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New frontiers of altimetry



Lake Constance - Germany,
27-31 October 2014

DORIS Future Missions

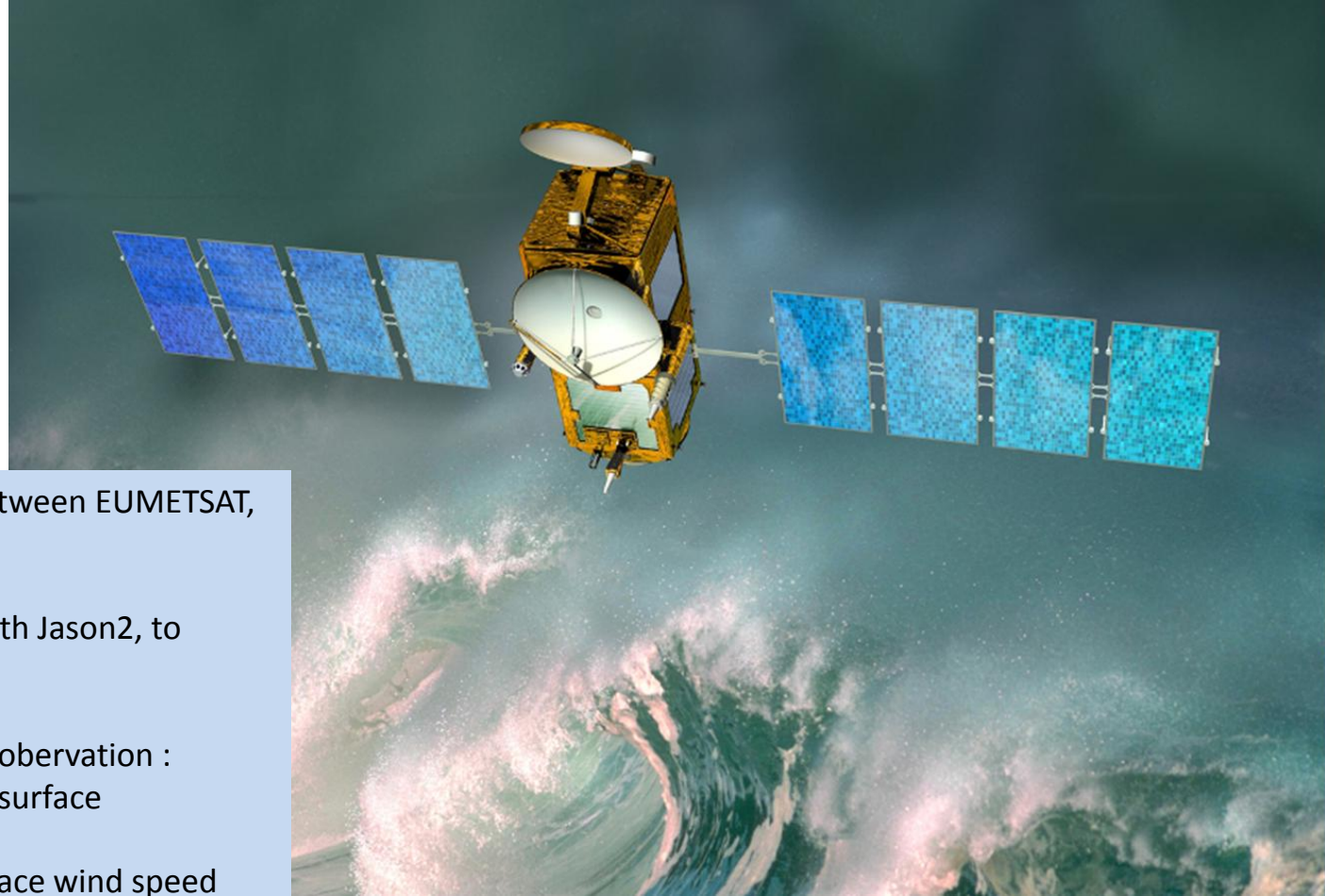
C. MANFREDI, A. AURIOL (CNES)

Introduction

- About fifteen DORIS instruments have already flown since 1990
- In a near future, 3 are in AIT, 3 are ordered, and few are in preparation

⇒ An overview of the four next missions which will embark a DORIS instrument

JASON3



International Cooperation between EUMETSAT, NOAA, NASA/JPL and CNES

Mission strongly recurrent with Jason2, to ensure continuity of service

Altimetry mission for oceans observation :

- Measurement of the sea surface topography
- Measurement of the surface wind speed
- Mean wave height

JASON3



Mini satellite PROTEUS

Payload :

- Radar Altimeter Poseidon 3B
- Microwave Radiometer AMR
- 3 systems of precise orbitography : DORIS (DGXX-S generation), GPS, Laser Reflector LRA

Orbit circular

Non sun-synchronous

Inclination : 66°

Altitude : 1336km

Life time : 5 years

Launch planned : March 31st 2015

JASON3

Satellite model (DIODE) : similar with Jason2,
model with 6 faces
Difference with Jason1 and 2 : the DORIS antenna
reference point

Satellite nadir Earth pointed
Attitude law : Yaw-steering mode, and
sometimes yaw fixed (to optimize the
illumination of solar panels)



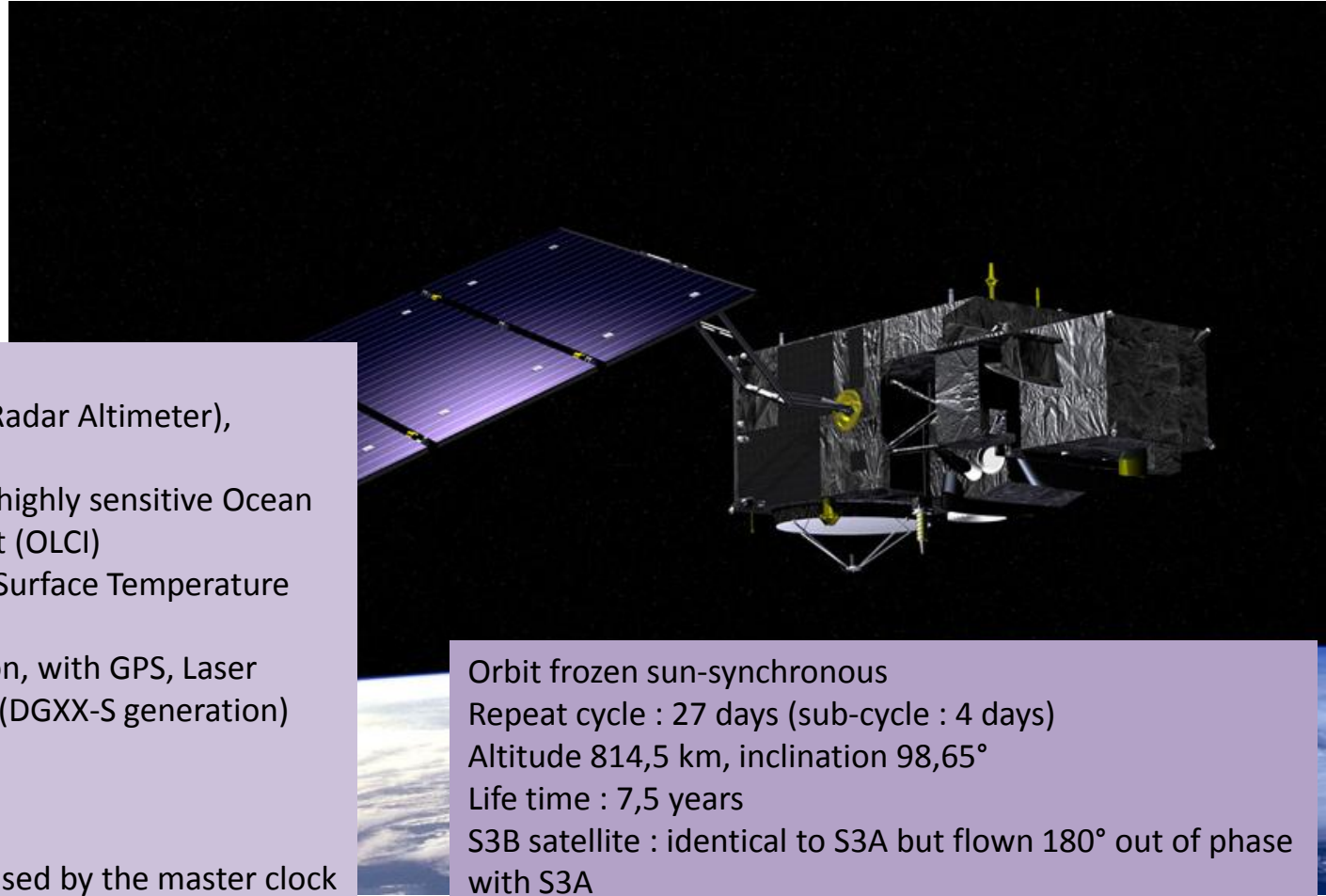
Sentinel3A & 3B



Earth observation satellite mission designed for the GMES (Global Monitoring for Environment and Security) program of ESA

The aim of the mission : to ensure the continuity of ENVISAT and SPOT/Vegetation

Sentinel3A & 3B



Payload :

- SRAL (Synthetic Aperture Radar Altimeter), Microwave Radiometer
- An imaging spectrometer, highly sensitive Ocean and Land Colour Instrument (OLCI)
- A dual-view Sea and Land Surface Temperature Radiometer (SLSTR)
- Precise Orbit Determination, with GPS, Laser Retro-reflector and DORIS (DGXX-S generation)

DORIS on Sentinel3 :

- POD
- 10MHz signal, from USO, used by the master clock of the SRAL instrument

Orbit frozen sun-synchronous

Repeat cycle : 27 days (sub-cycle : 4 days)

Altitude 814,5 km, inclination 98,65°

Life time : 7,5 years

S3B satellite : identical to S3A but flown 180° out of phase with S3A

S3A Launch planned : September 21st 2015

S3B launch planned : about 18 months later, February 2017

Sentinel3A & 3B



The satellite model is a model with 6 faces

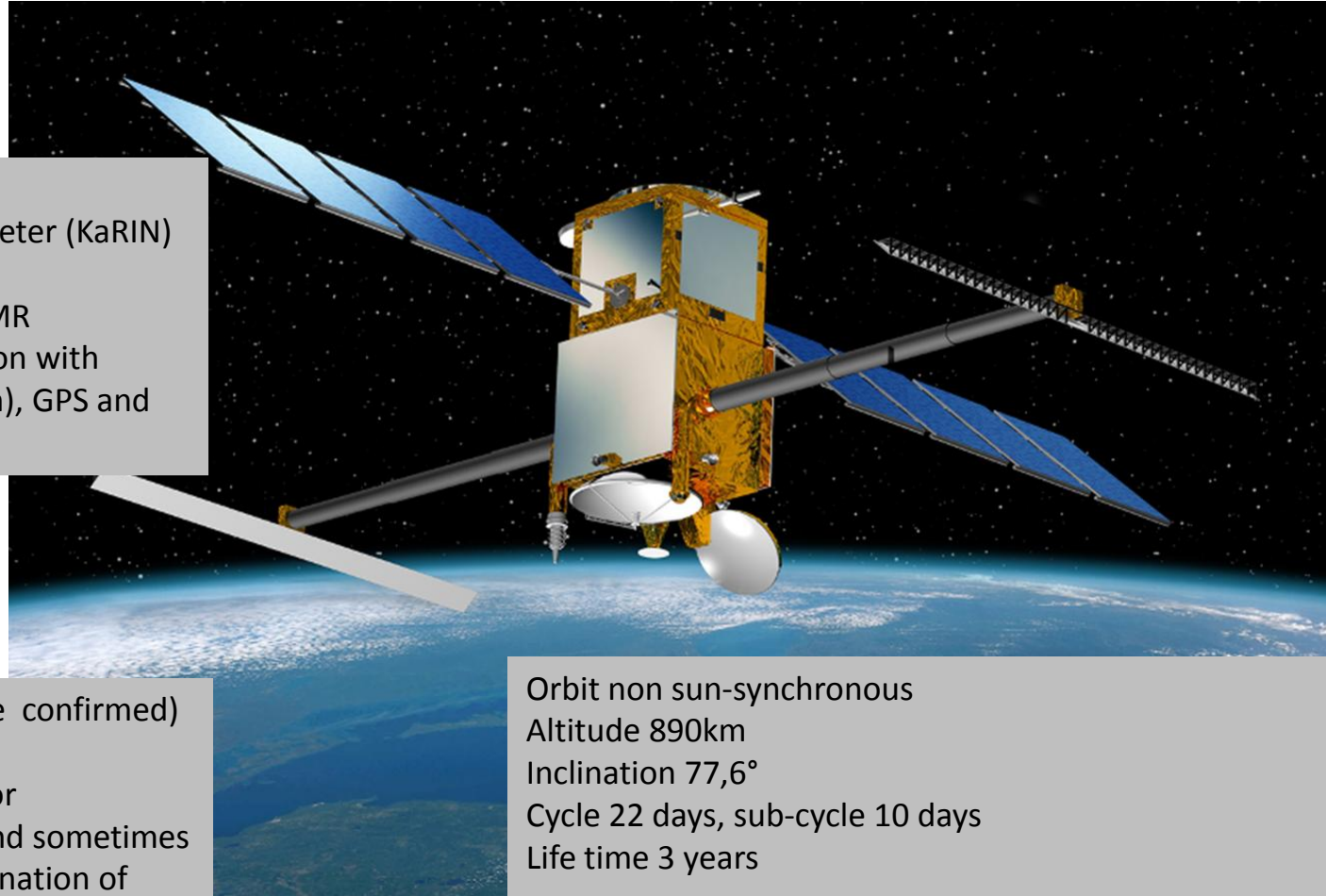
The nominal attitude of the satellite is Earth-pointed with simultaneous Yaw-Steering and geodetic pointing to align the footprints of the different instruments with the track on the Earth surface.

SWOT



SWOT Surface Water and Ocean Topography
Cooperation with CNES, NASA, and Canadian Space Agency
New technical challenge : altimetry interferometric with large swath, to measure sea surface heights and terrestrial water heights

SWOT



Payload

- Ka-band Radar Interferometer (KaRIN)
- Nadir Altimeter
- Microwave radiometer AMR
- Precise Orbit Determination with DORIS (DGXX-S generation), GPS and LRA

Satellite model : 6 faces (to be confirmed)

Attitude : geodetic pointing for instruments performances, and sometimes yaw flip to optimize the illumination of solar panels.

Orbit non sun-synchronous
Altitude 890km
Inclination 77,6°
Cycle 22 days, sub-cycle 10 days
Life time 3 years

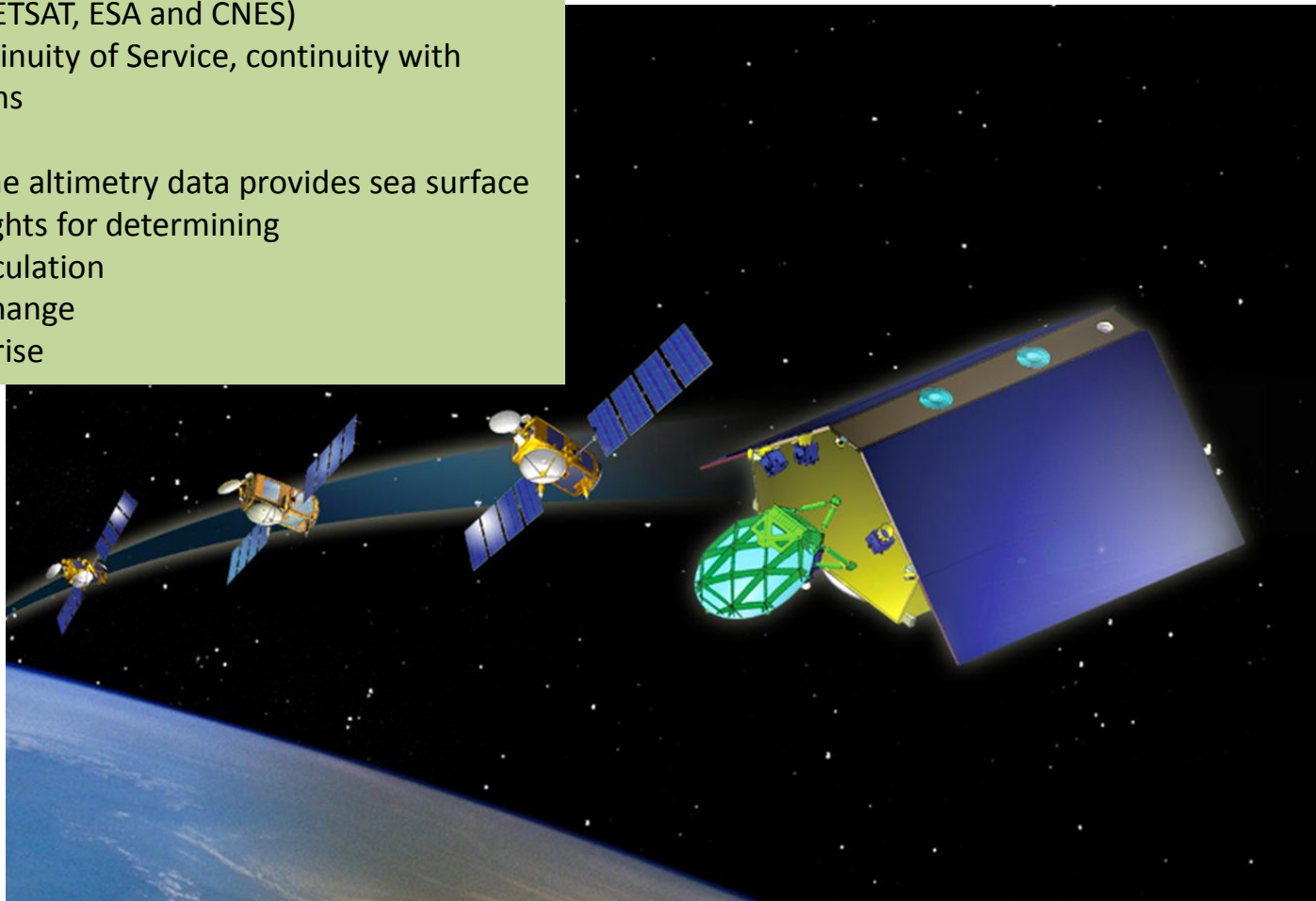
Launch planned in October 2020

JASON-CS

Partnership between the US (NOAA and JPL) and Europe (EUMETSAT, ESA and CNES)
« CS » as Continuity of Service, continuity with JASON missions

Like JASON, the altimetry data provides sea surface and wave heights for determining

- Ocean circulation
- Climate change
- Sea-level rise

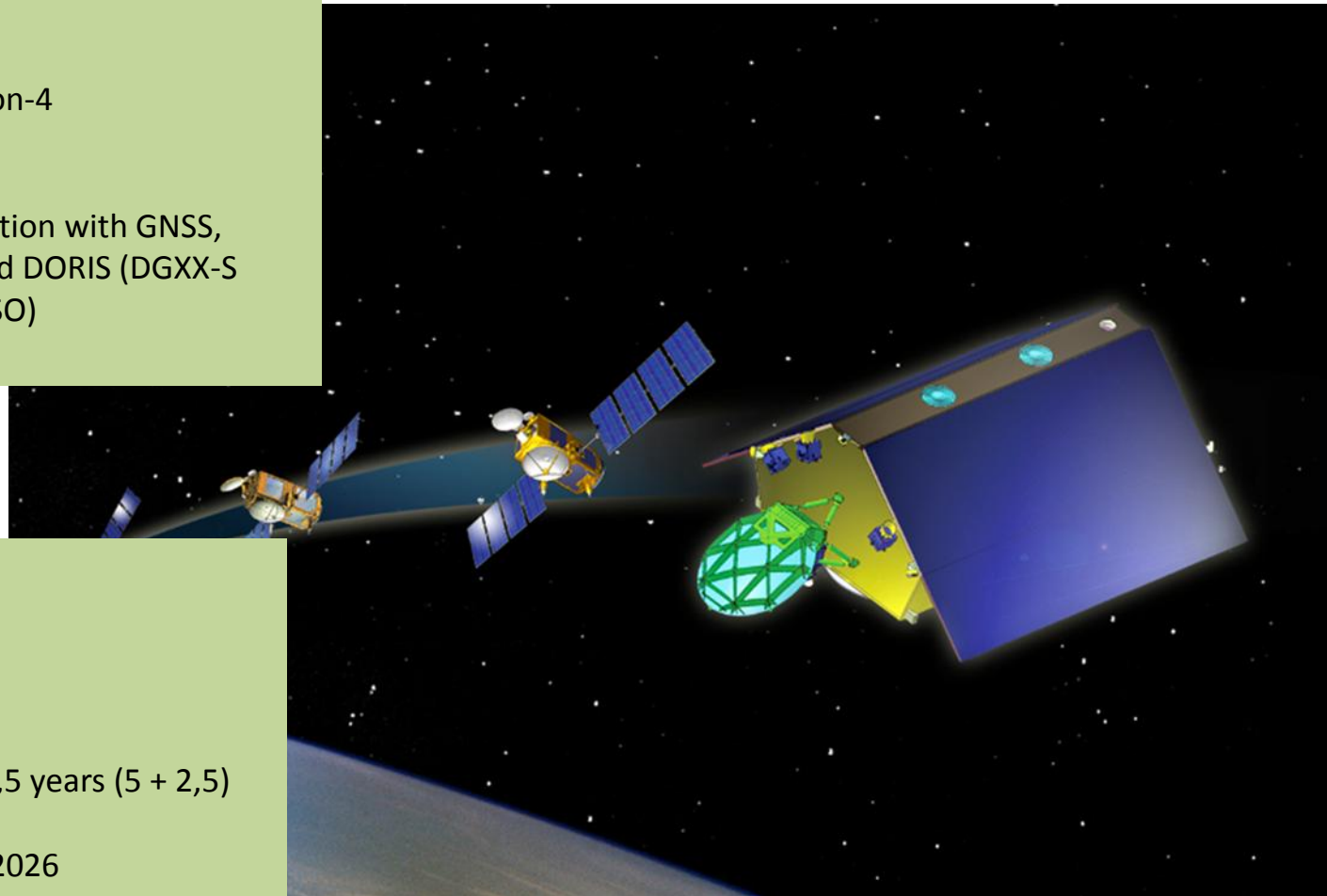


JASON-CS

Platform : CryoSat type

Payload :

- Radar altimeter, Poseidon-4
- Microwave radiometer
- GNSS radio-occultation
- Precise Orbit Determination with GNSS, Laser Reflector Array and DORIS (DGXX-S generation with mini-USO)



Orbit non sun-synchronous

Altitude 1336km

Inclination 66°

Repetitivity 10 days

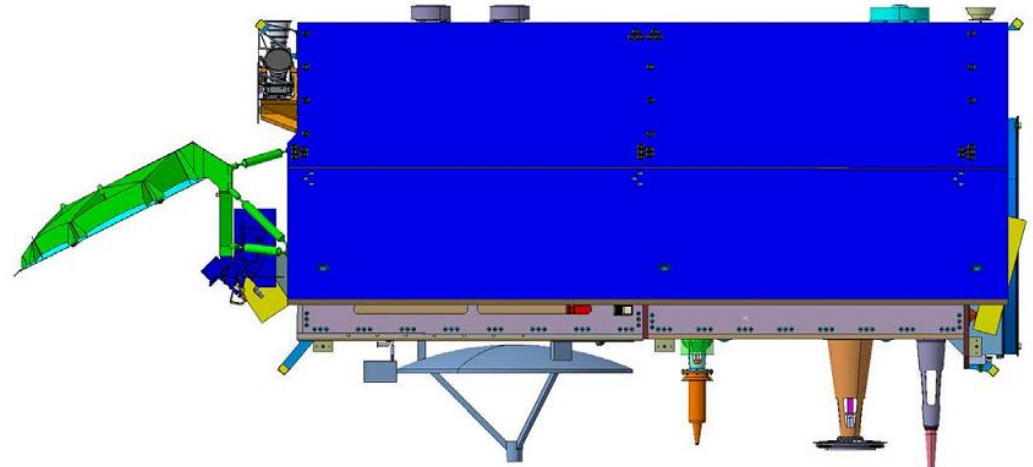
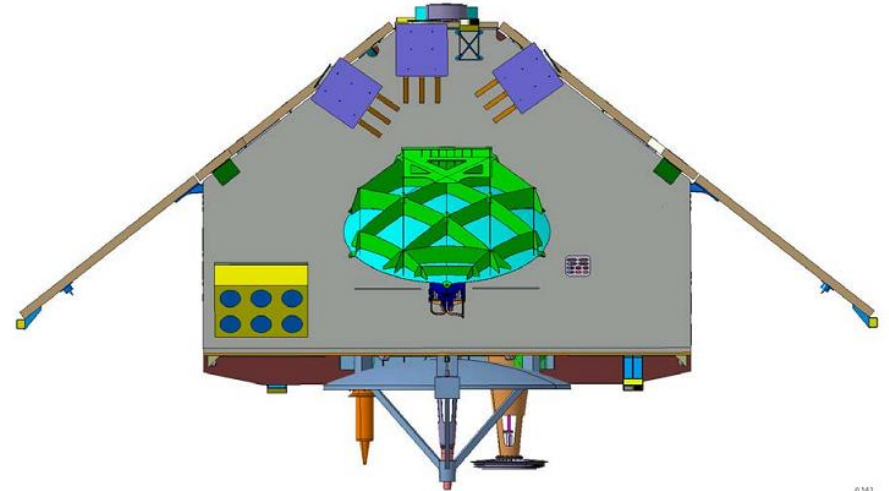
2 satellites with duration life 7,5 years (5 + 2,5)

Launches planned : 2020 and 2026

JASON-CS

Planned satellite model : 10 faces, 8 for satellite and 2 for radiometer

Attitude : normal pointing including yaw steering



NEXT MISSIONS

- Missions Sentinel3C&D

Continuity of the Sentinel3 mission

Recurrent satellites with Sentinel3A&B

- Mission GRASP

NASA/CNES cooperation

A geodetic mission will carry 4 geodetic techniques

- GNSS
- Satellite Laser Ranging reflector
- DORIS
- VLBI

THANK YOU
FOR YOUR ATTENTION