

JUICE Status Report

Committee on Astrobiology and Planetary Science

Olivier Witasse

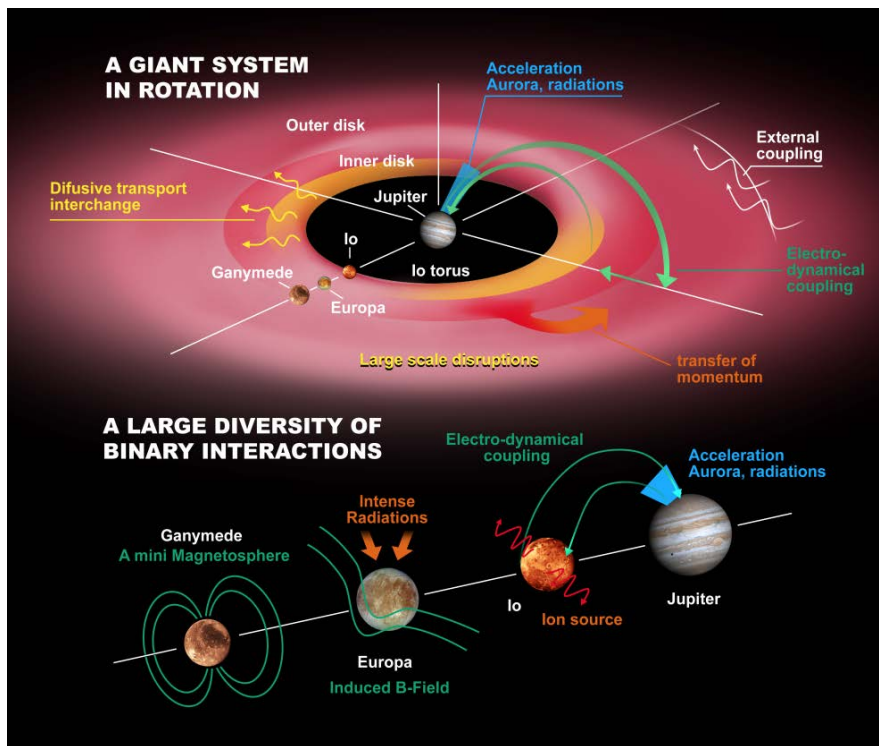
Project Scientist
European Space Agency

31 March 2020

ESA UNCLASSIFIED - For Official Use

Emergence of habitable worlds around gas giants

- Ganymede as a planetary object and possible habitat
- Europas's recently active zones
- Callisto as a remnant of the early jovian system



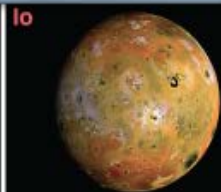
The Jupiter system as an archetype for gas giants

- Jovian atmosphere
- Jovian magnetosphere
- Jovian satellite and ring systems

HOW DOES
IT WORK?

SEARCH
FOR LIFE

ORIGINS &
FORMATION



OCEAN MOONS

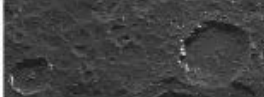
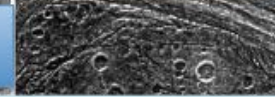
ROCKY MOONS



LAPLACE RESONANCE

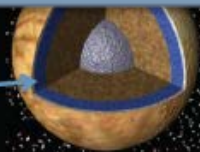


ACTIVE SURFACE

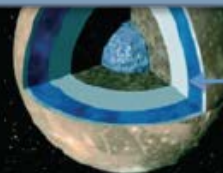


HABITABILITY

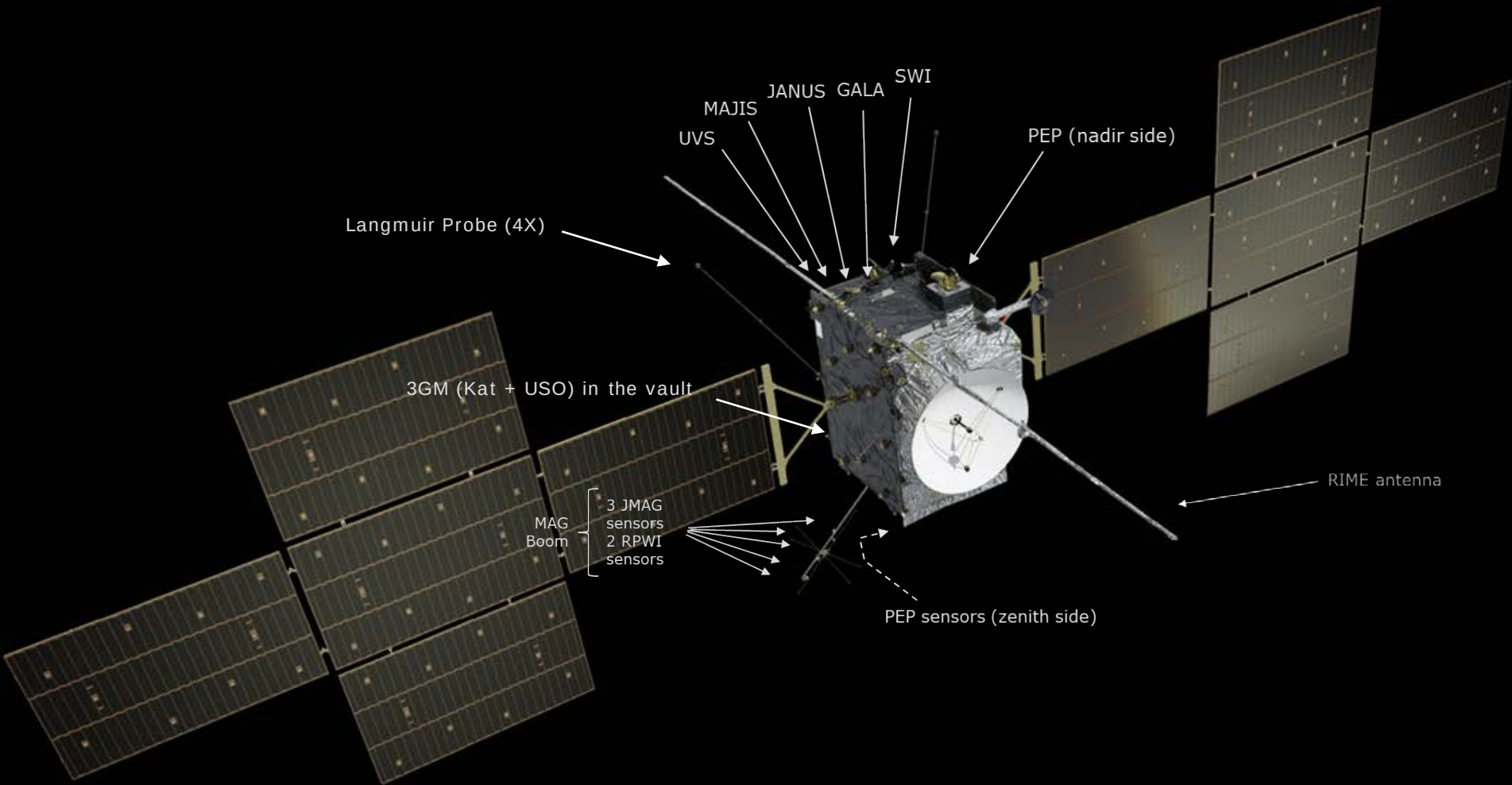
TYPE III
HABITAT



TYPE IV
HABITAT



Courtesy
Michel Blanc



Broad science and interdisciplinary



In-situ / Remote sensing
instruments, radio-science

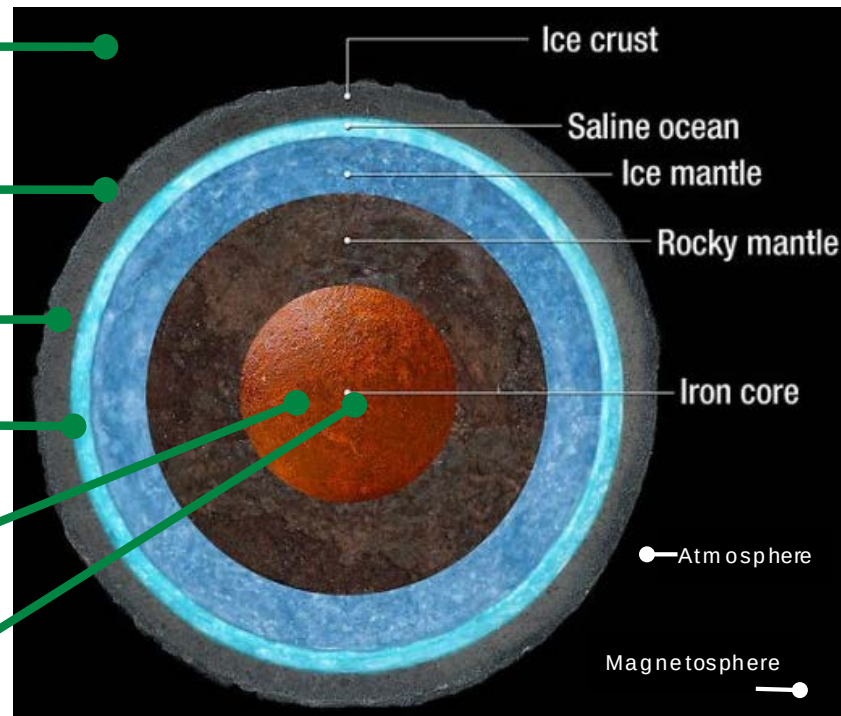
Remote sensing instruments,
Radar, altimeter

Radar, altimeter

Gravity science, magnetometer,
camera, altimeter, passive radar

Gravity science, magnetometer

Position/ephemerides:
radio-science and camera

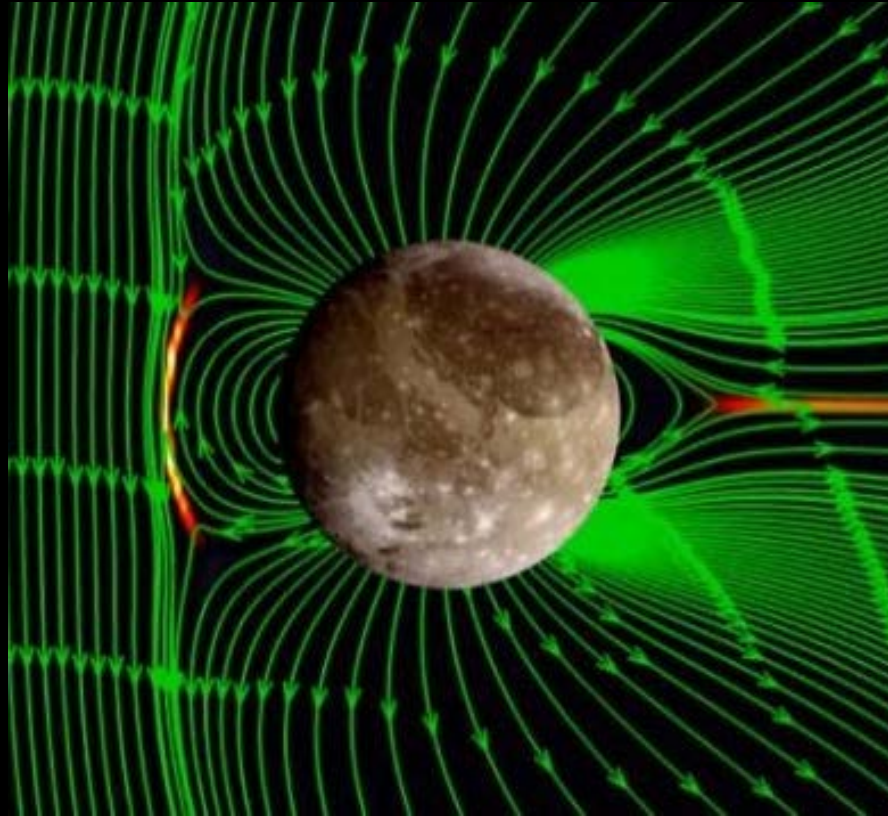


Ganymede moon European Space Agency

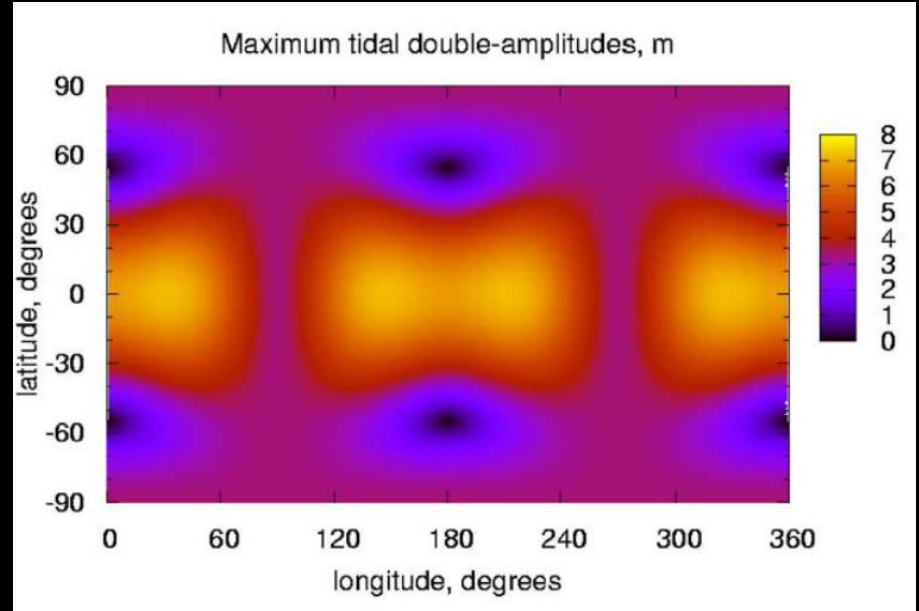
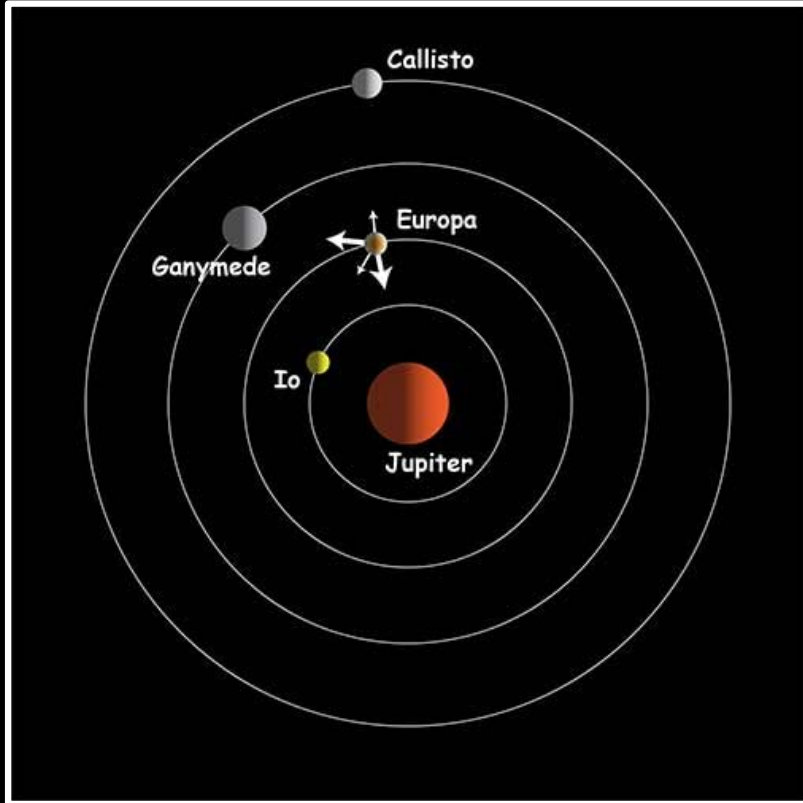
How to detect subsurface oceans?



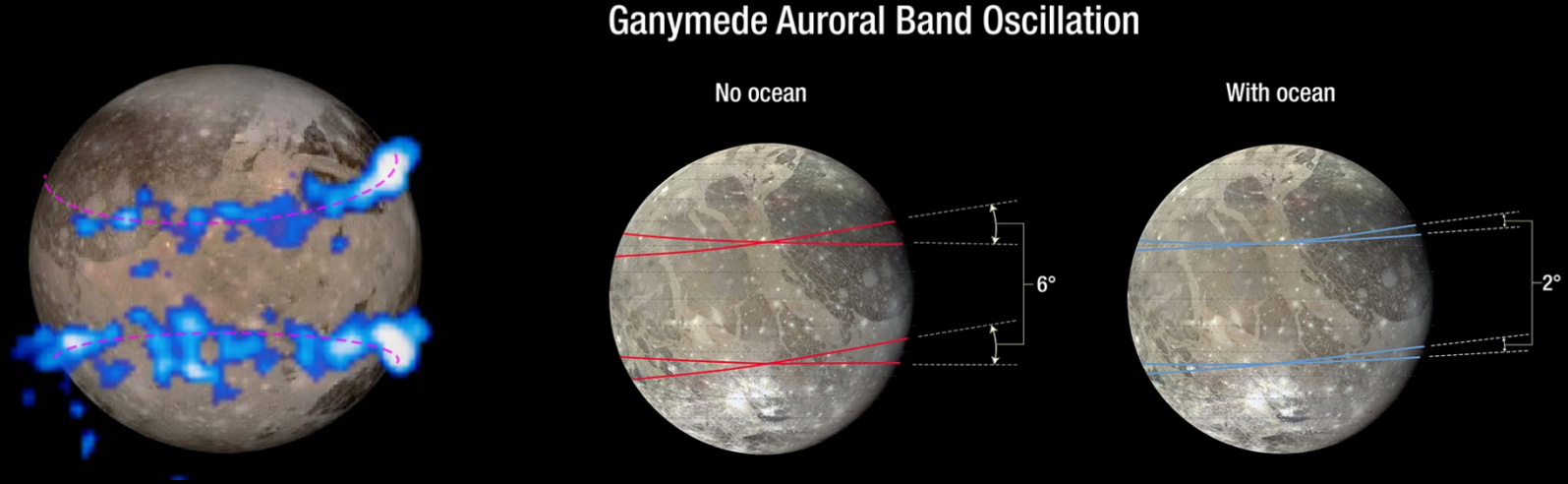
In-situ measurements of magnetic field



Measurements of Ganymede tides with the laser altimeter



In-situ and remote sensing observations of the Ganymede auroral ovals



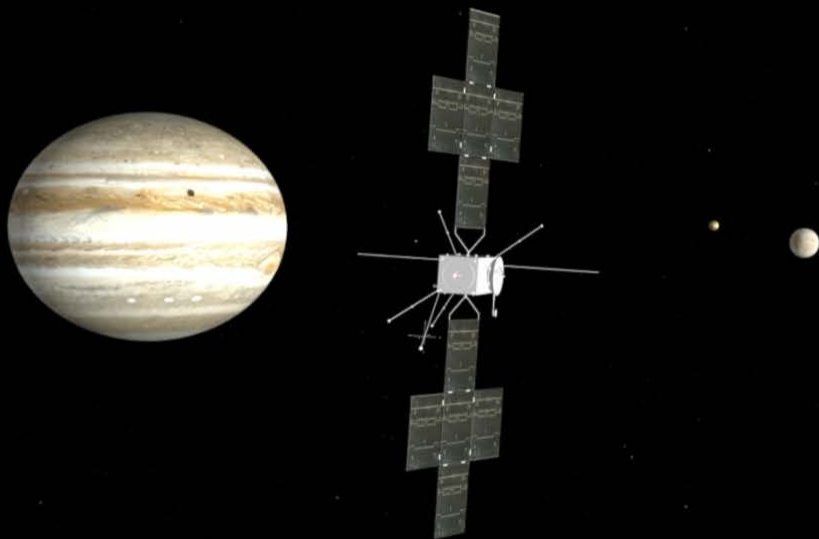
From Saur et al., 2015

In-situ and remote sensing observations of Europa plumes (?)

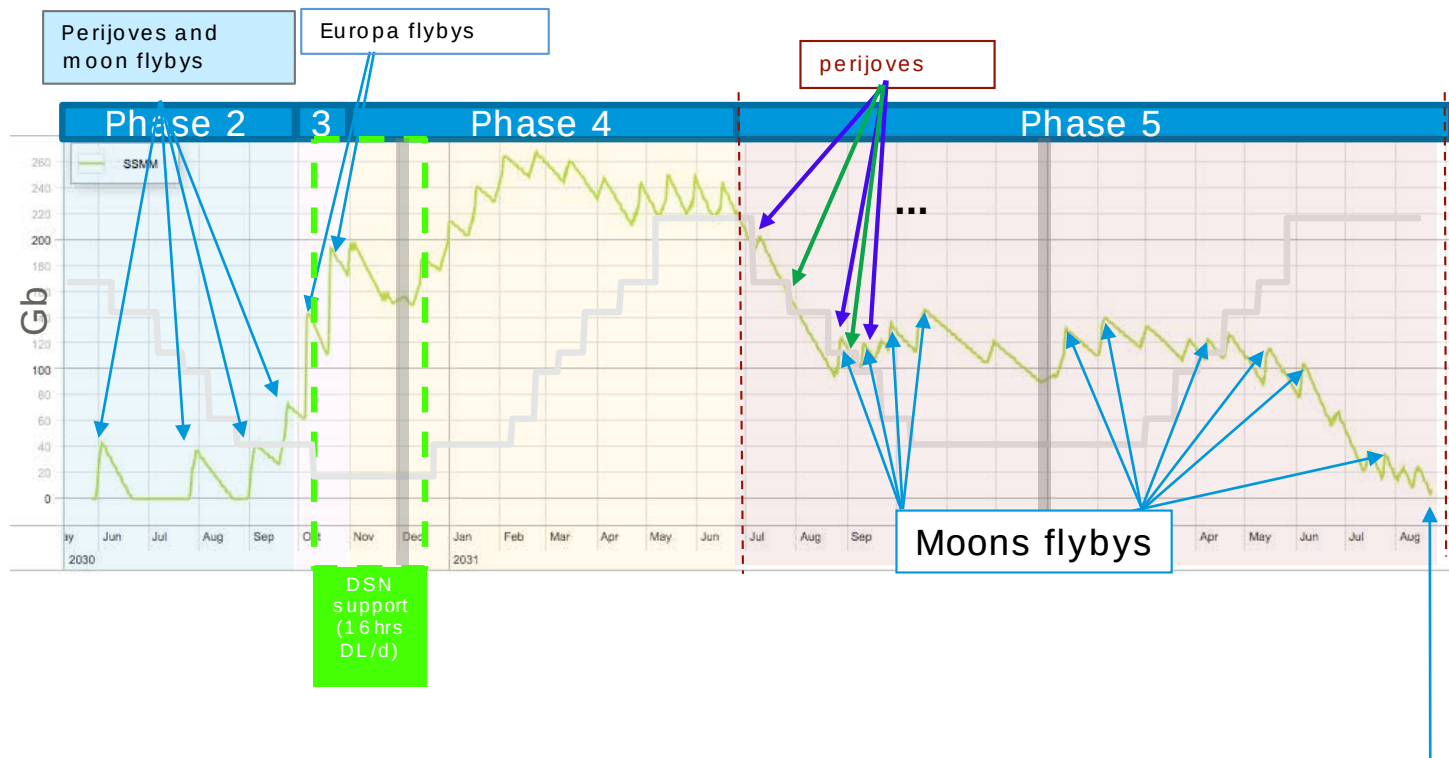


Overall Mission Profile

Launch	May / June 2022
Interplanetary transfer (Earth-Venus-Earth-Mars-Earth)	7.6 years
Jupiter orbit insertion	October 2029
2 Europa flybys	October 2030
Jupiter high-latitude phase	Dec 2030-May 2031
Transfer to Ganymede	June 2031-July 2032
Ganymede orbit insertion	August 2032
Ganymede elliptical orbit / 5000 km circular orbit	August-Dec 2032
Ganymede 500 km Circular Orbit	January-June 2033
End of mission	June 2033



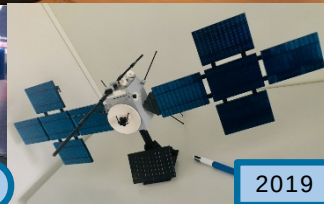
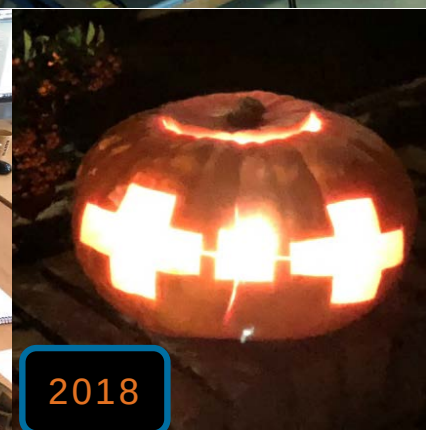
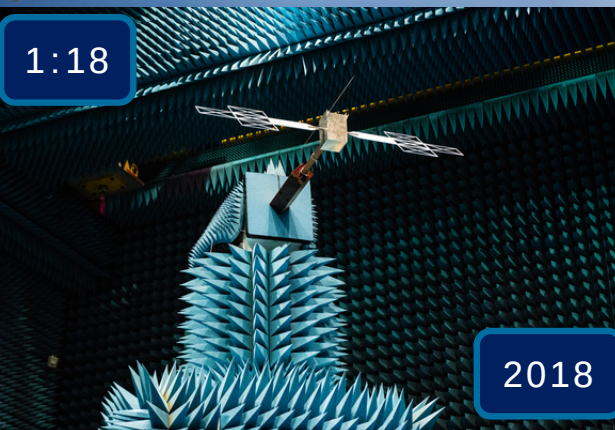
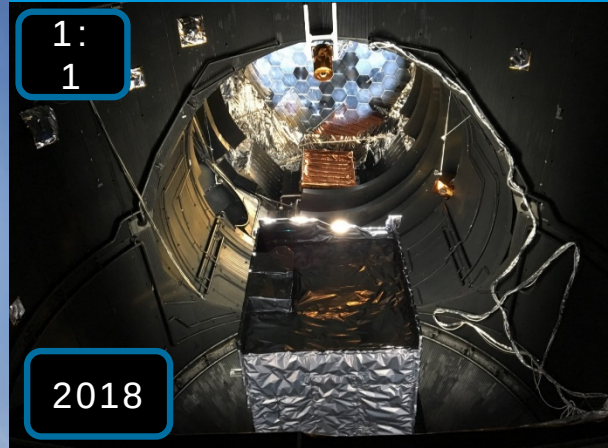
Evolution of the filling of the mass memory



Carry over to Ganymede phase 6 ~ 11.5 Gb

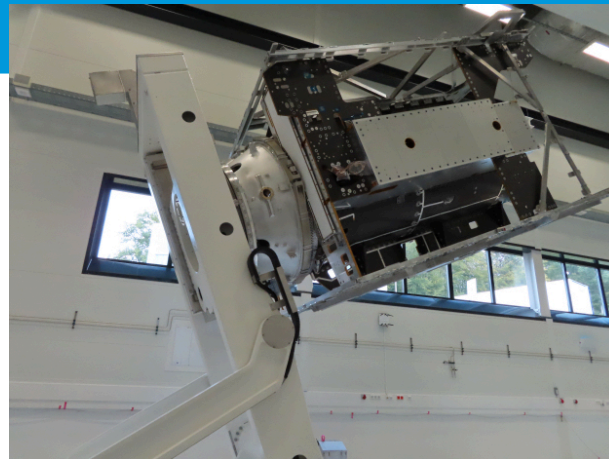
- **March 2007: ESA call for proposals**
- **May 2012: Mission selected**
- **February 2013: Payload selected**
- **July 2015: Prime industrial contractor selected**
- **May 2022: Launch from Kourou (Ariane 5 baseline)**
- **October 2029: Jupiter orbit insertion**
- **August 2032: Ganymede orbit insertion**
- **September 2033: End of mission**

- **March 2019: CDR / start of phase D**
- **June 2019: Instrument CDRs completed**
- **June 2019: Contract signature for the launcher (Ariane 5)**
- **October 2019: Start of the spacecraft FM integration**
- **December 2019: All instrument EM delivered**
- **February 2020: 1st FM instrument delivered (UVS)**
- **December 2020: Start of the environment test of the spacecraft FM at ESTEC**



**JUICE family
of models**

The real spacecraft ☺



Agency

The first instrument: UV spectrometer from SWRI



Challenges of the mission



Technical:

Mission lifetime

Radiations

**Thermal (hot
and cold cases)**

Power

**Electro-
magnetic
compatibility**

Operations:

Navigation

**Planetary
protection**

**Power & data
rate
constraints**



**Human,
knowledge
management**



- **Goal: to share information on science plans and capability of both missions, and to identify synergistic investigations and collaborations. Key questions are to understand how to carry out science if both missions are in the Jupiter system at the same time and how we can best leverage the science investigations if the missions are not in the Jupiter system at the same time.**
- **Exchange of technical information between the two projects.**
- **Regular teleconference between the JUICE and Clipper project scientist teams.**
- **Two science workshops organised (2018, Pasadena; 2019, Geneva).**
- **Regular reports at OPAG.**



Stay tuned!



- JUICE programme running well
- On track for a launch in June 2022
- Collaboration with the Clipper teams ongoing
- Websites:
sci.esa.int/juice
cosmos.esa.int/juice

