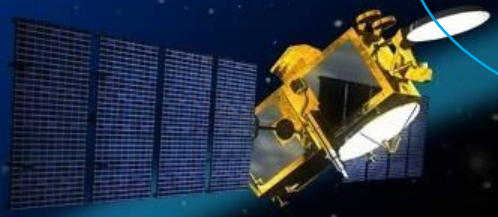
Jason-3 Project Status



J. Silva (NOAA)
F. Parisot (EUMETSAT)
P. Vaze (NASA/JPL)
G. Zaouche (CNES)

Presented by G. Zaouche (CNES)

Mission Summary

Science Measurements

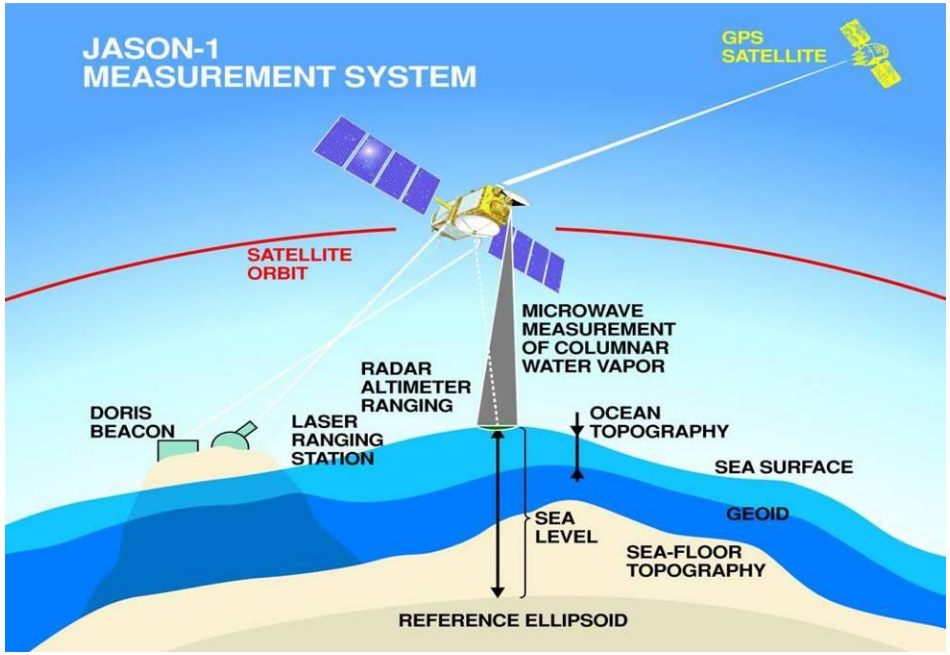
Global sea surface height to an accuracy of ≤ 4 cm every 10 days, for determining ocean circulation, climate change and sea level rise

Mission Objectives

- **Provide continuity of high precision ocean topography measurements beyond TOPEX/Poseidon , JASON-1 and JASON-2**
- **Provide a bridge to an operational mission to enable the continuation of multi-decadal ocean topography measurements**

Instruments

- **Core Mission:**
  - **Poseidon-3B Altimeter**
  - **DORIS (Precise Orbit Determination System)**
  - **Advanced Microwave Radiometer (AMR)**
  - **GPS Payload (GPSP)**
  - **Laser Retro-reflector Array (LRA)**
- **Passengers:**
  - **JRE (Carmen3 + LPT)**



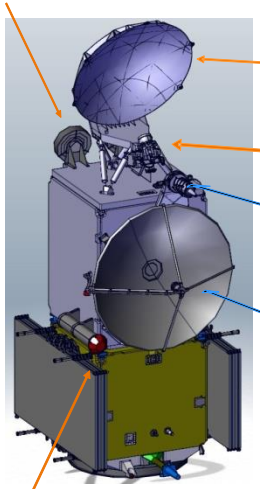
Mission Overview

- **Launch Date: Dec 2015 ???**
- **Launch Vehicle: Falcon 9 (SpaceX)**
- **Proteus Spacecraft Bus provided by CNES**
- **Mission life of 3 years (goal of 5 years)**
- **1336 km Orbit, 66º Inclination**

Jason-3 System elements

U.S. Elements
European Elements

Dedicated Launch Vehicle : Falcon9



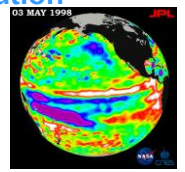
NOAA - Wallops/ Fairbanks – Barrow - USA

NOAA S/C Operations (Suitland, MD)

EUMETSAT – Usingen, Germany

EUMETSAT

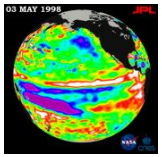
Operational product processing & Distribution



NASA/JPL

NASA Instrument Ops

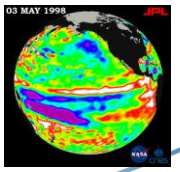
Operational product processing and Science Data archive & Distribution



CNES

S/C Operations (Toulouse, France)

Science data processing, archive & Distribution



Passengers Ops and mission centers CNES- JAXA

Changes and new features wrt OSTM/Jason-2 (1)

System : AMR in-flight cold-space calibration

- Lisbon OSTST recommendation, San Diego OSTST decision
- Satellite pitch maneuvers (80° off nadir).

This change is completed and validated

Satellite

- Slight modification of satellite OBSW (Tx OFF for safety improvement, PIM structure panels).

Completed and validated

POS3B (Altimeter)

- Implementation of a single mode with on-board automatic transitions between DIODE/DEM tracking and autonomous tracking, with respect to the satellite position.
- POS3B DEM upload is now possible without mission interruption.

Completed

DORIS

- New generation DGXX-S taking into account lessons learned from Jason-2
- Change of DORIS antenna location for compliance with potential launch vehicles
- Improvement in modeling the Solar Panels position

Completed

AMR (Radiometer)

- Mostly recurring design with improvement of the instrument thermal control and stability (lesson learned from Jason-2 experience)

Completed

Changes and new features wrt OSTM/Jason-2 (2)

GPSP

- Different receiver but with same basic design as on JASON-1/2
- Not mission critical but applying further updates for radiation hardened parts and shielding

Completed

Launcher

- Launch vehicle : Falcon 9 (SpaceX)
- New Payload Processing Facility (PPF) at Vandenberg : SpaceX PPF
- Launcher compatibility demonstrated in summer 2014 : completed
- **Launch Campaign : exercised until interruption**

Ground :

Capability to operate simultaneously JASON-2 and JASON-3 :

- Addition of stations for the “formation flight” phase : Barrow (NOAA) and Usingen2 (EUM)
- JASON-2 and JASON-3 operations “merging” (were planned after the launch)

NOAA JA2 ground has been merged into NOAA JA3 Ground : Completed

Product Processing :

- Development of a “digital retracking” to be used for Jason-3 GDR allowing to take into account the actual instrument features before launch and in-orbit and to better estimate the low sea states.

Completed

Jason-3 Project Status : Significant events since Konstanz OSTST

- **Beg Nov 2014 (after Konstanz OSTST) Programmatic:**

Launch date can no more be held in end of March 2015 due to :

  - NOAA FY2015 funding : Not confirmed by US Congress
  - Delays due to Space-X launcher consolidation (propulsion qualification components, certification, manufacturing, ...)
  - Schedule under construction : Launch date proposal expected ASAP

- **Mid Nov 2014 Satellite:**

Satellite Qualification Review (SQR) to assess the qualification status of the satellite : **successful**

- **Mid Nov – End Dec 2014 Satellite:**

"Satellite Final Preparation" tests : **successful**. Then Satellite has been stored

- **Beg Dec 2014 System:**

Performances and CAL/VAL key point to assess the compliance with system performances and the preparation of the calibration/validation phase : **successful**

- **Mid Dec 2014 Programmatic:**

NOAA FY2015 funding approved

Jason-3 Project Status : Significant events since Konstanz OSTST

- **End Jan 2015 System:**
4 Partner Operational Readiness Review (ORR1) to assess the qualification status of JA3 Ground System and to check the Mission Operations level of preparation : **successful**

- **End Feb 2015 Programmatic:**
New Launch date : July 22, 2015 (UTC)

- **Mid March 2015 System:**
LEOP Dress Rehearsal #1 at 4 partner level : **successful**

- **End April 2015 System:**
4 Partner Operational Readiness Review (ORR2) to assess the delta-qualification status of JA3 Ground System 3 months before Launch : **successful**

- **Beg Apr- End May 2015 Satellite:**
"Satellite Final Preparation" before Satellite shipment to VAFB
(Thruster problem solved with a 9 days impact for the shipment date !)
Mid May 2015 and End May 2015 "Satellite Pre-ship Review": **successful**

Jason-3 Project Status : Significant events since Konstanz OSTST

- **Beg June 2015 Programmatic:** New Launch date : Aug 9, 2015 (UTC)

- **18 June 2015 Satellite:** Jason-3 satellite arrival at Vandenberg

- **From 19 June 2015** Jason-3 Launch campaign activities : **successful** for a Launch date on Aug 9, 2015
- **Launch campaign stopped on 28 June** due to “other F9” launcher failure

- **From 10 July 2015** : **Satellite** stored at Vandenberg

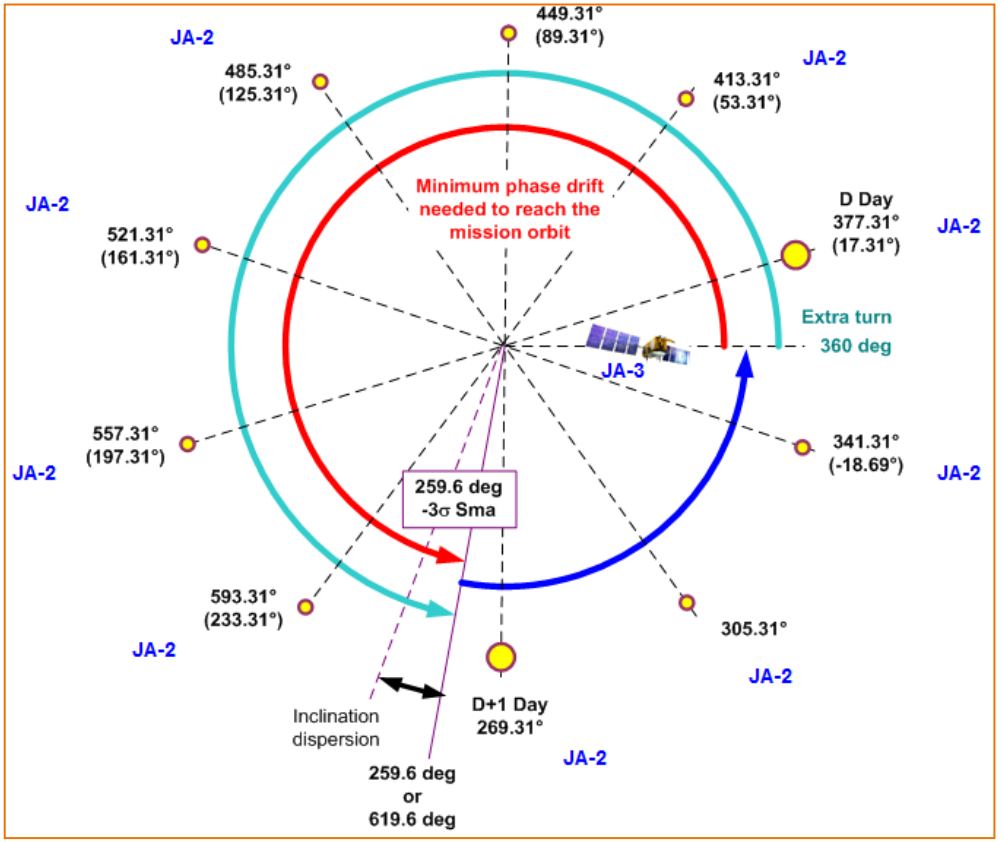
- **From Beg July 2015 : Launcher :** Investigations in progress

- **End Sept 2015** : **Ground**
NOAA JA2 ground has been merged into NOAA JA3 Ground : **successful**

- **Current :**
  - NASA and SpaceX working towards completing Falcon-9 investigations and return to flight plans and operations
  - A potential launch window exists for mid-late Dec pending the launcher readiness
  - Satellite and Ground are ready for this window
  - Projects are evaluating opportunities in 2016 for alternative launch windows

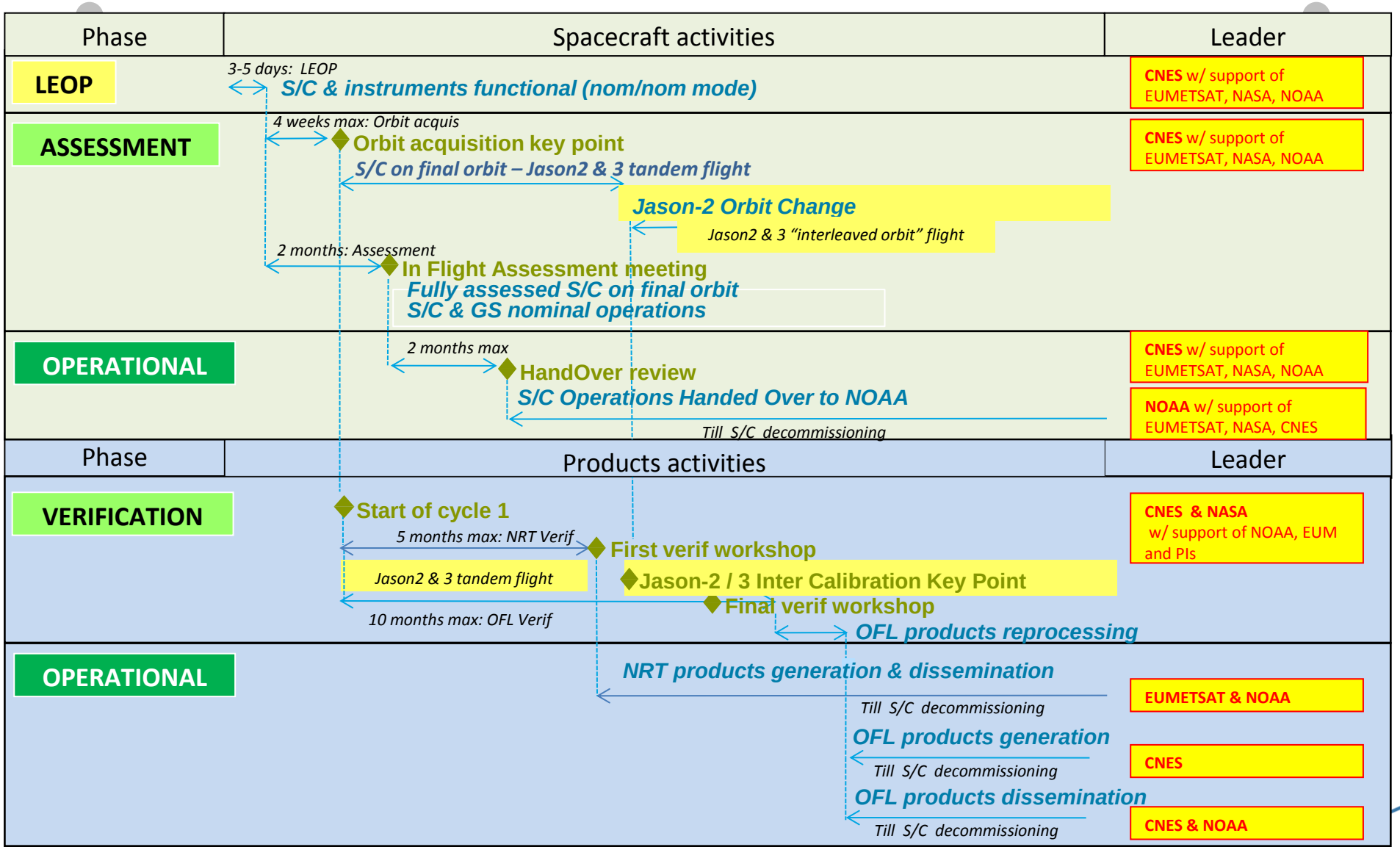
Jason-3 Orbit Acquisition Strategy

- Tandem flight with Jason-2 planned for both altimeters cross-calibration purposes
- Jason-3 final orbit characteristics :
  - same ground tracks as Jason-2
  - between 1-10 minutes ahead/behind Jason-2
- Injection orbit :
  - 25 km below the nominal Jason-3 orbit to avoid polluting the operational orbit and to avoid to cross the Jason-2 orbit (and Ja-1)
  - duration for station acquisition and number of maneuvers depends on the launch date (day number in the Jason cycle) and on the launcher dispersions



- Target duration for station acquisition : max 1 month : **mission analysis completed**

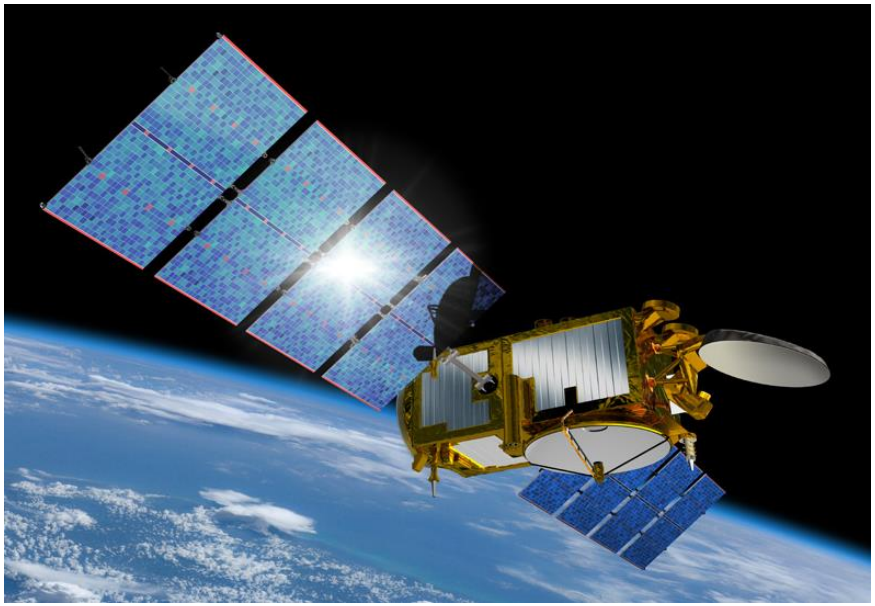
Jason-3 Phases



Jason-3 Project Summary and Next Steps

Jason-3 development is completed at satellite, instruments and ground levels

- Waiting for launcher readiness and a confirmed launch window
- Managing all of the technical, human and budget constraints is very challenging
- Joint projects are working hard to establish a launch at the earliest opportunity to ensure continuity of this important measurement



Thanks to all the project teams (CNES, EUMETSAT, NASA, NOAA)

Backup Slides

Performance requirements

Changes compared to Jason-2 are in red

	OGDR 3 hours	IGDR 1.5 days	GDR 60 days	GOALS
Altimeter Range RMS	**4.5 cm**	**3 cm**	**3 cm**	**2.25 cm**
RMS Orbit (radial)	5 cm *(a)* *(Ja2 : 10 cm)*	**2.5 cm**	**1.5 cm**	**1 cm**
Total RSS sea surface height	6.8 cm *(Ja2 : 11 cm)*	3.9 cm	3.4 cm	2.5 cm
Significant wave height	**10% or 0.5 m *(b)***	**10% or 0.4 m *(b)***	**10% or 0.4 m *(b)***	**5% or 0.25 m *(b)***
Wind speed	**1.6 m/s**	**1.5 m/s**	**1.5 m/s**	**1.5 m/s**
Sigma naught	**0.7 dB**	**0.7 dB**	**0.7 dB**	**0.5 dB**
System drift				**1 mm/year *(c)***

(a) Real time DORIS onboard ephemeris *(b)* Whichever is greater

(c) Jason 3 shall measure globally averaged sea level relative to levels established during the cal/val phase with zero bias +/- 1 mm (standard error) averaged over any one year period

Jason-3 Level2 Product files

Product	OGDR	IGDR	GDR
Processed by	**NOAA and EUMETSAT**	**CNES**	**CNES**
Disseminated by *Systematic – Electronic*	**NOAA and EUMETSAT**	**NOAA and CNES**	**NOAA and CNES**
Latency	**3-5 hours**	**1.5 days**	**~ 60 days**
1-Hz	**OGDR-SSHA**	**IGDR-SSHA**	**GDR-SSHA**
1-Hz 20-Hz	**OGDR** **OGDR-BUFR**	**IGDR**	**GDR**
Waveforms	**-**	**S-IGDR**	**S-GDR**
Structure	**segment**	**pass**	**pass**
Packaging	**segment**	**day**	**cycle**

No change compared to Jason-2 ! Current standard : GDR-E
JASON-3 will have benefit from any Jason-2 products improvement