SPACE L. 103, 104 (1980) [hereinafter cited as Mossinghoff].

77. Nineteenth Session U.N. Report, *supra* note 74, Principle II, Annex II Appendix, at 7.

Remote sensing of the earth from outer space and international cooperation in that field [shall] [should] be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and taking into consideration, in international cooperation, the particular needs of the developing countries.

*Id.*

78. *Id.* Principle II, Annex II Appendix, at 8.

Remote sensing of the earth from outer space [shall] [should] be conducted in accordance with international law, including the Charter of the United Nations and the

to promote international cooperation in remote sensing activities;<sup>79</sup> to share all data relevant to protecting the natural environment of the Earth;<sup>80</sup> and to “make available technical assistance to other interested States on mutually agreed terms.”<sup>81</sup> The Sub-Committee also agreed to accept the provisions of Principle VII, which establishes a supervisory role for the United Nations in the remote sensing field;<sup>82</sup> Principle X, which instructs sensing states to provide “technical information involving possible operational systems” to other nations;<sup>83</sup> and Principle XVI, which provides that remote sensing activities “be conducted with respect for the principle of full and permanent sovereignty of all states . . . over their own wealth and natural resources.”<sup>84</sup> This latter

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and the relevant instruments of ITU.

*Id.*

79. *Id.* Principle IV, Annex II Appendix, at 8.

1. States carrying out programmes for remote sensing of the earth from outer space [should] [shall] promote international cooperation in these programmes. To this end, sensing States [should] [shall] make available to other States opportunities for participation in these programmes. Such participation should be based in each case on equitable and mutually acceptable terms due regard being paid to principles.

2. In order to maximize the availability of benefits from such remote sensing data, States are encouraged to consider agreements for the establishment of shared regional facilities.

*Id.*

80. *Id.* Principle V, Annex II Appendix, at 8.

Remote sensing of the earth from outer space [should] [shall] promote the protection of the natural environment of the earth. To this end States participating in remote sensing [should] [shall] identify and make available information useful for the prevention of phenomena detrimental to the natural environment of the earth.

*Id.*

81. *Id.* Principle VI, Annex II Appendix, at 8.

States participating in remote sensing of the earth from outer space [should] [shall] make available technical assistance to other interested States on mutually agreed terms.

*Id.*

82. *Id.* Principle VII, Annex II Appendix, at 9.

1. The United Nations and the relevant agencies within the United Nations system should promote international cooperation, including technical assistance, and play a role of coordination in the area of remote sensing of the earth.

2. States conducting activities in the field of remote sensing of the earth [shall] [should] notify the Secretary-General thereof, in compliance with article XI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

*Id.*

83. *Id.* Principle X, Annex II Appendix, at 9.

States participating in remote sensing of the earth either directly or through relevant international organization [shall] [should] be prepared to make available to the United Nations and other interested States, particularly the developing countries upon their request, any relevant technical information involving possible operational system which they are free to disclose.

*Id.*

84. *Id.* Principle XVI, Annex II Appendix, at 10-11.

Principle thus recognizes that considerations of sovereignty in the sensed states play an important role in regulating the activities of the sensing nations.

The Sub-Committee had tentatively approved these eight principles when the Nineteenth Session set them aside "for the time being" to consider more controversial provisions.<sup>85</sup> The Session also quickly reached a tentative agreement on Principle VIII. This Principle provides for the sharing of teledetection data in the event of an impending natural disaster.<sup>86</sup> The term "natural disaster" is "subject to further discussion,"<sup>87</sup> but the basic meaning of it is clear.<sup>88</sup>

Most of the work of the Legal Sub-Committee during the 1980 meeting focused on the remaining eight principles. Principle I, which attempts to define "remote sensing of the Earth," "primary data," and "analyzed information," is still the subject of controversy.<sup>89</sup> Two important stumbling blocks

[Without prejudice to the principle of the freedom of exploration and use of outer space, as set forth in article I of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, remote sensing of the earth [should] [shall] be conducted with respect for the principles of full and permanent sovereignty of all States and peoples over their own wealth and natural resources [with due regard to the rights and interests of other States and their natural and juridical persons in accordance with international law] [as well as their inalienable right to dispose of their natural resources] [and of information concerning those resources].]

*Id.*

85. *Id.*

86. Nineteenth Session U.N. Report, *supra* note 74, Principle VIII, Annex II Appendix, at 9.

Remote sensing of the earth from outer space should promote the protection of mankind from natural disaster. To this end, States which have identified primary data from sensing of the earth and/or analysed information in their possession which would be useful in helping to alert States to impending natural disasters or in assisting States to deal with natural disasters should, as promptly as possible, notify those States affected or likely to be affected of the existence and availability of such data and/or information. Such data and/or information should, upon request, be disseminated as promptly as possible.

*Id.*

87. *Id.*

88. *See* Mossinghoff, *supra* note 76, at 117-18.

89. Nineteenth Session U.N. Report, *supra* note 74, Principle I, Annex II Appendix, at 7.

For the purpose of these principles with respect to remote sensing of the natural resources of the earth and its environment:

(a) The term "remote sensing of the earth" means "remote sensing of the natural resources of the earth and its environment."

(b) The term "primary data" means those primary data which are acquired by satellite-borne remote sensors and transmitted from a satellite either by telemetry in the form of electromagnetic signals or physically in any form such as photographic film or magnetic tape, as well as preprocessed products derived from those data which may be used for later analysis.

(c) The term "analysed information" means the end-product resulting from the analytical process performed on the primary data as defined in paragraph (b) above combined with data and/or knowledge obtained from sources other than satellite-borne remote sensors.

*Id.*

are the phrasing of definitions and general disagreement on whether "primary (raw) data" and "analyzed (processed) data" need to be distinguished.<sup>90</sup> It may be important to draw a distinction between these terms because such a distinction could "facilitate a solution to the delicate question of establishing a regime of free or restricted dissemination of the results of remote sensing activities."<sup>91</sup> The failure of the Legal Sub-Committee to settle upon basic definitions is noteworthy since it leaves the other proposed principles necessarily vague.<sup>92</sup>

Principle IX, which instructs sensing states to undertake research "in a manner compatible with the legitimate rights and interests of other states,"<sup>93</sup> provoked a controversy over whether the provision was redundant, since similar sentiments existed in Principles II and III.<sup>94</sup> Principle XI assigns international responsibility to sensing states for their remote sensing operations.<sup>95</sup> The U.N. Report tersely announced that "no consensus could be reached in the course of the discussion as to the retention or deletion of this principle."<sup>96</sup> Principle XII would guarantee the sensed states access to remotely gathered raw ("primary") data.<sup>97</sup> However, the conferees reached no agreement on specific guarantees of access; nor could they agree on extending access to processed, *i.e.*, analyzed, information.<sup>98</sup>

90. *Id.* Annex II, at 1-2.

91. Vlastic, *supra* note 6, at 325.

92. *Id.*

93. Nineteenth Session U.N. Report, *supra* note 74, Principle IX, Annex II Appendix, at 9.

Taking into account the principles II and III above, remote sensing data or information derived therefrom [shall] [should] be used by States in a manner compatible with the legitimate rights and interests of other States.

*Id.*

94. *See id.* Annex II, at 3.

95. *Id.* Principle XI, Annex II Appendix, at 9.

[States [shall] [should] bear international responsibilities for [national] activities of remote sensing of the earth [irrespective of whether] [where] such activities are carried out by governmental [or non-governmental] entities, and [shall] [should] [guarantee that such activities will] comply with the provisions of these principles.]

*Id.* "International responsibility" is a complicated area of international customary law. "Shortly, the law of responsibility is concerned with the incidence and consequences of illegal acts, and particularly the payment of compensation for loss caused." BROWNLIE, *PRINCIPLES OF PUBLIC INTERNATIONAL LAW* 432 (3d ed. 1979). For further explanation of international responsibility, *see id.* at 431-77; Wiewiorowska, *Some Problems of International Responsibility in Outer Space Law*, 7 *J. SPACE L.* 23 (1979).

96. Nineteenth Session U.N. Report, *supra* note 74, Annex II, at 3.

97. *Id.* Principle XII, Annex II Appendix, at 9.

[A sensed State [shall] [should] have timely and nondiscriminatory access to primary data obtained by remote sensing of the earth from outer space, concerning its territory, on [agreed] reasonable terms and [no later than] [before] access is granted to any third State. [[To the greatest extent feasible and practicable,] this principle shall also apply to analysed information.]]

*Id.*

98. *See id.* Annex II, at 3-4.

Principle XIII provoked sharp debate. The debate centers on whether a sensing state must notify a sensed state in advance that the sensed state is to be the subject of remote surveillance.<sup>99</sup> Some delegations advocated prior notification on the ground that remote sensing would otherwise interfere with the sovereignty of sensed states. Opponents of this view argued that "remote sensing by satellite *per se* does not involve the question of sovereignty of states."<sup>100</sup> The Legal Sub-Committee concluded that "there was no agreement on the text of this principle."<sup>101</sup> Principle XIV would require, at the sensed state's request, consultation between a sensed and a sensing state concerning teledetection.<sup>102</sup> This Principle, too, would seem to raise numerous questions of sovereignty and data collection and dissemination, but it engendered little debate in the Legal Sub-Committee.<sup>103</sup>

Principle XV orders that sensing states refrain from disseminating information on the natural resources of sensed states to third parties without the consent of the sensed state.<sup>104</sup> The conferees reached no agreement with respect to Principle XV for the same reasons: There is no clear consensus for a regime of open access, or for a regime of restricted access to remotely gathered information.<sup>105</sup> Nations like the United States find these types of provisions unworkable, since they are too expensive technically and too restrictive scientifically.<sup>106</sup> Alternatively, many states view unrestricted access to data as an impingement on national sovereignty.<sup>107</sup> These contrasting viewpoints repre-

99. *Id.* Principle XIII, Annex II Appendix, at 10.

[A State which intends to conduct remote sensing of the earth from outer space shall give advance notification to the States whose territory will be sensed.] [A State [intending to conduct] [conducting] remote sensing activities of the earth from outer space shall notify the Secretary-General of the United Nations and [upon request] the States whose territory is intended to be covered by such activities [to the fullest extent feasible and as soon as practicable] of the intended launch, [nature of the] mission, duration and coverage of such activities. The Secretary-General shall publish information thus received.]

*Id.*

100. *Id.* Annex II, at 4-5.

101. *Id.* at 5.

102. *Id.* Principle XIV, Annex II Appendix, at 10.

[A State carrying out remote sensing of the earth [shall] [should] without delay consult with a State whose territory is sensed upon request of the latter in regard to such activity, [in particular dissemination of data and information,] in order to promote international cooperation, friendly relations among States and to enhance the mutual benefits to be derived from this activity.]

*Id.*

103. *See id.* Annex II, at 5.

104. *Id.* Principle XV, Annex II Appendix, at 10.

[States carrying out remote sensing of the earth shall not, without the approval of the States whose territories are affected by these activities, disseminate or dispose of any data or information on the natural resources of these States to third States, international organizations, public or private entities.]

*Id.*

105. *See id.* Annex II, at 5.

106. Vlastic, *supra* note 6, at 322.

107. *Id.* at 320.

sent the basic conflict.<sup>108</sup>

The last of the draft principles, Principle XVII, calls for generalized conflict resolution procedure should a dispute between nations arise out of remote sensing activities.<sup>109</sup> However, in this situation, nations could not settle on even preliminary wording for the Principle, and much of the provision was left at the rough draft stage.<sup>110</sup>

COPUOS has labored over the draft principles on remote sensing since 1976,<sup>111</sup> putting the principles through numerous changes. But resolution of the basic disagreements seems no closer than before.<sup>112</sup> The record of the 1980 Legal Sub-Committee meetings shows that the goal of reaching an agreement on principles will not be met soon. At this time, "the deliberations of the Outer Space Committee [*sic*] have revealed little support for the internationalization of remote sensing as a means of resolving the major concerns of states."<sup>113</sup> The problem centers on a lack of consensus among member states with respect to United Nations participation,<sup>114</sup> rather than on a lack of communication. "Until such consensus is reached, there will be more studies, more reports for the Committee to comment upon but no concrete recommendation for a specific United Nations role."<sup>115</sup> This statement, made before a single principle had been formulated, "is as valid today as when it was originally written."<sup>116</sup>

#### IV. POLITICAL ASPECTS OF THE REMOTE SENSING CONTROVERSY

The record of the Outer Space Committee, the short name for COPUOS, reflects conspicuous failure. Although the purpose of the Committee was to in-

108. *Id.* at 319.

109. Nineteenth Session U.N. Report, *supra* note 74, Principle XVII, Annex II Appendix, at 11.

[Any dispute that may arise with respect to the application of [activities covered by] these principles [shall] [should] be resolved by prompt consultations among the parties to the dispute. Where a mutually acceptable solution cannot be found by such consultations it [shall] [should] be sought through other [established] [existing] procedures for the peaceful means of settlement of disputes mutually agreed upon by the parties concerned.]

*Id.*

110. *See id.*, Annex II, at 6.

111. Pursuant to G.A. Res. 3388, 30 U.N. GAOR, Supp. (No. 34) 14, U.N. Doc. A/10034 (1975). *See* note 70, *supra*.

112. *See* Vlasic, *supra* note 6, at 334, 335. For a convenient collection of the texts of the draft proposals prior to 1980, *see* Mossinghoff, *supra* note 76, at 119-53.

113. Vlasic, *supra* note 6, at 331. Another commentator affirms this conclusion, stating that "an international treaty on remote sensing seems no closer now than at the ERTS-I Earth Resources Satellite-Landsat I launching in 1972." Hahn, *supra* note 41, at 424.

114. Robinson, *The United Nations as an International Forum for Developing Consensus*, in LEGAL IMPLICATIONS OF REMOTE SENSING FROM OUTER SPACE 192 (N. Matte & H. DeSaussure eds. 1976) [hereinafter cited as Robinson].

115. *Id.*

116. Robinson, *supra* note 114 cited in Vlasic, *supra* note 6, at 328.



crease the speed and effectiveness of the making of international law, the Committee soon became "as ineffective as any of the bodies it was expected to surpass in productivity."<sup>117</sup> Between 1971 and 1978 it produced only one agreement,<sup>118</sup> and has been unable to formulate a definition for "space object,"<sup>119</sup> or even "outer space."<sup>120</sup> Even the definition of the apparently simple term "natural disaster" remains "subject to . . . discussion."<sup>121</sup> This record casts doubt on the wisdom of seeking broad-based solutions to the complex problems of remote sensing. At least one commentator has questioned the potential of existing mechanisms for the development of international space law to produce a legal system that will keep pace with technological developments.<sup>122</sup>

Negotiations for major multilateral agreements are subject to the changing dynamics of global politics.<sup>123</sup> A workable set of remote sensing principles must accommodate the "open data" views of the United States and most developed nations, the "restricted data" views of the Soviet Union and France, and the shifting, though predominantly "restricted data" sympathies of the developing nations.<sup>124</sup> Of basic importance is the fact that

each of these three groups of states negotiating in the international arena seeks a result consistent with its own internal political requirements. The Soviet Union, because of its socialist nature, must ensure in its negotiations that the outcome to which it agrees is consistent with its own ideological purpose. A federalist country such as the United States, not bound by any rigid political or economic dogma, seeks flexibility. The developing nations, pointing to a history of exploitation, assert that they are entitled to all the advantages on an equal basis with those possessing the technology.<sup>125</sup>

The positions taken by the three major groups on the issues of control and dissemination of remote sensing data thus generally reflect the ideological

117. Vlastic, *supra* note 6, at 334.

118. Convention on Registration of Objects Launched into Outer Space, January 14, 1975, 28 U.S.T. 695 (1975).

119. Vlastic, *supra* note 6, at 334.

120. See, e.g., Kopal, *The Question of Defining Outer Space*, 8 J. SPACE L. 154 (1980).

121. See § III.E2 *supra*.

122. Vlastic, *supra* note 6, at 334.

123. Hahn, *supra* note 41, at 425.

124. *Id.*

125. *Id.* The political equation has achieved a precarious balance in the United Nations because the nations with the technology (the U.S. and, to a much lesser extent, the U.S.S.R.) must seek the support of the numerically superior developing nations. The ability of the superpowers to push their respective positions on remote sensing regulation through the U.N. is thus offset by the volatile majority of Second and Third World states. *Id.*

system to which each group adheres.<sup>126</sup> Americans generally believe that having an unimpeded flow of information about minerals, crops, population and other teledetectable variables is both beneficial and consistent with their "open" value system.<sup>127</sup> The Soviet position differs. The Soviets feel that "freedom of space" has never been construed to mean an unrestricted freedom to conduct all activities in outer space.<sup>128</sup> The developing states fear both direct and indirect exploitation of their natural resources,<sup>129</sup> and therefore, have often supported the restrictive position.<sup>130</sup> The opposition of the French to an "open data" regime is difficult to reconcile with their status as a developed Western nation, since their industrialized European neighbors support such a system. Nonetheless, the French opposition further complicates an already complex situation.<sup>131</sup>

Although the United Nations is vulnerable to international political tensions, it is hardly surprising that no comprehensive remote sensing treaty has been forthcoming, or that, due to the lack of progress towards such a treaty, the United Nations has "assumed the role of monitor rather than

126. Polter, *supra* note 39, at 111-15, provides a useful analysis of a state's attitude towards information, including a comparison of "closed" and "open" national value systems, and their effect on divergent state positions with regard to remote sensing regulations. The attitudes of the Soviets and Americans towards the dissemination of remote sensing data may be said to vary as a result of their differing conceptions of the need for information. Polter argues that the Marxist social model is "closed," and reflects a preconceived value system.

Information is not essential for the individual governed by a preconceived system of values. He who possesses unquestionable truth does not necessarily need to know more. Information is merely incidental. On the other hand, within the framework of an open system of values it is essential to inform the individual, since he can only arrange his actual existence in an appropriate manner on the basis of information. In order to realize his opportunity for development and advancement it is necessary to give him access to as much information as possible. The United States and the other developed Western nations do not accept a closed social model. They therefore have less difficulty in supporting an unrestricted flow of remote sensing information.

*Id.* at 114.

127. Polter, *supra* note 39, at 114. The United States has supported the free distribution of information both internally and internationally. See § III.D.2 *supra*. The United States Freedom of Information Act, 5 U.S.C.A. § 552 (1977), is an additional example. See also Vlasic, *supra* note 6, at 323.

128. Vereshchetin, *supra* note 47, at 432-33.

129. Hopkins, *supra* note 2, at 82-83. See also Kimminich, *Der Internationale Schutz des Einzelnen*, 15 ARCHIV F. VOLKERRECHT 413 (1971-72); Bueckling, *The Strategy of Semantics and the "Mankind" Provisions of the Space Treaty*, 7 J. SPACE L. 15 (1979) [hereinafter cited as Bueckling]. The essence of the Kimminich-Bueckling argument is that fledgling governments in the Third World are often unstable and subject to wavering political allegiances. They guard their newly-found sovereignty with extreme jealousy and are suspicious of any intrusion into what they perceive as rightfully theirs. Bueckling, *supra* at 22.

130. Hopkins, *supra* note 2, at 82-83.

131. See Polter, *supra* note 39, at 106. It is only possible to speculate as to the reasons. The French do not yet have an operational remote sensing system, and may intend to slow development of a worldwide system until they have one. French reluctance to accept the open data position may abate once SPOT goes into service. See § II. *supra*.

supervisor."<sup>132</sup> Perhaps the United Nations should abandon hopes for immediate comprehensive regulation of remote sensing data disposal and dissemination, and concentrate instead on administrative efforts designed to "benefit the technology and promote its widest possible usage."<sup>133</sup>

#### V. THE MOVEMENT OF THE DEVELOPING NATIONS TOWARDS SUPPORT FOR UNRESTRICTED REMOTE SENSING DATA DISSEMINATION

Political and ideological considerations will play an important role in any future agreement concerning national sovereignty and conditions for the use of remote sensing information. The developing nations are of central importance in this process. They could benefit significantly from the knowledge generated by remote sensing.<sup>134</sup> On the other hand, they fear that their natural resources will be exploited by the developed countries, either directly or indirectly, by misusing teledetection data.<sup>135</sup> Administrative and political leaders are concerned that the results of teledetection surveys will allow the developed nations, which command the satellites, to exploit the weaker developing states.<sup>136</sup>

Superior knowledge in the hands of the industrialized nations does not necessarily translate into physical control of Third World resources under international law, but this has not lessened the anxieties of the leaders of non-industrialized states. Their concerns over data dissemination remain inextricably linked to aspects of national sovereignty.<sup>137</sup> Less developed nations, largely dependent upon mineral and biological resources for economic survival, fear economic imperialism.<sup>138</sup> At the same time, industrialized states hesitate to invest in Third World development, fearing that the developing states will fail to honor their commitments and international agreements, or will nationalize foreign investments without adequate compensation.<sup>139</sup> In this

132. Hahn, *supra* note 52, at 457.

133. *Id.* A notable example of an administrative effort in the field of remote sensing is the attempt of the Scientific and Technical Sub-Committee of the Committee on Peaceful Uses of Outer Space to organize and coordinate programs facilitating international cooperation in the use and transfer of resource survey technology. The U.N. also collects and disseminates information about national and regional remote sensing operations. Ifft & Doyle, *supra* note 4, at 276-77.

134. Hopkins, *supra* note 2, at 81.

135. *Id.* at 81-82. The fear of exploitation was expressed even before the first Landsat remote sensing satellite was launched in 1972. *Id.* Contemporary news accounts reveal that Argentina supported a Swedish proposal that the small, non-space powers seek assurances of protection from economic exploitation by nations collecting satellite data. Teltsh, *Space Plans Frustrate the 'Have-Nots'*, N.Y. Times, May 14, 1972, at 15, col. 1.

136. Morley, *International Organization for Remote Sensing — A Gordian Knot?*, in II ANNALS OF AIR AND SPACE LAW 423-24 (N. Matte ed. 1977).

137. Hopkins, *supra* note 2, at 81. See also Stowe, *supra* note 32, at 105; Moore, *supra* note 38, at 650-51.

138. Andhyarujina, *supra* note 37, at 521.

139. *Id.* at 521-22.

delicate situation, remote sensing can play a valuable role in economic development by pinpointing promising areas for investment.<sup>140</sup>

Although Third World intransigence is a continuing problem, the attitude of the developing states toward the use of remote sensing is changing. Some states have indicated a desire to share in the promise of remote sensing.<sup>141</sup> Resource managers are pressing for the increased use of teledetection as a developmental tool.<sup>142</sup> Mindful of the fact that remote sensing satellites will continue to operate even in a time of legal and diplomatic uncertainty,<sup>143</sup> many nations are beginning to view more favorably the American position that "open data dissemination to all interested parties is in fact more likely to enhance than to diminish the ability of states to control their natural resources."<sup>144</sup> In addition, opposition to an open data system will probably diminish once developing states realize that (1) under international law, they will have control over their natural wealth, and (2) equal access to remote sensing data reduces the potential for economic exploitation.<sup>145</sup>

Brazil has been a noteworthy convert to this viewpoint. Brazil had, along with Argentina, been part of the Latin American block adhering to the Franco-Soviet "restricted data" approach.<sup>146</sup> In discussions before the United Nations, the Brazilians continued to side with opponents of unfettered expansion of research survey technology. However, Brazil concluded a bilateral agreement with the United States which reversed their protectionist position and accepted the U.S. policy of "open data."<sup>147</sup> The United States also conducted negotiations with the People's Republic of China in January, 1980, for the purpose of establishing a ground station in China to receive Landsat data.

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140. *Id.* at 523.

141. Ifft & Doyle, *supra* note 4, at 276.

142. Morley, *supra* note 136, at 423-24.

143. Stowe, *supra* note 32, at 108.

144. *Id.* at 106.

145. Hopkins, *supra* note 2, at 84. The worldwide record of use of remote sensing data may help in this process. In the six-plus years of widespread international use of teledetection information, two American researchers profess that "we have yet to learn of any significant adverse economic effect on any country." Ifft & Doyle, *supra* note 4, at 274.

146. Vlastic, *supra* note 6, at 319-21. See also Franco-Soviet Draft Documents, *supra* note 42.

147. In an agreement with the United States, the Brazilians consented to an "open data policy comparable to that of NASA and the other U.S. agencies participating in the program such that catalogs of all data processed, as well as the data themselves are made publicly available as soon as practicable to the domestic and international community." See BRAZIL: MEMORANDUM OF UNDERSTANDING BETWEEN BRAZILIAN INSTITUTO DE PESQUISAS ESPACIAIS AND THE UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, March 27, 1973, 24 U.S.T. 898, 901 T.I.A.S. No. 7600. This agreement was extended on March 22, 1976 and on May 26, 1976. Hahn, *supra* note 41, at 441 n.69. Brazil now takes advantage of remote sensing technology, and has muted its formerly outspoken support for the prior consent of sensed states to teledetection activities, and for the right of developing nations to apply controls to the technological advancement of remote sensing. *Id.* at 449. Similar bilateral agreements have been concluded between the U.S. and Italy, the U.S. and Zaire, the U.S. and Chile, the U.S. and Canada, and the U.S. and India. *Id.* at 441-42; Vlastic, *supra* note 6, at 323.

Another major developing nation thus became involved in the American remote sensing program.<sup>148</sup>

Freedom of access to raw data will be of no value to developing nations unless these nations can also process the wealth of information transmitted from satellites.<sup>149</sup> For this reason, many nations involved in discussions on remote sensing regulation have recognized the need for additional national and regional data processing facilities to interpret remote sensing satellite messages.<sup>150</sup> Better data interpretation capabilities will increase the value of teledetected information, and reduce the likelihood that the non-industrialized nations will be exploited.<sup>151</sup>

## VI. THE POSSIBILITIES FOR A LEGAL FRAMEWORK

The efforts of the United States to convince less developed countries to accept Landsat technology and abandon the restricted data position might ultimately succeed if the United States can ensure that the recipients of remote satellite data will be able to make profitable use of it.<sup>152</sup> The American effort is "based on the recognition that a persistence of a complete inequality in the use of outer space would result in tensions which would have a highly damaging effect on international relations in general."<sup>153</sup>

Teledetection offers a chance for significant improvements in the quality of life around the world. But if teledetection is ever to "achieve its full potential, the satellite technology of remote sensing will require a benign political and legal environment where all nations share in the benefits and, also feel that their important economic interests are protected adequately."<sup>154</sup> Though few nations oppose the development of a "benign political and legal environment," any broad multilateral treaty must resolve "long festering disagreements over the peaceful nature of ERS (earth remote sensing), data release and use, sovereignty and the role of the United Nations."<sup>155</sup> Progress towards an all-encompassing treaty on resource surveying from outer space

148. N.Y. Times, Jan. 25, 1980, at 1, col. 6.

149. Moore, *supra* note 36, at 654.

150. Ifft & Doyle, *supra* note 4, at 276.

151. *Id.* at 276. Two technical authorities on remote sensing observe that current programs, under the auspices of the U.S., the European Space Agency, the U.N. Economic Commission for Africa and the U.N. Outer Space Committee, focus on training of data interpretation personnel and the integration of remote sensing techniques "into projects which can benefit from the unique capabilities of this technology." *Id.*

152. Hopkins, *supra* note 2, at 85.

153. Goedhius, *Legal Implications of the Use of Direct Broadcasting and Remote Sensing Satellites and Their Effect on International Relations*, 23 NETHERLANDS INT'L L. REV. 162, 179 (1976) [hereinafter cited as Goedhius]. This realization is seen as a hopeful sign, in that it places space concerns above the level of pettiness and political dispute characterized by the international.

154. Vlastic, *supra* note 6, at 306-07.

155. Hopkins, *supra* note 2, at 103.

has been slow, and the members of the United Nations, as already noted, have not been able to agree on even general principles for the regulation of teledetection.<sup>156</sup>

As a result of the stalemate in international negotiations, no regulations now restrict the expansion of remote sensing programs.<sup>157</sup> From the standpoint of the scientific and technological communities, this might appear promising. In reality, however, a continuing legal vacuum could encourage a scaling-down of the American remote sensing program because potential disputes over data dissemination and national sovereignty threaten the program's future.<sup>158</sup> Alternatively, unresolved legal problems might cause the United States to abandon all attempts to reach an international agreement and continue to develop remote sensing alone, without any international regulation.<sup>159</sup> Either alternative is undesirable, particularly for the developing nations which most need the valuable information remote sensing can provide.<sup>160</sup>

Additional difficulties might emerge in the absence of a workable remote sensing treaty. Some nations might claim sizable extensions of sovereignty into space.<sup>161</sup> Individuals or states might bring legal actions alleging violations of privacy, or sovereignty, by resource survey satellites.<sup>162</sup> Some commentators also believe that states might seek relief by applying their own criminal laws to activities originating in outer space.<sup>163</sup>

156. Sohn, *United Nations Decision-Making: Confrontation or Consensus?*, 15 HARV. INT'L L.J. 438, 445 (1974). The United Nations makes resolutions and drafts treaties through the device of consensus. *Id.* Agreements are not made final until there is universal, or near-universal approval by the nations participating in negotiations. Such a system ensures that the final product of the decision-making body has a broad base of support. But the achievement of consensus is a laborious process, and the dangers inherent in this manner of decision-making are that "too slavish adherence to the principle of consensus might result either in postponing decisions indefinitely even when delay might be catastrophic, or in reaching ambiguous, vague decisions representing the lowest common denominator and leading to later disputes about their meaning." For a good description of the relationship between majority and minority positions within a group operating through a consensus process, see *id.* at 440-41.

The use of consensus may eventually be successful in formulating an agreement on remote sensing, but the prospect for an early resolution of the dispute over teledetection data dissemination appears slight. See Vlasic, *supra* note 6, at 311-12.

157. Vlasic, *supra* note 6, at 311-12.

158. *Id.* at 333.

159. *Id.*

160. *Id.*

161. *Id.* at 334. Several equatorial states have claimed sovereignty over airspace above their territorial possessions all the way up to 36,000 kilometers. Such a claim, if allowed, would give these nations ownership of portions of the geostationary orbit above their territories. These assertions of ownership have not been accepted by other nations and have not been cited as a basis for objection to the use of outer space for remote sensing satellites. Still, an agreement in the United Nations might help to extinguish these exaggerated claims. *Id.*

162. DeSaussure, *supra* note 3, at 719.

163. See *id.* at 718-19. One commentator, drawing on the landmark case of *The S.S. Lotus* [1927] P.C.I.J., ser. A, No. 10, has already suggested that the territorial basis for the exercise of

A binding international treaty on remote sensing would provide many benefits. A global accord would mute developing legal problems and harmonize diverse interests.<sup>164</sup> Accepted principles would provide a basis for the regulation of "foreseeable and perhaps unforeseeable developments in the future."<sup>165</sup> With a "realistic and . . . expeditious approach to the task of formulating an international code of conduct for remote sensing from outer space,"<sup>166</sup> developing nations could share in the bounty of valuable resource information more readily.

Despite these considerations, the record to date suggests that such a treaty is not close to agreement.<sup>167</sup> Thus, both developed and developing nations are likely to prefer some progress rather than continued failure. The failure of the United Nations in reaching an acceptable remote sensing accord has apparently spurred the pursuit of bilateral agreements between sensing and sensed states.<sup>168</sup> These treaties are more modest in scope, and nations reach these agreements more readily. Bilateral treaties may provide the foundation of a legal system for teledetection technology in the future.<sup>169</sup> Support for this "piecemeal" bilateral approach rests on a growing impatience with the progress of multilateral space treaties, and a sense that incremental movement through a number of smaller agreements may be a more solid basis for future development. Adrian Bueckling, a commentator particularly dissatisfied with

jurisdiction in international law can be extended into outer space to regulate the activities of a satellite having a detrimental impact on a nation hundreds of miles beneath its orbit. *Id.*

In *Lotus*, a French steamer and a Turkish ship collided in international waters. Eight Turkish sailors died in the tragedy. The Turkish government sought permission to try the watchman on board the French vessel on a charge of manslaughter for his criminal negligence in failing to foresee the imminent collision. The Permanent Court of International Justice granted the Turkish request on the grounds that if an act committed in international waters has a detrimental impact on a ship flying another flag, the injured flag state can regard the offense as having been committed in its own territory; it may then prosecute the offending vessel. *Id.* The traditional notion of territorial sovereignty was thus extended to include acts not occurring within national political boundaries. This has come to be known as the "effects doctrine." The effects doctrine has been used to argue that a sensed nation affected by remote sensing, thus losing exclusive control over information concerning its natural resources, may bring an action against the sensing state. This would be true due to the fact that conduct by the state operating the satellite in free space produced harmful effects on the sensed state below. If such claims were allowed, a sensed state could invoke its own criminal law to decide upon a claim made by its own government or nationals. If a number of objecting sensed states took this course, a sensing state would be faced with defending its activities in litigation before hostile courts. *Id.* at 719.

164. *See id.* at 723.

165. Fiorio, *International Implications of Earth Resources Surveys by Satellites*, 1 J. SPACE L. 1, 5 (1973).

166. Vlasic, *supra* note 6, at 334.

167. *Id.* at 323.

168. Vlasic, *supra* note 6, at 331.

169. Bueckling, *supra* note 113, at 17-18. Support for bilateral and small-scale remote sensing agreements can also be found in Gorove, *Outer Space Treaty*, *supra* note 42, at 84; Stowe, *supra* note 32, at 107.

the "soft" nature of international space law,<sup>170</sup> expresses the hope that "the tendency to conceal unsolved legal problems under beautiful legal phrases will be put to an end, and that the generalized concepts will be replaced by more specific and substantial legislation which might gradually coalesce into a body of rules."<sup>171</sup>

Bilateral remote sensing agreements between sensing and sensed countries are creating a base of customary international law already.<sup>172</sup> This base may provide the necessary rules for continued progress in teledetection.<sup>173</sup> The conclusion of limited pacts provides valuable bases upon which nations may eventually construct a global treaty. "The need to insure perpetuation of existing bilateral agreements will be paramount. Thus, the stumbling blocks to agreement will be removed and broad international agreement on the method of global utilization of the technology will become possible."<sup>174</sup>

170. Bueckling, *supra* note 129, at 17-18, 22. This German judge is particularly distrustful of broad-based treaties, because they lack specific enforcement clauses and are therefore "soft" law, and because in his view they are built upon a flimsy foundation of platitudes and hollow phrases.

171. *Id.* The result of this reliance on semantics is that:

Space law in its present codification tries to give rules for the behavior of states in space in the form of generalized formulas. Time and again it becomes apparent how difficult it is to provide adequately phrased rules for, and to systematize in legal language, the extremely complicated subject matter created by the technological explorations in outer space and the resulting multitude of conflicting interest. Therefore, when in the search of compromise, generalized formulas are resorted to in order to accommodate such basic principles as the exploration and use of outer space . . . "for the benefit and in the interests of all countries"; "for peaceful purposes . . ."; . . . "without discrimination of any kind, on a basis of equality"; . . . and in the interest of . . . "promoting international cooperation and understanding"; with due regard to the corresponding interests of all other states parties to the Treaty, it becomes evident that the law is bound to go off course on the ocean of facts.

*Id.* at 17.

Bueckling believes that more "specific and substantial legislation," is to be favored over the concealment of unsolved legal problems under "beautiful legal phrases." *Id.* at 22. He also believes that "specific and substantial legislation" is more easily achieved in a bilateral or regional agreement. *Id.*

172. Hopkins, *supra* note 2, at 79-80. Practices common to the community of nations are said to crystallize into customary international law when the following occur:

- a) Concordant practice by a number of states with reference to a type of situation falling within the domain of international relations.
- b) Continuation or repetition of the practice over a considerable period of time.
- c) Conception that the practice is required by, or consistent with, prevailing international law.
- d) General acquiescence in the practice by other states.

DA PAM 27-161-1, para. II.A.1, at 9 (1964), *cited in* Hopkins, *supra* note 2, at 79 n.118. Hopkins contends that existing agreements and the practice of states allows sensing states to launch and orbit satellites without the prior consent of sensed states. Moreover, he sees this base as evolving and expanding over time. Hopkins, *supra* note 2, at 79-80.

173. Hahn, *supra* note 41, at 456-57.

174. *Id.* at 458.



## VII. CONCLUSION

Remote sensing by satellite of conditions on the Earth is becoming a major outer space activity. Many countries around the world have benefited already from resource survey data received from space. With the advent of improved satellite systems, nations will have access to even more valuable information.

Remote sensing activities are now loosely governed by the broad principles of the Outer Space Treaty and by general principles of international law. Efforts to achieve a more specific legal system to regulate remote sensing have not kept pace with technological advances. Peaceful solutions to disputes over data dissemination and claims of sovereignty over natural resources information are necessary, but multilateral treaty efforts made in the United Nations have met with little success. The politically charged nature of remote sensing regulation complicates the situation. Disputes between the sensed and sensing nations, particularly over national sovereignty and data dissemination, characterize the political atmosphere. The recent movement of the developing nations toward unrestricted resource survey data dissemination suggests that sensing and sensed nations may eventually establish an international legal framework to govern remote sensing.

But, until the political atmosphere in the United Nations changes to one more conducive to the achievement of consensus on remote sensing regulation, a comprehensive multilateral treaty is unlikely. In the absence of such a treaty, an incremental approach, combining bilateral agreements between the sensed and sensing states and the encouragement of regional cooperation under the auspices of the United Nations appears to be the best way to promote the growth of remote sensing while achieving some basic solutions to the accompanying legal problems.

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