Sentinel-6/Jason-CS News and Developments

OSTST 2019, Chicago

EUMETSAT NASA cnes NOAA esa

Summary Status

- **Mission development progressing towards launch (Nov 2020)**
  - Flight and Ground Systems are mature, undergoing system I&T
  - Refining work plans towards achieving next Milestones, Reviews & Schedule leading to launch under final consolidation between partners.
    - Prepared overall Mission Plan documenting linkage with the various dedicated post launch plans (LEOP, SIOV, Commissioning)
  - Ramping up partner management coordination in preparation for supporting key pre-launch activities
  - Establishing post-launch roles for MPWG and selection of a Validation Team.
    - Nomination of a S6 Validation Team planned through ESA-EUM Joint Announcement of Opportunity in Europe supported by CNES
    - NASA/NOAA plan to invite selected PI's from ROSES call for next OSTST
  - Establishing Joint Communication Plans (Public Relation/Outreach) related to launch & commissioning

System and Overall Ground Segment

- System Integration Verification and Validation Readiness Review (SIVVRR) on-going.
- Overall Ground Segment Critical Design Review (OGS CDR) completed.
- CNES Services (Precise Orbit Determination, Mission Performance Monitoring, L2P and L3 Product Processing, Doris and Altimeter expertise) agreed and under implementation.
- Operations preparation activities continued in close collaboration with partners.
- Several SSVT's (test between the ground segment and the real satellite or its test bench) successfully executed and aiming at demonstrating the capability to monitor and control the satellite.
- European Mission Data Acquisition and Tracking, Telemetry and Command services procured from Swedish Space Cooperation (SSC) in Kiruna and complementing the NOAA provided station services from Fairbanks.
- Payload Data Acquisition and Processing (PDAP):
    - Successful PDAP CDR => implementation of the PDAP V2 (launch critical version) authorized, delivery at EUMETSAT early 2020.
    - PDAP V3 version (full set of product generation) on-going in parallel with a target delivery for October 2020 to support the Commissioning Phase.

Products release during commissioning

- Early commissioning phase
  - LR products from *operational* PDAP v2 processor
  - LR and HR products from *validation* PDAP v3 processor
  - Distribution to partners on-line for initial performance assessment
- Mid-commissioning phase
  - Staggered release of NRT, STC, NTC products to S6VT (Sentinel-6 Validation Team)
  - Release of BUFR to selected users
- End of commissioning
  - LR and HR products from operational PDAP v3 processor to all users
  - Reprocessing with PDAP v3
- Corresponding timeline under preparation

CNES components of the Ground Segment

- Main concern: Continuity of Service, connect the time series + exploit the potential of new measurement modes
- Mission Performance Service similar to previous missions (EUMETSAT/CNES agreement)
    - Instruments and offline altimetry products quality monitoring
    - Cal/Val activities: CNES involved in 14 WP, alone on
        - WP 9.2 Jason-CS Quality assessment over inland water
- New tools, new analysis methods & new reporting methods
    - Poseidon-4 simulator
    - Poseidon-4 performance assessment (SAR-Raw & LRM)
    - Poseidon-4 on-board RMC processing impact
    - CNES Innovating Processing Center (S6PP):
        - adaptative LRM
        - Numerical SAR and LR-RMC retracking
        - fully-focused SAR
    - New OLTC tool
    - “Passive transponder” i.e. reflective corners = 2 m edge removable trihedral

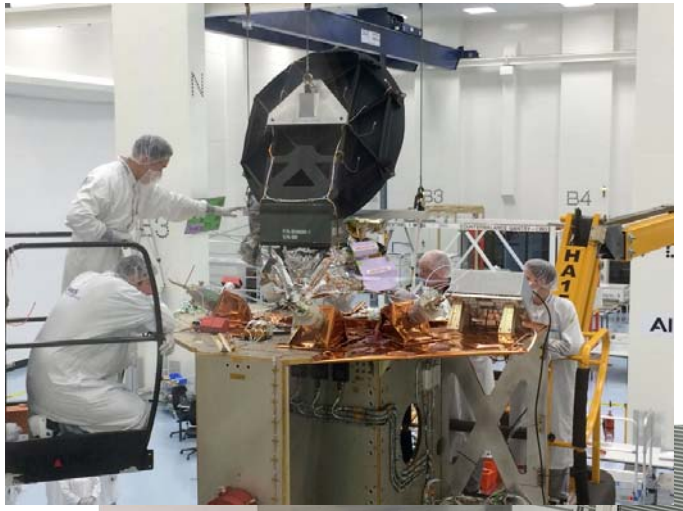
Satellite status

- Satellite-A completely integrated.
- Environmental test campaign started.
- Fit check/separation done.
- Mechanical sine vibration test on-going.
- Thermal testing in December 2019.
- Swap of the Poseïdon-4 RFU Q1 2020.
  - Acoustic/workmanship test.
  - Satellite EMC test.
- FAR conclusion July 2020.
- Shipment to Vandenberg 2nd half Sep. 2020.

- Satellite-B platform nearly integrated.
- AMR-C will be integrated soon.

Payload status

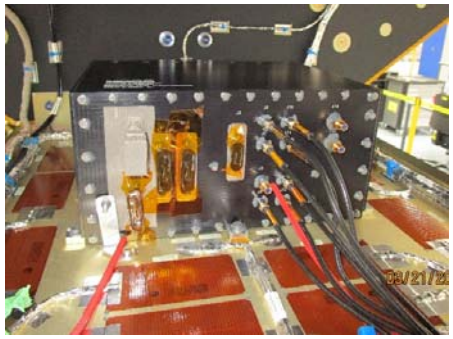
- AMR-C:
  - Radiometer fully integrated on S6-A.
  - Preliminary alignment is very good.
- Poseïdon-4:
  - Instrument configuration-1 integrated on S6-A.
  - End-to-end radiated tests successful.
  - A few anomalies investigated on the EM instrument.
  - The RFU's will be swapped after thermal test.
    (configuration-2, S3 Ku-band spare HPA's will fly on Sentinel-6A)
- DORIS:
  - Equipment PFM integrated on S6-A.
  - Robustness against launch-site RF environment TBC.
- GNSS-POD:
  - Equipment PFM integrated on S6-A.



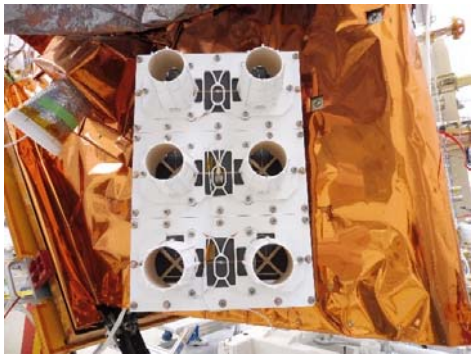
NASA STATUS (1) – INSTRUMENTS

- AMR-C instruments (A & B):
  - FM-A installed on S6-A (Apr. 2019) and operating well
  - FM-B instrument completed; delivery to Airbus in late 2019 with integration on S6-B in early 2020
  - Both instruments fully meet all key performance requirements for path delay correction and stability
  - New On-board calibrator (SCS) demonstrated (on both instruments) to provide 2-point (warm, cold) stable reference to maintain path delay drift correction to less than 0.7 mm/year
  - New HRMR (high-frequency radiometer channels (90,130,168 GHz) demonstrated to meet tech demo measurement goals
- GNSS-RO Instruments (A & B):
  - FM-A installed on S6-A (Mar. 2019) and operating well
  - FM-B instrument hardware complete and in final stages of testing at JPL; delivery to Airbus planned for late 2019 with integration onto S6-B in early 2020
- LRA for S6-A and B installed onto S/C

GNSS Receiver Electronics



GNSS RO Fore-Antenna



LRA

AMR-C FM-B During Final Testing

NASA STATUS (2) – GROUND AND LAUNCH VEHICLE

- Launch Vehicle (S6-A): SpaceX – Falcon9
  - Maturing S/C – LV interfaces and analyses towards CDR (Dec 2019)
    - Mainly working random vibe and EMI/EMC related items with plans to close in the coming months.
  - Launcher production has started
  - Selected SpaceX payload processing facility on Vandenberg Air Force Base (VAFB)
- Ground System: Development completed and supporting testing with partners
  - JPL components of the Ground Segment
  - Payload Operations Control Center (POCC)
    - Data Distribution and Management
    - Instrument Monitoring and Trend Analysis
  - GNSS Radio Occultation (RO) System
    - RO-NRT processing, product generation
    - RO-NTC processing, product generation, distribution & archival