

**MEMORANDUM OF UNDERSTANDING**

**AMONG**

**THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**AND**

**THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**

**JOINTLY**

**AND**

**THE CENTRE NATIONAL D'ETUDES SPATIALES**

**AND**

**THE EUROPEAN ORGANISATION FOR THE EXPLOITATION OF  
METEOROLOGICAL SATELLITES**

**FOR COOPERATION IN**

**THE OCEAN SURFACE TOPOGRAPHY MISSION**

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## Preamble

The National Aeronautics and Space Administration (hereinafter referred to as "NASA") and the National Oceanic and Atmospheric Administration (hereinafter referred to as "NOAA"), both agencies of the United States Government, acting jointly as one Party to this Memorandum of Understanding (MOU), and as represented by their Administrators;

The Centre National d'Etudes Spatiales (hereinafter referred to as "CNES"), established under the provisions of the French Law 61-1382, dated December 19, 1961, setting up a national center for space research and, as represented by its President; and

The European Organisation for the Exploitation of Meteorological Satellites (hereinafter referred to as "EUMETSAT"), established by the Convention which entered into force on June 19, 1986, as amended by the Amending Protocol which entered into force on November 19, 2000, and as represented by its Director-General,

hereinafter referred to as the "Parties" to this Memorandum of Understanding,

RECALLING the cooperative effort of NASA and CNES that led to the launch of the TOPEX/Poseidon mission by an Ariane launch vehicle from the Kourou launch site in French Guiana, on August 10, 1992,

RECALLING the cooperative effort of NASA and CNES that led to the launch of the Jason mission by a Boeing Delta II launch vehicle from Vandenberg Air Force Base in California, on December 7, 2001,

RECOGNIZING that both the TOPEX/Poseidon mission and the Jason mission have demonstrated clearly that global sea surface topography measurements of unparalleled accuracy can be obtained from space; and further, that such measurements can create new opportunities for monitoring ocean phenomena and developing models to predict global climatic change,

RECOGNIZING the important contribution that the Jason mission has brought to operational activities that led EUMETSAT and NOAA to express a strong interest in participating in the program,

RECALLING the success of NASA in research and development on a variety of environmental programs and the extensive experience of NOAA in operating civilian satellites for the benefit of users of environmental data and the World Meteorological Organization (WMO),

RECALLING NOAA's performance of various domestic and international missions including observation and reporting of the state of the oceans and preparation and issuance of warnings and forecasts of atmospheric, flood, and ocean conditions to ensure protection of life and property; operation of environmental satellites and data archives for the United States; and provision of products and services to users and managers of oceanic, atmospheric, and coastal zone programs,

RECALLING that the primary objective of EUMETSAT is to establish, maintain, and exploit European systems of operational meteorological satellites, taking into account as far as possible the recommendations of the WMO, and that a further objective of EUMETSAT is to contribute to the operational monitoring of the climate and the detection of global climatic changes,

TAKING INTO ACCOUNT the Enabling Resolution EUM/C/01/Res. VII on the Optional EUMETSAT Jason-2 Altimetry Programme, adopted at the 49<sup>th</sup> meeting of the EUMETSAT Council, in which the Council approved the execution, within the framework of the EUMETSAT Convention, of an Optional Jason-2 Altimetry Programme, and which tasked the Director-General with the preparation of the necessary cooperation agreements with international partners contributing to the overall Ocean Surface Topography Mission (OSTM),

TAKING INTO ACCOUNT that Declaration EUM/C/01/Decl. I on the Optional EUMETSAT Jason-2 Altimetry Programme adopted by EUMETSAT Potential Participating States on December 4-5, 2001, entered into force on June 27, 2003,

RECALLING that EUMETSAT and NOAA have enjoyed long-standing and fruitful cooperation in the field of operational Earth observation from space for meteorological purposes,

RECALLING that the CNES Board of Governors approved the program proposal (Phase B/C/D) for Jason-2/OSTM implementation on April 29, 2004,

TAKING INTO ACCOUNT the requirement for satellite ocean altimetry observations expressed by the WMO, the Global Ocean Data Assimilation Experiment (GODAE), the Global Ocean Observing System (GOOS), the Ocean Observations Program Committee (OOPC), and the Integrated Global Observing Strategy Partnership (IGOS-P),

TAKING NOTE OF the common interest of the Parties to continue using radar altimetry to study the oceans from space,

RECOGNIZING the imperative need that this measurement set be continued on an operational basis, and

HAVING IDENTIFIED a mutual interest in the conduct of OSTM,

HAVE AGREED as follows:

#### **Article I - Purpose**

The Parties each set forth in this MOU their respective responsibilities and the terms and conditions under which they have agreed to cooperate on OSTM. The Parties will use reasonable efforts to carry out their respective responsibilities in accordance with this MOU and to avoid changes that will have a negative effect on another Party with regard to scientific return, implementation approach, cost, and/or schedule, and where they cannot be avoided, to minimize these negative effects.

## Article II – Definitions

As used in this MOU, the following terms will have the specified meanings:

1. “Damage” means:
  - a. harm to, impairment of the health of, or death of any person;
  - b. harm to, destruction or loss of, or loss of use of any property;
  - c. other direct, indirect, or consequential damage.
2. “Data Products” are those resulting from processing of the Payload Instrument Data and any necessary supporting Housekeeping Data and/or ancillary data. These fall into two general categories:
  - a. Near Real Time (NRT) Products, available within a few hours of acquisition by the satellite; and
  - b. Offline Products, available with a delay of several days or weeks after additional processing.
3. “OSTM Ground Segment” means all elements and facilities required to operate the satellite, acquire its Telemetry, process, distribute, and archive Telemetry and Data Products.
4. “Partner” refers to NASA and to NOAA, when they are acting individually, and to CNES and to EUMETSAT.
5. “Proprietary Information” means information embodying trade secrets or comprising commercial or financial information that is privileged or confidential, excluding such information that:
  - a. is in the public domain at the time of disclosure or thereafter enters the public domain without breach of the receiving Partner (or a Related Entity of the receiving Partner);
  - b. is known to the receiving Partner at the time of disclosure;
  - c. has been disclosed to the receiving Partner without restriction from the disclosing Partner;
  - d. has been independently developed by the receiving Partner; or
  - e. has become known to the receiving Partner without similar restrictions from a source other than the disclosing Partner, that source having the right to disclose.
6. “PROTEUS” is the name of the satellite platform.
7. “Related Entity” means:
  - a. a contractor, subcontractor, or grant recipient of a Partner at any tier;
  - b. a user or customer having a contractual link with a Partner at any tier;
  - c. a contractor or subcontractor of a user or customer or grant recipient of a Partner at any tier; or

- d. a scientific investigator.

The terms "contractors" and "subcontractors" include suppliers of any kind.

8. "Satellite," sometimes referred to as "Jason-2," is the satellite composing the space component of OSTM. It consists of a PROTEUS platform, a payload module, and payload instruments.
9. "Telemetry" is downlinked data comprising of:
  - a. "Housekeeping Data" (measurements of spacecraft performance and health and welfare of the satellite); and
  - b. "Payload Instrument Data" (raw instrument data).
10. "Validated Data" are Data Products based upon Telemetry after successful completion of the relevant product assessment and verification.

### **Article III - Mission Description and Participation**

The objective of OSTM is to bring high-precision altimetry to a full operational status through the continuation of the TOPEX/Poseidon and Jason missions and their collection of measurements of sea surface height (SSH), significant wave height (SWH), wind speed at the ocean surface, and other parameters.

OSTM will provide Data Products to the operational and research user communities in support of:

- Marine meteorology and sea state forecasting;
- Operational oceanography;
- Seasonal forecasting;
- Climate monitoring;
- Ocean, Earth system and climate research.

CNES will provide the PROTEUS platform and payload module; NASA and CNES will jointly provide the payload instruments. CNES will provide a Poseidon-3, dual-frequency radar altimeter with its antenna and the Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) receiver package.

NASA will provide an Advanced Microwave Radiometer (AMR) with its antenna, a laser retroreflector array (LRA), and a Global Positioning System Payload (GPSP) receiver package.

NASA will provide launch services for the satellite.

CNES will provide a command and control center for the satellite, a European Earth Terminal and data processing, and archiving and distribution infrastructure for the mission.

NOAA will provide a control center for the satellite, command and data acquisition (CDA) stations, and data processing and archiving and distribution infrastructure for the mission.

EUMETSAT will provide a site and infrastructure for accommodation of the European Earth terminal to be integrated into the EUMETSAT Ground Segment infrastructure and data processing, rolling archiving and distribution infrastructure for the mission.

The Partners are to jointly establish and operate an OSTM Ground Segment. Telemetry is to be made available to the Partners and Data Products to the broader international user community through data centers and services under the responsibility of the Partners consistent with Article XII (Data Policy).

Data Products will be, at a minimum, consistent with TOPEX/Poseidon and Jason data products and will be defined in the Operational Service Specification (OSS) together with the associated services to the users.

OSTM operations are planned for 5 years. The mission operation is divided into six phases, the objectives of each being as follows:

1. Launch and Early Orbit Phase (LEOP). The satellite is launched and maneuvered into injection orbit. Satellite and instrument systems are activated and checked out.
2. Orbit Acquisition Phase. The satellite is maneuvered into its operational orbit. This phase is concurrent with the Assessment Phase.
3. Assessment Phase. This phase begins at the end of LEOP and ends when:
  - a. the satellite and instrument systems are functionally certified;
  - b. the satellite is in its operational orbit; and
  - c. the ground system is ready to operate routinely.
4. Verification Phase. This phase overlaps the Assessment Phase and continues until the data and processing algorithms are satisfactorily calibrated and validated.
5. Initial Routine Operation Phase. This phase begins after completion of the Assessment Phase and is consistent with the 3-year mission design life.
6. Extended Routine Operation Phase. Assuming useful data are still being collected, this phase extends the mission an additional 2 years or any additional period that may be agreed by the Parties. This phase will include end-of-life activities.

In this MOU, the term "Routine Operation Phases" is used for both "Initial Routine Operation Phase" and "Extended Routine Operation Phase."

#### **Article IV - CNES Responsibilities**

To implement this MOU, CNES will use reasonable efforts to:

1. Establish, with the support of all Partners, the overall systems engineering function for OSTM;

2. Establish and maintain, with the support of the other Partners, and make available to the Partners the OSTM Project Plan, OSS, System Requirements, Operational Concept, Project Schedule, and other Project Documents, to be approved by the Partners as defined in the Project Plan, including relevant interface control documents and in-orbit assessment and verification plans;
3. Support NASA with information as required for the preparation and maintenance of the OSTM Safety Plan; provide NASA with information to verify compliance with the OSTM Safety Plan;
4. Establish a Mission Assurance Plan (MAP) for its own contribution, make it available to the other Partners, and review the MAPs of the other Partners;
5. Conduct or support, together with the other Partners as necessary, OSTM project reviews, as defined in the OSTM Project Plan;
6. Provide interface, design, fabrication, and test information and support as necessary for the other Partners to fulfill their respective responsibilities under this MOU;
7. Design, fabricate, test, calibrate, and prepare to integrate the PROTEUS platform and the payload module;
8. Design, fabricate, assemble, test, and calibrate the CNES instruments (the Poseidon-3 altimeter and the DORIS receiver package) and provide fully tested instruments to be integrated with the satellite;
9. Provide a site and infrastructure for instrument integration and testing of the fully integrated satellite;
10. Conduct, with NASA support, integration of the fully tested instruments onto the platform; perform functional tests of the satellite; transport the flight-ready satellite to the NASA designated launch site and support launch site processing and testing;
11. Provide ground support equipment and qualified personnel at appropriate sites to support payload and system integration, testing, and launch operations;
12. Upgrade the CNES Command and Control Center (CCC) and the data processing, archival, and distribution center (SSALTO);
13. Test the CNES elements of the OSTM Ground Segment, as defined in the OSTM Project Plan;
14. Provide to NASA all satellite information necessary for NASA to ensure satellite and launch vehicle compatibility, as defined in the OSTM Project Plan;
15. Conduct, with the support of other Partners, satellite, ground system, and overall system-level testing, evaluation of test results, and preparation for operations, as defined in the OSTM Project Plan;
16. Perform quality control of all products generated by CNES;
17. Operate and control the satellite from launch until handover of this responsibility to NOAA, including operations of the European Earth terminal, and support routine operations at NOAA and EUMETSAT, as defined in the OSTM Project Plan;
18. Lead and conduct, with the support of other Partners, the OSTM Assessment and Verification Phases, as defined in the OSTM Project Plan, and perform evaluation and calibration activities to verify the OSTM performance achieved on-orbit;



19. Coordinate operations from a system perspective, in all phases, throughout the OSTM lifetime;
20. Archive all Telemetry, as defined in the OSTM Project Plan consistent with Article XII (Data Policy), and perform offline monitoring of Housekeeping Data during all OSTM Phases;
21. Process and archive Offline Products and distribute them to users, as defined in the OSTM OSS consistent with Article XII (Data Policy), and archive NRT Products generated by NOAA and EUMETSAT;
22. Provide, test, and deliver to EUMETSAT a European Earth terminal, including a set of spare parts, and requirements for its accommodation and operations at a EUMETSAT-designated site;
23. Provide, test, and deliver to EUMETSAT Headquarters a fully tested NRT processing system; support integration and testing of the system at the EUMETSAT-specified location;
24. Provide, test, and deliver to NOAA a fully tested NRT processing system; support integration and testing of the system at the NOAA-specified location;
25. Provide to NOAA a satellite performance and analysis function and engineering and operation support for anomaly resolution for CNES instruments and satellite for the total life of the satellite;
26. Conduct, together with NASA, the preparation and release of relevant Research Announcements and, in coordination with EUMETSAT, the selection of European Investigators as specified in Article XI (OSTM Science Investigations and Application Demonstrations) of this MOU; and
27. Inform the Partners promptly of any technical or programmatic problems that may affect overall OSTM schedules, cost, or performance.

#### **Article V - NASA Responsibilities**

To implement this MOU, NASA will use reasonable efforts to:

1. Support CNES for the overall systems engineering function for OSTM;
2. Support, along with the other Partners, the preparation and maintenance of the OSTM Project Plan, OSS, System Requirements, Operational Concept, Project Schedule, and other Project Documents, to be approved by the Partners as defined in the Project Plan, including relevant interface control documents and in-orbit assessment and verification plans;
3. With support from CNES, establish and maintain the OSTM Safety Plan in response to NASA requirements; verify compliance with controls, procedures, testing, and policies, as defined in the OSTM Safety Plan;
4. Establish a MAP for its own contribution, make it available to the other Partners, and review the MAPs of the other Partners;
5. Conduct or support, together with the other Partners as necessary, OSTM project reviews, as defined in the OSTM Project Plan;

6. Provide interface, design, fabrication, and test information and support as necessary for the other Partners to fulfill their respective responsibilities under this MOU;
7. Design, fabricate, assemble, test, and calibrate the NASA instruments (an AMR with its antenna, an LRA, and the GPSP receiver package), and provide fully tested instruments to be integrated with the satellite;
8. Support CNES in the integration of the NASA instruments onto the Payload module and functional testing of the satellite;
9. Provide launch services compatible with the Jason-2 satellite and OSTM mission requirements; conduct, with support of other Partners, launch site processing and testing activities;
10. Provide ground support equipment and qualified personnel at appropriate sites to support payload and system integration, testing, and launch operations;
11. Provide to CNES all necessary launch vehicle information, and support CNES in the verification of the compatibility of satellite interfaces with the launch vehicle;
12. Support CNES, along with the other Partners, in ground system and overall system-level testing, evaluation of test results, and preparation for operations;
13. Support CNES checkout and operation of the satellite during LEOP, including additional Earth terminals such as the Transportable Orbital Tracking System (TOTS), to provide data tracking, and Flight Dynamic Facility Center involvement to provide CNES with improved satellite position;
14. Support, along with the other Partners, the OSTM Assessment and Verification Phases, as defined in the OSTM Project Plan, and perform evaluation and calibration activities to verify the OSTM performance achieved on-orbit;
15. Provide to NOAA and CNES engineering support for anomaly resolution for NASA instruments throughout the OSTM lifetime;
16. Conduct, together with CNES, the preparation and release of relevant Research Announcements and, in coordination with NOAA, the selection of U.S. Investigators as specified in Article XI (OSTM Science Investigations and Application Demonstrations) of this MOU; and
17. Inform the Partners promptly of any technical or programmatic problems, which may affect overall OSTM schedules, cost, or performance.

#### **Article VI - EUMETSAT Responsibilities**

To implement this MOU, EUMETSAT will use reasonable efforts to:

1. Support CNES for the overall systems engineering function for OSTM;
2. Support, along with the other Partners, the preparation and maintenance of the OSTM Project Plan, OSS, System Requirements, Operational Concept, Project Schedule, and other Project Documents, to be approved by the Partners as defined in the Project Plan, including relevant interface control documents and in-orbit assessment and verification plans;

3. Establish a MAP for its own contribution, make it available to the other Partners, and review the MAPs of the other Partners;
4. Conduct or support, together with the other Partners as necessary, OSTM project reviews, as defined in the OSTM Project Plan;
5. Provide interface, design, fabrication, and test information and support, as necessary, for the other Partners to fulfill their respective responsibilities under this MOU;
6. Provide a mission-compliant site and infrastructure for accommodation of the European Earth terminal, support its installation, testing, and on-site acceptance, and perform its integration with CNES support into EUMETSAT Ground Segment infrastructure, and maintain it throughout OSTM operations;
7. Support the installation, testing, and acceptance of a near real-time processing system at EUMETSAT Headquarters, and perform its integration into the EUMETSAT Ground Segment infrastructure with CNES support;
8. Establish and test the EUMETSAT elements of the OSTM Ground Segment with support of CNES, as defined in the OSTM Project Plan;
9. Support ground system and overall system-level integration, testing, and preparation of operations and assessment of readiness for launch and operations, as defined in the OSTM Project Plan, including training of key personnel;
10. Perform quality control of all products generated by EUMETSAT;
11. During all OSTM Phases, retrieve all Telemetry acquired at the European Earth terminal and make it available to the other Partners, as defined in the OSTM Project Plan;
12. During OSTM Assessment, Verification, and Routine Operations Phases, produce NRT Products from Telemetry acquired at the European Earth terminal and make them available to the other Partners, as defined in the OSTM Project Plan;
13. During OSTM Assessment, Verification, and Routine Operations Phases, make available the NRT Products produced at EUMETSAT and those generated and made available by NOAA, to users, as defined in the OSTM OSS and consistent with the Article XII (Data Policy);
14. Maintain an online storage of Telemetry acquired by EUMETSAT until such Telemetry is safely archived at the long term archives of CNES and NOAA; archive NRT Products generated by EUMETSAT and NOAA;
15. Support, along with the other Partners, the OSTM Assessment and Verification Phases, as defined in the OSTM Project Plan, and support evaluation and calibration activities to verify the OSTM performance achieved on orbit;
16. Provide a support service to users of NRT Products and a European focal point for offline users of wind-wave products, as defined in the OSTM OSS;
17. During all OSTM Phases, support NOAA and CNES in conducting mission operations;
18. Support the relevant Research Announcement process, and assess the relevance of investigation results to future operational services as specified in Article XI (OSTM Science Investigations and Application Demonstrations) of this MOU; and
19. Inform the Partners promptly of any technical or programmatic problems which may affect overall OSTM schedules, cost, or performance.

## Article VII - NOAA Responsibilities

To implement this MOU, NOAA will use reasonable efforts to:

1. Support CNES for the overall systems engineering function for OSTM;
2. Support, along with the other Partners, the preparation and maintenance of the OSTM Project Plan, OSS, System Requirements, Operational Concept, Project Schedule, and other Project Documents, to be approved by the Partners, as defined in the Project Plan, including relevant interface control documents and in-orbit assessment and verification plans;
3. Provide NASA with required information necessary for NASA to establish and maintain the OSTM Safety Plan;
4. Establish a MAP for its own contribution, make it available to the other Partners, and review the MAPs of the other Partners;
5. Conduct or support, together with the other Partners as necessary, OSTM project reviews, as defined in the OSTM Project Plan;
6. Provide interface, design, fabrication, and test information and support as necessary to the other Partners to fulfill their respective responsibilities under this MOU;
7. Upgrade the NOAA Satellite Operations Control Center, CDA stations, and the data processing, archival, and distribution centers; integrate the OSTM-specific equipment, hardware, and real-time processing system into the NOAA infrastructure and communication system;
8. Test, with the support of NASA and CNES, the NOAA elements of the OSTM Ground Segment, as defined in the OSTM Project Plan;
9. Support the installation, testing, and acceptance of a near real time processing system at the NOAA-specified location, and perform its integration into the NOAA Ground Segment infrastructure with CNES support; procure and/or install the associated hardware as specified by CNES;
10. Archive all Telemetry, as defined in the OSTM Project Plan and consistent with Article XII (Data Policy), and perform offline monitoring of Housekeeping Data during all OSTM Phases;
11. Perform quality control of all products generated by NOAA;
12. Support ground system and overall system-level integration, testing, and preparation of operations and assessment of readiness for launch and operations, as defined in the OSTM Project Plan, including training of key personnel;
13. Support, along with the other Partners, the OSTM Assessment and Verification Phases, as defined in the OSTM Project Plan, and support evaluation and calibration activities to verify the OSTM performance achieved on orbit;
14. Support real-time mission operations before handover, and prepare for Routine Operations Phases with CNES support;
15. Operate and control the satellite after handover of this responsibility from CNES, including operation of the European Earth terminal;

16. During all OSTM Phases, acquire all Telemetry from the NOAA CDA Stations and make it available to the other Partners, as defined in the OSTM Project Plan;
17. During OSTM Assessment, Verification, and Routine Operations Phases, produce NRT Products from Telemetry acquired at the NOAA CDA Stations and make them available to the other Partners, as defined in the OSTM Project Plan;
18. During OSTM Assessment, Verification, and Routine Operations Phases, make available the NRT Products produced at NOAA and those generated and made available by EUMETSAT to users, as defined in the OSTM OSS and consistent with the Article XII (Data Policy);
19. Provide for long-term archival of OSTM Data Products and provide for access thereto; and make available the Offline Products generated by CNES to users, as defined in the OSTM OSS and consistent with the Article XII (Data Policy);
20. Support the relevant Research Announcement process, and assess the relevance of investigation results to future operational services, as specified in Article XI (OSTM Science Investigations and Application Demonstrations) of this MOU; and
21. Inform the Partners promptly of any technical or programmatic problems which may affect overall OSTM schedules, cost, or performance.

#### **Article VIII - Program and Project Management**

1. Each Partner will designate an OSTM Program and/or Project Manager responsible for fulfilling its respective responsibilities as defined in this MOU and based on mechanisms defined in the OSTM Project Plan.
2. The Partners will establish an OSTM Joint Steering Group (JSG) to provide oversight for the mission. The JSG will be comprised of up to two senior representatives from each Partner, as designated by the Partners in writing.
3. The JSG will meet at least once a year and, additionally, upon agreement of the Partners. The Partners' Program/Project Managers, Program or Mission Scientists, Project Scientists and others of their Project or Program staff, as agreed, will support these meetings.
4. The JSG will review project status, resolve conflicts as foreseen in Article XXIII (Settlement of Disputes), and provide institutional resources to ensure timely delivery of mission elements. The JSG will be cochaired by NASA and CNES during mission development, until handover of satellite operations, and by NOAA and EUMETSAT following handover of the satellite operations and control functions. Decision-making by the JSG will be made by consensus.
5. Changes that may impact other Partners in terms of OSTM cost, mission performance, schedule, and end of life of mission will require the approval of the JSG.

#### **Article IX - Mission Reviews, Integration, and Flight Readiness**

1. To implement OSTM, there will be a series of mission-level reviews, as defined in the OSTM Project Plan, to evaluate the readiness of the Space and Ground Segments to proceed to implementation, integration, test, and final launch preparation. The JSG, which serves as the steering committee for these reviews, will ensure that representatives from all

Partners, or each Partner's designees, are invited to serve on the boards of these reviews. All Partners will furnish relevant engineering and programmatic data and will participate in these reviews. The review process will be further described in the OSTM Project Plan.

2. Taking into account the results of the relevant reviews and key milestones, the Partners will jointly:
  - a. make a final determination on the system's readiness for operations;
  - b. make a final determination on the readiness of the satellite for integration with the launch vehicle; and
  - c. make a final determination on the overall readiness of the system for launch.

#### **Article X – Project Plan and Operational Service Specification**

1. CNES will prepare, in close coordination with the other Partners, the OSTM Project Plan. This plan will contain detailed statements as to how this cooperative project is to be carried out, including mission planning, provision of the satellite, instruments, and ground systems, description of interfaces, conduct of mission operations, and data delivery, overall delivery schedule, plan for formal and informal reviews, process and configuration control, data delivery timeline, and other such information as the Partners' Program/Project Managers deem necessary to control the project. The OSTM Project Plan will be approved by the JSG and maintained by the CNES Project Manager.
2. The Partners will establish and publish an OSTM OSS defining the OSTM standard Data Products and services that the Partners agree to make available jointly to the operational and Science user community. The OSTM OSS will be consistent with the Data Policy, approved by the JSG, and maintained by the CNES Project Manager.
3. In case of conflict between the OSTM Project Plan, OSS, or any other project document and this MOU, this MOU will prevail.

#### **Article XI - OSTM Science Investigations and Application Demonstrations**

1. Program or Mission Scientists: Each Partner will designate a Program or Mission Scientist responsible for its contribution to the joint OST Research Announcement (RA) process and related interactions with the operational user community. The designated Program or Mission Scientists will, in particular:
  - a. oversee the selection of an Ocean Surface Topography Science Team (OSTST) supporting TOPEX/Poseidon, Jason, and OSTM;
  - b. stimulate relevant interactions between selected OST investigators and the operational user community, including the establishment of agreed mechanisms for assessing the relevance of investigation results to future operational services; and
  - c. ensure relevant scientific input and feedback from the operational community to the JSG.
2. The OSTST: The suite of activities within the OSTST will be selected through competitions (the RA process) every 4 years or at a time as mutually agreed by the Partners. The activities will include scientific investigations and innovative application

demonstration projects for OSTM. NASA, in coordination with NOAA, will select proposals to be funded by the United States, and CNES, in coordination with EUMETSAT, will select proposals expected to be funded by European funding agencies. The Partners will jointly select investigators from outside the United States and Europe. The OSTST will be a major contributor to geophysical calibration of OSTM, geophysical correction models update, and validation of data prior to release.

3. Project Scientists: NASA and CNES will designate Project Scientists to oversee the work of the OSTST and its interaction with the OSTM Project. They will be jointly responsible for the development of the scientific aspects of OSTM and for assuring that all data are effectively used across the OSTST and that the investigation results are expeditiously produced and made available. They will also be jointly responsible for coordinating science requirements, calibration and validation plans, and associated field experiments with other organizations.

#### **Article XII - Data Policy**

1. The Partners will make available to each other all Telemetry and Data Products in a timely manner and without any conditions as to the Partners' use of Telemetry and Data Products.
2. As a joint contribution to the worldwide exchange of meteorological and related data and products under the auspices of the WMO, the Partners will treat all Data Products listed in the OSTM OSS as "essential data and products," as defined in WMO Resolution 40 (Cg-XII), and will make them available as such to other users on a free and unrestricted basis.
3. The Partners will make available Payload Instrument Data and Data Products to Investigators selected through the joint RA process and ensure that OSTM Investigators provide a report to the Partners on the results of their investigations.
4. Subject to Article XIX (Exchange of Technology and Goods), algorithms developed for the purposes of processing payload instrument data into higher level data and science data products will be made available to the OSTST and, upon request, to other interested members of the scientific community for purposes of scientific calibration and validation.
5. All Telemetry and Data Products obtained from the OSTM system will be archived in appropriate data centers of the Partners, as defined in the OSTM Project Plan, and Data Products will be made available to all users. Additionally, pertinent ground-based and correlative observations made in support of Payload Instrument Data and Data Product validation will be archived and made available. Notwithstanding termination of this MOU, all Telemetry and Data Products will be archived by the Partners for at least 10 years after the termination of OSTM, unless otherwise agreed by the Partners.
6. There will be no period of exclusive use of Validated Data. The goal should be the release of Validated Data in some preliminary form at the start of the Initial Routine Operation Phase.

### **Article XIII – Publication of Public Information and Results**

1. The Partners retain the right to release public information regarding their own activities under this MOU. The Partners will coordinate with each other in advance concerning public information activities which relate to the other Partner's responsibilities or performance under this MOU.
2. The Partners will ensure that the analyzed results obtained from the OSTM will be made available to the general scientific community through publication in appropriate journals or presentations at scientific conferences as soon as possible and consistent with good scientific practices. In the event that such reports or publications are copyrighted, the Partners will have a royalty free right under the copyright to reproduce, distribute, and use such copyrighted work for their own purposes.

### **Article XIV - Intellectual Property Rights**

1. Nothing in this MOU will be construed as granting or implying any rights to, or interest in, patents owned or inventions which are independently developed by a Partner or a Related Entity.
2. All intellectual property conceived or developed solely by a Partner or Related Entity, in the performance of the activities of this MOU, will be owned by such Partner or a Related Entity.
3. In the event that an invention is jointly made by employees of more than one Partner and/or a Related Entity of more than one Partner during the implementation of this MOU, the Partners concerned will consult and agree as to the responsibilities and costs of actions to be taken to establish and maintain patent protection (in any country) for such invention and on the terms and conditions of any license or other rights to be exchanged or granted by or between the Partners.

### **Article XV – Customs/Taxes/Immigration**

1. In accordance with applicable laws and regulations, each Partner will endeavor to facilitate free customs clearance and waiver of all applicable customs duties and taxes for equipment and related 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 Partner having its headquarters in the country levying such customs, duties, or taxes. Such arrangements will be fully reciprocal.
2. Subject to applicable laws and regulations, each Partner will endeavor to facilitate provision of the appropriate entry and residence documentation for personnel of the other Partners in order to carry out the activities under this MOU.

### **Article XVI – Exchange of Personnel**

To facilitate coordination related to the OSTM, the Partners will support the exchange of a limited number of personnel from each Partner, at a time and under conditions as mutually agreed between the Partners' Project Managers, pursuant to necessary administrative



authorizations. In the event of such an exchange, the Partners will provide necessary office space and administrative support at the host location, including such additional support services as may be agreed between the Partners' Project Managers. Salary and all other expenses will be borne by the employing Partner of the personnel throughout the duration of their assignment.

#### **Article XVII – Financial Arrangements**

Each Partner 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. Further, it is understood that each Partner's obligations are subject to the availability of appropriated funds. Should any Partner encounter budgetary problems that may affect the activities to be carried out under this MOU, the Partner encountering the problems will notify and consult with the other Partners as soon as possible.

#### **Article XVIII – Ownership of Elements and Equipment**

For the purposes of this MOU, each Partner will retain ownership of elements and equipment it furnishes to another Partner, except as otherwise agreed. Any equipment not launched into space will be returned to the furnishing Partner at such time as mutually agreed, unless otherwise agreed. Each Partner will transport its equipment to the delivery points, as specified in the OSTM Project Plan, and, where appropriate, from such delivery points, when the equipment is to be returned to the furnishing Partner.

#### **Article XIX - Exchange of Technology and Goods**

The Parties will transfer only that technology (including algorithms, software, and source code) and those goods necessary to fulfill their respective responsibilities under this MOU, in accordance with the following provisions:

1. All activities of the Parties will be carried out in accordance with applicable laws and regulations, including their export control laws and regulations and those pertaining to the control of classified information.
2. The transfer of technology for the purpose of discharging the Parties' responsibilities with regard to interface, integration, and safety will normally be made without restriction, except as provided in paragraph 1 above.
3. All transfers of goods and proprietary or export-controlled technology are subject to the following provisions: In the event a Partner or its Related Entity finds it necessary to transfer goods or to transfer proprietary or export-controlled technology, for which protection is to be maintained, such goods will be specifically identified and such proprietary or export-controlled technology will be marked. The identification for goods and the marking on proprietary or export-controlled technology will indicate that the goods and proprietary or export-controlled technology will be used by the receiving Partner or its Related Entity only for the purposes of fulfilling the receiving Partner's or its Related Entity's responsibilities under this MOU, and that the identified goods and marked proprietary technology or marked export-controlled technology will not be disclosed or retransferred to any other entity without the prior

written permission of the furnishing Partner or its Related Entity. The receiving Partner or its Related Entity will abide by the terms of the notice and protect any such identified goods and marked proprietary technology or marked export-controlled technology from unauthorized use and disclosure. The Partners to this MOU will cause their Related Entities to be bound by the provisions of this Article related to use, disclosure, and retransfer of goods and marked technology through contractual mechanisms or equivalent measures.

4. All goods exchanged in the performance of this MOU will be used by the receiving Partner or its Related Entity exclusively for the purposes of the MOU. Upon completion of the activities under the MOU, the receiving Partner or its Related Entity will return or, at the request of the furnishing Partner or its Related Entity, destroy, or otherwise dispose of, as mutually agreed, all goods and marked proprietary technology or marked export-controlled technology provided under this MOU.

#### **Article XX - Liability**

1. The Parties agree that a comprehensive cross-waiver of liability will enhance participation in space exploration, use, and investment. The cross-waiver of liability will be broadly construed to achieve this objective. The terms of the waiver are set out below.
2. As used in this Article:
  - a. "Launch Vehicle" means an object or any part thereof intended for launch, launched from Earth, or returning to Earth which carries payloads;
  - b. "Payload" means all property to be flown or used on or in a launch vehicle; and
  - c. "Protected Space Operations" means all activities pursuant to this MOU, including launch vehicle activities and payload activities on Earth, in outer space, or in transit between Earth and outer space. Protected Space Operations begin at the entry into force of this MOU and end when all activities done in implementation of this MOU are completed. It includes, but is not limited to:
    - (i) research, design, development, test, manufacture, assembly, integration, operation, disposal or use of launch or transfer vehicles, payloads, or instruments, as well as related support equipment and facilities and services; and
    - (ii) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

Protected Space Operations excludes activities on Earth that are conducted on return from space to develop further a payload's product or process for use other than for the joint activity in question.

3.
  - a. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subparagraphs (i)

through (iii) below based on Damage arising out of Protected Space Operations. This cross-waiver of liability will apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver of liability will apply to any claims for Damage, whatever the legal basis for such claims, including but not limited to delict and tort (including negligence of every degree and kind) and contract, against:

- (i) another Party;
- (ii) a Partner or a Related Entity of a Partner; and
- (iii) the employees of any of the entities identified in subparagraphs (i) and (ii) immediately above.

b. In addition, each Partner will extend the cross-waiver of liability, as set forth in subparagraph 3.a above, to its Related Entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons identified in subparagraphs 3.a (i) through 3.a (iii) above.

c. Notwithstanding the other provisions of this Article, this cross-waiver of liability will not be applicable to:

- (i) claims between a Partner and its own Related Entity or between its own Related Entities;
- (ii) claims made by a natural person, his/her estate, survivors, or subrogees for bodily injury, other impairment of health or death of such natural person, except where the subrogee is a Partner;
- (iii) claims for Damage caused by willful misconduct;
- (iv) intellectual property claims;
- (v) claims for Damage resulting from a failure of a Partner to extend the cross-waiver of liability, as set forth in subparagraph 3.b, or from a failure of a Partner to ensure that its Related Entities extend the cross-waiver of liability as set forth in subparagraph 3.b; or
- (vi) contract claims between the Partners based on the explicit contractual provisions.

d. Nothing in this Article will be construed to create the basis for a claim or suit where none would otherwise exist.

e. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the Convention on International Liability for Damage Caused by Space Objects of March 29, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property is damaged by virtue of its involvement in Protected Space Operations.

4. In the event of third-party claims for which any of the Partners may be liable, the Partners will consult promptly to determine an appropriate and equitable apportionment of any potential liability and on the defense of any such claims.

5. NASA and NOAA, jointly, and CNES, have requested their respective governments to conclude an agreement that includes a cross-waiver of liability between their respective governments. All rights and obligations under this MOU related to the responsibility to launch as provided by paragraph 9 of Article V (NASA Responsibilities), will be contingent upon the conclusion between France and the United States of such an agreement.

#### **Article XXI - Registration of Satellite and Frequencies**

1. CNES will perform all the procedures enabling the Government of France to register the Jason-2 satellite as a space object in accordance with the Convention on Registration of Space Objects Launched into Outer Space of January 14, 1975. Registration pursuant to this Article will not affect the rights or obligations of the Parties under the 1972 Convention on International Liability for Damage Caused by Space Objects.
2. CNES will also take the necessary steps to ensure registration of the Jason-2 satellite frequencies by the International Telecommunication Union (ITU), with the support of the other Parties as required.

#### **Article XXII – Provision for Future Cooperation**

The Partners will consider working together, as appropriate, on a long-term basis to help define the research and operational requirements for implementation of future ocean surface topography missions involving Europe and the United States, with the objective of ensuring fitness for purposes of research and continuity of data and services for all applications.

In the event a mission failure unexpectedly terminates the OSTM prior to its planned end of lifetime, the Partners agree to consult regarding the resulting gaps in data collection.

#### **Article XXIII - Settlement of Disputes**

Disputes relating to this MOU will be resolved exclusively by the Parties.

Any dispute in the interpretation or implementation of the terms of this MOU that is not resolved by the Project and Program Managers will be referred to the JSG for settlement. Should the JSG be unable to resolve the dispute, it will be submitted to the representatives of each Partner as mentioned in the Preamble of this MOU, or their designees, for an amicable resolution.

#### **Article XXIV - Entry into Force, Duration, Amendment, and Termination**

1. This MOU will enter into force upon signature by all Parties. It will remain in force until completion of the Extended Routine Operation Phase. This MOU may be amended and extended by written agreement of the Parties. Any Party may terminate its participation in this MOU at any time upon at least 12 months written notice to the other Parties. In that event, the terminating Party will consult with the other Parties and will endeavor to minimize negative impacts of such termination on the other Parties and the mission.

2. Termination or expiration of this MOU will not affect the Parties' continuing obligations under Articles XII (Data Policy), XIII (Publication of Public Information and Results), XIV (Intellectual Property Rights), XIX (Exchange of Technology and Goods), and XX (Liability) of this MOU.

Done, in four originals, in the English and French languages, both language versions being equally authentic.

Signed at: Washington, DC

Date: March 21, 2006



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FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Signed at: WASH. DC.

Date: 3/24/06

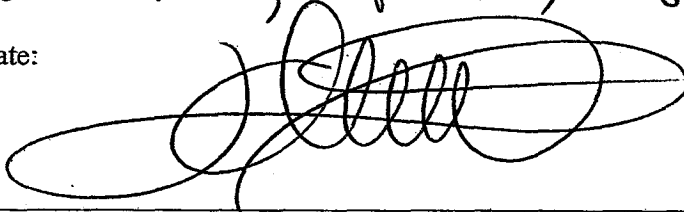


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FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Signed at: PARIS, April 7<sup>th</sup>, 2006

Date:



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FOR THE CENTRE NATIONAL D'ETUDES SPATIALES

Signed at: Darmstadt

Date: 30/3/06



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FOR THE EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES

I CERTIFY THIS TO BE A TRUE COPY OF THE SIGNED ORIGINAL.

Silvan Fleming 10-4-06