

**DECLARATION ON**  
**THE OPTIONAL EUMETSAT JASON-CS PROGRAMME**

**adopted by the Potential Participating States on 23-24 June 2015**  
**at the 83<sup>d</sup> Meeting of EUMETSAT Council**

**The Potential Participating States,**

**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 World Meteorological Organization, and that a further objective of EUMETSAT is to contribute to the operational monitoring of the climate and the detection of global climatic changes,

**BEARING IN MIND** that the Topex/Poseidon and Jason missions established by the Centre National d'Etudes Spatiales (CNES) and the United States National Aeronautics and Space Administration (NASA) have proven the value of altimetry observations in support of operational activities such as marine meteorology, seasonal forecasting, oceanographic services and the monitoring of the climate,

**BEARING IN MIND** that the requirement to continue these observations on a sustained operational basis and the recognition that EUMETSAT is the relevant European operational organisation led to the establishment of the Optional EUMETSAT Jason-2 and Jason-3 Altimetry Programmes through Declarations EUM/C/01/Decl.I and EUM/C/67/09/Decl.I,

**RECALLING** that, of the 30 EUMETSAT Member States, 25 participate in the Optional EUMETSAT Jason-2 Programme and 24 in the Optional EUMETSAT Jason-3 Programme,

**CONSIDERING** that the Declaration on the Optional EUMETSAT Jason-3 Altimetry Programme foresees that the Jason-3 Programme should be seen as a first intermediate step towards an operational high precision altimetry Jason-CS Programme to be agreed with ESA and that this Programme would consist of a series of Jason-class satellites based on the Cryosat mission heritage,

**CONSIDERING** further that the above Declaration tasked the Director-General to prepare with ESA and other international partners for a Jason-CS precise Altimetry Programme providing data continuity in a long term operational perspective on the basis of the EUMETSAT-ESA cooperation model successfully used for operational meteorology,

**RECALLING** that the EUMETSAT strategy "EUMETSAT: A global satellite operational agency at the heart of Europe" approved at the 72<sup>nd</sup> Council meeting foresees, as a strategic objective, to meet additional needs of EUMETSAT Member States for global space-based observations through International Cooperation and that, in this respect, in addition to their JPS Cooperation, EUMETSAT and NOAA shall also continue to work together to secure the continuation of precise ocean surface topography mapping, with the aim of building a sustainable operational satellite observation programme in this area, and that within Europe, appropriate relationships shall be constructed with the GMES initiative, which has now been renamed Copernicus,

**RECALLING** that the Agreement between the United States National Oceanic and Atmospheric Administration and EUMETSAT on long-term cooperation, signed on 28 August 2013, foresees continued cooperation on Operational Oceanography and preparation for the establishment and exploitation of the Jason Continuity of Services (Jason-CS) satellites (including, but not limited to, contribution to instrument payload, joint operations, sharing of ground infrastructures, common user services), in cooperation with other relevant international partners,

**BEARING IN MIND** that Regulation 377/2014 of the European Parliament and of the European Council of 3 April 2014 (“Copernicus Regulation”) establishes the European Union Earth observation and monitoring programme called “Copernicus”, thus ensuring continuity with the activities achieved under the Global Monitoring for Environment and Security (GMES) Programme,

**TAKING INTO ACCOUNT** that the Copernicus Regulation recognises that Copernicus services in the field of marine environment are important for the support of an integrated European capacity for ocean forecasting and monitoring and the future provision of Essential Climate Variables (ECVs) and further establishes that Copernicus marine monitoring service shall provide information on the state and dynamics of physical ocean and marine ecosystems for the global ocean and the European regional areas in support of marine safety, contribution to monitoring of waste flows, marine environmental, coastal and polar regions and of marine resources as well as meteorological forecasting and climate monitoring,

**TAKING INTO ACCOUNT** the requirement for sustained satellite ocean altimetry observations expressed by ECMWF, the WMO, the Global Ocean Data Assimilation Experiment (GODAE), the Global Ocean Observing System (GOOS), the Committee for Earth Observation Satellites (CEOS), the Intergovernmental Panel on Climate Change (IPCC),

**BEARING IN MIND** that the complete altimeter system requested by users consists of a Jason-class high precision ocean altimetry (HPOA) mission in non synchronous orbit as well as polar orbiting altimeter missions, forming altogether the Ocean Surface Topography Virtual Constellation of the Committee for Earth Observation Satellites (CEOS), and that the HPOA mission is required as a reference for cross-calibrating all other altimeter missions of the Constellation,

**TAKING INTO ACCOUNT** that, following the GMES Long Term Scenario, the European component of the complete altimeter system is to be realized in the context of Copernicus, through the combination of the Sentinel-3 marine mission and a Copernicus High Precision Ocean Altimetry (HPOA) activity comprising the operations of a Jason-3 and a Sentinel-6 mission, in cooperation with the US,

**HAVING REGARD TO** Resolution EUM/C/81/14/Res. I establishing a Third Party Programme on EUMETSAT Activities in Support of the Implementation of the Copernicus Programme in the Period 2014-2021 (“Copernicus Third Party Programme”),

**HAVING REGARD TO** the Agreement between the European Union and EUMETSAT on the Implementation of the Copernicus Programme Including the Transfer of Ownership of Certain Assets (“Copernicus Agreement”), signed on 7 November 2014 and entered into force on 1 January 2014, through which the EU entrusts to EUMETSAT the task of operating, *inter alia*, the Sentinel-3 marine mission, the Jason-3 mission and the Sentinel-6 mission implemented by two successive Jason-CS satellites,

**TAKING INTO ACCOUNT** the successful launch of the Jason-2 satellite in June 2008 and the expected launch of the Jason-3 satellite in 2015, with operations planned until 2020,

**CONSIDERING** the requirements to ensure operational continuity to the reference high precision ocean altimetry mission beyond Jason-3,

**AWARE** that this continuity requires the availability of the first Jason-CS satellite ready for launch in 2020 to start implementing the Sentinel-6 mission, and anticipating that the combination of the Jason-3 and Sentinel-6 missions will provide data continuity until the 2030 timeframe, thus allowing the maximum synergy with the Sentinel-3 marine mission for the benefit of operational oceanography and other applications,

**HAVING REGARD** to the policy principles approved by the 74<sup>th</sup> EUMETSAT Council in November 2011, which define the boundaries of the EUMETSAT Jason-CS Programme as a contribution to the GMES HPOA activity,

**BEARING IN MIND** that Article 2 of the EUMETSAT Convention defines Optional Programmes as programmes within the objectives of EUMETSAT and agreed as such by Council,

**HAVING REGARD** to Resolution EUM/C/76/12/Res. III on the Preparation of a Jason Continuity of Service (Jason-CS) Optional Programme, in which Council agreed that the proposed programme is consistent with EUMETSAT’s objectives and should be established and implemented as an Optional Programme within the framework of the EUMETSAT Convention,

**TAKING INTO ACCOUNT** the Programme Proposal on the Optional EUMETSAT Jason-CS Programme contained in document EUM/C/82/14/DOC/53 REV4,

**IN CONFORMITY** with Articles 3, 5 and 10 of the EUMETSAT Convention, and with EUMETSAT Resolution EUM/C/01/Res. I on the Approval of Optional Programmes,

**AGREE:**

- I** To establish an Optional EUMETSAT Jason-CS Programme within the framework of the EUMETSAT Convention as described in the EUMETSAT Jason-CS Programme Proposal referred to in the Preamble.
- II** That the Optional EUMETSAT Jason-CS Programme constitutes EUMETSAT’s direct contribution to the development and implementation of the Sentinel-6 mission, which will be carried out in partnership with ESA through its GMES Space Component Programme Segment 3 (GSC-3), the EU through its Copernicus Programme, and NASA through its planned own Jason-CS programme.

- III** That the objectives of the Sentinel-6 mission, the description of the Sentinel-6/Jason-CS system and the scope of the Optional EUMETSAT Jason-CS Programme shall be as described in the Programme Definition attached as Annex I to this Declaration.
- IV** That the financial envelope for the Optional EUMETSAT Jason-CS Programme amounts to a maximum of MEUR 111.0 at 2015 e.c. (MEUR 104.6 at 2012 e.c.) and that all efforts shall be made to keep actual expenditure below this figure.
- V** That the Copernicus Third Party Programme and the Copernicus Agreement between the EU and EUMETSAT define the EU's funding for operations build-up and initial operations of the Sentinel-6 mission and that operations are expected to continue through follow-up agreements.
- VI** That EUMETSAT's contribution to the Sentinel-6 mission shall be defined in detail in cooperation agreements with ESA and NASA.
- VII** That the conclusion of any agreement with the aforementioned partners will require separate approval by the EUMETSAT Council.
- VIII** To participate in the Optional EUMETSAT Jason-CS Programme in accordance with an indicative expenditure profile and the scale of contributions as set out in Annex II to this Declaration.
- IX** To invite the EUMETSAT Member States wishing to participate in this Optional Jason-CS Programme to sign this Declaration as soon as possible and no later than 10 September 2015, thereby becoming Participating States.
- X** To invite EUMETSAT Cooperating States to contribute to the Optional EUMETSAT Jason-CS Programme under terms to be agreed by the EUMETSAT Participating States.
- XI** To replace the Declaration on the Optional EUMETSAT Jason-CS Programme (EUM/C/82/14/Dcl.I) and the associated Programme Definition annexed thereto, unanimously adopted by Potential Participating States at the 82<sup>nd</sup> Council meeting on 26 November 2014, with the present Declaration and associated Programme Definition.

This Declaration has been signed by the following Participating States:

<b>PARTICIPATING STATES</b>	<b>DATE</b>



## **OPTIONAL EUMETSAT JASON-CS PROGRAMME DEFINITION**

### **1 INTRODUCTION**

Capitalising on the success of the Topex-Poseidon and Jason missions on the heritage from the Jason-3, Cryosat-2 and Sentinel-3 programme, the Sentinel-6 mission is expected to continue and enhance the Jason, Jason-2 and Jason-3 missions in providing critical high precision observations of ocean surface topography, until 2030<sup>+</sup>.

In addition, the Sentinel-6 mission will take advantage of the unique time sampling of its non synchronous orbit, to provide radio occultation observations that are complementary to those provided by sun-synchronous missions.

The Sentinel-6 mission will be implemented by two successive Jason-CS satellites and will be developed and exploited in cooperation between Europe and the United States, through a partnership between the EU, ESA, EUMETSAT and the National Aeronautics and Space Administration (NASA).

The overall European contribution to the development and implementation of the mission will be implemented through the combination of the ESA GMES Space Component Programme Segment 3 (GSC-3), this EUMETSAT Optional Jason-CS Programme and the EU Copernicus programme. The latter will be associated to Delegations Agreements with ESA and EUMETSAT. The Delegation Agreement with EUMETSAT will be implemented through EUMETSAT Third Party Programmes covering contributions of the organisation to the EU Copernicus Programme.

The EUMETSAT Optional Jason-CS Programme is the direct EUMETSAT contribution to the development and implementation of the Sentinel-6 mission.

### **2 SHARING OF RESPONSIBILITIES AND COSTS FOR THE DEVELOPMENT AND IMPLEMENTATION OF THE SENTINEL-6 MISSION**

#### **2.1 Sharing of technical responsibilities**

The EU, ESA, NASA and EUMETSAT have agreed the following high level sharing of responsibilities for the development and implementation of the Sentinel-6 mission:

- EUMETSAT is the system authority and is responsible for the Sentinel-6 ground segment development and operations preparation. EUMETSAT will also carry out the operations build up and operations of the Sentinel-6 system including both satellites and delivery of data services to Copernicus Service Providers and users on behalf of the EU;
- ESA is responsible for the development of the first satellite and the instruments prototype processors, for the procurement of the recurrent satellite on behalf of EUMETSAT and the EU, for the delivery of both satellites to orbit, including the LEOP services, and for satellite commissioning and storage of the recurrent spacecraft;

- NASA delivers US payload instruments for both satellites, ground segment development support, provides both launch services and contributes to operations;
- ESA, EUMETSAT and NASA share the responsibility of science teams' coordination and Calibration/Validation activities, with EC being involved in the interactions with the science teams.

In recognition of the vast expertise available in CNES, the partners will seek support from CNES for system and ground segment activities and in the preparation and release of relevant Research Announcements.

## **2.2 Detailed EUMETSAT responsibilities**

The detailed EUMETSAT responsibilities in the development and implementation of the Sentinel-6 mission are the following:

- Lead the overall Sentinel-6 system engineering with the support of other partners.
- Perform mission management during the lifetime of each satellite with support of other partners.
- Provide the command and control centre for the satellites and the MDA and TT&C European ground station (for command and data acquisition).
- Provide NRT data processing for altimetry data acquired by EUMETSAT ground station.
- Provide offline data processing for Topography and Radio Occultation mission.
- Provide Radio Occultation raw data acquired by the European ground station and any necessary ancillary data to NASA/NOAA.
- At the end of the LEOP phase, take over the operational responsibility for the satellites.
- Conduct commissioning and routine operation activities with the support of the partners.
- Exchange with NASA all necessary data and products to fulfil responsibilities of the partners.
- Develop the operational processor in accordance with specifications and test data (generated by the prototype processor) deliver by ESA
- Deliver to NASA the operational processors to support NOAA provision of NRT topography products.
- Provide dissemination of all NRT data (NOAA and EUMETSAT) and offline products.
- Provide a long-term archive of all NRT and offline data including telemetry, orbital and auxiliary data sets;
- Contribute together with the other partners to:
  - Ensuring the mission performance and related Calibration and Validation activities;
  - Support interactions with the scientific community and coordination of the science support activities, e.g. in the context of the international OSTST and of the Science Advisory Group to be established on the European side by ESA and EUMETSAT in coordination with the EC;
  - Support the preparation and release of relevant Research Announcements and the selection and coordination of Investigators.



### 2.3 Sharing of costs

As regards funding, the following has been agreed:

- ESA funds the development of the first Jason-CS satellite (JCS-A) implementing the Sentinel-6 mission, the related In Orbit Commissioning, LEOP service and instrument prototype processors delivered to EUMETSAT;
- EUMETSAT funds a fixed financial contribution to the ESA development of the first Jason-CS satellite (JCS-A), the development of the European part of the Sentinel-6 overall ground segment and operations preparation, and co-funds the procurement of the recurrent spacecraft with the EU;
- The EU funds the build-up of operations and operations for both spacecraft, the LEOP service and the storage for the recurrent spacecraft, and co-funds the recurrent spacecraft with EUMETSAT;
- NASA funds both launch services and all US payload instruments, ground segment support and the US contribution to operations preparation and operations.

## 3 SENTINEL-6 MISSION: OBJECTIVES AND BENEFITS

### 3.1 Sentinel-6 mission objectives and data services

The primary observation mission of Sentinel-6 is high precision ocean altimetry (HPOA) aimed at monitoring sea surface height (SSH), significant wave height (SWH) and wind speed at the ocean surface.

The Sentinel-6 HPOA products shall be of sufficient accuracy and quality for Sentinel-6 to serve as the reference altimeter mission against which all altimeter missions coordinated under the Ocean Surface Topography Virtual Constellation of the Committee for Earth Observation Satellites (CEOS), e.g. Sentinel-3, SARAL/AltiKa, HY-2) can be cross-calibrated, such that their observations can be combined for monitoring the broadest possible spectrum of ocean variability and to provide inputs to operational ocean prediction models.

Furthermore, the Sentinel-3 and Sentinel-6 altimeter missions altogether need to sample mesoscale and sub-mesoscale ocean circulation features through the use altimeter SAR<sup>1</sup> mode capabilities, to fulfil the requirements of important applications in operational oceanography.

The highest quality of products is also needed for monitoring sea level rise at global and regional scales in our changing climate. This requires flying the same non-synchronous orbit as the Jason missions and places demanding requirements for extensive calibration and validation activities involving support from the radar altimetry science community. This also calls for high quality off-line products including highly accurate corrections that cannot be generated in near real time.

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<sup>1</sup> Synthetic Aperture Radar

The Sentinel-6 altimeter mission shall also contribute to marine meteorology by providing significant wave height and wind speed products in near real-time.

These objectives of the Sentinel-6 altimeter mission will be fulfilled by three basic data services:

- Near Real Time service (NRT), with an end-to-end timeliness of 3 hours;
- Short Time Critical service (STC), with an end-to-end timeliness of 36 hours;
- Non-Time Critical service (NTC), with an end-to-end timeliness of 60 days.

As a secondary objective, the Sentinel-6 mission will support a radio occultation observation mission contributing to climate change monitoring and weather forecasting. This observation mission will provide unique coverage and sampling in space and time from the non-synchronous orbit that are not accessible from sun-synchronous orbits providing observations at fixed local solar times.

To maximise the number of occultations per day and thus contribute to the fulfilment of requirements expressed e.g. in the EGOS-IP<sup>2</sup>, the GNSS-RO instrument of Sentinel-6 needs to allow tracking of several GNSS constellations. Related products shall include bending angle, refractivity, and higher level profiles to infer information on atmospheric temperature and humidity.

For radio occultation, three services will be established:

- Near Real Time service (NRT), with an end-to-end timeliness of 3 hours.
- Two independent Non-Time Critical services (NTC), with an end-to-end timeliness of 60 days, for Climate applications and data quality monitoring (one US and one European NTC service).

The Sentinel-6 mission shall be operational, meaning that it shall meet the requirements of the operational Copernicus Marine Monitoring services and of other operational weather, marine and climate services. This leads to stringent requirements on availability, reliability, timely distribution of data products, support to the operational downstream information service providers, including reprocessing capabilities.

### **3.2 Expected benefits**

The benefits of *operational oceanography* in the areas of marine safety, shipping, fisheries, off shore industry, marine renewable energy, management of marine environment and resources, represent a fraction of the “blue” economy which in the European Union represents a gross added value of around €500 billion per year and involves 5.4 million jobs.

With its Copernicus Programme, the European Union has taken the leadership in the development of operational oceanography in Europe, through the implementation of the Copernicus Marine Service via the MyOcean projects, and the implementation of Sentinel space missions required to feed these services with observations from space. In this regard, the contribution of the Sentinel-6 mission will be decisive, as the unique reference mission for

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<sup>2</sup> Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP), WMO Integrated Global Observing System, Technical Report No. 2013 – 4

the virtual constellation of altimeter missions: it will not only deliver invaluable observations but also provide the basis for unified products that are needed by operational ocean models, thus leveraging substantial benefits for EU and EUMETSAT Member States, far beyond those of its capabilities considered in isolation.

The simultaneous observations of surface wind speed, sea state and surface currents delivered by Sentinel-6 will also benefit the increasing integration of real time operational oceanography and *marine meteorology*. In addition, the high resolution of the pioneering interleaved radar altimeter mode of Sentinel-6 will give access to sub-mesoscale features (small eddies) associated with the most energetic ocean currents.

This will enhance the benefits of both the marine forecasts delivered by the National Meteorological Services of the “marine” Member States of EUMETSAT and the ocean forecasts delivered by Copernicus.

In the area of *climate services* taken in the broadest sense, socio-economic benefits will first accrue from the sea level monitoring service delivered by Sentinel-6, through the extension up to 2030+ of the unique Climate Data Record accumulated since 1992 by the Topex-Poseidon and Jason missions. Also from a climate monitoring perspective, the Sentinel-6 radio occultation measurements will contribute to the assessment of the rate of the expected warming in the troposphere and cooling in the stratosphere.

#### **4 SENTINEL-6/JASON-CS SYSTEM DESCRIPTION**

The Sentinel-6 system consists of the following main elements:

- Space Segment;
- Overall Ground Segment;
- Launch service;
- LEOP.

##### **4.1 Space Segment**

The Sentinel-6 Space Segment consists of two successive Jason-CS satellites (A and B), based on the CryoSat-2 heritage platform, with some tailoring to specific needs of the Sentinel-6 mission.

The platforms will include the following subsystems:

- The structure;
- The thermal control subsystem;
- The propulsion subsystem;
- The attitude and control system (AOCS);
- The power subsystem;
- The data handling subsystem;
- The communications subsystem.

The Telemetry, Tracking & Command (TT&C) part of the communication subsystem will use S-band for uplink of telecommands and downlink of telemetry, while the payload data downlink will be in X band, as required to accommodate the data rate generated by the instrument payload.

The Jason-CS satellites will embark the following payload instruments:

- For the altimeter observation mission:
  - o A Ku/C band altimeter (Poseidon-4) developed and procured by ESA;
  - o A microwave radiometer (AMR-C) provided by NASA;
  - o A GNSS receiver (GNSS-POD) developed and procured by ESA;
  - o A DORIS instrument developed and procured by ESA;
  - o A Laser Retroreflector Array (LRA) provided by NASA
  
- For the radio-occultation observation mission:
  - o a radio occultation instrument (GNSS-RO) provided by NASA.

The Jason-CS satellites will be designed for launch on a Falcon 9-class launcher and to be technically compatible with three potential US launch vehicles (Falcon-9, Atlas-4 and Antares).

The Space Segment also includes all necessary Ground Support Equipment (GSE) for satellite AIV, such as mechanical and electrical GSE's test facilities to support test and qualification of the satellites and specific tools used for system verification and validation, such as Radio Frequency suitcase.

## **4.2 Overall Ground Segment**

The Sentinel-6 Overall Ground Segment (OGS) shared between EUMETSAT and NASA/NOAA will support all the ground functions required to meet the mission objectives and will be capable of supporting two Jason-CS satellites (A and B) in orbit.

The OGS include the following main components:

- Mission Control and Operations (MCO);
- Payload Data Acquisition and Processing (PDAP);
- Multi Mission Elements (MMEs).

The Mission Control and Operations system implements the following main functions:

- Spacecraft M&C;
- Flight Dynamics;
- Mission Planning.

The MCO will be supported by TT&C Stations, operating in S-band providing visibility of the satellites on average twice per day for reception of telemetry and commanding.

For *data acquisition*, the PDAP will include two Mission Data Acquisition (MDA) Stations receiving in X-band on-board recorded payload data once per orbit and forwarding data to the EUMETSAT MCC for processing and distribution.

For *processing*, the PDAP system will implement eight main functions:

- Ingest and Distribute Data;
- Extract and Consolidate Payload Data;
- Generate Level 0 (L0) Products;
- Generate Level 1 (L1) Products;
- Generate Level 2 Products;
- Aggregate and Reformat Data;
- Manage Processing;
- Monitor Production.

The overall PDAP will be supported on the European side by Precise Orbit Determination and production of Level 2P and Global Level 3 Products delivered as services by CNES and by the ROM SAF for L2 NTC product processing of radio occultation data and on the US side by NASA provided services.

The Multi Mission Elements (MMEs) are EUMETSAT operational facilities and common infrastructure already used by existing programmes, split in four groups:

- The Infrastructure (MME-INF) comprises building infrastructure in the Technical Infrastructure Building, control rooms in the main building, networks and storage systems;
- The Ground Segment Monitoring and Control (MME-MON) system provides a set of tools for monitoring the Ground Segment hardware and services, including analysis, reporting and product quality monitoring;
- The EUMETSAT Data Centre (MME-DAC) receives and archives data and products and provides data retrieval services, including on-line access, and user support functions;
- The Dissemination (MME-DISS) system provides a secure file transfer service through external network interfaces, and includes EUMETCast as the prime EUMETSAT near real time delivery service to end users.

In most cases, the re-use of the MMEs will require little modification other than to increase bandwidth and storage capacity.

The Sentinel-6 OGS functions will be implemented by physical elements located at different sites:

- The Mission Control Centre (MCC) at EUMETSAT Headquarters will host:
  - all Mission Control and Operations systems;
  - the main PDAP processing system for all L0, L1 and L2 products, except the processing of Level-2 NTC products provided by the ROM SAF;
- The Remote Mission Control Centre (RMCC), collocated with the EPS/EPS-SG RMCC will host a back up instance all Mission Control and Operations systems;
- The NOAA SOCC will host the US contributions to the Mission Control and Operations, a system for the Near Real Time processing of US-acquired data dumps and multi-mission facilities and services for delivering data and products to users in the US;
- The US Fairbanks site will host the NOAA Mission Data Acquisition antenna, and one of two NOAA Tracking, Telemetry and Command/Control antennas;

- The US Wallops site will host the second NOAA Tracking, Telemetry and Command/Control antenna;
- One high latitude site in Europe will host both the European Mission Data Acquisition antenna and the European Tracking, Telemetry and Command/Control antenna;
- CNES will host the altimeter product quality monitoring service, the POD service and Level 2P/Level 3 processing services;
- NASA/JPL will host the Performance monitoring service for US instruments;
- One TBD site will host the altimeter transponder service;
- UCAR/NOAA will host the Radio Occultation NRT service and one of the two independent NTC processing service;
- The Radio Occultation Meteorology Satellite Application Facility (ROM SAF) will host the Level-2 processing service supporting the second radio-occultation NTC service. As part of the future CDOPs, ROM-SAF may also provide other possible contributions including Level 4 gridded products for Climate monitoring.

#### **4.3 Launch Services**

The launch services are under the responsibility of NASA and are inclusive, i.e. cover also launch site facilities and logistic services.

#### **4.4 Launch and Early Operations Phase (LEOP)**

ESA performs Launch and Early Orbit Phase (LEOP) operations for each satellite, until the handover to EUMETSAT.

### **5 DEPLOYMENT**

Assuming a design lifetime of 5.5 years for each Jason-CS satellite - with consumables for another 2 years - both Jason-CS satellites will be launched in sequence:

- Jason-CS A end of 2020;
- Jason-CS B early 2026.

This will ensure that the Jason-3 and Sentinel-6 HPOA missions, combined, will have the same lifespan as the Sentinel 3 marine mission, thus enabling the combined use of their data by the marine user community.

### **6 SCOPE OF THE EUMETSAT OPTIONAL JASON-CS PROGRAMME**

The EUMETSAT Optional Jason-CS Programme covers all activities contributing to the development and implementation of the Sentinel-6 mission that are under the direct responsibility of EUMETSAT, and/or funded by EUMETSAT.

From a technical and managerial point of view this covers mainly:

- Overall coordination with technical partners and with the European Commission;
- The role of System authority;
- System level activities, including system AIT and preparation of operations;

- The development of the European part of the Sentinel-6 overall ground segment, including related procurements and upgrades of existing EUMETSAT facilities;
- Support to ESA for space segment development, LEOP services and in orbit commissioning;
- Contributions to interactions with the user communities and the altimeter science community during the design and development phase of the Sentinel-6/Jason-CS system.

This excludes the build-up of operations and routine operations activities that are outside of the scope of the EUMETSAT Optional Jason-CS Programme.

From a financial perspective the Programme covers funding of:

- The aforementioned technical and managerial activities;
- A fixed financial contribution to the ESA space development programme;
- Funding of the recurrent altimeter and Doris instruments procured by ESA;
- Contribution to the funding of ESA internal costs related to its role of procurement agent for the recurrent altimeter and Doris instruments;
- A management margin covering the risks associated to all activities within the scope of the Optional Jason-CS Programme.

EUMETSAT's fixed contribution to the development of the first satellite is MEUR 18.8 at 2015 e.c (MEUR 18 at 2012 e.c.).

The EUMETSAT contribution to the cost of the recurrent satellite is MEUR 40.3 at 2015 e.c (MEUR 37.5 at 2012 e.c.) and covers:

- o The full industrial procurement cost of the recurrent altimeter and Doris instruments;
- o A proportionate contribution to the ESA internal costs associated to its role of procurement agent for the recurrent altimeter and Doris instruments.

The operations build up and routine operations activities that are outside the scope of the Jason-CS Programme will be performed as tasks entrusted by the EU to EUMETSAT under relevant Third Party Programmes funded by the EU Copernicus Programme under successive Multi-annual Financial Frameworks.

## **7 IMPLEMENTATION ARRANGEMENTS**

### **7.1 Interactions with users and experts**

The international Ocean Surface Topography Science Team will continue to serve as an international user to requirements for altimeter missions in general and related science matters.

A European Science Advisory Group will be established by ESA and EUMETSAT to support the development and implementation of the Sentinel-6 HPOA mission and European participation in the OSTST.

For the radio-occultation secondary mission, mechanisms will be established with UCAR and the SAF-ROM for the provision of appropriate science support.

EUMETSAT will address Sentinel-6 - relevant interactions with its user community through its Delegate Bodies, and support interactions with the relevant Copernicus Service Providers and users through the appropriate fora and mechanisms established by the European Commission.

### **7.2 Further decisions by Council**

The MOU and Agreements foreseen in section 7.3 hereafter will be submitted for approval to Council, as foreseen by the Convention.

Proposed changes to the EURD and later on to the Operational Service Specification will be processed in coordination with the partners and the EC and submitted for approval by EUMETSAT Delegate Bodies.

Council will also make any decision required for the implementation of the Optional Jason-CS Programme, in particular foreseen EUMETSAT procurements, in line with the Convention.

### **7.3 Cooperation Framework**

#### **7.3.1 Three-partner MOU**

A three-partner Memorandum of Understanding (MoU) between EUMETSAT, ESA and NASA will be established to capture the respective responsibilities.

This MOU will inter alia establish the Joint Steering Group (JSG) and the Project Plan integrating all contributions into a joint, unified high level planning and management framework addressing inter alia the Sentinel-6/Jason-CS development logic, detailed planning, review milestones, deliverables across partners, coordinated baseline documentation and joint management mechanisms. The MOU will capture applicable rules and legal arrangements applicable across the partners, and confirm the free and open data policy.



The European Commission, representing the EU, will be associated to the deliberations of the JSG during the development phase and will become a full member in the operations phase.

The parties will use reasonable efforts to carry out their respective responsibilities in accordance with Project Plan, and to avoid changes that will have a negative effect on the other party with regard to scientific return, implementation approach, cost, and/or schedule. Where changes cannot be avoided they will be planned to minimise any negative effects, and all changes to the Project Plan that may impact costs, mission performance and schedule will require the approval of the JSG.

The MOU will not foresee any exchange of funds between the partners. EUMETSAT will ensure that it does not assume any financial liability for elements provided by other partners.

### **7.3.2 Cooperation with ESA**

Considering the major roles of ESA at space segment level and EUMETSAT at system and overall ground segment levels, and the foreseen exchange of funds with ESA, a dedicated Cooperation agreement will be established.

As regards EUMETSAT's financial contributions, the Agreement will be based on principles similar to those adopted for cooperation on mandatory programmes, but will limit the financial contributions and liability of EUMETSAT to the cost of the full procurement of the recurrent altimeter and Doris instruments.

This Agreement will refer to a Programme Implementation Plan addressing all detailed implementation arrangements between both organisations.

### **7.3.3 Cooperation with other partners**

An agreement will be concluded between EUMETSAT and CNES for the provision of system level expertise support, as appropriate during the development phase, and for the integration of the services in the Sentinel-6 system and related support to EUMETSAT IV&V activities.

The provision of these services during the operations phase will also be secured by this agreement.

The agreement will also cover CNES participation in science support activities, including the preparation, release and implementation of relevant Research Announcements in cooperation with NASA.

## **8 DATA POLICY**

The data policy for the Sentinel-6 mission shall be free and open, with no restriction, as is the case for the Jason-2 and Jason-3 missions.



**OPTIONAL EUMETSAT JASON-CS PROGRAMME FINANCIAL ENVELOPE,  
SCALE OF CONTRIBUTIONS AND VOTING COEFFICIENT**

**1 FINANCIAL ENVELOPE & INDICATIVE EXPENDITURE PROFILE**

The financial envelope of the EUMETSAT Jason-CS Programme is estimated at MEUR 111.0 at 2015 e.c. (or MEUR 104.6 at 2012 e.c.) with the following indicative expenditure profile (in KEUR at 2015 e.c.):

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
100	16,533	28,596	23,315	22,246	12,436	2,246	880	900	1,380	1,772	596

## 9 SCALE OF CONTRIBUTIONS AND VOTING COEFFICIENT

The Participating States shall contribute to the EUMETSAT Jason-CS Programme in accordance with the scale of contributions indicated in the table below. This table also lays down the voting coefficient of each Participating State, pursuant to the scale of contributions, and taking into account Article 5.3(b) of the EUMETSAT Convention.

<b>PARTICIPATING STATE</b>	<b>CONTRIBUTION %</b>	<b>VOTING COEFFICIENT %</b>
AUSTRIA (AU)		
CROATIA (HR)		
DENMARK (DK)		
FRANCE (FR)		
GERMANY (DE)		
ICELAND (IS)		
ITALY (IT)		
LUXEMBOURG (LU)		
THE NETHERLANDS (NL)		
NORWAY (NO)		
PORTUGAL (PT)		
SWEDEN (SE)		
SWITZERLAND (CH)		
TURKEY (TR)		
UNITED KINGDOM (UK)		
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>

**RESOLUTION ON**  
**FLEXIBILITY FOR THE TRANSFER OF APPROPRIATIONS**  
**BETWEEN EPS-SG BUDGET ARTICLES**

**adopted at the 83<sup>rd</sup> Meeting of the EUMETSAT Council on 23-24 June 2015**

**The EUMETSAT Members States,**

**HAVING REGARD** to the EUMETSAT Financial Rules, in particular its Article 9.2,

**CONSIDERING** the complexity of the EPS-SG programme and its numerous external interfaces,

**TAKING INTO ACCOUNT** Council Resolution EUM/C/98/Res. XIV, in which EUMETSAT Member States agreed *inter alia* to authorise the Director-General to make transfers of appropriations in the context of the EPS programme,

**RECOGNISING** the need for the Director-General to make timely and optimum decisions on unforeseen, necessary changes across the various components of the EPS-SG system in order to minimise schedule impacts and cost consequences,

**AGREE:**

- I** That the Director-General shall be authorised to transfer Commitment Appropriations and Payment Appropriations between articles 4000 (Cost of contract with ESA) and 4100 (Other expenditure) of the EPS-SG budget without restriction.
- II** That Council, in its regular meetings, shall be informed of any Payment Appropriations transferred between budget articles pursuant to Agree I.



## ENABLING RESOLUTION

### ON THE OPTIONAL EUMETSAT JASON-CS PROGRAMME

adopted at the 83<sup>rd</sup> Meeting of the EUMETSAT Council on 23-24 June 2015

**The EUMETSAT Council,**

**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 World Meteorological Organization, and that a further objective of EUMETSAT is to contribute to the operational monitoring of the climate and the detection of global climatic changes,

**BEARING IN MIND** that the EUMETSAT Convention defines Optional Programmes as programmes within the objectives of EUMETSAT agreed as such by Council,

**HAVING REGARD** to Resolution EUM/C/76/12/Res. III on the Preparation of a Jason Continuity of Services (Jason-CS) Optional Programme, in which Council agreed that the proposed Programme is consistent with EUMETSAT's objectives and should be established and implemented as an Optional Programme within the framework of the EUMETSAT Convention,

**HAVING REGARD** to the Declaration EUM/C/83/15/Dcl. I and attached Programme Definition on the Optional EUMETSAT Jason-CS Programme adopted by interested Member States on 24 June 2015,

**NOTING** that any Member State shall have the opportunity to become a Participating State of the Optional EUMETSAT Jason-CS Programme through signature of the Declaration within the timeframe set out therein,

**AWARE** that the Optional EUMETSAT Jason-CS Programme will take effect once at least one third of all EUMETSAT Member States have declared their participation by signing the Declaration within the timeframe set out and the subscriptions of these Participating States have reached 90% of the total financial envelope,

**IN CONFORMITY WITH** Articles 3, 5 and 10 of the EUMETSAT Convention and with EUMETSAT Council Resolution EUM/C/01/Res. I on the Approval of Optional Programmes,

**AGREES:**

- I** To approve the execution, within the framework of the EUMETSAT Convention, of the Optional EUMETSAT Jason-CS Programme on the basis of the Declaration and Programme Definition attached thereto referred to in paragraph four of the Preamble of this Resolution.
- II** To invite Participating States to sign the Declaration within the timeframe set out therein.
- III** To task the Director-General to prepare the necessary cooperation agreements with the international partners contributing to the development and implementation of the Sentinel-6 mission, to be submitted for Council approval.
- IV** To task the Director-General to execute the Optional EUMETSAT Jason-CS Programme in accordance with EUMETSAT's Rules and Procedures.
- V** To replace the Enabling Resolution EUM/C/82/14/Res. II on the Optional EUMETSAT Jason- CS Programme adopted by Council at its 82<sup>nd</sup> meeting on 26 November 2014 with the present Resolution.



**RESOLUTION ON**

**THE IMMEDIATE ACCESSION OF MEMBER STATES TO THE OPTIONAL  
EUMETSAT JASON-CS PROGRAMME UPON SUBSCRIPTION**

**adopted at the 84<sup>th</sup> Meeting of the EUMETSAT Council on 1-2 December 2015**

**THE PARTICIPATING STATES,**

**HAVING REGARD** to Declaration EUM/C/83/15/Decl. I on the Optional EUMETSAT Jason-CS Programme adopted by Potential Participating States on 24 June 2015 and entered into force on 9 September 2015,

**NOTING** that the subscription level to the Optional EUMETSAT Jason-CS Programme currently stands at 90.01% of the MEUR 111.0 programme envelope at 2015 economic conditions,

**TAKING INTO ACCOUNT** that the current Participating States have already made their utmost efforts to increase their rate of contributions to achieve a 90.01% subscription level, and that they will not be able to increase their contributions further to fulfil the requirements of Article 10.5 EUMETSAT Convention,

**REQUIRING** therefore that the shortfall of 9.99% be covered through accession of further Member States as Participating States by 8 September 2016,

**WELCOMING**, beyond the coverage of the shortfall, the accession of any further Member State as Participating State to the Optional EUMETSAT Jason-CS Programme to ensure maximum participation, thereby stressing the solidarity principle,

**HAVING REGARD** to Article 5.3 and Article 10 of the EUMETSAT Convention

**UNANIMOUSLY AGREE:**

- I** To continue accepting, until 8 September 2016, the accession of Member States to the Optional EUMETSAT Jason-CS Programme with immediate effect upon their notification of subscription to the Programme, with related pro-rata adjustments of the scale of contributions and voting coefficients laid down in Declaration EUM/C/83/15/Decl. I, as applicable.
- II** To review the funding situation of the Programme at the latest one year after the date at which it took effect, i.e. 8 September 2016.

- III** To request the Director-General to continue his efforts in addressing the contribution to this Programme by those Member States that have not yet subscribed, with the support of the Working Group established by the 83rd Council.
- IV** To continue accepting new accessions of Member States to the Programme beyond 8 September 2016, subject to relevant arrangements related to investments already effected towards the Programme.