**JANUS: THE SCIENTIFIC CAMERA ONBOARD THE ESA JUICE MISSION. IN-FLIGHT AND ON-GROUND ACTIVITIES IN PREPARATION OF THE SCIENCE PHASE.** Cecilia Tubiana[1], Livio Agostini[1], Luca Penasa[2], Alessio Aboudan[3], Alice Lucchetti[2], Ricardo Hueso[4], Pasquale Palumbo[1], Thomas Bilotta[5], Jose Maria Castro[6], Alessandro Dattolo[5], Stubbe Hviid[7], Elke Kersten[7], Luisa Lara[6], Klaus-Dieter Matz[7], Romolo Politi[1], Ganna Portyankina[7], Thomas Roatsch[7], Nicole Schmitz[7], Rolf Schroedter[7], Frank Trauthan[7], Michele Zusi[1], and the JANUS team.

[1]INAF-IAPS Roma, Istituto di Astrofisica e Planetologia Spaziali di Roma, Rome, Italy (cecilia.tubiana@inaf.it); [2]INAF-OAPD Astronomical Observatory of Padova, Padova, Italy; [3]CISAS G. Colombo, Universita' di Padova, Italy; [4]Escuela de Ingenieria de Bilbao, UPV/EHU, Bilbao, Spain; [5]Leonardo SpA, Firenze, Italy; [6]Instituto de Astrofisica de Andalucia - CSIC, Granada, Spain; [7]Institute of Planetary Research, DLR, Berlin, Germany.

The Jupiter Icy Moons Explorer (JUICE) mission is the first Large (L-class) mission selected for the European Space Agency (ESA) Cosmic Vision 2015-2025 program. It is devoted to exploring the Jupiter system and investigating its icy Galilean satellites Europa, Ganymede and Callisto [1]. JUICE has been succesfully launched on 14 April 2023 from Europe's Spaceport in Kourou, French Guiana, on an Ariane 5 launcher and, after its 8 years journey throughout the inner Solar System, it will reach the Jupiter system in July 2031. During its nominal science phase, JUICE is planned to spend many months orbiting around Jupiter, performing fly-bys of Europa, Ganymede and Callisto, and finally conducting an orbital tour of Ganymede.

JUICE carries 10 state-of-the-art instruments, comprising the most powerful remote sensing, geophysical and in situ payload suite ever flown to the outer Solar System.

Among those, JANUS (Jovis Amorum ac Natorum Undique Scrutator) is the scientific optical camera system [2]. Its design has been optimised, according to JANUS' scientific requirements, for observations of a wide range of targets, from Jupiter's atmosphere, to solid satellite surfaces and their exospheres, rings, and transient phenomena like lightning.

JANUS is a modified Ritchey-Chrétien telescope. It has a nominal focal length of 467 mm, an effective entrance pupil diameter of 103.6 mm, a FoV of 1.72°×1.29° covered by a 2000×1504 pixel CMOS sensor with a pixel dimension of 7 µm. In addition, a filter wheel with 13 filters allows JANUS to obtain multi-spectral images in the 340-1080 nm wavelength range. This camera provides images of the targets with a scale of 7.5 m/pixel at a distance of 500 km. Such characteristics will allow to observe the surfaces of the icy satellites with a spatial resolution ranging from 400 m to 3 m for Europa, Ganymede and Callisto. In addition, Jupiter and other targets, e.g. Io, small moons and rings, will be observed with a resolution from few km to tens of km.

JANUS underwent its in-flight commissioning on 16 – 18 May 2023 with the purpose of verifying that each subsystem was fully functional after launch and of characterizing the in-flight performance. A first analysis shows that JANUS is fully functional and its performances are as expected. Among the various activities, a verification of the radiometric capabilities (including the goodness of the on-ground calibration) and of the geometrical ones has been performed and improvements of the calibration products are currently on going. These activities has been performed exploting the GAIA DR3 database which allows to easily access a tremendous amount of information both in terms of star fluxes and precise astrometric positions.

Functionality and performace checks will be repeated regularly during the cruise phase to access the real instrument capabilities.

The achievement of mission and instrument science goals during the science phase is strictly related to the resources available to each instrument. A series of science planning exercises, lead by ESA and involving all instruments, are taking place during the cruise phase. The outcome of the planning exercises is the identification of the available resources (and in particular of pointings, data volume and power) during each scenario and the definition of the best observation approach which ensures the best scientific outcome at instrument and mission level for each scientific target.

Three science planning exercises have been carried out to date: one Callisto flyby, one of the two Europa flybys and one perijove. One of the key outcomes of those planning exercises is that, given the limited resources available, it is critical to identify the best observation approach for all targets.

**Acknowledgments:** The activity has been realized under the ASI-INAF contract 2023-06-HH.0.

**References:**

[1] Grasset et al., (2013), *PSS*, 78, 1-21. [2] Palumbo et al., (2014), *EGU conference*.