

SPACE COOPERATION

**X-Ray Astronomy Satellite
(ASTRO-H) Project**

**Agreement Between the
UNITED STATES OF AMERICA
and JAPAN**

Effected by Exchange of Notes at
Washington October 8, 2013

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.”

JAPAN

**Space Cooperation: X-Ray Astronomy
Satellite (ASTRO-H) Project**

*Agreement effected by exchange of notes at
Washington October 8, 2013;
Entered into force October 8, 2013.
With memorandum of understanding.*

October 8, 2013

Excellency:

I have the honor to refer to the recent discussions between representatives of the Government of the United States of America and representatives of the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA") and the Japan Aerospace Exploration Agency (hereinafter referred to as "JAXA") on the X-ray Astronomy Satellite (ASTRO-H) Project for the development, launch, and operations of the satellite, gathering data and related scientific activities (hereinafter referred to as "the Project"), which will be undertaken as a part of the JAXA's Mid-Term Plan approved by the competent Ministers to achieve the JAXA's Mid-Term Goal based on "Basic Plan on Space Policy" of the Government of Japan.

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; and taking into account the Agreement between the Government of

His Excellency
Kenichiro Sasae,
Ambassador of Japan.

DIPLOMATIC NOTE

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 and amended; 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, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Project, I have further the honor to propose on behalf of the Government of the United States of America the following arrangements:

1. The Project will be conducted in accordance with the terms and conditions of a Memorandum of Understanding (MOU) to be agreed upon by NASA and JAXA.
2. The Project will be conducted in accordance with the laws and regulations in force in each country and subject to the availability of appropriated funds.

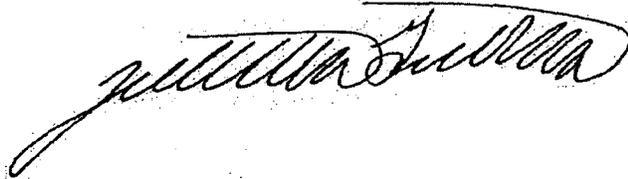
3. Unless otherwise agreed, the Government of Japan shall register the ASTRO-H satellite as a space object in accordance with the Convention on Registration of Objects Launched into Outer Space, done at New York, on January 14, 1975 (hereinafter referred to as "the Registration Convention"). Registration pursuant to the Registration Convention shall not affect the rights or obligations of NASA, JAXA, or both Governments under the Convention on International Liability for Damage Caused by Space Objects, done on March 29, 1972.
4. NASA and JAXA will consult with each other on any matter that may arise from or in connection with the Project with a view to finding a mutually acceptable solution. 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 seven years, unless terminated by either Government upon six months' written notice through diplomatic channels of its intention to terminate them. The present

arrangements 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 note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of your note in reply.

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

For the Secretary of State

A handwritten signature in black ink, appearing to be "John M. Acheson", written in a cursive style. The signature is positioned below the typed text "For the Secretary of State".



EMBASSY OF JAPAN
WASHINGTON, D. C.

Washington, October 8, 2013

Excellency:

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

"Excellency:

I have the honor to refer to the recent discussions between representatives of the Government of the United States of America and representatives of the Government of Japan concerning the cooperation between the National Aeronautics and Space Administration of the United States of America (hereinafter referred to as "NASA") and the Japan Aerospace Exploration Agency (hereinafter referred to as "JAXA") on the X-ray Astronomy Satellite (ASTRO-H) Project for the development, launch, and operations of the satellite, gathering data and related scientific activities (hereinafter referred to as "the Project"), which will be undertaken as a part of the JAXA's Mid-Term Plan approved by the competent Ministers to achieve the JAXA's Mid-Term Goal based on "Basic Plan on Space Policy" of the Government of Japan.

In consideration of the continuing mutually beneficial relationship between the two Governments in the field of peaceful exploration and use of outer space; and 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 and amended; 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, and the Exchange of Notes of the same date between the two Governments concerning subrogated claims shall apply to the Project, I have further the honor to propose on behalf of the Government of the United States of America the following arrangements:

1. The Project will be conducted in accordance with the terms and conditions of a Memorandum of Understanding (MOU) to be agreed upon by NASA and JAXA.
2. The Project will be conducted in accordance with the laws and regulations in force in each country and subject to the availability of appropriated funds.
3. Unless otherwise agreed, the Government of Japan shall register the ASTRO-H satellite as a space object in accordance with the Convention on Registration of Objects Launched into Outer Space, done at New York, on January 14, 1975 (hereinafter referred to as "the Registration Convention"). Registration pursuant to the Registration Convention shall not affect the rights or obligations of NASA, JAXA, or both Governments under the Convention on International Liability for Damage Caused by Space Objects, done on March 29, 1972.
4. NASA and JAXA will consult with each other on any matter that may arise from or in connection with the Project with a view to finding a mutually acceptable solution. 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 seven years, unless terminated by either Government upon six months' written notice through diplomatic channels of its intention to terminate them. The present arrangements may be extended or amended by mutual written agreement of the two Governments.

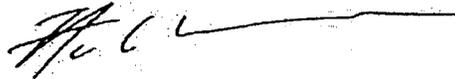
I have further the honor to propose that, if the foregoing arrangements are acceptable to the Government of Japan, this note and your note in reply shall constitute an agreement between the two Governments, which shall enter into force on the date of your note in reply.

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

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 shall 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



His Excellency
John Forbes Kerry
The Secretary of State

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
OF THE UNITED STATES OF AMERICA
AND
THE JAPAN AEROSPACE EXPLORATION AGENCY
FOR
COOPERATION ON THE ASTRO-H PROJECT

TABLE OF CONTENTS

PREAMBLE

ARTICLE 1 – PURPOSE

ARTICLE 2 – DEFINITIONS

ARTICLE 3 – DESCRIPTION OF COOPERATION

ARTICLE 4 – RESPONSIBILITIES

ARTICLE 5 – RIGHTS IN RESULTING DATA

ARTICLE 6 – MANAGEMENT IMPLEMENTATION

ARTICLE 7 – POINTS OF CONTACT

ARTICLE 8 – FINANCIAL ARRANGEMENTS

ARTICLE 9 – LIABILITY AND RISK OF LOSS

ARTICLE 10 – REGISTRATION OF SPACE OBJECTS

ARTICLE 11 – TRANSFER OF GOODS AND TECHNICAL DATA

ARTICLE 12 – INTELLECTUAL PROPERTY RIGHTS

ARTICLE 13 – RELEASE OF RESULTS AND PUBLIC INFORMATION

ARTICLE 14 – EXCHANGE OF PERSONNEL AND ACCESS TO FACILITIES

ARTICLE 15 – CUSTOMS CLEARANCE AND MOVEMENT OF GOODS

ARTICLE 16 – OWNERSHIP OF EQUIPMENT

ARTICLE 17 – CONSULTATION AND DISPUTE RESOLUTION

ARTICLE 18 – MISHAP INVESTIGATION

ARTICLE 19 – AMENDMENTS

ARTICLE 20 – ENTRY INTO FORCE, TERM AND TERMINATION

PREAMBLE

The National Aeronautics and Space Administration of the United States of America (NASA) and the Japan Aerospace Exploration Agency (JAXA) (hereinafter jointly referred to as the “Parties”),

Recalling with satisfaction the considerable amount of cooperation already conducted between the countries of the United States and Japan in the area of space science;

Convinced that further collaboration will continue to produce benefits for both countries;

Desiring to continue the collaboration established under the NASA/JAXA Interim Agreement for the ASTRO-H Program, concluded on December 11, 2008, as amended;

Recalling 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 of April 24, 1995 (hereinafter referred to as the “Cross-Waiver Agreement”), the Exchange of Notes of the same date between the Government of the United States of America and the Government of Japan concerning subrogated claims, and the Agreed Minutes of December 8, 2000, concerning the Cross-Waiver Agreement;

Affirming their mutual interest in joint collaboration on the ASTRO-H Project, a joint Japan-U.S. x-ray astronomy mission initiated by the Institute of Space and Astronautical Science (ISAS) of JAXA, given the scientific value in investigating the universe’s extremely energetic phenomena using ASTRO-H’s unprecedented sensitivity for high-resolution spectroscopy of cosmic x-ray sources; and

Pursuant to the Agreement effected by the Exchange of Notes between the Government of the United States of America and the Government of Japan, dated October 8, 2013, concerning cooperative activities related to the ASTRO-H Project (hereinafter referred to as the “Exchange of Notes”), agree to the provisions of this Memorandum of Understanding (hereinafter referred to as the “MOU”), as follows:

ARTICLE 1 – PURPOSE

1. The purpose of this MOU is to establish the terms and conditions under which the Parties will cooperate on the ASTRO-H Project. It applies to the mission development, integration, launch, operations, data analysis, and publication/dissemination of the scientific results. The Parties will cooperate according to the Exchange of Notes and this MOU.

2. This MOU will supersede, in its entirety, the ASTRO-H Interim Agreement established between the Parties on December 11, 2008, as amended.

ARTICLE 2 – DEFINITIONS

1. For the purpose of this MOU, with the exception of Article 9 (Liability and Risk of Loss), the term “Related Entity” means:
 - A. A contractor or subcontractor of a Party at any tier;
 - B. A grantee or any other cooperating entity or investigator of a Party at any tier; or
 - C. A contractor or subcontractor of a grantee or any other cooperating entity or investigator of a Party at any tier.
2. In Article 11 (Transfer of Goods and Technical Data), the term “Related Entity” may also include another State or an agency or institution of another State, where such State, agency, or institution is an entity described above or is otherwise involved in the activities undertaken pursuant to this MOU.

ARTICLE 3 – DESCRIPTION OF COOPERATION

ASTRO-H is the sixth Japanese x-ray astronomy satellite and is directed at high-throughput, high-resolution spectroscopy of celestial x-ray sources such as stars, compact binary systems, x-ray novae, supernova remnants, clusters of galaxies, and active galactic nuclei. The primary goal of ASTRO-H is to provide new insights into the nature and detailed physics of some of the most energetic objects in the universe.

ASTRO-H is expected to be comprised of a suite of four highly complementary instruments spanning the X-ray energy band from 0.3 to 600 keV. The Soft X-ray Spectrometer (SXS), being developed jointly by a team led by NASA’s Goddard Space Flight Center (GSFC) and JAXA’s ISAS, is a high-resolution, non-dispersive x-ray spectrometer operating between 0.3 and 12 keV. It represents the core instrument on ASTRO-H, providing a high-resolution spectroscopic capability for the ASTRO-H Project and covering the energy band where all of the astrophysically abundant elements have characteristic emission lines that can be used for a wide range of spectral studies of matter under extreme conditions. Three additional scientific instruments, provided by JAXA, extend the bandpass to produce an observatory with extraordinary new capabilities. The Soft X-ray Imager (SXI) covers the same energy band as the SXS and expands the field of view of the observatory with a new-generation Charge Coupled Device (CCD) camera. The x-ray mirror for this instrument will be provided by NASA. The Hard X-ray Imager (HXI) will perform sensitive imaging spectroscopy in the 5-80 keV band

using specially coated x-ray optics and the non-imaging Soft Gamma-ray Detector (SGD) extends the observatory's energy band to 600 keV.

ASTRO-H is expected to be launched into low-Earth orbit (550 km circular, 31 degree inclination) from the Tanegashima Space Center, Japan, using an H-IIA rocket. Communication with and operation of the spacecraft is the responsibility of JAXA.

ARTICLE 4 – RESPONSIBILITIES

1. NASA will use reasonable efforts to:

- A. Provide to JAXA for the duration of the ASTRO-H Project:**
 - i. Flight model hardware as follows:**
 - a. X-Ray calorimeter detector assembly, including an internal calibration source;**
 - b. Adiabatic Demagnetization Refrigerator (ADR) assembly, including three ADRs and heat switches;**
 - c. Aperture assembly, including five filters, baffles and mounts;**
 - d. X-Ray calorimeter amplifier and ADR control electronics;**
 - e. Mirror Assemblies for the SXS and SXI instruments; and**
 - f. Electrical harnesses, connectors, and thermometers, as required for the hardware listed above.**
 - ii. On a temporary basis, as mutually agreed, engineering model (EM) hardware, simulators, drilling templates, and required ground support equipment (GSE) for the SXS;**
- B. Provide JAXA with documentation relating to the NASA-provided components, including functional description documents, analytical thermal and mechanical models (e.g., Computer Aided Design (CAD) and analysis software), interface requirements for NASA-provided components to dewar/spacecraft, interface drawings and documents, and other technical and programmatic information required to ensure compatibility of the NASA-provided components with the ASTRO-H satellite;**
- C. Provide limited consultation to JAXA upon request to optimize the performance of NASA-provided items or systems critical to the performance of the NASA-provided items, including, if necessary, specific design elements of the instrument cryogenic system, x-ray mirrors, instrument electronics system and related software, contamination control, and end-to-end system operation;**
- D. Develop and implement, as mutually agreed, a NASA/JAXA Joint Systems Engineering Team Plan;**

- E. Provide scheduling software to be used for science operations planning, data analysis software in a form suitable for use both by the Science Working Group (SWG) and Guest Observers, the data analysis pipeline, and the Calibration Data Base;
- F. Participate in the system level interface reviews and the mission level design reviews;
- G. Provide JAXA with technical support for integration and test of the NASA-provided components, the launch campaign, the post-launch initial checkout and calibration of the ASTRO-H satellite, and operations planning; and
- H. Assign personnel, as mutually agreed, to support:
 - i. Requirements and instrument systems architecture development;
 - ii. Handling and testing of the NASA-provided components prior to integration with the ASTRO-H satellite;
 - iii. Pre- and post-launch calibration activities;
 - iv. Activities relating to integration and testing of the NASA-provided components on the ASTRO-H satellite;
 - v. Launch campaign, post-launch initial checkout, and operations throughout the ASTRO-H Project flight phase;
 - vi. Observation planning; and
 - vii. Creation and maintenance of observation planning and data analysis software.

2. JAXA will use reasonable efforts to:

- A. Design, test and develop the following flight hardware:
 - i. Cooling system to provide 4.5 Kelvin (K) or below;
 - ii. Digital pulse processing electronics;
 - iii. Fixed Optical Bench;
 - iv. Contamination sensor, as necessary;
 - v. Filter wheel for the SXS, as necessary;
 - vi. Sources for in-flight calibration of SXS, as necessary;
 - vii. Satellite bus, including instrument specific power and telemetry interfaces;
 - viii. Thermal shields and pre-collimators for mirror assemblies, as necessary; and
 - ix. Electrical harnesses, connectors, and thermometers, as required for the hardware listed above including, specifically:
 - a. Harnesses internal to the dewar, with connection from the inside of the dewar main shell;
 - b. External harnesses between the outside of the dewar and the NASA-provided electronics.

- B. Provide NASA with prototype models of applicable flight power supply units and their GSE (if required), an EM of the digital pulse processing system, heat-forming mandrels as necessary, simulators, and/or other GSE as necessary;**
- C. Provide NASA with mutually agreed documentation, including the ASTRO-H satellite environmental specifications, interface requirements, subsystem description documents, interface drawings and documents, test and handling specifications and acceptance criteria, analytical thermal and mechanical models (e.g., CAD and analysis software), and other technical and programmatic information required to ensure compatibility of the NASA-provided components with the ASTRO-H satellite;**
- D. Handle the NASA-provided components after delivery to JAXA in compliance with the agreed-upon procedures and ground environment;**
- E. Integrate and test the NASA-provided components, as mutually agreed, and provide pre-launch instrument data to NASA, as appropriate;**
- F. Develop and implement, as mutually agreed, a NASA/JAXA Joint Systems Engineering Team Plan;**
- G. Participate in the NASA instrument reviews, and include NASA personnel in the ASTRO-H Project level design reviews;**
- H. Accommodate appropriate access to applicable ASTRO-H Integration and Test (I&T) facilities by NASA during integration and testing of the NASA-provided components for the purpose of ensuring proper integration and verification;**
- I. Procure an H-IIA launch service for the ASTRO-H satellite, perform pre-launch checkout, and track and control of the ASTRO-H satellite during the launch campaign, and conduct post-launch initial checkout and calibration of the ASTRO-H satellite;**
- J. Perform all initial processing of ASTRO-H science and engineering data, and provide all processed data to NASA, along with updated trend analyses and calibration data which are essential to removing instrumental signatures from first pass-processed data;**
- K. Support development of the data processing pipeline and analysis software by providing algorithms for SXI, HXI, and SGD data processing; and**

- L. Assign personnel, as mutually agreed, to support:
 - i. Requirements and instrument systems architecture development;
 - ii. Calibration activities;
 - iii. Handling and testing of the NASA-provided components prior to integration with the ASTRO-H satellite;
 - iv. Activities relating to integration and testing of the NASA-provided components on the ASTRO-H satellite; and
 - v. Activities related to the development and maintenance of the data processing pipeline and analysis software.

ARTICLE 5 – RIGHTS IN RESULTING DATA

- 1. The operation of the ASTRO-H satellite will consist of three phases commencing immediately after the post-launch initial checkout and calibration period:
 - A. Phase 1 will consist of the first six months thereafter, during which all available observing time will be exclusively allocated to, and analyzed by, ASTRO-H SWG members. No Guest Observations will be conducted during this phase;
 - B. Phase 2, lasting for a period of 12 months, will commence immediately following Phase 1. During Phase 2, all available observing time, except that reserved for the use of the observatory and SWG members, will be appropriately allocated for Guest Observations through respective Announcement of Opportunity (AO) processes open to the scientific communities of those countries involved in the mission; and
 - C. Phase 3 will commence immediately following Phase 2 and will continue until the completion of the mission. During Phase 3, all available observing time, except that reserved for the use of the observatory and the conduct of key projects, will be appropriately allocated for Guest Observations through respective AO processes open to the respective scientific communities.
- 2. The detailed arrangement for the allocation of observing time between the Parties during the above phases is to be separately agreed by the Parties, based upon their respective financial, technical, and scientific contributions to the mission. The agreed-to observing time allocations will be documented in a Science Mission Plan. Some fraction of the observing time (to be determined at a later date) will be designated as joint Japan-U.S. time. This time will be allocated for key projects, explicitly collaborative Japan/U.S. proposals, and Guest Observations that are independently proposed and recommended for observation in both the U.S. and Japan and merged with the mutual consent of the proposing scientists.

3. In principle, all members of the SWG and Guest Observers selected under proposal solicitations will retain exclusive rights to the analysis and publication of the resulting data for a period of no longer than 12 months after receipt of processed data in a form suitable for scientific analysis.
4. The Parties will have access to and use of the data and any associated data during the above proprietary period, but such access and use will not prejudice the first publication rights of the SWG or Guest Observers.
5. Upon expiration of the exclusive data rights period, all scientific data (including the first-pass processed data) will be placed into the NASA and JAXA data archives and open to the international scientific community. Results of the scientific investigations carried out using ASTRO-H data will be made available to the scientific community, as soon as practicable, through publication in appropriate journals or other established channels, in a manner consistent with established scientific practice.

ARTICLE 6 – MANAGEMENT IMPLEMENTATION

1. Mission implementation under this MOU will involve extensive collaboration between Japanese and U.S. scientists. A number of joint teams will be established to coordinate activities on the collaborative aspects of the mission. These aspects include the design, development, integration, calibration and qualification of hardware, and development of software for instrument data analysis. The teams will be grouped into the following major areas:
 - A. An X-Ray Calorimeter Spectrometer team to oversee the development of the sensor, cooling system, and readout of the SXS;
 - B. A Soft X-Ray Telescope team to oversee the development of the x-ray mirrors for the SXS and SXI instruments;
 - C. A calibration team to assist in developing project-wide calibration requirements. This team will work with the respective hardware teams to ensure that the requirements are addressed and communicated to the overall ASTRO-H science team. It will also participate in the application of the calibration data to flight data; and
 - D. A data analysis development team to establish the requirements and development of a data analysis system designed to be used by the general astronomy community through a Guest Observer Facility. A member of the U.S. team will be located at ISAS to participate in the optimal scheduling of celestial observations.
2. The activities of the groups described above will be detailed in a Science Mission Plan to be drafted between NASA and JAXA ASTRO-H project managers.

ARTICLE 7 – POINTS OF CONTACT

The NASA Point of Contact for this MOU will be:

Dr. Paul Hertz
Director, Astrophysics Division
Science Mission Directorate
NASA Headquarters
300 E Street, SW
Washington, DC 20546
USA
Phone: +1-202-358-0986
E-mail: paul.hertz@nasa.gov

The JAXA Point of Contact for this MOU will be:

Professor Tadayuki Takahashi
ASTRO-H Project Manager
Institute of Space and Astronautical Science, JAXA
3-1-1, Yoshinodai, Chuo-ku,
Sagamihara, Kanagawa 252-5210
Phone: +81-50-3362-6448
E-mail: takahashi.tadayuki@jaxa.jp

Any change in a Party's respective contact information will be communicated in writing to the other party.

ARTICLE 8 – FINANCIAL ARRANGEMENTS

1. Each Party will bear the costs of discharging its respective responsibilities, including travel and subsistence of personnel and transportation of all equipment and other items for which it is responsible.
2. The ability of the Parties to carry out their obligations is subject to the availability of appropriated funds. Should either Party encounter budgetary problems which may affect the activities to be carried out under this MOU, the Party encountering the problems will notify and consult with the other Party as soon as possible.

ARTICLE 9 – LIABILITY AND RISK OF LOSS

1. 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 of April 24, 1995 (hereinafter referred to as “Cross-Waiver Agreement”), the Exchange of Notes of the same date between the Governments of Japan and the United States of America concerning subrogated claims and the Agreed Minutes of December 8, 2000, concerning the Cross-Waiver Agreement, will apply to activities under this MOU.
2. JAXA will purchase insurance coverage to hold harmless the Government of the United States of America, NASA, and its related entities against liability arising from subrogated claims of the Government of Japan against the Government of the United States of America, NASA, and its related entities based on damage arising from activities undertaken pursuant to this MOU. In any event, JAXA will ensure that the Government of the United States of America, NASA, and its related entities are reimbursed for any costs incurred by them relating to any such claims. NASA will waive all claims, including subrogated claims, of the Government of the United States of America against the Government of Japan, JAXA, and its related entities based on damage arising from activities undertaken pursuant to this MOU.

ARTICLE 10 – REGISTRATION OF SPACE OBJECTS

JAXA will request the Government of Japan to register the ASTRO-H satellite as a space object in accordance with the Convention on the Registration of Objects Launched into Outer Space, done on November 12, 1974 (the Registration Convention).

ARTICLE 11 – TRANSFER OF GOODS AND TECHNICAL DATA

The Parties are obligated to transfer only those technical data (including software) and goods necessary to fulfill their respective responsibilities under this MOU, in accordance with the following provisions, notwithstanding any other provisions of this MOU:

1. All activities under this MOU will be carried out in accordance with the Parties’ national laws and regulations, including those laws and regulations pertaining to export control and the control of classified information.
2. The transfer of technical data for the purpose of discharging the Parties’ responsibilities with regard to interface, integration, and safety will normally be made without restriction, except as required by paragraph 1, above.

3. All transfers of goods and proprietary or export-controlled technical data are subject to the following provisions:
 - A. In the event a Party or its Related Entity finds it necessary to transfer such goods or data, for which protection is to be maintained, such goods will be specifically identified and such data will be marked;
 - B. The identification for such goods and the marking on such data will indicate that the goods and data will be used by the receiving Party and its Related Entities only for the purposes of fulfilling the receiving Party's or Related Entities' responsibilities under this MOU, and that such goods and data will not be disclosed or retransferred to any other entity without the prior written permission of the furnishing Party;
 - C. The receiving Party and its Related Entities will abide by the terms of the notice and protect any such goods and data from unauthorized use and disclosure; and
 - D. The Parties to this MOU will cause their Related Entities to be bound by the provisions of this Article through contractual mechanisms or equivalent measures.
4. All goods exchanged in the performance of this MOU will be used by the receiving Party or Related Entity exclusively for the purposes of this MOU. Upon completion of the activities under this MOU, the receiving Party or Related Entity will return or otherwise dispose of all goods and marked proprietary or export-controlled technical data provided under this MOU, as directed by the furnishing Party or Related Entity.

ARTICLE 12 – INTELLECTUAL PROPERTY RIGHTS

1. Nothing in this MOU will be construed as granting, either expressly or by implication, to the other Party any rights to, or interest in, any inventions or works of a Party or its Related Entities made prior to the entry into force of, or outside the scope of, this MOU, including any patents (or similar forms of protection in any country) corresponding to such inventions or any copyrights corresponding to such works.
2. Any rights to, or interest in, any invention or work made in the performance of this MOU solely by one Party or any of its Related Entities, including any patents (or similar forms of protection in any country) corresponding to such invention or any copyright corresponding to such work, will be owned by such Party or Related Entity. Allocation of rights to, or interest in, such invention or work between such Party and its Related Entities will be determined by applicable laws, rules, regulations, and contractual obligations.

3. It is not anticipated that there will be any joint inventions made in the performance of this MOU. Nevertheless, in the event that an invention is jointly made in the performance of this MOU, the Parties will, in good faith, consult and agree within 30 calendar days as to:
 - A. The allocation of rights to, or interest in, such joint invention, including any patents (or similar forms of protection in any country) corresponding to such joint invention;
 - B. The responsibilities, costs, and actions to be taken to establish and maintain patents (or similar forms of protection in any country) for each such joint invention; and
 - C. The terms and conditions of any license or other rights to be exchanged between the Parties or granted by one Party to the other Party.
4. For any jointly authored work by the Parties, should the Parties decide to register the copyright in such work, they will, in good faith, consult and agree as to the responsibilities, costs, and actions to be taken to register copyrights and maintain copyright protection (in any country).
5. Subject to the provisions of Article 11 (Transfer of Goods and Technical Data) and Article 13 (Release of Results and Public Information), each Party will have an irrevocable royalty-free right to reproduce, prepare derivative works, distribute, and present publicly, and authorize others to do so on its behalf, any copyrighted work resulting from activities undertaken in the performance of this MOU for its own purposes, regardless of whether the work was created solely by, or on behalf of, the other Party or jointly with the other Party.

ARTICLE 13 – RELEASE OF RESULTS AND PUBLIC INFORMATION

1. The Parties retain the right to release public information regarding their own activities under this MOU. The Parties will coordinate with each other in advance concerning releasing to the public information that relates to the other Party's responsibilities or performance under this MOU.
2. The Parties will make the results available to the general scientific community, as appropriate and agreed between the Parties, in a timely manner.
3. The Parties acknowledge that the following data or information does not constitute public information and that such data or information will not be included in any publication or presentation by a Party under this Article without the other Party's prior written permission:

- A. Data furnished by the other Party in accordance with Article 11 (Transfer of Goods and Technical Data) which is identified as export-controlled, classified, or proprietary;
- B. Information about an invention of the other Party before an application for a patent (or similar form of protection in any country) corresponding to such invention has been filed covering the same, or a decision not to file has been made; or
- C. Other specific information that the Parties expressly agree not to disclose or release.

ARTICLE 14 – EXCHANGE OF PERSONNEL AND ACCESS TO FACILITIES

1. To facilitate implementation of the activities conducted under this MOU, the Parties may support the exchange of a limited number of personnel, including contractors and subcontractors, from each Party, at an appropriate time and under conditions mutually agreed between the Parties.
2. Access by the Parties to each other's facilities or property, or to each other's Information Technology (IT) systems or applications, is contingent upon compliance with each other's respective security and safety policies and guidelines including, but not limited to: standards on badging, credentials, and facility and IT system application/access.

ARTICLE 15 – CUSTOMS CLEARANCE AND MOVEMENT OF GOODS

1. In accordance with its laws and regulations, each Party will facilitate free customs clearance and waiver of all applicable customs duties and taxes for goods necessary for the implementation of this MOU. In the event that any customs duties or taxes of any kind are nonetheless levied on such equipment and related goods, such customs duties or taxes will be borne by the Party of the country levying such customs duties or taxes.
2. In accordance with its laws and regulations, each of the Parties will also facilitate the movement of goods into and out of its territory as necessary to comply with this MOU.

ARTICLE 16 – OWNERSHIP OF EQUIPMENT

Unless otherwise agreed in writing, each Party will retain ownership of all equipment, including the goods, hardware, software, and associated technical data, it provides to the other Party under the terms of this MOU, without prejudice to any individual rights of ownership of the Parties' respective Related Entities. To the extent feasible and recognizing that equipment sent into space or integrated into the other Party's equipment cannot be returned, each Party agrees to return the other Party's equipment in its possession at the conclusion of activities under this MOU.

ARTICLE 17 – CONSULTATION AND DISPUTE RESOLUTION

The Parties agree to consult promptly with each other on all issues involving interpretation, implementation, or performance of the MOU. Such issues will first be referred to the appropriate points of contact named above for the Parties. If they are unable to come to an agreement, then the issues will be referred to the NASA Administrator and the JAXA President, or their designated representatives, for joint resolution.

ARTICLE 18 – MISHAP INVESTIGATION

In the case of a mishap or mission failure, the Parties agree to provide assistance to each other in the conduct of any investigation, bearing in mind, in particular, the provisions of Article 11 (Transfer of Goods and Technical Data). In the case of activities which might result in the death of or serious injury to persons, or substantial loss of or damage to property as a result of activities under this MOU, the Parties agree to establish a process for investigating each such mishap.

ARTICLE 19 – AMENDMENTS

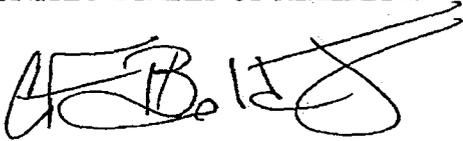
This MOU may be amended by mutual written agreement of the Parties.

ARTICLE 20 – ENTRY INTO FORCE, TERM AND TERMINATION

1. This MOU will enter into force upon signature by the Parties and will remain in force for a period of seven years, unless extended by mutual written agreement, provided that the Exchange of Notes remains in force.
2. Either Party may terminate this MOU at any time upon giving at least six months prior written notice to the other Party of its intent to terminate. In the event of termination, the Parties will endeavor to minimize any negative impacts of such termination on the other Party. Termination of this MOU will not affect a Party's continuing obligations under the following Articles of this MOU: Rights in Resulting Data, Transfer of Goods and Technical Data, Intellectual Property Rights, Liability and Risk of Loss, and Customs Clearance and Movement of Goods, unless otherwise agreed.

IN WITNESS WHEREOF, the undersigned duly authorized representatives of the Parties have signed this MOU, in two originals, in the English language.

FOR THE NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION OF
THE UNITED STATES OF AMERICA:



DATE: NOV 4 2013

PLACE: Washington, DC

FOR THE JAPAN AEROSPACE
EXPLORATION AGENCY:



DATE: Nov. 11 2013

PLACE: Tokyo