SPACE COOPERATION

Agreement Between the
UNITED STATES OF AMERICA
and JAPAN

Effected by Exchange of Notes
Signed at Washington October 24, 1996

with

Memorandum of Understanding

NOTE BY THE DEPARTMENT OF STATE

Pursuant to Public Law 89–497, approved July 8, 1966 (80 Stat. 271; 1 U.S.C. 113)—

''. . . the Treaties and Other International Acts Series issued under the authority of the Secretary of State shall be competent evidence . . . of the treaties, international agreements other than treaties, and proclamations by the President of such treaties and international agreements other than treaties, as the case may be, therein contained, in all the courts of law and equity and of maritime jurisdiction, and in all the tribunals and public offices of the United States, and of the several States, without any further proof or authentication thereof.''

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JAPAN

Space Cooperation

Agreement effected by exchange of notes
Signed at Washington October 24, 1996;
Entered into force October 24, 1996.
With memorandum of understanding.

The Secretary of State to the Japanese Ambassador

DEPARTMENT OF STATE
WASHINGTON

October 24, 1996

Excellency,

I have the honor to refer to the recent discussions between representatives of the Government of the United States of America and of the Government of Japan concerning the terms and conditions whereby cooperation on the Advanced Spaceborne Thermal Emission and Reflection Radiometer Program (hereinafter referred to as "the Program") for the flight of the Advanced Spaceborne Thermal Emission and Reflection Radiometer on the EOS-AM1 spacecraft and related scientific activities will be undertaken between the two Governments.

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; taking into account the Agreement between the Government of the United States of America and the Government of Japan on Cooperation in Research and Development in Science and Technology, signed at Toronto, on June 20, 1988, as extended; [1] and reaffirming that the provisions of the Agreement between the Government of the United States of America and the Government of Japan Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes, signed at Washington, on April 24, 1995,[2] and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Program, I have further the honor to propose on behalf of the Government of the United States of America the following arrangements:

His Excellency,
Kunihiko Saito,
Ambassador of Japan.

[1] TIAS 12025.
[2] TIAS 12638.

1. Cooperation on the Program will be executed for the Government of the United States of America by the National Aeronautics and Space Administration (hereinafter referred to as "NASA") and for the Government of Japan by the Ministry of International Trade and Industry (hereinafter referred to as "MITI").

2. With a view to setting forth detailed terms and conditions for cooperation on the Program, NASA and MITI will conclude the implementing arrangements (Memorandum of Understanding, hereinafter referred to as "the MOU").

3. The provisions of the present arrangements and the MOU shall be implemented in accordance with the laws and regulations in force in each country. Activities under the present arrangements and the MOU shall be subject to the availability of appropriated funds.

4. NASA and MITI shall consult with each other regarding any matter that may arise from or in connection with the cooperation on the Program. If the matter cannot be resolved through such consultations, consultations between the Government of the United States of America and the Government of Japan shall be held through diplomatic channels with a view to finding a mutually acceptable solution.

5. The present arrangements shall remain in force for a period of eight years, unless terminated by either Government upon twelve months' written notice of its intention to terminate them through diplomatic channels. It may be extended or amended by mutual written agreement of the two Governments.

I have further the honor to propose that, if the foregoing arrangements are acceptable to the Government of Japan, this Note and Your Excellency's Note in reply shall constitute an agreement between the two Governments, which will enter into force on the date of Your Excellency's reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State:

Anne K. Solomon

The Japanese Ambassador to the Secretary of State

EMBASSY OF JAPAN
WASHINGTON, D. C.

Washington, October 24, 1996

Excellency,

I have the honor to acknowledge the receipt of Your Excellency's Note of today's date which reads as follows:

[For text of U.S. note, see pp. 2-3.]

I have further the honor to confirm on behalf of the Government of Japan that the foregoing arrangements are acceptable to the Government of Japan and to agree that Your Excellency's Note and this Note in reply shall constitute an agreement between the two Governments, which will enter into force on the date of this reply.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Ambassador Extraordinary
and Plenipotentiary of Japan

[Signature]

His Excellency
Warren M. Christopher
The Secretary of State

IMPLEMENTING ARRANGEMENT

between the

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OF THE UNITED STATES OF AMERICA**

and the

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY OF JAPAN

concerning

**COOPERATION ON THE
ADVANCED SPACEBORNE THERMAL EMISSION AND
REFLECTION RADIOMETER (ASTER) PROGRAM**

The National Aeronautics and Space Administration of the United States of America (hereinafter "NASA") and the Ministry of International Trade and Industry of Japan (hereinafter "MITI"), as the Parties to this Implementing Arrangement (Memorandum of Understanding -- MOU),

Considering that the international scientific community has endorsed the need to improve our understanding of the Earth as a system and to create an integrated scientific observing system, which will enable multidisciplinary study of the Earth and long-term systematic monitoring of changes in the Earth system, including the International Geosphere-Biosphere Program (IGBP) of the International Council of Scientific Unions (ICSU), the World Climate Program, and other associated Global Change research programs in which the Parties also participate, and intending that the scientific and the technical cooperation undertaken pursuant to this Implementing Arrangement (MOU) achieves this goal,

Realizing that the timely flow of data in support of scientific and operational uses, including both acquisition and processing, is critical to the success of the programs of Earth observations,

Recalling that the Parties and related agencies in the United States and Japan have enjoyed long-standing and fruitful cooperation in the field of Earth observations from space and look forward to continuing such cooperation in programs such as the Japanese Earth Resources Satellite-1 (JERS-1), the Advanced Earth Observing Satellite (ADEOS), the Tropical Rainfall Measuring Mission (TRMM), and others,

Recognizing that the Parties and related agencies in the United States and Japan, in coordination with the European Space Agency (ESA), the Canadian Space Agency (CSA), and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) have begun development of platforms and instruments to fly in Earth orbit which, together, will make up the International Earth Observing System (IEOS), and

Pursuant to paragraph 2 of the Exchange of Notes dated October 24, 1996, between the Government of Japan and the Government of the United States of America concerning the cooperation on the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Program (hereinafter referred to as "the Exchange of Notes"),

Have agreed as follows:

Article 1

PURPOSE AND OBJECTIVES

1.1 The purpose of this Implementing Arrangement (MOU) is to establish that the Parties will undertake scientific and technical cooperation for flight of the ASTER instrument on the NASA EOS-AM1 platform, including:

A. planning, development, calibration, and operation of the ASTER instrument to measure visible, near-infrared, short wave infrared, and thermal infrared radiance in several bands, and to provide stereo imagery in a subset of the near infrared bands;

B. access to and exchange of data from Earth observations instruments on the NASA polar platforms and Japanese missions as agreed for research, operational, and other use; and access to and exchange of research results from investigations using such data.

1.2 The Parties jointly undertake this program with the purpose of furthering cooperation in global change research by enabling the multidisciplinary study and long-term systematic monitoring of the Earth, including research involving data from all Earth observing platforms contained in the IEOS and related activities of the IGBP, such as sensor calibration and data validation.

Article 2

GENERAL DESCRIPTION OF THE EOS-AM1 PROGRAM

2.1 The NASA EOS-AM1 platform is planned for launch in June 1998 in a nominal low-altitude (705 km) circular, sun-synchronous orbit, having a nominal 10:30 am equator crossing time, descending node. It has a design life of five years and a planned mission life of six years. This Implementing Arrangement (MOU) covers the provision of the ASTER instrument for flight on the EOS-AM1 platform, both of which have a planned six-year mission life.

2.2 Extensive ground system investments in data and information systems, including archive capability, are planned by all participants in the International Earth Observing System (IEOS) to handle the expanded volumes of data which will be acquired, provide users ready access to data, and provide the means for the retention and distribution of research results obtained using the mission data.

Article 3

PROGRAMMATIC RESPONSIBILITIES OF NASA

In order to implement the cooperation within the terms of this Implementing Arrangement (MOU), NASA will use its best efforts to fulfill the following responsibilities:

3.1 Platform

A. Develop, procure, test and launch into the agreed orbit the EOS-AM1 platform which will carry and support the ASTER instrument. The platform will have interfaces and other required resources to enable the ASTER instrument to meet the specifications and performance level defined and agreed to in a jointly-developed Project Implementation Plan.

B. Perform such post-launch check out procedures and testing as are required to ensure that the platform is supplying the necessary resources to the instrument and assist the ASTER operators to check-out the performance and operation of the ASTER instrument, as defined and agreed to in the jointly-developed Project Implementation Plan.

C. Provide and staff an EOS Operations Center (EOC) which will provide command and control functions for the EOS-AM1 platform and will integrate command operations from MITI into the overall mission command operations. NASA will operate ASTER on-orbit for the lifetime of the instrument or platform in accordance with a mission management plan to be agreed upon between the Parties, consistent with the jointly-developed Project Implementation Plan.

D. Conduct integration and test functions, including operations at the NASA contractor integration and test facility and at the launch site, for the ASTER instrument provided.

E. Accommodate instrument-related personnel and test equipment as required and agreed between NASA and MITI to support the integration, testing and operation of the ASTER instrument provided.

F. Provide technical assistance as requested by either Party and mutually agreed, including attending instrument technical reviews.

G. Accommodate instrument-related personnel at platform technical reviews and at meetings concerning the interface between the platform and the instrument, if such attendance is requested by either Party and mutually agreed.

H. Inform and coordinate with MITI, in a timely manner, any changes in platform technical characteristics and development schedules that affect the instrument interfaces and resources.

I. Designate a point of delivery and the latest delivery date as mutually agreed in the jointly-developed Project Implementation Plan for the ASTER EOS-AM1 flight unit and related equipment.

J. Appoint an ASTER U.S. team leader, and support participation of the U.S. team leader and any other NASA-sponsored ASTER science team members, selected by NASA with MITI endorsement, in Science Working Group activities, as required. Ensure that all activities of the U.S. team leader and the NASA-sponsored team members, as related entities of NASA, are carried out in accordance with the terms and conditions set forth in this Implementing Arrangement (MOU). NASA will inform MITI of any changes in the NASA-sponsored science team membership.

K. Include the ASTER science team leader and the ASTER U.S. team leader in the EOS Investigator Working Group and include appropriate ASTER science representatives in relevant working groups.

L. Carry out all other obligations agreed to in the jointly-developed Project Implementation Plan.

M. Make available all prelaunch data requested by MITI, and agreed to by NASA, for ASTER data processing.

N. Support, as necessary, the conduct of trade-off studies relating to instrument accommodations, if such support is required by MITI and mutually agreed.

3.2 Data System

A. Receive and record all available ASTER data acquired by NASA, and process these data to Level 0 (Levels of data defined in Appendix 2) at an average rate no less than the average transmission rate, adding the supplemental information necessary for further processing; and archive the Level 0 data, as agreed to and defined in the jointly-developed Project Implementation Plan.

B. Make the Level 0 data and the related supplemental information in the agreed form available to MITI as quickly as possible following completion of Level 0 processing, for pickup at the NASA-designated National Data Node.

C. (1) Obtain from MITI at the MITI-designated pick-up point: all Level 1a data and the necessary coefficients to enable NASA to generate Level 1b data from the U.S. Level 0 or Level 1a archive; and Level 1b data, along with necessary ancillary information/coefficients, in response to NASA requests.

(2) Process these data to higher level products and archive these products at the Earth Resources Observation System (EROS) Distributed Active Archive Center (DAAC). NASA may distribute these data and products in accordance with Article 5 of this Implementing Arrangement (MOU) and the IEOS Data Exchange Principles (Appendix 1).

(3) Obtain from MITI the software source code and documentation for Level 1a and Level 1b processing (compatible with EOS Data and Information System [EOSDIS]) and implement that software in the EROS DAAC data production system, according to a schedule defined in the jointly-developed Project Implementation Plan.

(4) Make available to MITI, at a NASA-designated pick-up point: a) all NASA-generated standard products along with the algorithm software, coefficients, and ancillary data used to generate them; and b) all ASTER special products along with the associated ancillary data and algorithms used to produce them, maintained within the EOSDIS.

(5) Make available to MITI the algorithm software (source code and documentation), compatible with EOSDIS standards, used by NASA to produce ASTER standard data products, according to a schedule defined in the jointly-developed Project Implementation Plan.

D. Designate a National Data Node in the United States to be responsible for international coordination, connection, and transfer of data between the data systems of the Parties. The National Data Node will be responsible for creating and maintaining a directory and an inventory of relevant data, as agreed to by the Parties.

E. Accommodate data system-related personnel and ground system elements, as required and mutually agreed between NASA and MITI, to support the ASTER-related MITI activities in the United States.

F. Accommodate data system-related personnel at data system reviews and interface meetings, if such attendance is required by either Party and mutually agreed.

G. Carry out all other obligations agreed to in the jointly-developed Project Implementation Plan.

H. Inform and coordinate with MITI, in a timely manner, any changes in the EOSDIS technical characteristics and development schedules that affect instrument or data system interfaces or resources.

3.3 Provide available aircraft data for ASTER in-flight and pre-flight data calibration and validation in support of the science team.

3.4 NASA will transmit real-time ASTER data on an X-band direct downlink over ground stations in Japan. The schedule and technical characteristics of the transmissions will be defined in the jointly-developed Project Implementation Plan.

Article 4

PROGRAMMATIC RESPONSIBILITIES OF MITI

In order to implement the cooperation within the terms of this Implementing Arrangement (MOU), MITI will use its best efforts to fulfill the following responsibilities:

4.1 Instrument

A. Develop and provide for flight on the EOS-AM1 platform the ASTER instrument meeting the specifications, schedules, and performance levels (including supporting models and spare parts) as defined and agreed to in the jointly-developed Project Implementation Plan.

B. Assist in performing such post-launch check out procedures and testing as are required to ensure that the ASTER instrument is being provided the necessary platform resources, and perform the checkout of the performance and operation of the ASTER instrument, as defined and agreed to in the jointly-developed Project Implementation Plan.

C. Provide and staff an ASTER support center to monitor the instrument, generate instrument command lists and schedules, and assist in conflict and anomaly resolution.

D. Provide the agreed ASTER instrument and all instrument-unique ground support and testing equipment, as identified and mutually agreed in the jointly-developed Project Implementation Plan for integration and testing, to the NASA-designated delivery point, according to the delivery schedule agreed upon by both Parties in the jointly-developed Project Implementation Plan.

E. Provide technical assistance as requested by NASA and mutually agreed, including technical documentation and analytic models and providing appropriate personnel, to support the integration, testing, and operation of ASTER, including operations at the agreed upon launch site and the EOC, in accordance with the jointly-developed Project Implementation Plan.

F. Accommodate NASA personnel at instrument technical reviews and at meetings concerning the interface between the platform and the instrument, if such attendance is requested by either Party and mutually agreed.

G. Provide appropriate personnel to attend platform technical reviews, if attendance at such reviews is requested by either Party and mutually agreed.

H. Inform and coordinate with NASA, in a timely manner, any changes in instrument technical characteristics and schedule that affect the platform interfaces and resources.

I. Ensure that the platform integration and testing schedule in the jointly-developed Project Implementation Plan is not delayed by instrument malfunction, through provision of spare parts or repair of the instrument provided in a timely manner, as requested by NASA and mutually agreed.

J. Support, as necessary, the conduct of trade-off studies relating to instrument accommodations, if such support is requested by NASA and mutually agreed.

K. Provide for the scientific guidance of the instrument through the formation of an ASTER science team that includes participation by the U.S. team leader and NASA-funded investigators, designation of a team leader, and support for the team's participation in the mission or platform working groups, and the team leader's participation in the EOS Investigator Working Group. Ensure that all activities of the team leader and other Japanese team members, as related entities of MITI, are carried out in accordance with the terms and conditions set forth in this Implementing Arrangement (MOU). MITI will inform NASA of any changes in the Japanese ASTER science team membership.

L. Carry out all other obligations agreed to in the jointly-developed Project Implementation Plan.

M. To assist in resolution of ASTER-related conflicts and anomalies, make available health and safety data to the EOC and involve the ASTER support center personnel.

N. Deliver the flight version of the ASTER instrument to be manifested on EOS-AM1 to the designated delivery point, as mutually agreed in the jointly-developed Project Implementation Plan. Confirm the schedule, by instrument Critical Design Review (CDR), that will result in the delivery of the flight instrument to NASA by the mutually-agreed date.

4.2 Data System

A. Make available through the ASTER Data Archive Center: 1) all data collected by the ASTER instrument in either Level 0 or Level 1A format; 2) all Level 1a, NASA-requested 1b, and higher standard data products generated at the ASTER Data Archive Center, along with the algorithm software (source code and documentation), compatible with EOSDIS standards, necessary to generate them; and 3) special products held at the ASTER Data Archive Center with any ancillary data and algorithms necessary to utilize them.

Create and maintain a directory and an inventory of ASTER data and make ASTER data available to users in accordance with Article 5 of this Implementing Arrangement (MOU) and the IEOS Data Exchange Principles (Appendix 1).

B. Obtain Level 0 ASTER data and supplemental data from NASA at the NASA-designated National Data Node and process these data to Level 1a, and in response to NASA or user requests, process the data to Level 1b.

C. (1) Make available to NASA, at the MITI-designated pick-up point: all Level 1a data and corresponding browse products and the necessary coefficients to enable NASA to generate Level 1b data from the U.S. Level 0 or Level 1a archive; and ASTER Level 1b data, along with necessary ancillary information/coefficients, in response to NASA requests.

(2) Provide to NASA, the software source code and English documentation, compatible with the EOSDIS standards, necessary to perform Level 1a and Level 1b processing, and support the implementation of that software in the EROS DAAC data production system, as mutually agreed according to a schedule defined in the jointly-developed Project Implementation Plan.

(3) Make available to NASA ASTER Science Team Members, upon request, observation performance specifications and related engineering data to which the instrument is built, along with pre-launch test data and post-launch engineering data which are necessary to characterize instrument performance, in a manner consistent with Article 6.

(4) Make available to NASA, at MITI-designated pick-up point: a) all MITI-generated standard products at Level 2 or higher, along with the coefficients and ancillary data used to generate them; and b) special products held at the ASTER Data Archive Center with any ancillary data and algorithms necessary to utilize them.

(5) Make available to NASA the algorithm software (source code and documentation), in accordance with EOSDIS standards, used by MITI to produce ASTER higher level standard data products, according to a schedule defined in the jointly-developed Project Implementation Plan.

D. Designate a National Data Node in Japan, the Earth Remote Sensing Data Analysis Center (ERSDAC), to be responsible for international coordination, connection and transfer of data between the data systems of the Parties. The National Data Node will be responsible for creating and maintaining a directory and an inventory of relevant data, as agreed to by the Parties.

E. Inform and coordinate with NASA, in a timely manner, any changes in instrument/data system technical characteristics and schedule that affect the EOSDIS interfaces and resources.

4.3 Provide available aircraft data for ASTER in-flight and pre-flight data calibration and validation in support of the science team.

4.4 MITI will establish the capability to acquire and process real-time ASTER data transmitted on an X-band direct downlink. The schedule and technical characteristics for the transmissions will be defined in the jointly-developed Project Implementation Plan. MITI will distribute data acquired through the direct downlink in accordance with Article 5 of this Implementing Arrangement (MOU).

Article 5

MISSION MANAGEMENT AND EARTH OBSERVATION DATA EXCHANGE

5.1 The following are Mission Management Priorities:

A. Overall Priorities

1. Platform Health and Safety
2. Instrument Health and Safety
3. Data to assist in a declared national or international environmental emergency

B. Initial Calibration

1. Calibration of individual instruments during post-launch commissioning phase

C. Calibration/Validation

1. Special Observations to enable cross calibration of instruments
2. Periodic calibration of individual instruments
3. Support of specific validation measurements

D. Large Data Acquisitions

1. Acquisitions to continue long-term data records deemed significant by the international scientific community
2. Acquisition of time-critical data on specific earth phenomena as established by the international scientific community
3. Support of large scale multi-investigator field experiments deemed important by the international scientific community

E. Smaller Data Acquisitions

1. Specific requests by cooperating IEOS agencies, the total of which shall not exceed 10% of the available duty cycle of each instrument
2. Support of modest or single investigator field experiments
3. Acquisitions which have been scheduled two or more times and not successfully fulfilled

F. All Other Requests for Data Acquisition

5.2 A. NASA and MITI will share all of the data products from the sensors on NASA's EOS program which is described in the IEOS Implementation Plan, including ASTER, and may each use these data and make them available to other users in accordance with the IEOS Data Exchange Principles in Appendix 1. NASA and MITI agree that this Appendix will be revised as necessary to remain consistent with any revisions to the (IEOS) Data Exchange Principles, through an exchange of letters between the Parties.

B. For the purposes of the Principles, NASA as the EOS platform provider, and MITI, as the ASTER instrument provider, are the Data Providing Agencies (DPAs) for ASTER data. The DPA functions specified in the Principles will be performed jointly, or as otherwise agreed. Consistent with Principle 6 of Appendix 1, NASA will distribute all ASTER imagery data to all users at the lowest possible cost, on a nondiscriminatory basis, and without restriction. NASA is the DPA for data from all other EOS instruments unless otherwise provided in separate agreements between NASA and the EOS instrument provider.

C. MITI, the ASTER instrument provider and a DPA, will distribute all ASTER imagery data to all users on a nondiscriminatory basis for peaceful purposes in accordance with the IEOS Data Exchange Principles in Appendix 1 and consistent with national laws and regulations.

D. NASA will use its best efforts to ensure that all other EOS instrument providers agree to data exchange principles consistent with the IEOS Data Exchange Principles.

E. NASA and MITI will jointly allocate up to 10 percent of the ASTER duty cycle for other IEOS participants' observation requests. NASA will take into account MITI's requirements when making reciprocal observation requests to other IEOS participants' scheduled instruments.

5.3 Any arrangements for direct downlink of ASTER data to countries other than the United States or Japan must be approved by both Parties and specified in the jointly-developed Project Implementation Plan.

5.4 Each Party will designate technical (project-level) points of contact responsible for the technical implementation of the cooperative activity defined in this Implementing Arrangement (MOU).

5.5 Each Party will designate management (program-level) points of contact responsible for the overall implementation of the cooperative activity defined in this Implementing Arrangement (MOU).

5.6 The project-level points of contact will jointly develop a Project Implementation Plan governing the platforms, instruments, and data systems referenced in this Implementing Arrangement (MOU) for initial joint approval by the Parties. The jointly-developed Project Implementation Plan will set out the delivery and formal review schedules and the services and technical documentation to be provided by the instrument provider and the platform provider.

5.7 A Change Control Board (CCB), chaired by NASA at the project level, with equal representation from the Parties, will be appointed by the Parties to review any proposed changes to the jointly-developed Project Implementation Plan. Such changes may be proposed by either Party. All changes to the jointly-developed Project Implementation Plan must be approved by the CCB. If the CCB is unable to agree on changes, the question shall be referred to the designated program-level contacts for resolution. If the program-level contacts are unable to resolve the question, the mechanism contained in Article 13 of this Implementing Arrangement (MOU) shall be invoked.

Article 6

RIGHTS IN TECHNICAL DATA

6.1 Except as otherwise provided in this Article, each Party shall transfer all technical data and goods considered to be necessary to fulfill its responsibilities under this Implementing Arrangement (MOU). Each Party undertakes to handle expeditiously any request for technical data or goods presented by the other Party. This paragraph shall not require a Party to transfer any technical data and goods in contravention of its national laws or regulations. The following paragraphs are not intended to cover rights in ASTER imagery data. These are covered in Article 5.2.

6.2 Transfers of technical data and goods under this Implementing Arrangement (MOU) shall be subject to the restrictions set forth in this

paragraph. Technical data or goods not covered by the restrictions set forth in this paragraph shall be transferred without restrictions, except as otherwise restricted by national laws or regulations.

A. The furnishing Party shall mark with a notice, or otherwise specifically identify, the technical data or goods that are to be protected for export control purposes. Such a notice or identification shall indicate any specific conditions regarding how such technical data or goods may be used by the receiving Party and its contractors and subcontractors, including (1) that such technical data or goods shall be used only for the purposes of fulfilling the receiving Party's responsibilities under this Implementing Arrangement (MOU); and (2) that such technical data or goods shall not be used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purposes, without the prior written permission of the furnishing Party.

B. The furnishing Party shall mark with a notice the technical data that are to be protected for proprietary rights purposes. Such notice shall indicate any specific conditions regarding how such technical data may be used by the receiving Party and its contractors and subcontractors, including (1) that such technical data shall be used, duplicated, or disclosed only for the purposes of fulfilling the receiving Party's responsibilities under this Implementing Arrangement (MOU); and (2) that such technical data shall not be used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purposes, without the prior written permission of the furnishing Party.

C. In the event that any technical data or goods transferred under this Implementing Arrangement (MOU) are classified, the furnishing Party shall mark with a notice or otherwise specifically identify such technical data or goods. The requested Party may require that any such transfer shall be pursuant to a security of information agreement or arrangement that sets forth the conditions for transferring and protecting such technical data or goods. A transfer need not be conducted if the receiving Party does not provide for the protection for the secrecy of patent applications containing information that is

classified or otherwise held in secrecy for national security purposes. No classified technical data or goods shall be transferred under this Implementing Arrangement (MOU) unless both Parties agree to the transfer.

6.3 Each Party shall take all necessary steps to ensure that the technical data or goods received by it under subparagraphs 2(A), 2(B) or 2(C) above shall be treated by the receiving Party and other persons and entities (including contractors and subcontractors) to which the technical data or goods are subsequently transferred in accordance with the terms of the notice or identification. Each Party shall take all reasonably necessary steps, including ensuring appropriate contractual conditions in their contracts and subcontracts, to prevent unauthorized use, disclosure, or retransfer of, or unauthorized access to, such technical data or goods. In the case of technical data or goods received under subparagraph 2(C) above, the receiving Party shall accord such technical data or goods a level of protection at least equivalent to the level of protection accorded by the furnishing Party.

6.4 It is not the intent of the Parties to grant, through this Implementing Arrangement (MOU), any rights to a recipient beyond the right to use, disclose, or retransfer received technical data or goods consistent with conditions imposed under this Article.

6.5 Interface, integration, safety, and testing data (excluding detailed design, manufacturing, and processing data and associated software) will be exchanged without restrictions as to use or disclosure, subject to national laws and regulations.

6.6 Withdrawal from this Implementing Arrangement (MOU) by a Party shall not affect rights of or obligations regarding the protection of technical data and goods transferred under this Implementing Arrangement (MOU) prior to such withdrawal, unless otherwise agreed in an agreement for termination pursuant to Article 15 of this Implementing Arrangement (MOU).

Article 7

FINANCIAL ARRANGEMENTS

7.1 Each Party will bear the costs of discharging its respective responsibilities, including, but not limited to, costs of compensation, travel, and subsistence of its own personnel, and transportation of all equipment and other items for which it is responsible under this Implementing Arrangement (MOU). The receiving Party is responsible for the costs of the media and the data transmission itself from the other Party's national data node.

7.2 Activities under this Implementing Arrangement (MOU) are subject to the availability of appropriated funds to the Parties. Should either Party encounter funding problems which may affect its ability to fulfill its responsibilities under this Implementing Arrangement (MOU), that Party has the obligation to notify and consult promptly with the other Party.

Article 8

CUSTOMS CLEARANCE AND VISAS

8.1 Each Party will use its best efforts to realize free customs clearance for goods necessary for the implementation of this Implementing Arrangement (MOU). Such arrangements shall be fully reciprocal. In the event that MITI is unable to provide duty-free customs clearance, MITI shall pay (through arrangements with its contractors) all duties, taxes, or other fees assessed by the Japanese customs service. In the event that NASA is unable to provide duty-free customs clearance, NASA shall pay all duties, taxes, or other fees assessed by the U.S. customs service. For the purposes of this Implementing Arrangement (MOU), equipment furnished by NASA to MITI remains the property of the Government of the United States and equipment furnished by MITI to NASA remains the property of Japan.

8.2 NASA will use its best efforts to facilitate the issuance of export licenses for equipment purchased by MITI in the United States for ASTER.

8.3 NASA and MITI will render assistance for obtaining appropriate visas by NASA and MITI personnel, including contractors and investigators participating in IEOS.

Article 9

PUBLIC INFORMATION

9.1 The Parties retain the right to release public information regarding their own activities under this Implementing Arrangement (MOU).

9.2 The Parties undertake to coordinate with each other in advance concerning public information activities which relate to each other's responsibilities or performance under this Implementing Arrangement (MOU).

Article 10

CROSS-WAIVER OF LIABILITY;
LIABILITY CONVENTION; REGISTRATION

10.1 It is confirmed that the Agreement Between the Government of Japan and the Government of the United States of America Concerning Cross-Waiver of Liability for Cooperation in the Exploration and Use of Space for Peaceful Purposes of April 24, 1995 (hereinafter referred to as "the Cross-Waiver Agreement"), and Exchanges of Notes of the same date between the Governments of Japan and the United States of America concerning subrogated claims shall apply to activities under this Implementing Arrangement (MOU).

Further, MITI, through arrangements with its contractors, shall hold harmless NASA and its related entities against liability arising from subrogated claims against such entities made by the Government of Japan, as a subrogee based on damage arising out of activities under this Implementing Arrangement (MOU). NASA agrees to waive subrogated claims of the United States Government against the Government of Japan, MITI, and MITI's related entities based on damage arising out of Protected Space Operations.

10.2 It is understood that the United States shall register the EOS-AM1 platform in accordance with the Convention on Registration of Objects Launched into Outer Space of January 14, 1975.[1]

[1] TIAS 8480; 28 UST 695.

Article 11

PATENT USE - AUTHORIZATION, CONSENT AND INDEMNIFICATION

11.1 In order to avoid any possible interruption in the conduct of this cooperative project, NASA hereby gives the United States Government's authorization and consent (without prejudice to any rights of indemnification) for all use and manufacture of any invention covered by a United States patent in the performance of MITI responsibilities under this Implementing Arrangement (MOU), including the performance of such responsibilities by MITI contractors or subcontractors.

11.2 In the event the U.S. Government incurs any liability for the practice of inventions covered by privately-owned U.S. patents, either as royalties owed under an existing U.S. Government patent license or as an unlicensed practice of such patents (patent infringement), and such liability is incurred as a result of MITI and/or any of MITI contractors' or subcontractors' performance of MITI responsibilities under this Implementing Arrangement (MOU), MITI agrees to indemnify the United States Government (through arrangements between MITI and its contractors) against such liability, including patent infringement costs and reimbursement for any such royalties. MITI shall also provide such information and assistance as it has available to the United States Government in defending against any suit or claim for such patent royalties or infringements.

Article 12

INVENTION AND PATENT RIGHTS

Nothing in this Implementing Arrangement (MOU) shall be construed as granting or implying any rights to, or interest in, patents or inventions of the Parties or their contractors or subcontractors.

Article 13

CONSULTATIONS

Each Party will consult with the other in advance of any factors that may affect the terms and conditions of this Implementing Arrangement (MOU). Any matter related to the interpretation or implementation of this Implementing Arrangement (MOU) shall be first referred to the NASA Associate Administrator for Mission to Planet Earth and the MITI Director of the Space Industry Division. Any matter which cannot be resolved at this level will be referred to the NASA Administrator and the MITI Director-General for Machinery and Information Industries Bureau for settlement.

Article 14

AMENDMENTS

This Implementing Arrangement (MOU) may be amended at any time by written agreement of the Parties.

Article 15

TERMINATION

15.1 Either Party may terminate this Implementing Arrangement (MOU) at any time after having given the other Party at least 12 months written notice of its intent to terminate.

15.2 With a view toward continuation of the overall IEOS, the Parties shall endeavor to reach terms and conditions of a Party's withdrawal before the effective date of withdrawal.

15.3 Withdrawal by either Party will not affect the Party's continuing obligations under this Implementing Arrangement (MOU) with regard to liability and the protection of data and goods unless otherwise agreed in a agreement for termination pursuant to 15.2 above.

Article 16

ENTRY INTO FORCE

This Implementing Arrangement (MOU) will enter into force upon signature and remain in force for the duration of the EOS-AM1 program, provided that the Exchange of Notes remains in force. It may be extended thereafter for such additional periods as may be mutually agreed in writing, provided that the Exchange of Notes remains in force. The duration of the EOS-AM1 program is for the actual life of the EOS-AM1 spacecraft plus an additional ten years, after flight, for continuing EOS-AM1 data management responsibilities. Details will be further specified in the jointly-developed Project Implementation Plan.

Done at NASA, this 7th day of November, 1996, in two originals.

FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OF THE UNITED STATES OF AMERICA	FOR THE MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY OF JAPAN
Daniel S. Goldin	[Signature]

APPENDIX 1

IEOS DATA EXCHANGE PRINCIPLES

The Data Exchange Principles contained in this document establish the basis on which the Agencies listed below (hereinafter referenced as the "Agencies") will share the data from the International Earth Observing System (IEOS) among themselves and make such data available to other users. These Agencies are the four Agencies which are responsible for the Earth Observation programmes of the Space Station partners and which will act as Delegations with respect to implementation of the Principles, along with the operational organisations closely related to them. The Agencies are: the European Space Agency (ESA) along with the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) [to be confirmed]; the United States National Aeronautics and Space Administration (NASA) along with the United States National Oceanic and Atmospheric Administration (NOAA); the Japanese Science and Technology Agency (STA) along with the National Space Development Agency of Japan (NASDA), the Ministry of International Trade and Industry of Japan (MITI), the Japan Environment Agency (JEA), and the Japan Meteorological Agency (JMA); and the Canadian Space Agency (CSA).

The IEOS is currently composed of the following platforms and their corresponding Earth Observation instruments which are listed in the IEOS Implementation Plan: the NASA Earth Observing System (EOS), beginning with EOS-AM1; the ENVISAT-1 element of the ESA Polar Orbit Earth Observation Mission (POEM) programme; the NOAA Polar-orbiting Operational Environmental Satellites (POES), beginning with NOAA-N; the Japanese Earth Observing System (JEOS) beginning with the Advanced Earth Observing Satellite (ADEOS); and the NASA/Japanese Tropical Rainfall Measuring Mission (TRMM). The IEOS Agencies will endeavor to include future Earth Observation missions, as appropriate, within the IEOS framework, including application of these Data Exchange Principles.

Any Agency may propose an addition to the IEOS. With the unanimous agreement of all Agencies, a new element may be added to the IEOS and its provider may become an Agency for purposes of these Data Exchange Principles.

The following Principles address the criteria of access and utilisation of data from the above platforms. Modalities of implementation will be agreed by the parties in the IEOS Implementation Plan. Detailed Terms and Conditions for the practical execution of these Principles will be documented in the IEOS Implementation Plan and agreed by the Agencies. The definitions attached to

these Data Exchange Principles are an integral part of them, and will be referred to for the correct implementation of all arrangements and cooperative activities carried out in the IEOS.

1. All IEOS Data will be available for peaceful purposes to all users on a non-discriminatory basis and in a timely manner.

2. There will be no period of exclusive data use. Where the need to provide validated data is recognized, any initial period of exclusive data use should be limited and explicitly defined. The goal should be release of data in some preliminary form within three months after the start of routine reception of instrument data.

3. All IEOS Data will be available for the use of each of the Agencies and its designated users at the lowest possible cost for non-commercial use in the following categories: Research, Applications, and Operational Use for the Public Benefit.

4. Agencies which designate users for Research Use and for Applications Use will do so through an Announcement of Opportunity or similar process. The designation will include a definition of the data to be provided. Research Users shall be required to submit their results for publication in the scientific literature and Applications Users shall be required to publish their results in a technical report and both shall be required to provide their results to the designating Agency and to the Data Providing Agency.

5. Any of the Agencies may designate national users of the respective countries or Member States of the Agencies as it deems appropriate to be given access to all IEOS data at the lowest possible cost for Non-commercial Operational Use for the Public Benefit, provided the designating Agency assumes responsibility for ensuring that all the terms and conditions for data use are met. This use will have to be reported to the Data Providing Agency on the basis of commonly agreed criteria including type, usage, and final destination of the data. Designation of users outside the national territory of the Agencies or their member states (e.g., international organisations and agencies in non-participating countries) for Non-commercial Operational Use for the Public Benefit will be done only with the agreement of the Data Providing Agency.

6. For purposes other than 3 above, the specified data will be made available in accordance with terms and conditions to be established by the Data Providing Agency.

7. Each Data Providing Agency will fulfill the data requests of the other Agencies and their designated users to the maximum extent possible. In the event that

these data requests exceed the Data Providing Agency's capacity, the Data Providing Agency and the designating Agency will pursue alternative arrangements to fulfill such requests.

8. All data required by the Agencies and their designated users will be made available on condition that the recipient agrees to applicable intellectual property rights terms and conditions and/or proprietary rights consistent with these Data Exchange Principles, and ensures that the data shall not be distributed to non-designated parties, nor used in ways other than those for which the data were provided, without the written consent of the Data Providing Agency.

9. Any of the Agencies may delegate some of its functions to other entities; in which case, such Agency will remain responsible for ensuring compliance with these Data Exchange Principles.

10. Agencies will harmonise criteria and priorities for data acquisition, archiving, and purging, in consultation with other relevant organisations.

Definitions

The following Definitions apply in the context of these Principles:

Applications Use of data is a limited proof of concept study toward: 1) the solution of an applied program to demonstrate the utility of the data; or 2) the demonstration of the operational use of the data.

Data refers to original Earth observation sensor output and higher level products created from it by the Data Providing Agency as part of the standard set of products.

Data Providing Agency is the Agency which has primary responsibility for the distribution of data from a particular instrument or is the owner of such data. The Data Providing Agency will be defined in agreements between the operator of the platform carrying the instrument and the instrument provider should the two be different organisations.

Lowest Possible Cost for designated users is no more than the additional cost of resources, above the cost of the normal planned data system operations, required to fill a specific user request. These costs may include media, labour, expenses for operating and maintaining equipment, as well as delivery charges for mail or electronic transmission. The above costs should not include non-recurring costs such as research, development, and space segment capital cost. However, it may include a reasonable amount towards additional capital cost of data provision.

Non-commercial Use is the utilisation of data to provide a service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users.

Non-commercial Operational Use for the Public Benefit is the utilisation of data to provide a regular service for the public benefit as distinguished from conferring an economic advantage on a particular user or group of users. An example is the use of data to carry out a mandate of environmental observation and prediction. These activities can be carried out by national or international agencies or other entities designated by these agencies to support their public benefit mandate. Such a user may be requested by the Data Providing Agency and/or the designating Agency to provide a periodic status report back to them.

Non-discriminatory Basis means that all users in a clearly defined data use category can obtain data on the same terms and conditions, and the categories are defined in such a way that all potential users will be included in categories with access to the data.

Research Use of data is utilisation of data in a study or investigation which aims to establish facts or principles.

APPENDIX 2

Definitions:

Supplemental information:

> Any data required to process level 0 data to higher level; including, but not limited to, ephemeris updates, time codes, engineering data, spacecraft parameters and navigation information, time-ordered spacecraft orientation information, etc.

Level 0 data:

> Reconstructed unprocessed instrument/payload data at full resolution

Level 1a data:

> Reconstructed unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric calibration and geometric correction coefficients and georeferencing parameters (e.g. platform ephemeris) computed and appended, but not applied, to the level 0 data

Level 1b data:

> Level 1a data that has been processed using radiometric calibration and geometric correction coefficients units.

Level 2 data:

> Retrieved environmental variables (e.g., ocean wave height, soil moisture, ice concentration) at the same location and similar resolution as the Level 1 source data.

Level 3 data:

> Data or retrieved environmental variables that have been spatially and/or temporally resampled (i.e., derived from Level 1 or Level 2 data products). Such resampling may include averaging and compositing.

Standard Products:

> Standard data products are generated as part of a research investigation, of wide research utility, accepted by IWG and the EOS Program Office, routinely produced, and, in general, spatially and/or temporally extensive data products. Standard level 1 data products will be generated for all EOS instruments; standard level 2 products will be generated for most EOS instruments. Some EOS Interdisciplinary Investigations will also generate standard data products. They are character-

ized by guaranteed availability within set time periods after necessary input data become available. They are produced by community-consensus algorithms and generated in Distributed Active Archive Centers (DAACs) with quality assurance provided by scientists. Every EOS instrument must yield such products.

Algorithm:

A step-by-step mathematical procedure for solving a problem. Each step is precisely and unambiguously defined so that in principle it can be carried out by a machine. In the context of remote sensing, algorithms generally specify how to determine higher-level data products from lower-level source data.

Browse:

Data produced primarily to provide other investigators with an understanding of the type and quality of data available. Typically, browse data sets are limited in size or resolution. The specific form of browse data will be defined in the Jointly-developed Project Implementation Plan (JPIP).

Documentation:

The collection, organized and stored, or records that describe the purpose, use, structure, details, and operational requirements of a software program, for the purpose of making this information easily accessible to the user.

Special Products:

Special products are generated as part of a research investigation using ASTER data and are produced for a limited region or time period, or products that are not accepted as standard by EOS IWG. Special products will normally be generated at investigator site or Science Computing Facilities.

Source Code:

The original mnemonic or higher-level statement of a computer program coded in other than machine language that must be translated into machine language before use.