

**MEMORANDUM¹ OF UNDERSTANDING BETWEEN
THE GOVERNMENT OF INDIA AND THE
GOVERNMENT OF THE UNITED STATES
OF AMERICA REGARDING
LANDSAT SATELLITES
New Delhi, 3 January 1978**

The United States National Aeronautics and Space Administration (NASA), which conducts an experimental Landsat earth resources satellite program and, under certain conditions, provides for direct reception of data from these satellites by stations operated outside the United States, and the National Remote Sensing Agency (NRSA) which plans to establish a station to receive, process, archive and disseminate Landsat data, have decided to enter into this Memorandum of Understanding which, subject to the following terms and conditions, provides for

- (a) direct access to NASA's currently operating and future experimental Landsat satellites by the NRSA ground station and
 - (b) availability to NASA and others of Landsat data acquired by this NRSA station.
1. For its part, NRSA will use its best efforts to :
- (a) set up and operate a ground station at Hyderabad for the reception, processing, archiving and dissemination of Landsat data at its own cost including the cost of the necessary communication links with the NASA Landsat operations control center at the Goddard Space Flight Center;
 - (b) produce at the Hyderabad station Landsat computer compatible tapes and image products;
 - (c) ensure, in conformance with US Landsat data dissemination practices, unrestricted public availability of all Landsat data of areas within range of the Hyderabad ground station at a

1. Came into force on 3 January 1978.

fair and reasonable charge, and in a non-discriminatory manner;

- (d) ensure the provision of processed Landsat data (imagery and digital products) to NASA—selected Principal Investigators whose test sites are within range of the Hyderabad station, for the period of coverage envisaged and under the same conditions as NASA applies to them. Should another country in the region operate a Landsat ground station, NRSA's obligation to provide data to NASA Principal Investigators in the other country will terminate as soon as the other country's ground station is capable of providing this service;
- (e) provide to NASA reasonable support requested by NASA in a spacecraft emergency condition, such as the provision of duplicate station tapes or high density digital tapes should the Landsat on-board tape recorders fail;
- (f) provide the NASA and the Earth Resources Observation Systems (EROS) Data Center on a monthly, cost-free basis catalog listings of Landsat data acquired by the Hyderabad ground station. These catalog listings will also be made publicly available;
- (g) make available to NASA on request, for US Agencies' experimental purposes, on a cost-free basis and in reasonable quantities, copies of Landsat data acquired and processed by NRSA.

2. For its part, NASA will use its best efforts to :

- (a) program Landsat-2, Landsat-C and any subsequent experimental Landsat type satellites to acquire and transmit data of the area accessible for direct read-out by the Hyderabad station with a view to ensuring regular coverage of this area commensurate with the Landsat repeat cycle. Details of this programming will be subject to mutual agreement by the designated technical representatives of NASA and NRSA;
- (b) provide the Hyderabad ground station with orbital elements for calculating the antenna pointing angles necessary to acquire the Landsat transmitted signal, and for processing the data acquired;
- (c) process on a time-available basis, as agreed by the designated technical representatives, a limited number of NRSA data

tapes for initial evaluation and calibration of the Hyderabad station's performance;

- (d) make available to NRSA for comparison purposes, a limited number of NASA Landsat data tapes covering selected portions of the Hyderabad station's coverage zone.
3. NRSA and NASA will each designate technical representatives to be responsible for coordinating the agreed functions and responsibilities of each party with the other. The technical representatives, or their deputies and advisors as mutually agreed, will participate in meetings of the Landsat Ground Station Operations Working Group. This Working Group, established by NASA, meets every six months and serves as a forum for exchange of technical information among station operators. Supplemental meetings between NRSA and NASA will be held as mutually agreed.
 4. The following additional understandings are confirmed :
 - (a) NRSA will take appropriate measures so that any radio frequency problem occurring in relation to Landsat data reception by the Hyderabad station is resolved to the satisfaction of the parties to this Memorandum of Understanding. In this context it is noted that provisions of the International Telecommunications Union's Radio Regulations require that radio frequencies for future operational Landsat type satellites will differ from those currently used for experimental satellites;
 - (b) It is understood that the NASA Landsat programme is experimental in character and, therefore, subject to change in accordance with modifications in technical requirements and opportunities, and that at the date of this Memorandum of Understanding, NASA cannot make a firm commitment regarding the launching of future Landsat type satellites. NASA, however, undertakes to keep NRSA informed in good time of any modifications to the satellite design or to its plans for the Landsat series of satellites which may affect the implementation of this Memorandum of Understanding;
 - (c) NASA and NRSA will exchange, upon request, such technical information as may be necessary for the implementation of this Memorandum of Understanding, as is mutually agreed, and is consistent with the export regulations of the two countries;
 - (d) NASA and NRSA may each release public information

regarding their own activities under this Memorandum of Understanding and, in so far as the participation of the other Party is concerned, after suitable consultation;

- (e) It is understood that construction on the Hyderabad ground station will be underway within fifteen months of the signing of this Agreement. In the event that construction of the Hyderabad station is not underway within fifteen months of the signing of this Agreement, NASA, after consultation with NRSA, shall have the option to terminate its responsibilities under this Agreement;
- (f) The responsibility for spacecraft control, health and status will remain with NASA throughout the execution of this Memorandum of Understanding;
- (g) When the expected coverage of a prospective Landsat ground station overlaps with that of the Hyderabad station, NASA will inform NRSA and will advise the prospective station operator of this NRSA/NASA Memorandum of Understanding which provides for the unrestricted public availability of data of areas within the range of the Hyderabad station at a fair and reasonable charge. Should the prospective station operator choose to pursue plans for a station with substantially overlapping coverage, NASA will encourage the prospective station operator and NRSA to consult with a view toward reaching a mutually satisfactory understanding on responding to requests for data of the overlapping coverage area;
- (h) The US EROS Data Center will include with all responses to request for Landsat data acquired in the Hyderabad station coverage zone, a statement noting that the Hyderabad station should have available more recent and/or more complete data. In the event that the EROS Data Center receives requests for specific Landsat scenes, products or for specific information on their holdings, EROS will, in accordance with US Freedom of Information laws, provide the data and/or information requested;
- (i) The ability of NRSA and NASA to carry out their responsibilities under this Memorandum of Understanding is subject to the availability of appropriate funds;
- (j) Copies of any agreements signed by NRSA concerning sale of Landsat data from the Hyderabad ground station shall be

made available to NASA upon request and shall be consistent with the provisions of paragraph 1(c) above.

5. In consideration of the costs NASA is bearing for the Landsat space segment, NRSA will pay to NASA the sum of \$200,000 per annum beginning six months after the date the Hyderabad station begins to acquire Landsat data. NRSA will pay this sum in quarterly instalments at the end of each quarter. This rate is expected to remain in effect until January 1, 1979 after which NASA may, after consultation with operating agencies, revise the rate and arrangements for cost sharing. Such revised cost sharing arrangements will be applied to all non-US Landsat stations on an equitable basis.
6. The present Memorandum of Understanding shall be subject to review by the two governments at any time following acceptance by both governments of a future multilateral instrument in the form of guidelines, principles or agreements dealing with the same substantive matters.
7. This Memorandum of Understanding shall enter into force upon signature by NRSA and NASA representatives and shall continue in force for four years, subject to extension as may be agreed between NRSA and NASA.
8. DONE in New Delhi in four originals, two each in the English and Hindi languages, on the 3rd of January 1978. In case of a difference in interpretation, the English text shall prevail.

For the National Remote
Sensing Agency

For the National Aeronautics
and Space Administration

Sd/-
ATAL BIHARI VAJPAYEE
Minister for External Affairs
India

Sd/-
CYRUS VANCE
Secretary of State
United States of America