

MEMORANDUM OF AGREEMENT

BETWEEN

**THE NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION,**

THE DEPARTMENT OF THE NAVY,

AND

**THE NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION**

FOR

**THE NASA NEW MILLENNIUM PROGRAM
EARTH OBSERVING 3 GEOSYNCHRONOUS
IMAGING FOURIER TRANSFORM
SPECTROMETER/NAVY INDIAN OCEAN METOC
IMAGER MISSION**

FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION:



Dr. Ghassem R. Asrar
Associate Administrator for Earth Science

Date: 11 July 2002

FOR THE DEPARTMENT OF THE NAVY:



RADM Richard D. West, N096
Oceanographer of the Navy

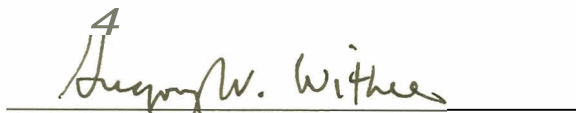
Date: 22 July 02



VADM Dennis V. McGinn, N7,
Deputy Chief of Naval Operations
Resources, Warfare Requirements & Assessments

Date: 22 JUL 02

FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION:



Mr. Gregory W. Withee
Assistant Administrator for Satellite
and Information Services

Date: 11 July 2002

MEMORANDUM OF AGREEMENT

1. PURPOSE

The purpose of this Memorandum of Agreement (MOA) between the National Aeronautics and Space Administration (NASA), the Department of the Navy (the Navy), and the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce (referred to herein as the Parties) is to establish a framework for cooperation on a mission involving: the development, integration, and launching, of a satellite platform for geosynchronous imaging spectrometer technology; the conduct of space flight operations required for utilization of the technology; and the analysis, **calibration/validation**, distribution, and technology transfer of the resulting data to meet NASA, Navy and NOAA requirements.

2. BACKGROUND

NASA's New Millennium Program (NMP) objective is to validate revolutionary technologies and innovative measurement concepts that will enable future science measurements. The NASA NMP Earth Observing 3 (EO-3) Project is a Conterminous United States (CONUS) technology demonstration and space flight validation experiment of the Geosynchronous Imaging Fourier Transform Spectrometer (GIFTS) sensor. The **GIFTS** sensor **will** provide **measurement** of water vapor distribution as a function of altitude, leading to determination of tropospheric wind parameters. In addition, the GIFTS sensor will validate the key enabling technologies leading to improved weather and climate analysis and prediction capabilities.

The Navy's Indian Ocean Meteorological and Oceanographic (METOC) Imager (IOMI) Program is the sensor program identified in the Future Year Defense Plan (FYDP) to meet the Navy's Indian Ocean METOC requirement as defined by the Oceanographer of the Navy. The IOMI Program objective is to develop, integrate, and launch an advanced technology sensor providing a demonstration of operational utility of high-resolution weather imagery direct to Navy ships in the Indian Ocean. The NASA EO-3 GIFTS mission, with design enhancements to extend the sensor and mission lifetime and orbit relocation, will meet the Navy requirements.

NOAA's objective is to **confirm** GIFTS technology can meet requirements for future operational geosynchronous sounders and provide for early development of processing algorithms that can shorten the time between launch and operations for future NOAA operational sounders.

This joint program provides the opportunity for direct infusion of these technologies into the NOAA advanced geosynchronous sounder program and into future military and civil weather systems.

For these reasons, the Parties have agreed to collaborate on a joint EO-3 **GIFTS-IOMI** Mission. The overall mission lifetime design requirement is seven years. This mission envisions two distinct phases:

Phase 1 (the **CONUS** Phase) will be the NASA GIFTS New Millennium Program technology demonstration phase carried out over the **CONUS**. This phase has a **planned** duration of 12 months not to exceed 16 months unless agreed upon by the Navy. While NASA and the Navy operate the EO-3 **GIFTS-IOMI** satellite over the **CONUS** for the first 12-16 months, NOAA will capture and analyze GIFTS data to enable the GIFTS measurement concept to achieve a successful transition from research to **operation**.

Phase 2 (the Indian Ocean Phase) will be a Navy demonstration of operational utility over the Indian Ocean, with a planned duration of at least five years. By demonstrating this capability over the Indian **Ocean**, the Navy mission will provide valuable data to fill a large weather data void, which in turn has the potential to provide great improvements in global weather forecasting.

GIFTS is the primary payload for the **CONUS** mission. Additional payloads (instruments) are secondary payloads and cannot interfere with the development, deployment or **CONUS** utilization of the GIFTS sensor.

AUTHORITY

NASA, the Navy and NOAA are authorized to enter into this MOA pursuant to Sections 203(c)(5) and (6) of the National Aeronautics and Space Act of 1958, 42 U.S.C. § 2473(c)(5) and (6), and Section 3 of the Weather Service Organic Act, as amended, 15 U.S.C. § 313.

4. **SPECIFIC RESPONSIBILITIES**

The Parties agree to provide their best efforts to meet the responsibilities stipulated below.

4.1. NASA will use its best efforts to:

- a) Provide funding per Section 6 of this MOA.
- b) Develop the protoflight GIFTS sensor in accordance with NMP EO-3 and applicable **IOMI** requirements consistent with cost and schedule.
- c) Manage the development of the EO-3 GIFTS-IOMI Mission, including the scheduling, programmatic and technical **interchange/review** meetings with the Navy and NOAA, to facilitate EO-3 GIFTS-IOMI Mission development.
- d) Jointly with the Navy and NOAA, through the Interagency Coordinating Office (ICO), coordinate, direct and manage the merging of mission, programmatic and technical requirements and the implementation of those requirements for the integrated mission as defined in Sections 7.2 – 7.4 below.

- e) In partnership with the Navy, identify, negotiate and enter into additional agreements for secondary payloads.
- f) Validate GIFTS technologies and the GIFTS measurement concept based on measurements made during the CONUS Phase.
- g) Operate the _____ during the CONUS Phase. Develop all facilities and procedures for operation to ensure safe and efficient transfer of control to the Navy at the end of the CONUS Phase, including:
 - Support fleet demonstrations and **calibration/validation** of selected Navy products before Indian Ocean demonstration of Navy operational utility
 - Provide sensor operations training for Navy **and/or** designated contractor personnel before on-orbit delivery of the GIFTS sensor
- h) At the completion of the CONUS Phase of the mission, carry out a smooth transfer of operational responsibility from NASA to the Navy, including:
 - Delivery to the Navy all Ground Support Equipment (GSE) specific to the EO-3 GIFTS-IOMI Mission required for routine operation of the sensor including GSE hardware, software, and documentation related to the command and control of the sensor in flight.
 - Delivery to the Navy of a copy of all GIFTS sensor documentation including as-built drawings, as-built source code, operations plans, operations manuals, and calibration and validation data and results.
- i) Develop plans and proposals and identify funding for potential science use of the EO-3 GIFTS-IOMI satellite during the Indian Ocean Phase, as appropriate, and support the negotiation of related agreements for potential scientific Indian Ocean mission operations, as mutually agreed by the Parties.
- j) Assist the Navy and NOAA in obtaining continued program support.

4.2. The Navy will use its best efforts to:

- a) Provide funding per Section 6 of this MOA.
- b) Participate in the EO-3 GIFTS-IOMI mission development through contribution of management and key personnel, scheduling, programmatic and technical interchange/review meetings with NASA and NOAA.
- c) Jointly with NASA and NOAA, through the Interagency Coordinating Office (ICO), coordinate, direct and manage the merging of mission, programmatic and technical requirements and the implementation of those requirements for the integrated mission as defined in Sections 7.2 – 7.4 below.
- d) In partnership with NASA, identify, negotiate and enter into additional agreements for secondary payloads.

- e) Provide for an increase in the reliability of the GIFTS instrument beyond the requirement for the CONUS Phase to meet the mission lifetime requirement of seven years.
- f) Provide the acquisition vehicle for the spacecraft for the EO-3 GIFTS-IOMI Mission (including its design, integration and testing).
- g) Provide the launch vehicle and launch services for the GIFTS-IOMI mission and selected secondary payloads to achieve geosynchronous transfer orbit through a Memorandum of Agreement with the Department of Defense (DoD) Space Test Program (STP), as mutually agreed between NASA, the Navy and NOAA.
- h) Support mission/spacecraft operations during the CONUS Phase, as required to meet Navy mission requirements during Phase 1. Accept the spacecraft on-orbit at the end of the CONUS Phase, transfer orbit location to the Indian Ocean, and assure ground system operations for the Indian Ocean Phase
- i) File for and provide orbital slots and RF frequency allocations for Phase 1 and Phase 2 mission.
- k) Provide appropriate end of life disposal for the EO-3 GIFTS-IOMI satellite.
- l) Review, and accommodate if feasible, NASA and NOAA proposals for scientific and weather service use of the EO-3 GIFTS-IOMI satellite during the Indian Ocean Phase. Support the negotiation of related agreements for scientific and weather service Indian Ocean Phase mission operations, as mutually agreed by the Parties.
- m) Assist NASA and NOAA in obtaining continued program support.

4.3 NOAA will use its best efforts to:

- a) Provide funding for NOAA commitments per Section 6 of this MOA .
- b) Jointly with the Navy and NASA, through the Interagency Coordinating Office (ICO), coordinate, direct and manage the merging of mission, programmatic and technical requirements and the implementation of those requirements for the integrated mission as defined in Sections 7.2 – 7.4 below.
- c) Provide downlink reception and associated data ground system operations (including GIFTS operational algorithms, software and data archiving) starting immediately after completion of launch and on-orbit delivery and continuing through completion of the CONUS Phase. Effect transfer of ground station operations to Navy at CONUS on-orbit transfer of the spacecraft to Navy.
- d) Provide timely access to all available raw data and data products produced as part of the GIFTS technology and measurement concept validation to NASA for NMP technology validation, and to the Navy to facilitate Navy Indian Ocean mission operations.
- e) During the CONUS Phase, collect and distribute the data necessary to maximize the use of GIFTS data, and support research efforts ensuring the readiness of

operational product processing for the launch of ~~the~~ advanced geosynchronous sounder. In addition, cooperate with NASA to designate tasking to collect this data during the CONUS Phase.

- f) Perform applied research aimed at developing algorithms for using GIFTS data and **establishing** a stable set of products and **nowcasting** tools ready for use when the advanced geosynchronous sounder data are available.
- g) Make full use of the NASA/NOAA Joint Center for Satellite Data Assimilation to develop efficient assimilation mechanisms and to perform model benefit studies to demonstrate the advantages of an interferometer sounder to Numerical Weather Prediction.
- h) Integrate GIFTS technology into NOAA's operational advanced geosynchronous sounder, as **appropriate** (utilizing the NASA GOES Project office). NOAA will establish a time and material account to cover partnership costs in support of this requirement.
- i) Participate in scheduling, programmatic and technical **interchange/review** meetings with NASA and the Navy to facilitate EO-3 GIFTS-IOMI Mission development.
- j) Develop plans and proposals and identify funding for National Weather Service (NWS) use of the EO-3 GIFTS-IOMI satellite during the Indian Ocean Phase, as appropriate. Also, support the negotiation of related agreements for scientific Indian Ocean Phase mission operations, as mutually **agreed** by the Parties.
- k) Assist NASA and Navy in obtaining continued program support.
- l) Manage these activities and deliver products to the EO-3 GIFTS-IOMI Program, as appropriate, together with the time and material support in item 4.3(f).

5. MAJOR MISSION MILESTONES

The key milestones shown below are included to convey the intent of NASA, the Navy and NOAA to develop, launch and operate the EO-3 GIFTS-IOMI Missions. The target launch date for EO-3 GIFTS-IOMI satellite is November 2005, with the target relocation date of the flight system to the Indian Ocean between November 2006 and March 2007. The schedule for these events is critical to the timeliness of both the NASA NMP technology validation and the Navy Indian Ocean operational utility demonstration.

TASK	COMPLETION
a) GIFTS-IOMI System Requirements Identified	Jul 2000
b) GIFTS-IOMI Preliminary Design Completed	Mar 2001
c) GIFTS-IOMI Mission Confirmation	May 2002
d) GIFTS-IOMI Mission CDR	Mar 2003
e) Ground System Availability	Oct 2004
f) Spacecraft Bus Delivery to System Integration and Test	Jan 2005
g) Payload(s) Delivery to System Integration and Test	Mar 2005
h) Mission Launch Readiness Date	Nov 2005
i) Phase 1 Completion of EO-3 Calibration/Validation of Data/Technology Demonstration	Launch+14 months
j) Phase 2 Relocation of Satellite to Navy Indian Ocean Mission	Launch+16 months
k) Completion of Indian Ocean Phase 2	Launch+76 months

6. ANTICIPATED PROGRAM FUNDING (\$M)

	Prior	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
NASA*	26.80	27.20	18.30	10.00	3.00	3.00	1.60	89.90
Navy*	0.50	6.75	12.72	15.29	5.28	16.31	8.90	45.75
NOAA	0.20	2.00	10.20	10.20	5.20	5.20	5.20	38.20
Total**	27.50	35.95	41.22	35.49	13.48	24.51	15.70	193.85

* Each partner is responsible to provide funding to offset cost growth consistent with that partner's share of responsibility as shown in Section 4. The partners agree to address and resolve funding phasing issues and cost risks in a timely fashion. Funding does not include secondary payloads and associated costs.

**Total reflects funds required for GIFTS sensor design, increased lifetime and development, and ground system costs plus funds to acquire the spacecraft and support mission requirements. To the extent required by DoD Instruction (AFI 10-1202(I), Section 1.13.5), the Navy and NASA shall fund STP for any increases in costs incurred as a result of GIFTS-IOMI mission delays. The cost of the Delta IV and launch service, estimated at \$75 million, is in addition to funding outlined in Section 6 above and raises the DoD (Navy, STP) mission contribution to ~\$140M, for the total mission cost to ~\$268 million, not including the cost of secondary payloads.

Funding outlined reflects the agency contribution to the program, disbursement details will be outlined in the Project Implementation Plan, i.e. sensor development, ground station development, etc.

7. OVERSIGHT AND COORDINATION

7.1. A Senior Oversight Board will set the overall direction of the EO-3 GIFTS-IOMI Mission and will resolve any inter-agency difficulties or disputes not capable of resolution through coordinating functions of the Parties at lower levels. The Senior Oversight Board will be composed of the following senior officials responsible for the three agency programs contributing to the EO-3 GIFTS-IOMI Mission: for NASA, the Associate Administrator for Earth Science; for the Navy, the Deputy Chief of Naval Operations, in coordination with the Oceanographer of the Navy; and for NOAA, the Assistant Administrator for Satellite and Information Services. The members of the Senior Oversight Board may designate a senior official within their respective programs to represent them on the Board.

7.2. Program Offices from the Parties, NASA's NMP Office, the Navy's IOMI Program Office, and NOAA's Office of Systems Development will coordinate their activities to accomplish the agency responsibilities set out in Sections 4, 5, and 6 of this MOA. The three program offices will assure that the EO-3 GIFTS-IOMI Project receives the resources necessary to accomplish the mission. In addition, the program offices will conduct appropriate reviews on the progress of the mission, and will make timely reports to their respective authority.

7.3. An Interagency Coordinating Office (ICO) will be formed including representation from the Parties' Program Offices, and will be chaired by an ICO Director from NASA. The ICO will provide an integrated management approach and structure for mission implementation. The ICO will be responsible for coordinating, directing and managing the merging of mission, programmatic and technical requirements from the Parties, and for managing the implementation of those requirements for the integrated GIFTS-IOMI mission. In addition, the ICO will be responsible on behalf of mission implementation for all organizational interfaces outside Project procurements and similar contractual agreements.

7.4. The Project Office at LaRC will report to the ICO and will be the lead office for the EO-3 GIFTS-IOMI Mission implementation. This office includes the Project Manager (NASA) and Deputy Project Managers (detailed from the Navy and NASA). The GIFTS-IOMI Project Plan will be the Implementation Plan for this agreement. The members of the ICO will have approval authority for the Project Plan.

7.5. Each Federal agency participating in the EO-3 GIFTS-IOMI Mission will be responsible for its own administrative and personnel costs, including the costs of any of its officials detailed to the offices of another agency. Nothing in this MOA shall be interpreted to require the interagency funding of a board, panel or office in violation of

the Congressional prohibition contained in Section **610** of the Treasury and General Appropriations Act, 2002 (P.L. **107-67**).

8. LIABILITY AND RISK OF LOSS

Each Party agrees to assume liability for its own risks associated with activities undertaken pursuant to this MOA.

9. DATA EXCHANGE

The Parties intend that ~~the~~ information and data produced during mission operations shall be exchanged without use and disclosure restrictions unless required by statute or regulation, or unless otherwise agreed to by the Parties for specifically identified ~~information~~ or data. During the Navy IOMI mission, data may be subject to military embargo restrictions. Any media can be used as appropriate for the type of information. Direct access to a database or tapes shall constitute transfer.

10. AMENDMENT AND TERMINATION

The Parties will review this MOA annually and amend it as required. This MOA may be amended at any time upon the mutual consent of all ~~three~~ Parties. Amendments must be in writing, and signed by the authorized representatives of each of the ~~three~~ Parties.

This MOA will terminate automatically upon completion of ~~the~~ EO-3 GIFTS-IOMI Mission, or eleven years from the effective date of this MOA, whichever comes first. The Parties may amend this MOA pursuant to the preceding paragraph to extend the termination date. Any Party may terminate its participation in this MOA at its sole discretion, subsequent to providing **120** days advance written notice to the other Parties. In the event of a termination, ~~the~~ Parties agree to negotiate ~~the~~ equitable settlement of termination costs.

11. DISPUTE RESOLUTION

Should any disagreement arise on the interpretation of the provisions of this MOA, or amendments ~~and/or~~ revisions thereto, that cannot be resolved at the operating level, the area or areas of disagreement shall be stated in writing by each of the disputing Parties and presented to the Senior Oversight Board for **resolution**.

12. AGENCY POLICIES, REGULATIONS AND DIRECTIVES

Nothing in this MOA is intended to conflict with current laws or NASA, Navy, or **Department** of Commerce policies, regulations, or directives. If the terms of this MOA are inconsistent with existing directives of any of the three agencies, then those portions of this MOA which are determined to be inconsistent shall be invalid; but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of this MOA, all necessary changes will be accomplished by either an amendment to this MOA, or by entering into a new agreement, whichever is deemed expedient to the interest of the Parties.

13. ANTI-DEFICIENCY ACT

All activities under or pursuant to this MOA are subject to the availability of appropriated funds, and no provision herein shall be interpreted to require obligation or provision of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

14. EFFECTIVE DATE

This MOA shall be effective on the date of the last signature to this MOA.