PDS_VERSION_ID = PDS3
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LABEL_REVISION_NOTE = "
  2012-03-12 JUNO: Kurth Revision 1;
  2015-08-15 JUNO: Kurth and Stephens Revision 2;
  2016-10-13 PDS: Mafi Revision 3;
  2016-04-20 JUNO: Kurth Revision 4;
  2022-01-21 JUNO: Kurth, Bolton Revision - XM"

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  OBJECT = MISSION_INFORMATION
    MISSION_START_DATE = 2011-08-05
    MISSION_STOP_DATE = NULL
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    MISSION_DESC = "The majority of the text in this file was extracted from the Juno Mission Plan Document, S. Stephens, 29 March 2011.[JPL D-35556]

Mission Overview
================

Prime Mission

Juno launched on August 5, 2011. The spacecraft used a delta V - EGA trajectory consisting of deep space maneuvers on August 30, and September 14, 2012 followed by an Earth gravity assist on 9 October 2013 at an altitude of ~500 km. Juno arrived at Jupiter in July 2016 using a 53.5-day capture orbit prior to commencing operations for a prime mission comprising 32 high inclination, high eccentricity orbits of Jupiter. The orbit is polar (~90deg inclination) with a periapsis altitude of ~4,500 km and a semi-major axis of ~57 RJ giving an orbital period of about 53 days. Data were not acquired during Jupiter Orbit Insertion (Perijove 0) nor during Perijove 2.

The primary science is acquired during a period of several hours centered on each periapsis although fields and particles data are acquired at generally lower rates for the remaining apoapsis portion of each orbit. Some of the periapses are dedicated to microwave radiometry of Jupiter's deep atmosphere by turning the spin axis of Juno so as to optimize the microwave radiometry field of view on Jupiter with other orbits optimized for gravity measurements to determine the structure of Jupiter's interior. All orbits include fields and particles measurements of the planet's auroral regions.

Juno is spin stabilized with a rotation rate of ~2 revolutions per minute (RPM). For the radiometry orbits the spin axis is precisely perpendicular to the orbit plane so that the radiometer fields of view pass through the nadir. For gravity passes, the spin axis is aligned to the Earth direction, allowing for Doppler measurements through the periapsis portion of the orbit. Provision is made for a tilted attitude between these two when the radiometry tilt exceeds the allowable off-sun angle for power considerations. The orbit plane is initially very close to perpendicular to the Sun-Jupiter line and evolves over the mission. The apoapsis passes through the anti-sunward direction, but a modest inclination change was used to avoid an umbral eclipse. Data acquired during the periapsis passes are recorded and played back over the subsequent apoapsis portion of the orbit.

Extended Mission

The extended mission adds an additional 40 orbits (76 orbits total) to continue the orbital tour through September 2025. The orbital period at the beginning of the extended mission is ~43 days and is reduced by a close flyby of Europa at orbit 45 in the fall of 2022 to ~38 days and further reduced by two close flybys of Io at orbit 57 and 58 in early 2024 to ~33 days. Juno's northward perijove precession reduces the altitude over Jupiter's northern hemisphere and enables close flybys of Ganymede, Europa, Io and Jupiter's ring system as well as the study of Jupiter's northern hemisphere. The longitude of the perijoves is controlled only through orbit 58. After Io, the mapping of the magnetic and gravity field is no longer controlled via orbital maneuvers. During the extended mission, the perijove local time rotates from about 9 hours at perijove 35 to about 2 hours. The latitude of perijove continues to precess from about 29 degrees north on perijove 35 to about 64 degrees north.

Extended Mission Instrumentation

Juno's instrument complement includes Gravity Science using the X- and Ka-bands to determine the structure of Jupiter's interior; vector fluxgate magnetometer (MAG) to study the magnetic dynamo and interior of Jupiter as well as to explore the polar magnetosphere; and a microwave radiometer (MWR) experiment covering 6 wavelengths between 1.3 and 50 cm to perform deep atmospheric sounding and composition measurements. The MAG investigation includes Advanced Stellar Compasses (ASCs) mounted on optical benches including the fluxgate magnetometers (FGMs) in order to directly provide attitude information that does not rely on understanding how the solar panel inboard of the MAG boom flexes. The ASCs can provide some imaging of various non-stellar objects to enhance science or to provide outreach images.

The instrument complement also includes a suite of fields and particle instruments to study the polar magnetosphere and Jupiter's aurora. This suite includes an energetic particle detector (JEDI), a Jovian auroral (plasma) distributions experiment (JADE), a radio and plasma wave instrument (Waves), an ultraviolet spectrometer (UVS), and a Jupiter infrared auroral mapping instrument (JIRAM). During the extended mission, the Stellar Reference Unit (SRU) can image Jupiter's ring system, lightning, satellites and auroras as well as record radiation noise. The JunoCam is a camera included for education and public outreach and can provide images of Jupiter's atmosphere, satellites and rings. During the EM, the data are archived in the PDS along with the other mission data.

Investigators

Scott Bolton is the Juno Principal Investigator. The Science Team members responsible for the delivery and operation of the instruments are listed below:

Instrument	Acronym	Lead Co-I
Gravity Science	GRAV	Folkner
Magnetometer	MAG	Connerney
Microwave Radiometer	MWR	Janssen
Jupiter Energetic Particle Detector Instrument	JEDI	Mauk
Jovian Auroral Distributions Experiment	JADE	Allegrini
Radio and plasma wave instrument	Waves	Kurth
Ultraviolet Imaging Spectrograph	UVS	Gladstone
Jovian Infrared Auroral Mapper	JIRAM	Adriani
Juno color, visible-light camera	JUNOCAM	Hansen
Stellar Reference Unit	SRU	Becker
Advanced Stellar Compass	ASC	Joergensen

Mission Phases

LAUNCH

The Launch phase starts at L-40 min (Launch-40 min), and covers the interval from launch, through initial ground station acquisition, until the establishment of a pre-defined, stable, and slowly changing Sun-pointed attitude when cruise attitude control algorithms and ephemerides can be used. The end of the Launch phase is determined by post-launch health and safety assessments. The boundary is at L+3 days, after initial acquisition and after confirmation that the Flight System is safe and in a power-positive, thermally stable, and commandable attitude.

```
Target Name                :  N/A
Mission Phase Start Time :  2011-08-05 (2011-217)
Mission Phase Stop Time  :  2011-08-08 (2011-220)
```

INNER CRUISE 1

The Inner Cruise 1 phase lasts from post-Launch establishment of a pre-defined and stable Sun-pointed attitude when cruise attitude control algorithms and ephemerides can be used, until after initial spacecraft and instrument checkouts have been performed and the spacecraft has gotten far enough from the Sun to allow Earth-pointing instead of Sun-pointing. TCM 1 (the first planned trajectory correction maneuver) was deemed not necessary, hence, was not executed. The phase spans the interval from L+3 to L+66 days.

```
Target Name                :  SOLAR_SYSTEM
Mission Phase Start Time :  2011-08-08 (2011-220)
Mission Phase Stop Time  :  2011-10-10 (2011-283)
```

INNER CRUISE 2

The Inner Cruise 2 phase spans the period from L+66 days until L+663 days. The Deep Space Maneuvers (DSMs) occur during this phase, near aphelion of Juno's first orbit about the Sun, on the way to Earth Flyby and then Jupiter. There is increased DSN (Deep Space Network) coverage associated with the DSMs and a cleanup TCM. DSMs 1 and 2 occur on 2012-08-30 and 2010-09-14.

```
Target Name              :  SOLAR_SYSTEM
Mission Phase Start Time :  2011-10-10 (2011-283)
Mission Phase Stop Time  :  2013-05-29 (2013-149)
```

INNER CRUISE 3

The Inner Cruise 3 phase spans the interval from L+663 days to L+823 days. The duration of this cruise phase is 160 days. Featured in this phase is Earth Flyby (EFB), which gives Juno a gravity assist (providing 7.3 km/s of deltaV) on its way to Jupiter. It occurs as the spacecraft is completing one elliptical orbit around the Sun and includes perihelion. Three TCMs were planned before EFB (the last of which was deemed not necessary) and one after EFB. There is increased DSN coverage associated with the 4 maneuvers and EFB. The Inner Cruise 3 phase is focused on performing the required maneuvers, as well as an integrated operations exercise around Earth Flyby, subject to Flight System constraints. Closest approach to Earth occurs on 2013-10-09 at 19:21 UTC.

```
Target Name              :  EARTH, SOLAR_SYSTEM
Mission Phase Start Time :  2013-05-29 (2013-149)
Mission Phase Stop Time  :  2013-11-05 (2013-309)

Earth Closest Approach   :  2013-10-09T19:21 (2013-282)
```

OUTER CRUISE

The Outer Cruise phase lasts from L+823 days until the start of Jupiter Approach at Jupiter Orbit Insertion (JOI)-6 months (JOI-182 days or L+1614 days). The duration of this cruise phase is 791 days, which is over 2 years.

```
Target Name              :  SOLAR_SYSTEM
Mission Phase Start Time :  2013-11-05 (2013-309)
Mission Phase Stop Time  :  2016-01-05 (2016-005)
```

JUPITER APPROACH

The Jupiter Approach phase lasts the final 6 months of cruise before Jupiter Orbit Insertion and is an opportunity for final Flight System and instrument checkouts as well as science observations to start exercising the ground system and Flight System, although orbit insertion preparations limit instrument activities close to JOI. There are more frequent maneuvers approaching JOI, starting with a TCM at JOI-5 months, and correspondingly increasing DSN coverage. The 178-day Jupiter Approach phase is preceded by a 26-month Outer Cruise phase. Jupiter Approach starts 3 months after the project is fully staffed up in preparation for JOI and the 1.3 years of science orbits. The phase ends at JOI-4 days, which is the start of the JOI critical sequence.

```
Target Name:              :  JUPITER, SOLAR_SYSTEM
Mission Phase Start Time :  2016-01-05 (2016-005)
Mission Phase Stop Time  :  2016-07-01 (2016-183)
```

JUPITER ORBIT INSERTION

The JOI phase encompasses the JOI critical sequence. It begins 4 days before the start of the orbit insertion maneuver and ends 1 hour after the start. JOI, the second critical event of the mission, occurs at closest approach to Jupiter, and slows the spacecraft enough to let it be captured by Jupiter into a 53.8-day orbit. A cleanup burn at JOI+8.6d during the Capture Orbits phase is required to clean up JOI maneuver execution errors. DSN coverage is continuous during the JOI phase.

```
Target Name               :  N/A
Mission Phase Start Time :  2016-07-01 (2016-183)
Mission Phase Stop Time  :  2016-07-05 (2016-187)

Perijove 0                :  2016-07-05T02:47:32 (2016-187)
```

PRIME MISSION

The Science Orbits phase includes Orbit 0 through Orbit 35. Orbit N is defined from apojove (AJ) N-1 through apojove N, and includes perijove (PJ) N. Orbit numbering starts before the Science Orbits phase. JOI occurs at PJ0, so Orbit 0 lasts from PJ0 through AJ0 (including a JOI cleanup maneuver at JOI+8.6d). Orbit 1 includes PJ1, and runs from AJ0 through AJ1. Orbit 2 includes PJ2, and runs from AJ1 through AJ2. Orbit 3 includes PJ3, and runs from AJ2 through AJ3. Early orbital science was baselined in Orbits 0, 1, 2, and 3, except for the JOI keepout zone. Orbit 4 is the first science orbit. It includes PJ4 (and the first OTM at PJ4+7.5h), and runs from AJ3 through AJ4. The flyby of Ganymede (PJ34) reduced the orbital period from about 53 days to about 43 days. Small (up to 8 m/s) orbit trim maneuvers (OTMs) are planned after each set of perijove science observations, at PJ+4h, PJ+6h, or PJ+7.5h in Orbits 4 through 34, to target the perijove longitude required for science observations in the next orbit.

Radiation accumulation increases substantially as the orbital line of apsides rotates and perijove latitude increases from 3 degrees at JOI to 36 (TBD) degrees at PJ35.

```
Target Name               :  JUPITER
Mission Phase Start Time :  2016-07-05 00:00:00 (2016-187)
```

Mission Phase Stop Time : 2021-07-03 00:00:00 (2021-184)

Perijove 1	:	2016-08-27 12:50:44 (2016-240)
Perijove 2	:	2016-10-19 18:10:54 (2016-293)
Perijove 3	:	2016-12-11 17:03:41 (2016-346)
Perijove 4	:	2017-02-02 12:57:09 (2017-033)
Perijove 5	:	2017-03-27 08:51:52 (2017-086)
Perijove 6	:	2017-05-19 06:00:45 (2017-139)
Perijove 7	:	2017-07-11 01:54:51 (2017-192)
Perijove 8	:	2017-09-01 21:48:57 (2017-244)
Perijove 9	:	2017-10-24 17:43:00 (2017-297)
Perijove 10	:	2017-12-16 17:57:39 (2017-350)
Perijove 11	:	2018-02-07 13:51:49 (2018-038)
Perijove 12	:	2018-04-01 09:45:57 (2018-091)
Perijove 13	:	2018-05-24 05:40:07 (2018-144)
Perijove 14	:	2018-07-16 05:17:38 (2018-197)
Perijove 15	:	2018-09-07 01:11:55 (2018-250)
Perijove 16	:	2018-10-29 21:06:15 (2018-302)
Perijove 17	:	2018-12-21 17:00:25 (2018-355)
Perijove 18	:	2019-02-12 16:19:48 (2019-043)
Perijove 19	:	2019-04-06 12:13:58 (2019-096)
Perijove 20	:	2019-05-29 08:08:13 (2019-149)
Perijove 21	:	2019-07-21 04:02:44 (2019-202)
Perijove 22	:	2019-09-12 03:40:47 (2019-254)
Perijove 23	:	2019-11-03 23:32:56 (2019-307)
Perijove 24	:	2019-12-26 16:58:59 (2019-360)
Perijove 25	:	2020-02-17 17:51:36 (2020-048)
Perijove 26	:	2020-04-10 14:24:34 (2020-101)
Perijove 27	:	2020-06-02 10:19:55 (2020-154)
Perijove 28	:	2020-07-25 06:15:21 (2020-207)
Perijove 29	:	2020-09-16 02:10:49 (2020-260)
Perijove 30	:	2020-11-08 01:49:39 (2020-313)
Perijove 31	:	2020-12-30 21:45:12 (2020-365)
Perijove 32	:	2021-02-21 17:40:31 (2021-052)
Perijove 33	:	2021-04-15 13:36:26 (2021-105)
Perijove 34	:	2021-06-08 07:46:00 (2021-159)
Perijove 35	:	2021-07-21 08:15:05 (2021-202)

Satellite flybys less than 150,000 km (Prime Mission)

Satellite	PJ		CA Time(UTC) and Altitude(km)	
Ganymede	24	:	2019-12-26 02:14:57 (2019-360)	97100
Europa	26	:	2020-04-10 05:39:08 (2020-101)	142564
Ganymede	34	:	2021-06-07 16:56:08 (2021-158)	1053
Ganymede	35	:	2021-07-20 16:48:30 (2021-201)	49992

EXTENDED MISSION

Using the same orbit numbering scheme as in the Prime Mission, the Extended Mission begins on 1 August 2021 and extends to orbit 76, through September 2025. The Extended Mission includes a close Europa flyby during orbit 45 which reduces the orbital period to about 38 days. Close flybys of Io occur on orbits 57 and 58, reducing the period to about 33 days. Note that times are from the reference trajectory and are not be be construed as as-flown, reconstructed times.

```
Perijove 36             :  2021-09-02 22:42:52 (2021-245)
Perijove 37             :  2021-10-16 17:13:32 (2021-289)
Perijove 38             :  2021-11-29 14:13:30 (2021-333)
Perijove 39             :  2022-01-12 10:32:57 (2022-012)
Perijove 40             :  2022-02-25 01:58:52 (2022-056)
Perijove 41             :  2022-04-09 15:49:15 (2022-099)
Perijove 42             :  2022-05-23 02:15:50 (2022-143)
Perijove 43             :  2022-07-05 09:17:23 (2022-186)
Perijove 44             :  2022-08-17 14:45:33 (2022-229)
Perijove 45             :  2022-09-29 17:11:55 (2022-272)
Perijove 46             :  2022-11-06 21:38:28 (2022-310)
Perijove 47             :  2022-12-15 03:23:23 (2022-349)
Perijove 48             :  2023-01-22 05:43:30 (2023-022)
Perijove 49             :  2023-03-01 05:53:19 (2023-060)
Perijove 50             :  2023-04-08 08:13:24 (2023-098)
Perijove 51             :  2023-05-16 07:22:37 (2023-136)
Perijove 52             :  2023-06-23 06:55:05 (2023-174)
Perijove 53             :  2023-07-31 09:05:43 (2023-212)
Perijove 54             :  2023-09-07 11:58:02 (2023-250)
Perijove 55             :  2023-10-15 10:52:59 (2023-288)
Perijove 56             :  2023-11-22 12:16:48 (2023-326)
Perijove 57             :  2023-12-30 12:36:21 (2023-364)
Perijove 58             :  2024-02-03 21:47:31 (2024-034)
Perijove 59             :  2024-03-07 15:52:50 (2024-067)
Perijove 60             :  2024-04-09 08:53:21 (2024-100)
Perijove 61             :  2024-05-12 06:48:48 (2024-133)
Perijove 62             :  2024-06-14 03:33:09 (2024-166)
Perijove 63             :  2024-07-17 01:13:18 (2024-199)
Perijove 64             :  2024-08-18 21:13:01 (2024-231)
Perijove 65             :  2024-09-20 18:50:25 (2024-264)
Perijove 66             :  2024-10-23 14:45:47 (2024-297)
Perijove 67             :  2024-11-25 09:38:25 (2024-330)
Perijove 68             :  2024-12-28 07:02:23 (2024-363)
Perijove 69             :  2025-01-30 03:32:11 (2025-030)
Perijove 70             :  2025-03-04 02:25:53 (2025-063)
Perijove 71             :  2025-04-06 00:13:33 (2025-096)
Perijove 72             :  2025-05-08 21:51:02 (2025-128)
Perijove 73             :  2025-06-10 21:20:34 (2025-161)
Perijove 74             :  2025-07-13 19:36:22 (2025-194)
Perijove 75             :  2025-08-15 18:55:46 (2025-227)
Perijove 76             :  2025-09-17 17:29:08 (2025-260)

Satellite flybys less than 150,000 km (Extended Mission)

Satellite  PJ              CA Time(UTC) and Altitude(km)

Europa     37           :  2021-10-16 08:46:28 (2021-289)    81360
Europa     40           :  2022-02-24 18:15:43 (2022-055)    46982
Io         41           :  2022-04-09 11:43:39 (2022-099)   105820
Io         43           :  2022-07-05 04:55:57 (2022-186)    86131
```

```
Europa     45            :  2022-09-29 09:36:29 (2022-272)      355
Io         47            :  2022-12-14 23:16:09 (2022-348)    63743
Io         49            :  2023-03-01 01:32:07 (2023-060)    51522
Io         51            :  2023-05-16 03:10:08 (2023-136)    35556
Io         53            :  2023-07-31 04:57:16 (2023-212)    22203
Io         55            :  2023-10-15 06:47:22 (2023-288)    11641
Io         57            :  2023-12-30 08:36:01 (2023-364)     1498
Io         58            :  2024-02-03 17:48:36 (2024-034)     1497
Io         60            :  2024-04-09 04:58:04 (2024-100)    17346
Io         65            :  2024-09-20 15:54:42 (2024-264)   124146
Io         67            :  2024-11-25 05:35:34 (2024-330)    85734
Io         72            :  2025-05-08 18:14:06 (2025-128)    92656


Target Name              :  JUPITER
Mission Phase Start Time :  2021-07-03 00:00:00 (2021-184)
Mission Phase Stop Time  :  2025-09-17 00:00:00 (2021-260)

"


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```

JUNO MISSION OBJECTIVES
=======================

Prime Mission Objectives
========================

Juno's science objectives encompass four scientific themes: origin, interior structure, atmospheric composition and dynamics, and polar magnetosphere. These are based on Appendix E to the New Frontiers Program Plan: Program Level Requirements for the Juno Project (PLRA). Juno addresses science objectives central to three NASA Science divisions: Solar System (Planetary), Earth-Sun System (Heliophysics), and Universe (Astrophysics).

Juno's primary science goal of understanding the formation, evolution, and structure of Jupiter is directly related to the conditions in the early solar system which led to the formation of our planetary system. The mass of Jupiter's solid core and the abundance of heavy elements in the atmosphere discriminate among models for giant planet formation. Juno constrains the core mass by mapping the gravitational field, and measures through microwave sounding the global abundances of oxygen (water) and nitrogen (ammonia). Juno reveals the history of Jupiter by mapping the gravitational and magnetic fields with sufficient resolution to constrain Jupiter's interior structure, the source region of the magnetic field, and the nature of deep convection. By sounding deep into Jupiter's atmosphere, Juno determines to what depth the belts and zones penetrate. Juno provides the first survey and exploration of the three-dimensional structure of Jupiter's polar magnetosphere. The overall goal of the Juno mission is to improve our understanding of the solar system by understanding the origin and evolution of Jupiter.

ATMOSPHERIC COMPOSITION

Juno investigates the formation and origin of Jupiter's atmosphere and the potential migration of planets through the measurement of Jupiter's global abundance of oxygen (water) and nitrogen (ammonia).

a) Constrain the global O/H ratio (water abundance) in Jupiter's atmosphere.

b) Constrain the global N/H ratio (ammonia) in Jupiter's atmosphere.

ATMOSPHERIC STRUCTURE

Juno investigates variations in Jupiter's deep atmosphere related to meteorology, composition, temperature profiles, cloud opacity, and atmospheric dynamics.

a) Determine microwave opacity as a function of latitude and altitude (pressure).

b) Determine depths of cloud and atmospheric features such as zones, belts, and spots, and map dynamical variations.

c) Characterize microwave opacity of the polar atmosphere region.

MAGNETIC FIELD

Juno investigates the fine structure of Jupiter's magnetic field, providing information on its internal structure and the nature of the dynamo.

a) Map the magnetic field of Jupiter, globally, by direct measurement of the field at close-in radial distances.

b) Determine the magnetic spectrum of the field, providing information on the dynamo core radius.

c) Investigate secular variations (long-term time variability) of the magnetic field.

GRAVITY FIELD

Juno gravity sounding explores the distribution of mass inside the planet.

a) Determine the gravity field to provide constraints on the mass of the core.

b) Determine the gravity field to detect the centrifugal response of the planet to its own differential rotation (winds) at depths of kilobars and greater.

c) Investigate the response to tides raised by the Jovian satellites.

POLAR MAGNETOSPHERE

Juno explores Jupiter's three-dimensional polar magnetosphere and aurorae.

a) Investigate the primary auroral processes responsible for particle acceleration.

b) Characterize the field-aligned currents that transfer angular momentum from Jupiter to its magnetosphere.

c) Identify and characterize auroral radio and plasma wave emissions associated with particle acceleration.

d) Characterize the nature, location, and spatial scale of auroral features.

Extended Mission Objectives

During the Extended Mission (EM) phase, Juno will address the following science objectives:

Atmosphere:
Investigate Jupiter's northern latitudes, gather information on its water/ammonia abundance, polar cyclones, ionospheric profile (electron and neutral temperature), and variability of lightning.

Interior structure:
Investigate shearing, characterize shallow dynamo, dilute core, and the interior/atmosphere coupling.

Magnetosphere:
Explore the polar magnetopause and probe the polar cap auroral acceleration.

Ring studies:
Characterize the ring dust and the ring plasma environment.

Ganymede:
Investigate the 3-D structure and dynamics of its magnetosphere and ionosphere.

Europa:
Investigate the ice shell and characterize surface sputtering.

Io:
Constrain the global magma ocean, monitor volcanic activity, and characterize magnetospheric interaction.

ATMOSPHERE

Investigate variation of water abundance as a function of latitude. Determine if the northern pole of Jupiter is unique in composition.

Characterize atmospheric composition, vertical structure, and dynamics of the northern hemisphere. Investigate the transition from zonal jets to vortices at mid-latitudes and the culmination that leads to vortex crystals at the poles. Monitor long-term changes and roots of vortex patterns.

Characterize temporal and spatial variability of Jovian lightning to investigate the role of thunderstorms on the shallow and deep atmospheric dynamics.

Investigate Jupiter's upper atmosphere, ionosphere and auroral heating and energy transfer to lower latitudes.

INTERIOR

Investigate the shearing of the Great Blue Spot (GBS), and the source depth of the GBS dynamo region.

Investigate the dynamo source depth, characterize small spatial scale features in the northern hemisphere, constrain convective stability of a double layer dynamo.

Constrain and characterize the dilute core and constrain the existence of a compact inner core.

Investigate the coupling between the interior structure, magnetic field and deep atmosphere.

SATELLITES

Investigate the 3-D structure of Ganymede's magnetosphere and its interaction with the Jovian magnetosphere over a wide range of magnetic latitudes. Provide constraints on the density and composition of Ganymede's ionosphere and exosphere over a range of latitudes and altitudes Ganymede and its magnetosphere.

Investigate the upper 10 km of Europa's ice shell to characterize the variations in thickness and identify regions of subsurface water. Characterize variations in density, temperature, and purity of the subsurface ice to distinguish geologic processes within the ice shell to probe how terrain types are associated with subsurface-surface exchange. Investigate surface sputtering effects on Europa and atmosphere. Search for evidence of shallow, near-surface thermal anomalies indicative of recent geological activity (warm diapirs) and/or near surface melt or trapped water. Investigate surface sputtering effects on Europa and atmosphere.

Investigate Io's interior via tidal gravitational response to Jupiter's gravity and magnetic induction. Address current stability of the Laplace

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  resonance that controls tidal heating.

  Investigate the local environment of Io and its interaction with Jupiter's
  magnetosphere.

  Investigate and monitor Io volcanic activity, composition, topography, heat
  flow and lava temperatures, including high latitudes.  Map surface changes
  relative to previous missions to constrain resurfacing rates.

  Investigate Io's atmospheric pickup ions, sublimation, volcanic sources,
  and supply of various species to Io torus.

  RINGS
  -----
  Characterize the dust population of Jupiter's ring system. Characterize
  density and size distribution of micron-sized dust between Jupiter's ring
  and the planet extending into the halo region. Study interactions between
  ring particles and low- and high-energy charged particles. Investigate ring
  particle density distribution relative to equatorial plane. Constrain
  charging environment close to the ring.

  MAGNETOSPHERE
  -------------
  Determine the spatial and temporal variability of the Io and Europa plasma
  tori in order to address the transport of mass and energy through Jupiter's
  inner magnetosphere. Explore the region near Jupiter's polar magnetopause
  to investigate the interconnection and accessibility to the interplanetary
  medium. Characterize Jupiter's auroral acceleration region by searching
  beneath altitudes accessed during Juno's prime mission.
"

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    OBJECT                              = MISSION_TARGET
      TARGET_NAME                       = "MOON"
    END_OBJECT                          = MISSION_TARGET

    OBJECT                              = MISSION_TARGET
      TARGET_NAME                       = "J RINGS"
    END_OBJECT                          = MISSION_TARGET

    OBJECT                              = MISSION_TARGET
      TARGET_NAME                       = "SOLAR WIND"
    END_OBJECT                          = MISSION_TARGET

    OBJECT                              = MISSION_TARGET
      TARGET_NAME                       = "SOLAR_SYSTEM"
    END_OBJECT                          = MISSION_TARGET

  END_OBJECT                            = MISSION_HOST

  OBJECT                              = MISSION_REFERENCE_INFORMATION
    REFERENCE_KEY_ID                  = "JPLD-35556"
  END_OBJECT                          = MISSION_REFERENCE_INFORMATION

END_OBJECT                              = MISSION

END
```