

Amendment No. 1  
to the  
Memorandum of Agreement  
between the  
National Science Foundation and  
the National Aeronautics and Space Administration  
in support of the  
Constellation Observing System for Meteorology,  
Ionosphere and Climate (COSMIC) Program

WHEREAS, the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA), collectively known as the Parties, signed an Memorandum of Agreement (MOA) effective December 2, 2002 for support of the Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) Program, and NASA's involvement therein; and

WHEREAS, the Parties desire to extend the scope of the MOA to include two (2) additional programs, Equatorial Atmospheric Research Satellite (EQUARS) and Road Runner, in order to provide benefits to both Parties.

NOW, THEREFORE, the parties hereto agree to amend the MOA as follows (revisions indicated in bold lettering):

I. Article I, "Purpose," is revised as follows:

The purpose of this interagency Memorandum of Agreement (MOA) is to document the roles and responsibilities, and the terms and conditions, between NASA and NSF, for the NASA involvement in the COSMIC, EQUARS, and Road Runner programs.

II. The following paragraphs shall be appended to Article II, "Background":

EQUARS

The scientific mission of the Equatorial Atmospheric Research Satellite (EQUARS) program was defined by the satellite project committee of the Instituto Nacional de Pesquisas Espaciais' (INPE) Aeronomy division, *i.e.*, Global scale monitoring of the Earth's equatorial low, middle and upper atmosphere-ionosphere. The main objective is to study dynamical, photochemical and ionospheric processes in the equatorial low, middle and upper atmosphere, with special emphasis on vertical energy transport, propagation of gravity, tidal and planetary scale waves, and the generation and development of plasma bubbles in the ionosphere.

The EQUARS satellite is composed of eight payloads including the Integrated GPS Occultation Receiver (IGOR) payload. The IGOR payload will provide both the occultation measurements and the

GPS position of the EQUARS satellite. The physical parameters, which will be taken from the occultation measurements will include water vapor profile (troposphere); atmospheric temperature profile (stratosphere); total electron contents, TEC (ionosphere). This data will be combined with COSMIC program data at the COSMIC data processing center. After processing, all of the meteorological data will be made freely available to the international scientific community in near real time.

### Road Runner

The Integrated Experiments Division of the Air Force Research Laboratory is exploring ways to provide responsive space capabilities to the war fighter through the Road Runner responsive space demonstration. Road Runner is a highly autonomous satellite system with capabilities in target geolocation and tracking, imaging, and tactical communications. Road Runner is designed to demonstrate rapid development and fielding, along with responsive data dissemination directly into theater.

The Road Runner space mission requires the navigation accuracy of a precision orbit determination GPS receiver. The IGOR receiver meets and exceeds the Road Runner's requirement for navigation, as well as providing an on-orbit "pathfinder" COSMIC IGOR receiver to validate the new receiver design on orbit, as well as an on-orbit test bed for new occultation algorithms being developed by JPL and UCAR.

III. The following paragraphs shall be appended to Section A of Article III, "Responsibilities," which defines the tasks that NSF will use its reasonable efforts to accomplish:

5. All data gathered by the EQUARS GPS IGOR (BlackJack) receiver will be provided to NASA in near real time after download for distribution to the scientific community without restriction via the GENESIS data system or other data distribution channel to be determined by NASA and as mutually agreed upon by NSF.
6. All data gathered by the Road Runner GPS IGOR (BlackJack) receiver will be provided to NASA in near real time after download for distribution to the scientific community without restriction via the GENESIS data system or other data distribution channel to be determined by NASA and as mutually agreed upon by NSF.
7. Amend its other agreements, as applicable, to conform to the terms of this amendment, including the disclaimer of warranty

for the Application Specific Integrated Circuits (ASICS) and the data rights provisions.

IV. The following paragraphs shall be appended to Section B of Article III, "Responsibilities," which defines the tasks that NASA will use its reasonable efforts to accomplish:

3. NASA will provide Broad Reach Engineering (BRE) via JPL ten (10) Application Specific Integrated Circuits (ASICS) to support the BRE GPS Receiver planned for EQUARS. The ASICS are provided under the following terms:

These ASICS are supplied "as is" with no stated or implied warranty on the part of NASA or JPL for the functional performance of either the ASICS or the associated GPS receivers. Furthermore, unused or damaged ASICS for the purposes stated are to be returned to JPL within a reasonable period of time.


4. NSF, UCAR and INPE efforts in developing these data will be publicly acknowledged in defining the databases to be made available via this MOA.

5. NASA will provide to the DoD via JPL ten (10) ASICS to support the Broad Reach Engineering GPS Receiver planned for Road Runner. The ASICS are provided under the following terms:


These ASICS are supplied 'as is" with no stated or implied warranty on the part of NASA or JPL for the functional performance of either the ASICS or *the* associated GPS receivers. Furthermore, unused **or** damaged ASICS for the purposes stated are to be returned to JPL within a reasonable period of time.

6. NSF, UCAR and the Department of Defense (DoD) efforts in developing these data will be publicly acknowledged in defining the databases to be made available via this MOA.

**Signed:**

  
Dr. Margaret S. Leinen  
Director, Geosciences Directorate  
National Science Foundation

Date: 9/23/04

  
Dr. Ghassem R. Asrar  
Deputy Associate Administrator for  
Science Mission Directorate  
National Aeronautics and Space  
Administration

Date: 11/17/04