FOLDOUT 1 (1 OF 4)
SCIENCE TRACEABILITY MATRIX

EUROPA EXPLORER: TRACEABILITY MATRIX

Goal	Science Objective	Science Investigation	Measurement	Instrument
Explore Europa and investigate its habitability.	**A Characterize the ocean and deeper interior.**	A1. Determine the amplitude and phase of the gravitational tides.	A1a. Doppler shift from spacecraft tracking via two-way Doppler, to resolve 2nd degree gravity field time dependence. Doppler velocity of 0.1 mm/s over 60 s accuracy to recover k_2 to 0.0005 (at the orbital frequency). Multi-frequency communication (e.g. Ka & X) is best, but X is sufficient.	A1a. Telecom system.
			A1b. Topographic differences at cross-over points from globally distributed topographic profiles, with better than or equal to 1-m vertical accuracy, to recover h_2 to 0.01 (at the orbital frequency).	A1b. Laser altimeter.
		A2. Determine the induction response from the ocean over multiple frequencies.	A2a. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously for at least one month.	A2a. Magnetometer.
		A3. Characterize surface motion over the tidal cycle.	A3a. Topographic differences at cross-over points from globally distributed topographic profiles, with better than or equal to 1 m vertical accuracy, to recover h_2 to 0.01 (at the orbital frequency).	A3a. Laser altimeter
			A3b. Doppler shift from spacecraft tracking via two-way Doppler, to resolve 2nd degree gravity field time dependence. Doppler velocity of 0.1 mm/s over 60 s accuracy to recover k_2 to 0.0005 (at the orbital frequency). Multi-frequency communication (e.g. Ka & X) is best, but X is sufficient.	A3b. Telecom system.
		A4. Determine the satellite's dynamical rotation state.	A4a. Doppler shift from spacecraft tracking via two-way Doppler, to determine mean spin pole direction. Doppler velocity of 0.1 mm/s over 60 s accuracy. Multi-frequency communication (e.g. Ka & X) is best, but X is sufficient.	A4a. Telecom system.
			A4b. Topographic differences at cross-over points from globally distributed topographic profiles to determine spin pole direction and libration amplitudes, with better than or equal to 1 m vertical accuracy.	A4b. Laser altimeter.
		A5. Investigate the core and rocky mantle.	A5a. Doppler shift from spacecraft tracking via two-way Doppler, to resolve high degree gravity field. Doppler velocity of 0.1 mm/s over 60s accuracy. Multi-frequency communication (e.g. Ka & X) is best, but X is sufficient.	A5a. Telecom system.
			A5b. Topographic profiles to resolve coherence with gravity, with better than or equal to 1 m vertical accuracy.	A5b. Laser altimeter.
			A5c. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously for several months.	A5c. Magnetometer.
	B Characterize the ice shell and any subsurface water, and the nature of surface-ice-ocean exchange.	B1. Characterize the distribution of any shallow subsurface water.	B1a. Identify and locally characterize physical subsurface horizons related to the current or recent presence or water or brine, by obtaining sounding profiles of subsurface thermal, compositional, or structural horizons, with ≤50 km profile spacing over >80% of the surface, at depths of 100 m to 3 km at 10 m vertical resolution, and perform targeted detailed characterization of selected sites.	B1a. Radar sounder (nominally ~50 MHz, with ~10 MHz bandwidth).
			B1b. Topography at better than or equal to 100 m/pixel spatial scale and better than or equal to 10 m vertical resolution and accuracy, over >80% of the surface, co-located with sounding profiles.	B1b. Wide-angle camera (stereo) and laser altimeter.
		B2. Search for an ice-ocean interface.	B2a. Identify deep dielectric subsurface horizons, by obtaining sounding profiles of subsurface thermal, compositional, or structural horizons, with ≤50 km profile spacing over >80% of the surface, at depths of 1 to 30 km at 100 m vertical resolution.	B2a. Radar sounder (nominally ~5 or 50 MHz, with ~1 MHz bandwidth).
			B2b. Topography at better than or equal to 100 m/pixel spatial scale and better than or equal to 10 m vertical resolution, over >80% of the surface, co-located with sounding data.	B2b. Wide-angle camera (stereo) and laser altimeter.
		B3. Correlate surface features and subsurface structure to investigate processes governing communication among the surface, ice shell, and ocean.	B3a. Global identification and local characterizaton of physical and dielectric subsurface horizons, at depths 1 to 30 km at 100 m vertical resolution and depths of 100 m to 3 km at 10 m vertical resolution, by obtaining sounding profiles with ≤50 km spacing over >80% of the surface, plus targeted characterization of selected sites.	B3a. Radar sounder (dual-frequency, nominally ~5 & ~50 MHz, with ~1 and ~10&1 MHz bandwidth)
			B3b. Map thermal emission from the surface by measuring the albedo over >80% of the surface at spatial resolution of better than or equal to 250 m/pixel to 10% radiometric accuracy, and make targetted thermal observations at better than 250 m/pixel spatial resolution and temperature accuracy	B3b. Thermal instrument
			B3c. Surface reflectance measurements by visible to short wavelength infrared spectroscopy of targeted features at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm.	B3c. IR imaging spectrometer.
			B3d. Topography at better than or equal to 100 m/pixel spatial scale and better than or equal to 10 m vertical resolution and accuracy, over >80% of the surface, co-located with sounding data.	B3d. Wide-angle camera (stereo) and laser altimeter.
			B3e. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel, and topographic sampling of targeted sites with better than 1 m vertical accuracy.	B3e. Narrow-angle camera and laser altimeter.
			B3f. Determine surface color characteristics at ~100 m/pixel scale in at least 3 colors, over >80% of the surface.	B3f. Wide-angle camera, color.
			B3g. Surface reflectance measurements by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeted characterizatoin of selected sites.	B3g. UV imaging spectrometer.
			B3h. High-resolution visible stereo imaging of targeted features, at better than or equal 10 m/pixel.	B3h. Medium-angle camera.
			B3i. Doppler velocity of 0.1 mm/s over 60 s accuracy, to identify regions of density contrast within the ice crust. Multi-frequency communication (e.g. Ka & X) is best, but X is sufficient.	B3i. Telecom system.

Europa Explorer Themes: Origins | Evolution | Processes | Habitability | Life

continued

FOLDOUT 1 (2 OF 4)
SCIENCE TRACEABILITY MATRIX

Goal	Science Objective	Science Investigation	Measurement	Instrument
Explore Europa and investigate its habitability.	**C Determine global surface compositions and chemistry, especially as related to habitability.**	C1. Characterize surface organic and inorganic chemistry, including abundances and distributions of materials, with emphasis on indicators of habitability.	C1a. Surface reflectance measurements by visible to short wavelength infrared spectroscopy at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm, along profiles with ≤25 km spacing over >80% of the surface, plus targeted characterization of selected sites.	C1a. IR imaging spectrometer.
			C1b. Characterize the composition of sputtered products from energetic particle bombardment of the surface, using ion mass spectrometry over a mass range of 300 Daltons, mass resolution of ≥500, and pressure range of 10^{-6} to 10^{-17} mbar, and energy resolution of 10%.	C1b. INMS.
			C1c. Surface reflectance measurements by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeted characterization of selected sites.	C1c. UV imaging spectrometer.
		C2. Relate compositions to geological processes, especially communication with the interior.	C2a. Surface reflectance measurements by visible to short wavelength infrared spectroscopy of targeted features at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm.	C2a. IR imaging spectrometer.
			C2b. Global identification and local characterizaton of physical and dielectric subsurface horizons, at depths 1 to 30 km at 100 m vertical resolution and depths of 100 m to 3 km at 10 m vertical resolution, by obtaining sounding profiles with better than 50 km spacing, plus targeted characterization of selected sites.	C2b. Radar sounder.
			C2c. Surface reflectance measurements by ultraviolet spectroscopy of targeted features at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm.	C2c. UV imaging spectrometer.
			C2d. High-resolution visible stereo imaging of targeted features, at better than or equal 10 m/pixel.	C2d. Medium-angle camera (stereo).
			C2e. Map thermal emission from the surface by measuring albedo to 10% radiometric accuracy at better than or equal to 250 m/pixel spatial resolution, and by making thermal observations at spatial resolution better than or equal to 250 m/pixel spatial resolution and temperature accuracy <2 K, over >80% of the surface.	C2e. Thermal instrument
			C2f. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel.	C2f. Narrow-angle camera.
			C2g. Topography at better than or equal to 100 m/pixel spatial scale and better than or equal to 10 m vertical resolution over >80% of the surface, and topographic characterization at better than 10 m/pixel spatial scale and better than or equal 1 m vertical resolution and accuracy for targeted features, co-located with sounding data.	C2g. Wide-angle camera (stereo), medium-angle camera (stereo), and laser altimeter.
		C3. Assess the effects of radiation on surface materials, albedo, sputtering, and redox chemistry.	C3a. Surface reflectance measurements by visible to short wavelength infrared spectroscopy of targeted features at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm.	C3a. IR imaging spectrometer.
			C3b. Surface reflectance measurements by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeted characterization of selected sites.	C3b. UV imaging spectrometer.
			C3c. Characterize the composition of sputtered products from energetic particle bombardment of the surface, through ion mass spectrometry over a mass range of 300 Daltons, mass resolution of ≥500, and pressure range of 10^{-6} to 10^{-17} mbar, and energy resolution of 10%.	C3c. INMS.
			C3d. Characterize the structure of the sputter-produced atmosphere using ultraviolet stellar occultations, and ultraviolet imaging of atmospheric emissions, at equal to or better than 3 nm spectral resolution and 100 m/pixel scale through a spectral range of at least 0.1-0.35 µm.	C3d. UV spectrometer.
			C3e. Determine global distribution of bombarding energetic electron flux, and detect upstream impacting energetic ions, by measuring magnetospheric electrons in the energy range 100 keV to 10 MeV, with pitch angle distribution and ΔE/E ~0.1 over Europa's surface, and ion from 15 keV to 750 keV from the ram direction.	C3e. Particle and plasma instrument.
			C3f. Determine surface color characteristics at ~100 m/pixel scale in at least 3 colors, over >80% of the surface.	C3f. Wide-angle camera, color.
			C3g. Measure the surface albedo at spatial resolution of better than or equal to 250 m/pixel to 10% radiometric accuracy, over >80% of the surface.	C3g. Thermal instrument.
			C3h. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel.	C3h. Narrow-angle camera.
		C4. Characterize the nature of exogenic materials.	C4a. Determine the energy spectrum of energetic jovian electrons in the energy range 100 keV to 10 MeV to ΔE/E=0.1.	C4a. Particle and plasma instrument.
			C4b. Determine the flux and composition of plasma ions impacting Europa by measuring ions from 10 eV to 10 keV with 15 degree angular resolution to ΔE/E=0.15, and ion mass spectrometry over a mass range of 300 Daltons, mass resolution of ≥500, and pressure range of 10^{-6} to 10^{-17} mbar, and energy resolution of 10%.	C4b. Particle and plasma instrument and INMS.
			C4c. Surface reflectance measurements by visible to short wavelength infrared spectroscopy at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm, along profiles with ≤25 km spacing over >80% of the surface, plus targeted characterizatoin of selected sites.	C4c. IR imaging spectrometer.
			C4d. Surface reflectance measurements by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeted characterization of selected sites.	C4d. UV imaging spectrometer.
			C4e. Determine surface color characteristics at ~100 m/pixel scale in at least 3 colors, over >80% of the surface.	C4e. Wide-angle camera, color.

Europa Explorer Themes: Origins | Evolution | Processes | Habitability | Life

continued

FOLDOUT 1 (3 OF 4)
SCIENCE TRACEABILITY MATRIX

Goal	Science Objective	Science Investigation	Measurement	Instrument
Explore Europa and investigate its habitability.	**D Understand the formation of surface features, including sites of recent or current activity, and identify and characterize candidate sites for future *in situ* exploration.**	D1. Characterize magmatic, tectonic, and impact features.	D1a. Determine the distributions and morphologies of surface landforms at regional and local scales, by determining surface color characteristics at ~100 m/pixel scale in at least 3 colors, over >80% of the surface, and characterize surface morpphology at ~10 m/pixel over targeted sites.	D1a. Wide-angle camera (color) and Medium-angle camera.
			D1b. Topography at better than or equal to 100 m/pixel spatial scale and better than or equal to 10 m vertical resolution, over >80% of the surface, co-located with sounding profiles.	D1b. Wide-angle camera (stereo).
			D1c. Topographic characterization at better than 10 m/pixel scale and better than or equal to 1 m vertical resolution and accuracy for targeted features, co-located with sounding profiles.	D1c. Medium-angle camera (stereo) and laser altimeter.
			D1d. Global identification and local characterizaton of physical and dielectric subsurface horizons, at depths 1 to 30 km at 100 m vertical resolution and depths of 100 m to 3 km at 10 m vertical resolution, by obtaining sounding profiles with ≤50 km spacing over >80% of the surface, plus targeted characterization of selected sites.	D1d. Radar sounder (nominally ~50 MHz, with ~10 MHz bandwidth).
			D1e. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel.	D1e. Narrow-angle camera.
		D2. Search for areas of recent or current geological activity.	D2a. Thermal mapping better than or equal to 250 m/pixel spatial resolution and temperature accuracy < 2 K, over >80% of the surface, with the same regions observed in both the day and night.	D2a. Thermal instrument.
			D2b. Search for and identify any regions of outgassing using ultraviolet stellar occultations, and ultraviolet imaging of the surface and atmosphere, at better than or equal to 3 nm spectral resolution and 100 m/pixel scale through a range of at least 0.1-0.35 µm, using limb views, along with surface profiles of ≤25 km spacing over >80% of the surface.	D2b. UV spectrometer.
			D2c. High-resolution visible stereo imaging of targeted features, at better than or equal 10 m/pixel.	D2c. Medium-angle camera (stereo).
			D2d. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel.	D2d. Narrow-angle camera.
			D2e. Identify and map any age-sensitive chemical and physical indicators (e.g. H_2O frost, ice crystallinity, SO_2, H_2O_2) using surface reflectance measurements by visible to short wavelength infrared spectroscopy at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm, and by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeting of selected sites.	D2e. IR spectrometer and UV spectrometer.
		D3. Investigate global and local heat flow.	D3a. Map thermal emission from the surface by measuring albedo to 10% radiometric accuracy at spatial resolution better than or equal to 250 m/pixel, and by making thermal observations at spatial resolution better than or equal to 250 m/pixel spatial resolution and temperature accuracy < 2 K, over >80% of the surface.	D3a. Thermal instrument.
		D4. Assess relative surface ages.	D4a. Determine regional and global stratigraphic relationships with imaging at ~100 m/pixel scale in at least 3 colors, with near-uniform lighting conditions and solar phase angle ≤ 45 degrees, over >80% of the surface.	D4a. Wide-angle camera (color).
			D4b. Identify any regional or local areas of anomalously high heat flow, by mapping nighttime temperatures at better than or equal to 250 m/pixel spatial resolution and and temperature accuracy < 2 K.	D4b. Thermal instrument.
			D4c. Determine small-scale surface morphology, with stereo imaging at ~1 to 10 m/pixel over targeted high-priority sites, with vertical rsolution of better than or equal 1 m.	D4c. Medium-angle camera and/or Narrow-angle camera.
			D4d. Identify and map any age-sensitive chemical and physical indicators (e.g. H_2O frost, ice crystallinity, SO_2, H_2O_2) using surface reflectance measurements by visible to short wavelength infrared spectroscopy at better than or equal to 25 m/pixel spatial resolution, with better than 6 nm spectral resolution through a spectral range of at least 0.9-2.5 µm (0.4-2.5 µm desireable), and better than 12 nm through a spectral range of at least 2.5-5 µm, and by ultraviolet spectroscopy at better than or equal to 100 m/pixel spatial resolution, and better than or equal 3 nm spectral resolution, through a spectral range of at least 0.1-0.35 µm, using profiles at ≤25 km spacing over >80% of the surface, plus targeting of selected sites.	D4d. IR spectrometer and UV spectrometer.
		D5. Characterize the physical properties of the regolith, and assess processes of erosion and deposition.	D5a. Determine thermal inertia of surface materials, by thermal mapping; to better than or equal to 250 m/pixel spatial resolution and better than 2 K absolute temperature over >80% of the surface, with the same regions observed in both the day and night.	D5a. Thermal instrument.
			D5b. Detailed morphological characterization of targeted features through imaging at better than or equal 1 m/pixel.	D5b. Narrow-angle camera.
			D5c. Measure ion-cyclotron waves and relate to plasma-pickup and erosion by magnetic field sampling at 32 vectors/s and a sensitivity of 0.1 nT.	D5c. Magnetometer.

Europa Explorer Themes: Origins | Evolution | Processes | Habitability | Life

continued

FOLDOUT 1 (4 OF 4)
SCIENCE TRACEABILITY MATRIX

Goal	Science Objective	Science Investigation	Measurement	Instrument
Explore Europa and investigate its habitability.	**E Characterize the magnetic environment and moon-particle interactions.**	E1. Characterize the magnetic environment.	E1a. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously.	E1a. Magnetometer.
		E2. Characterize the ionosphere and neutral atmosphere and their dynamics, with implications for surface interactions.	E2a. Understand how sputtering generates an exosphere, by measuring the ion flux from energies of 10 keV to 1 MeV to ΔE/E=0.1, and measuring ions from 10 eV to 10 keV with 15 degree angular resolution to ΔE/E=0.15.	E2a. Particle and plasma instrument.
			E2b. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously.	E2b. Magnetometer.
			E2c. Determine the fluxes of positive ions and neutral particles, by ion mass spectrometry over a mass range of 300 Daltons, mass resolution of ≥500, and pressure range of 10^{-6} to 10^{-17} mbar, and energy resolution of 10%.	E2c. INMS.
			E2d. Identify atmospheric emissions, and characterize spatial heterogeneity and temporal variation including through the synodic cycle, by ultraviolet imaging of the atmosphere at better than or equal 3 nm spectral resolution, and sampling on time scales of hours, through a spectral range of at least 0.1-0.35 μm.	E2d. UV imaging spectrometer.
		E3. Characterize relationships between the magnetic field and plasma.	E3a. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously.	E3a. Magnetometer.
			E3b. Understand how plasma interaction currents affect the induction field signature, by measuring 50 eV to 10 keV ions with 15 degree angular resolution and ΔE/E=0.15.	E3b. Particle and plasma instrument.
		E4. Characterize the global radiation environment.	E4a. Global detection of energetic ion and electron fluxes, by measuring Jovian electrons at energies from 100 keV to 10 MeV, and Jovian ions from energy of 10 keV to 10 MeV to ΔE/E=0.1.	E4a. Particle and plasma instrument.
			E4b. Magnetic field measurements at 8 vectors/s and a sensitivity of 0.1 nT, near-continuously.	E4b. Magnetometer.
			E4c. Determine plasma distribution function to characterize the particle environment at all pitch angles, by measuring ions from 10 eV to 10 keV with 15 degree angular resolution to ΔE/E=0.15.	E4c. Particle and plasma instrument.
	F Determine how the components of the Jovian system operate and interact, leading to potentially habitable environments in icy moons.	F1. Determine the nature and history of the geological activity and interior evolution of the Galilean satellites.	F1a. Understand the mechanisms responsible for formation of surface features and implications for geological history, evolution, and levels of current activity, by means of: visible imaging, IR spectroscopy, and UV spectroscopy to resolve surface features; UV stellar occultations; subsurface sounding; and thermal imaging of Io.	F1a. Cameras (including color & stereo), IR spectrometer, UV spectrometer, Radar Sounder, and Thermal Instrument.
			F1b. Determine the surface compositions and implications for the origin, evolution and transport of surface materials, by means of: visible color imaging, IR spectroscopy, and UV spectroscopy to determine composition; subsurface sounding; and ion and neutral compositions near satellites.	F1b. Cameras (especially color), IR spectrometer, UV spectrometer, Radar Sounder, and INMS.
			F1c. Determine the compositions, origins, and evolution of the atmospheres, including transport of material throughout the Jovian system, by means of: UV stellar occultations; ion and neutral compositions near satellites; magnetic field, particle, and plasma measurements near satellites; and radio occultations.	F1c. UV spectrometer, INMS, Magnetometer, Particle and plasma instrument, and Telecom system.
			F1d. Determine the interior structures and processes operating in the Galilean satellites in relation to the formation and history of the Jupiter system and potential habitability of the moons, by means of: magnetic field measurements; Doppler gravity measurements.	F1d. Magnetometer and Telecom system.
			F1e. Investigate the small bodies and rings in the Jovian system, by means of: visible imaging, IR spectroscopy, and UV spectroscopy.	F1e. Cameras, IR spectrometer, and UV spectrometer.
		F2. Understand the processes that determine the composition, structure and dynamics of the Jovian atmosphere as a type example of a gas giant planet.	F2a. Map the distribution of condensable and trace species in the Jovian atmosphere, by means of: UV, visible, IR, and thermal imaging at high spatial, spectral, and temporal resolution; UV stellar occultations; and radio occultations.	F2a. UV spectrometer, Cameras, IR spectrometer, and Thermal instrument.
			F2b. Investigate the energy transport in the Jovian atmosphere, by means of: UV, visible, IR, and thermal imaging at high spatial, spectral, and temporal resolution; UV stellar occultations; and radio occultations.	F2b. UV spectrometer, Cameras, IR spectrometer, and Thermal instrument.
		F3. Study the interactions between Jupiter's magnetosphere and its satellites.	F3a. Understand the magnetospheric and ionospheric environments of Jupiter and its moons, and their interactions, by means of: magnetic field, particle, and plasma measurements throughout the magnetosphere, especially at boundaries and near satellites; UV and visible observations of the Io torus, UV and visible observations of Jovian aurorae and satellite footprints; radio occultations.	F3a. Magnetometer, Particle and plasma instrument, UV spectrometer, and Cameras.

Europa Explorer Themes:	Origins	Evolution	Processes	Habitability	Life