

A HIGHLY INTEGRATED PAYLOAD SUITE FOR EUROPA

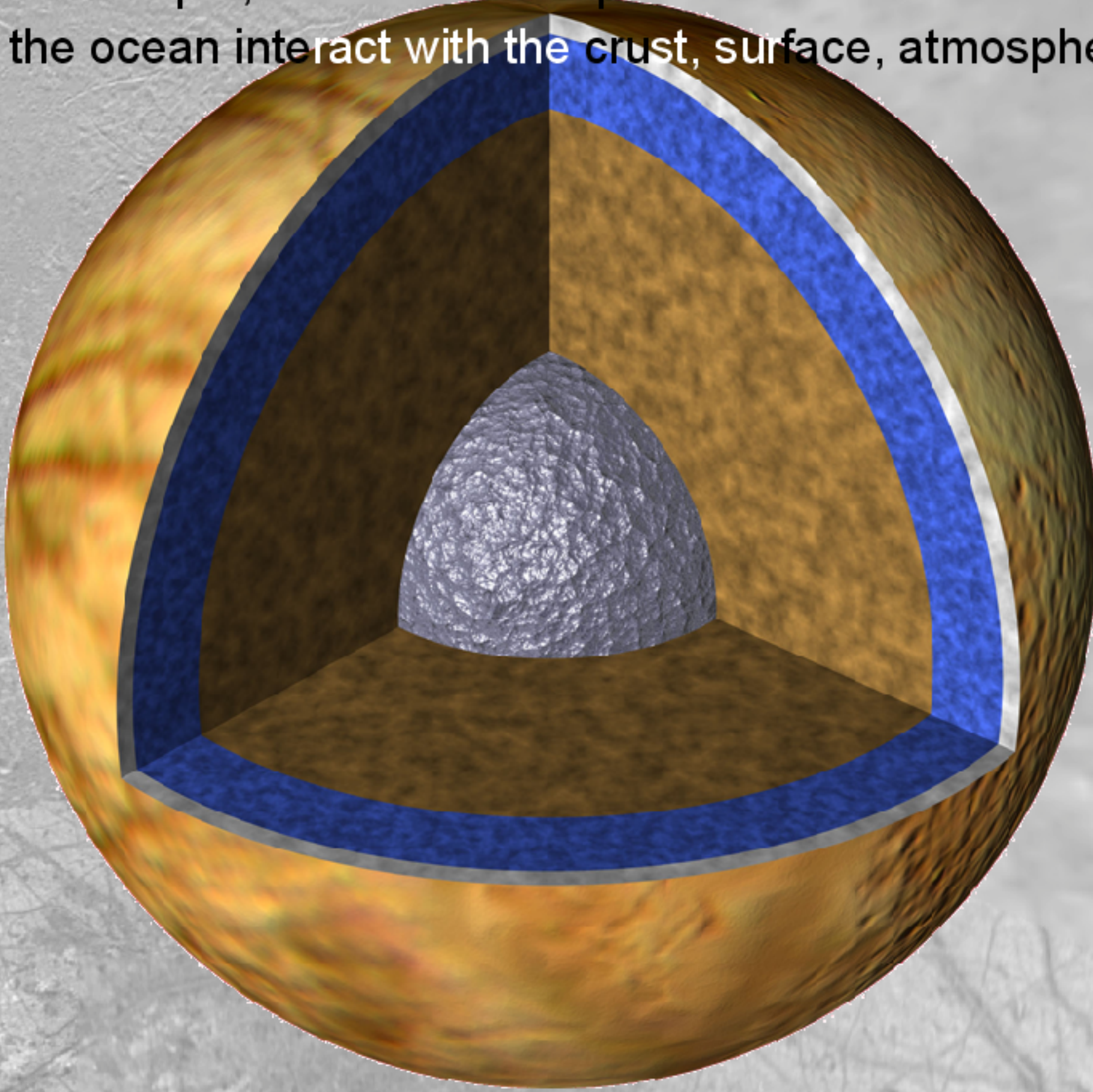
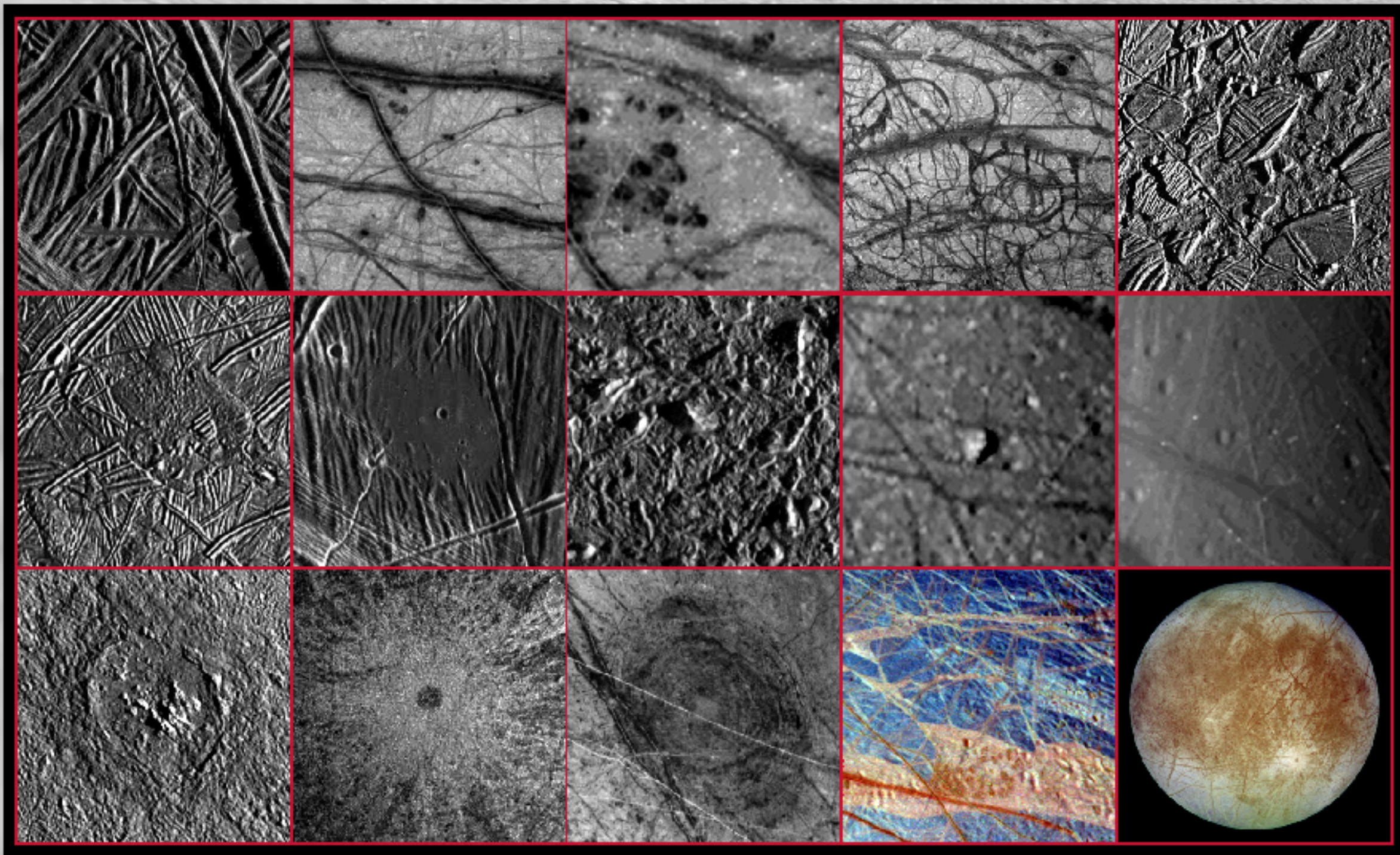
M.S. Bentley, A. Palacios, F. Varlet, D. Voigt, S. Kraft, *cosine* Research B.V., Leiden, The Netherlands
P. Falkner, A. Peacock, ESA-ESTEC, Science Payload and Advanced Concepts Office, Noordwijk, The Netherlands

Surface

Questions

Interior

What geological processes have operated, or are operating, on Europa?
What is the bulk composition of surface materials and surface chemistry?
How did Europa evolve geologically - is it active today?



Measurements

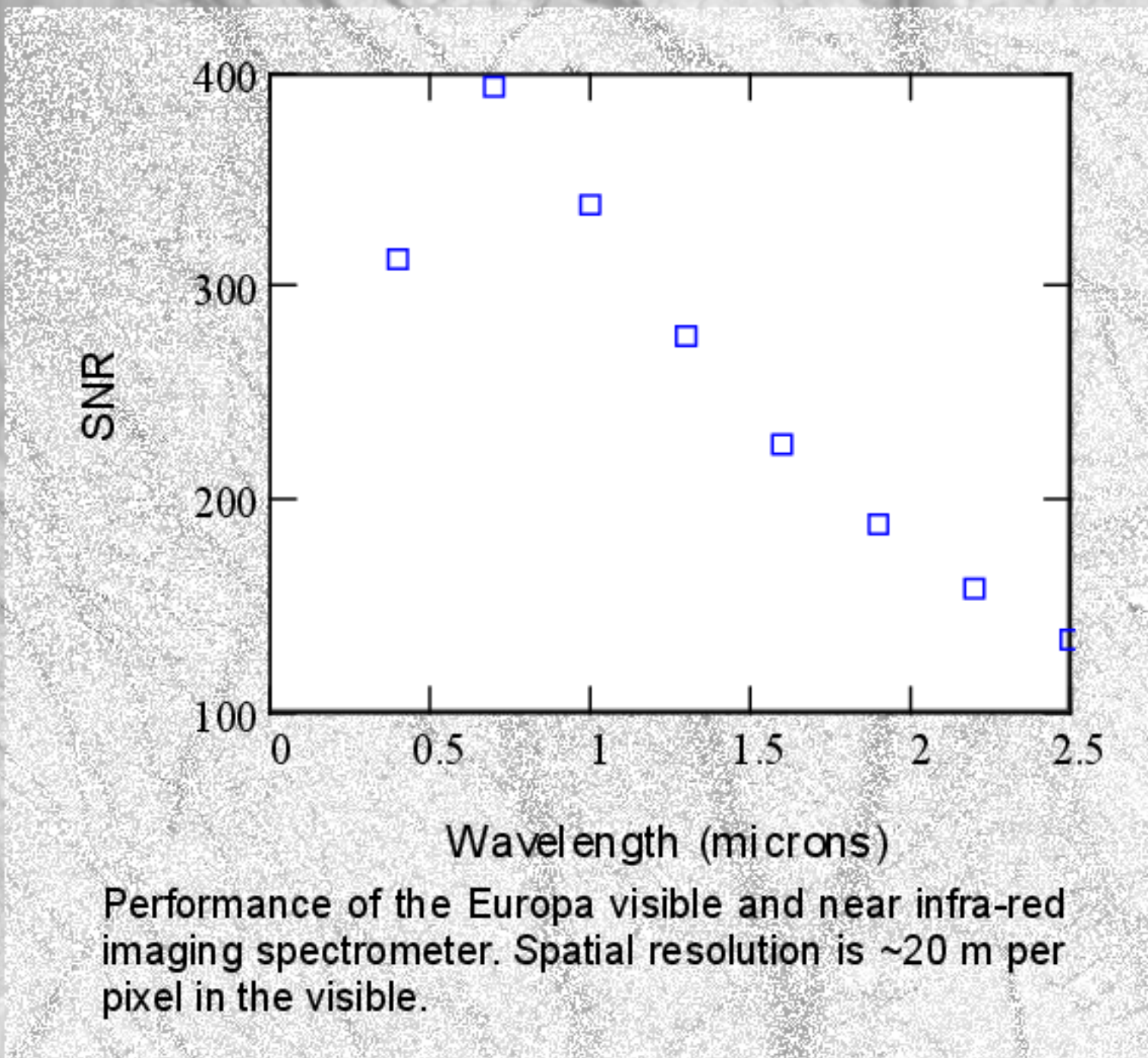
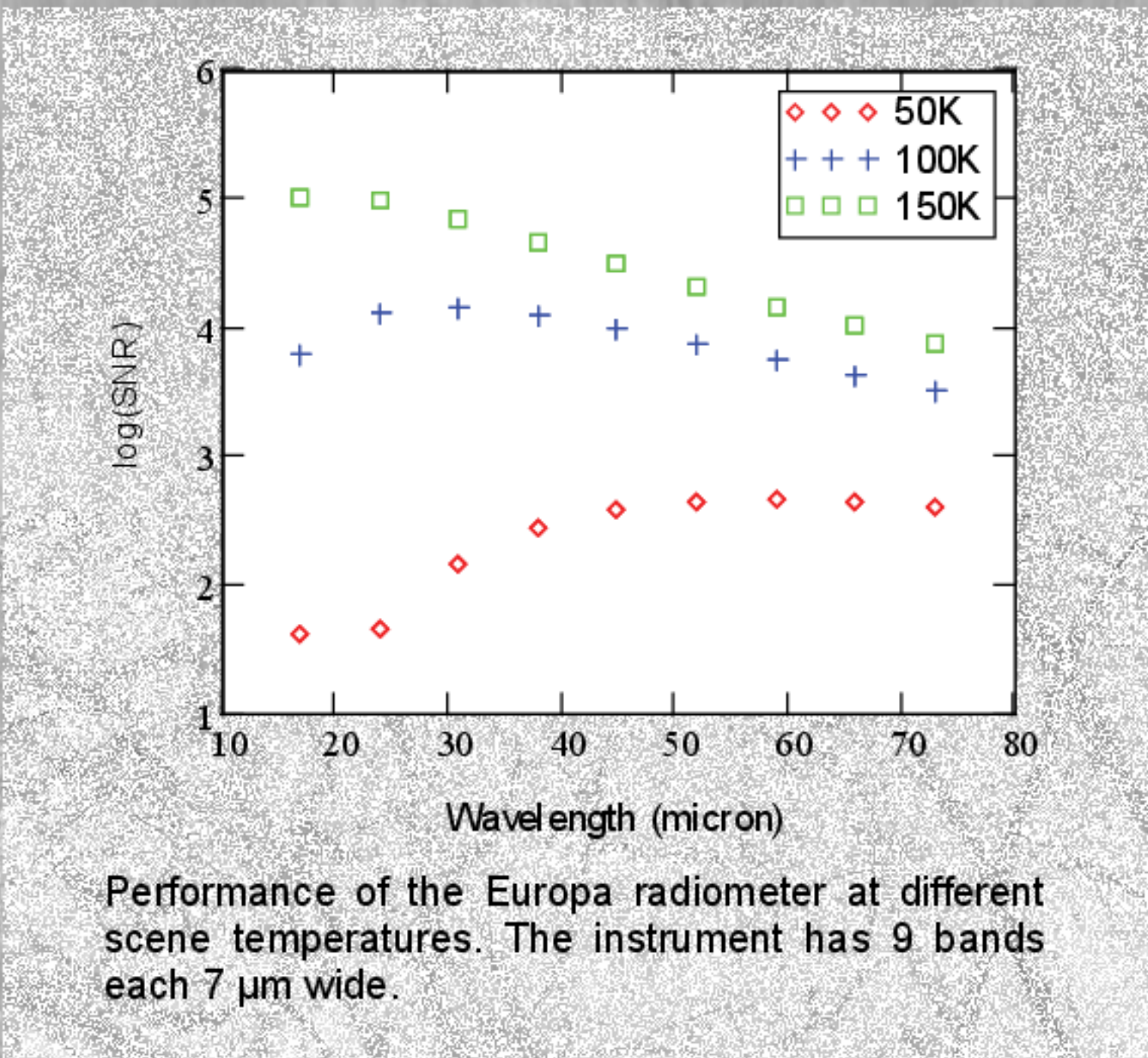
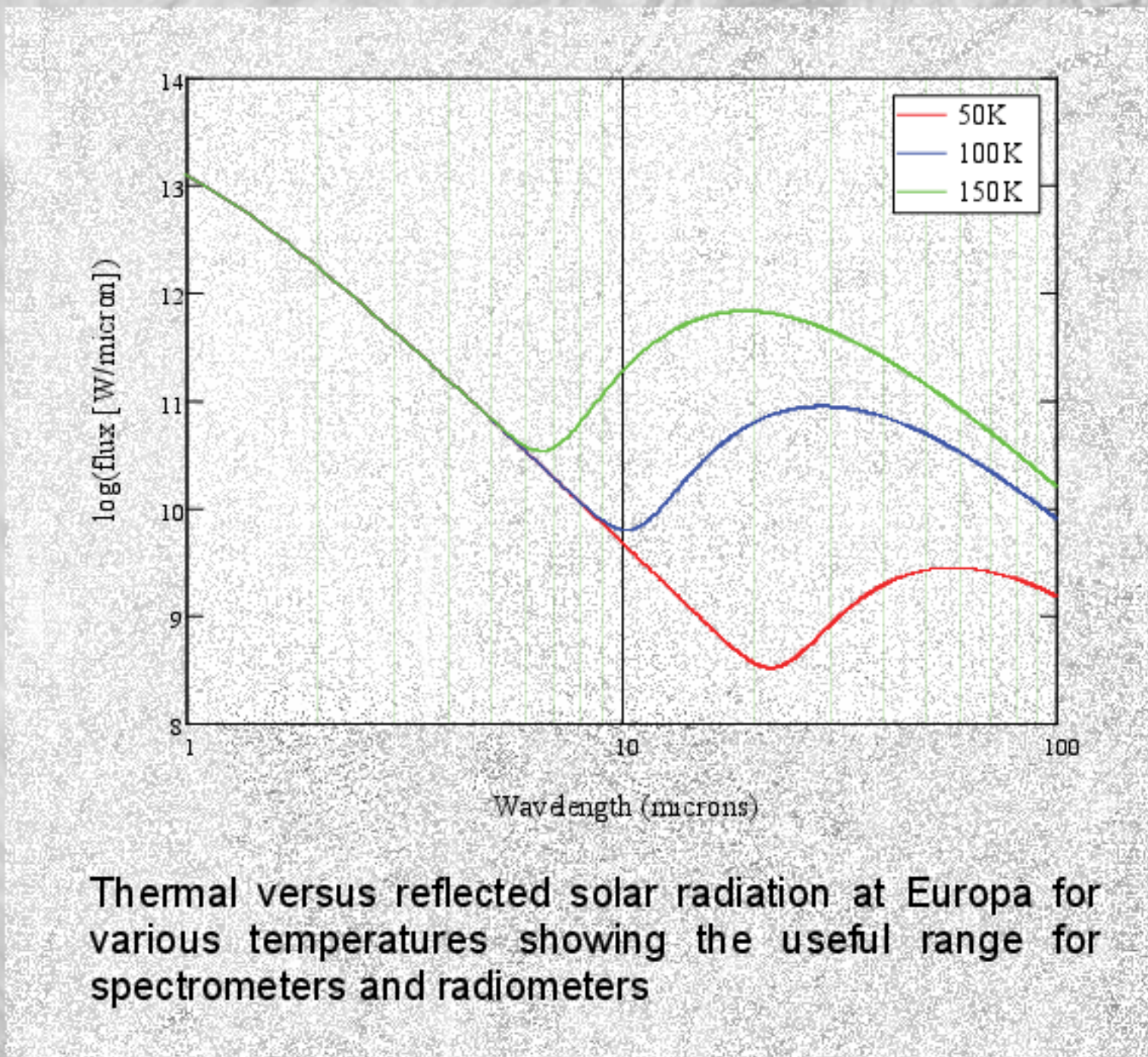
Global topography to 1 m vertical resolution
Global imaging at a resolution of <300 m, targeted images <50 m
Global mapping in the NIR (1-5 microns) with 10 nm spectra resolution
Thermal imaging (10-100 micron) at <5 km/pixel

Temporal and spatial map of magnetic field to ~0.5 nT
Measurement of Europa's gravity field
Thickness of the ice layer and depth of the ocean to tens of kilometres

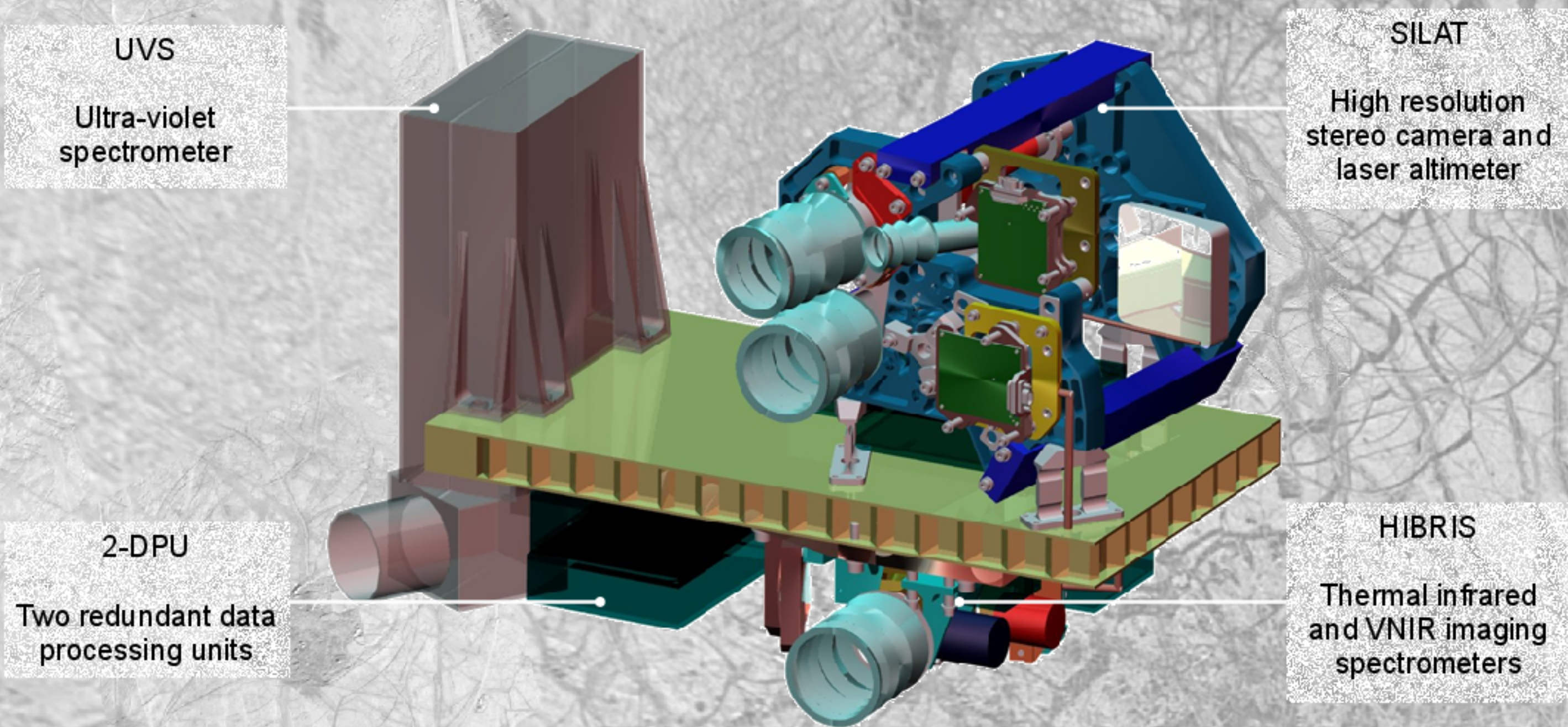
Instruments

Instrument	Spatial resolution	Spectral resolution	Remarks
Laser altimeter	12.5 m, <1 m alt	N/A	532 nm, 25 µJ laser
Stereo camera	20 m	Single band	Combined with VNIR
VNIR spectrometer	40 m	5 nm, 0.4-2.5 µm	See performance calculations below
IR radiometer	1000 m	9 bands, 10-73 µm	

Instrument	Range	Precision	Remarks
Magnetometer	± 500 nT	0.5 nT	Triaxial fluxgate
GPR	10-20 km depth		
Radio science	Uses ultra-stable oscillator in communications system		



Payload



Philosophy

The HIPS approach not only miniaturises, but integrates design, management and hardware across the entire payload suite. The purpose of this exercise is to mature the HIPS concept with a generic planetary remote sensing instrument suite.

Instrument and science quality must not be sacrificed in the process.

With ESA's Science Payload & Advanced Concepts Office, cR performed a HIPS design of the BepiColombo payload (left) as a show case.

Much of this design philosophy, and indeed some instrument elements, are directly applicable to a Europa orbiter.

The next steps in this technology development process will be to build a laboratory breadboard encompassing the main instruments and system architecture.

References
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