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United States of America
and
Brazil

Memorandum of Understanding between the U.S. National Aeronautics and Space Administration (NASA) and the Brazilian Space Agency (AEB) for flight of the Humidity Sounder for Brazil (HSB) instrument on NASA's Earth Observing System PM-1 spacecraft. Washington, 5 December 1996

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États-Unis d'Amérique
et
Brésil

Mémorandum d'accord entre la National Aeronautics and Space Administration des États-Unis (NASA) et l'Agence spatiale brésilienne (AEB) pour le vol de l'instrument Humidity Sounder for Brazil (HSB) sur le vaisseau spatial PM-1 du Système d'observation terrestre de la NASA. Washington, 5 décembre 1996

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[ENGLISH TEXT – TEXTE ANGLAIS]

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

U.S. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

AND

THE BRAZILIAN SPACE AGENCY (AEB)

FOR

FLIGHT OF THE HUMIDITY SOUNDER FOR BRAZIL (HSB) INSTRUMENT

ON NASA'S EARTH OBSERVING SYSTEM PM-1 SPACECRAFT

The purpose of this Memorandum of Understanding is to define the terms and conditions of scientific and technical cooperation between the U.S. National Aeronautics and Space Administration (NASA) and the Brazilian Space Agency (AEB) regarding the provision by the Brazilian National Space Research Institute, INPE, of the Ministry of Science and Technology, of the Humidity Sounder for Brazil (HSB) instrument on NASA's Earth Observing System (EOS) PM-1 spacecraft.

EOS PM-1 is NASA's primary contribution to the International Earth Observing System (IEOS). IEOS is itself part of a larger international effort including the International Geosphere-Biosphere Program, the World Climate Research Program, and associated Global Change research programs,-- to advance multidisciplinary study of the Earth and long-term systematic monitoring of changes in the Earth system. HSB is scheduled for flight in the year 2000 on EOS PM-1, in conjunction with the Atmospheric Infrared Sounder (AIRS) and the Advanced Microwave Sounding Unit (AMSU).

The data from the HSB instrument are highly related to and will be correlated with AIRS and AMSU. HSB will be a significant contribution to the advanced atmospheric sounding package on EOS PM-1 and the larger international monitoring efforts of which it is a part. NASA will work together with AEB in this endeavor. INPE will be the implementing agency responsible for carrying out this MOU for the AEB. To this end, NASA and AEB agree on the following arrangements of this cooperative effort.

I. AEB, through INPE, will:

1. Develop and provide for flight, as part of the advanced atmospheric sounding package of the EOS PM-1 satellite, an HSB instrument, meeting the specifications and performance levels, including supporting models and spare parts, as defined and agreed to in the EOS HSB Joint Implementation Plan, as described in Article III.

2. Deliver the agreed HSB instrument and all instrument-unique ground support and testing equipment, in accordance with the requirements and schedules in the EOS HSB Joint Implementation Plan, for spacecraft integration and testing, to the NASA-designated delivery point.

3. Provide technical assistance as requested by NASA (including the provision of appropriate personnel) to support the integration, testing, and operation of HSB, including operations at the agreed launch site and at the EOS Operation Center at Goddard Space Flight Center.

4. Allow NASA personnel participation at instrument technical reviews, if attendance at such reviews is requested by either Party.

5. Provide appropriate personnel to attend platform technical reviews, if attendance at such reviews is requested by either Party.

6. Promptly inform NASA of any relevant changes in instrument technical characteristics or schedule.

7. Ensure that the platform integration and testing schedule in the EOS HSB Joint Implementation Plan is not delayed by instrument malfunction, through repair of the instrument provided in a timely manner, as requested by NASA and mutually agreed.

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

9. Provide technical support to the AIRS science team, which is expected to have primary responsibility for the AIRS, AMSU, and HSB investigation, as requested by NASA.

10. Assist in performing such post launch check out procedures and testing as are required to ensure that the instrument is being provided the necessary platform resources, as defined and agreed in the EOS HSB Joint Implementation Plan, to permit nominal instrument performance.

11. Establish a dedicated data center to archive and distribute the HSB instrument data and to serve as the Brazilian National Data Node to be

responsible for international coordination, connection, and transfer of data between the data systems of the Parties.

12. Establish and operate, if it so desires, a dedicated data receiving station to receive and process the raw data stream coming from the direct broadcast capability of the EOS PM-1 platform.

13. Install an HSB Instrument Support Terminal in Brazil for routine monitoring of HSB instrument performance.

14. Carry out all other obligations agreed to in the EOS HSB Joint Implementation Plan.

II. NASA will:

1. Develop, procure, test, and launch the EOS PM-1 platform which will carry and support the HSB instrument. The platform will have interfaces and other required resources to enable the HSB instrument to meet the specifications and performance level defined and agreed in the EOS HSB Joint Implementation Plan.

2. 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, as defined and agreed in the EOS HSB Joint Implementation Plan, to permit nominal instrument performance.

3. Provide and staff an HSB Support Center to monitor the instrument, generate instrument commands, and assist in conflict and anomaly resolution as required. HSB instrument control will be performed at the EOS Operation Center at Goddard Space Flight Center with participation of appropriate INPE personnel, as mutually agreed.

4. Support installation in Brazil of an HSB Instrument Support Terminal.

5. Provide mission objectives and integrated commands for HSB from INPE into the overall mission commands. NASA will allow for the continuous operation of HSB on orbit for the life of the instrument or spacecraft (whichever is shorter) in accordance with a mission management plan to be agreed between the parties.

6. Conduct integration and test functions, including operations at the NASA contractor integration and test facility and at the launch site.

7. Allow for HSB instrument-related personnel participation, and test equipment required to support the integration, testing, and operation of the instrument provided.

8. Allow for instrument-related personnel participation at platform technical reviews, if attendance at such reviews is requested by either party.

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

10. Provide technical assistance as requested by INPE and agreed by NASA, including attending instrument technical reviews.

11. Inform INPE of relevant changes in platform technical characteristics or development schedule in a timely manner.

12. Designate a point of delivery for the HSB and related equipment to be provided.

13. Carry out all other obligations agreed to in the EOS HSB Joint Implementation Plan.

14. Receive and record the raw data stream from the HSB instrument carried on the EOS PM-1 platform. NASA will process the raw HSB data in conjunction with AIRS and AMSU data, generate products, archive and distribute data and products in accordance with the EOS Data Policy described below.

15. Make available global HSB, AIRS, and AMSU data from the EOS ground system. These data will be available in raw form within 3 hours of observation and in processed forms as described in the EOS HSB Joint Implementation Plan.

16. Provide, through the scientific team of the EOS PM-1, scientific support on the data utilization of the HSB in conjunction with AIRS and AMSU.

17. Provide for real-time transmission of the HSB, AIRS, and AMSU instruments raw data to Brazil through the use of the EOS-PM-1 spacecraft direct broadcast system.

III. NASA AND INPE together shall develop a EOS HSB Joint Implementation Plan to be presented to and approved by the designated Management Points of Contact. The technical points of contact shall be responsible for developing the EOS HSB Joint Implementation Plan governing the platform and the HSB instrument. The EOS HSB Joint Implementation Plan will include the delivery and formal review schedules and the services and technical documentation to be provided by the instrument provider and the platform provider.