

Solar Wind Interaction with Bodies in the Solar System

Adam Masters

SPAT PG Lecture Series

Outline

Yesterday

- ✧ Brief history of the field
- ✧ Diverse space plasma environments... So what?
- ✧ The solar wind + a reminder of key plasma physics

Today

- ✧ **Solar wind interaction with...**
 - ✧ **Unmagnetised bodies without an atmosphere**
 - ✧ **Unmagnetised bodies with an atmosphere**
 - ✧ **Magnetised bodies without an atmosphere**
 - ✧ **Magnetised bodies with an atmosphere**
- ✧ **The future of the field**

Friday: Introduction to space mission design

Outline

Yesterday

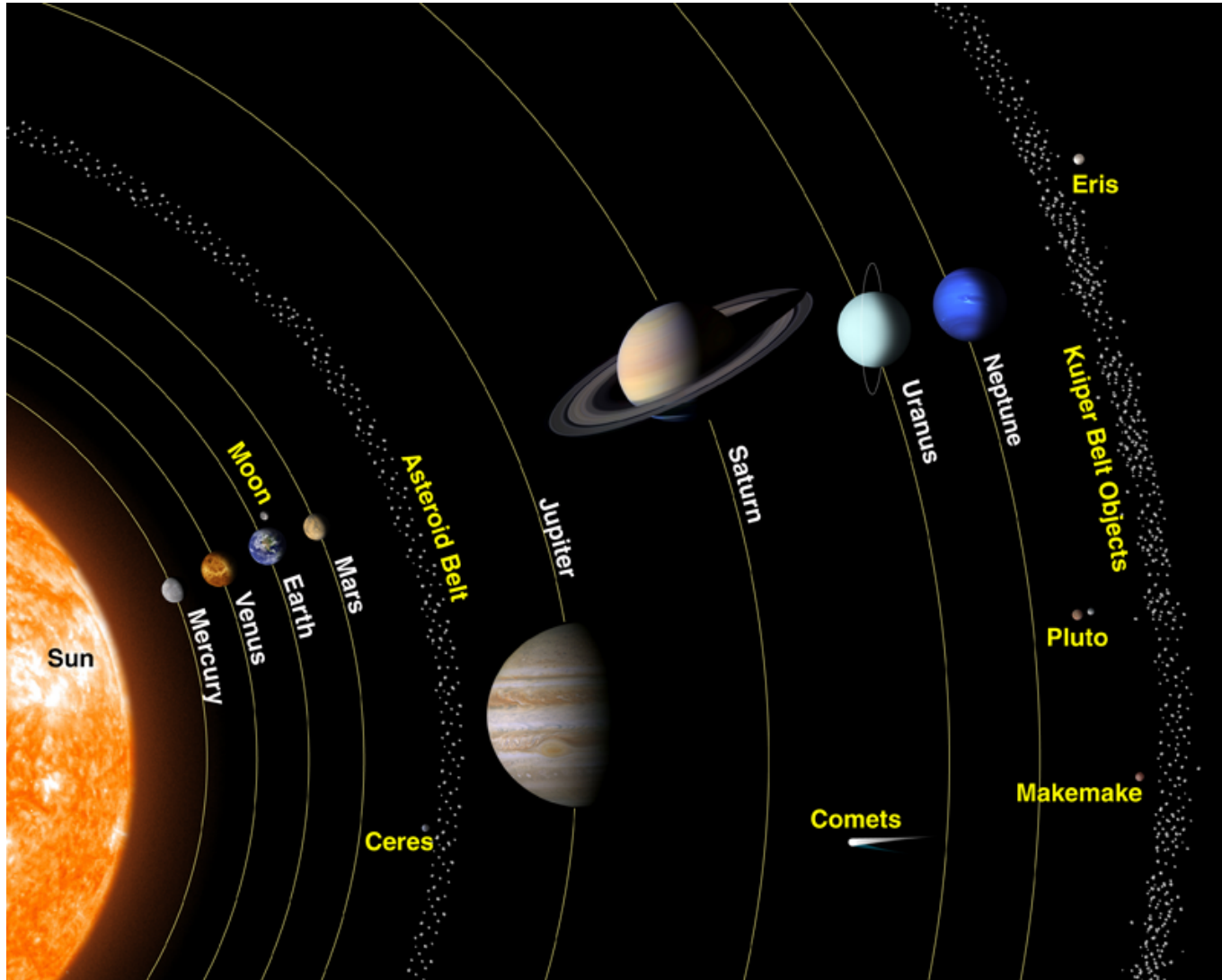
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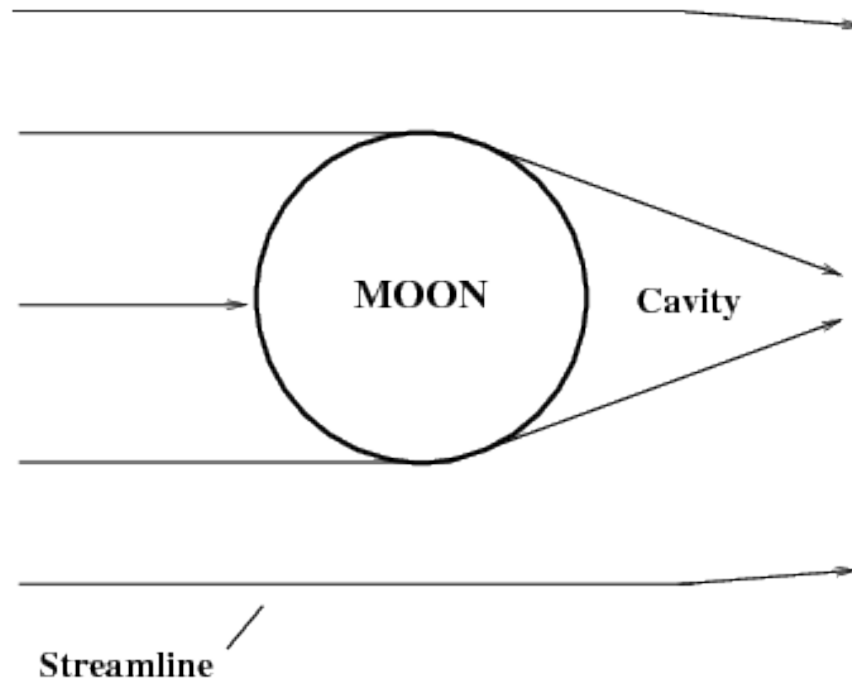
Friday: Introduction to space mission design

Bodies in the Solar System

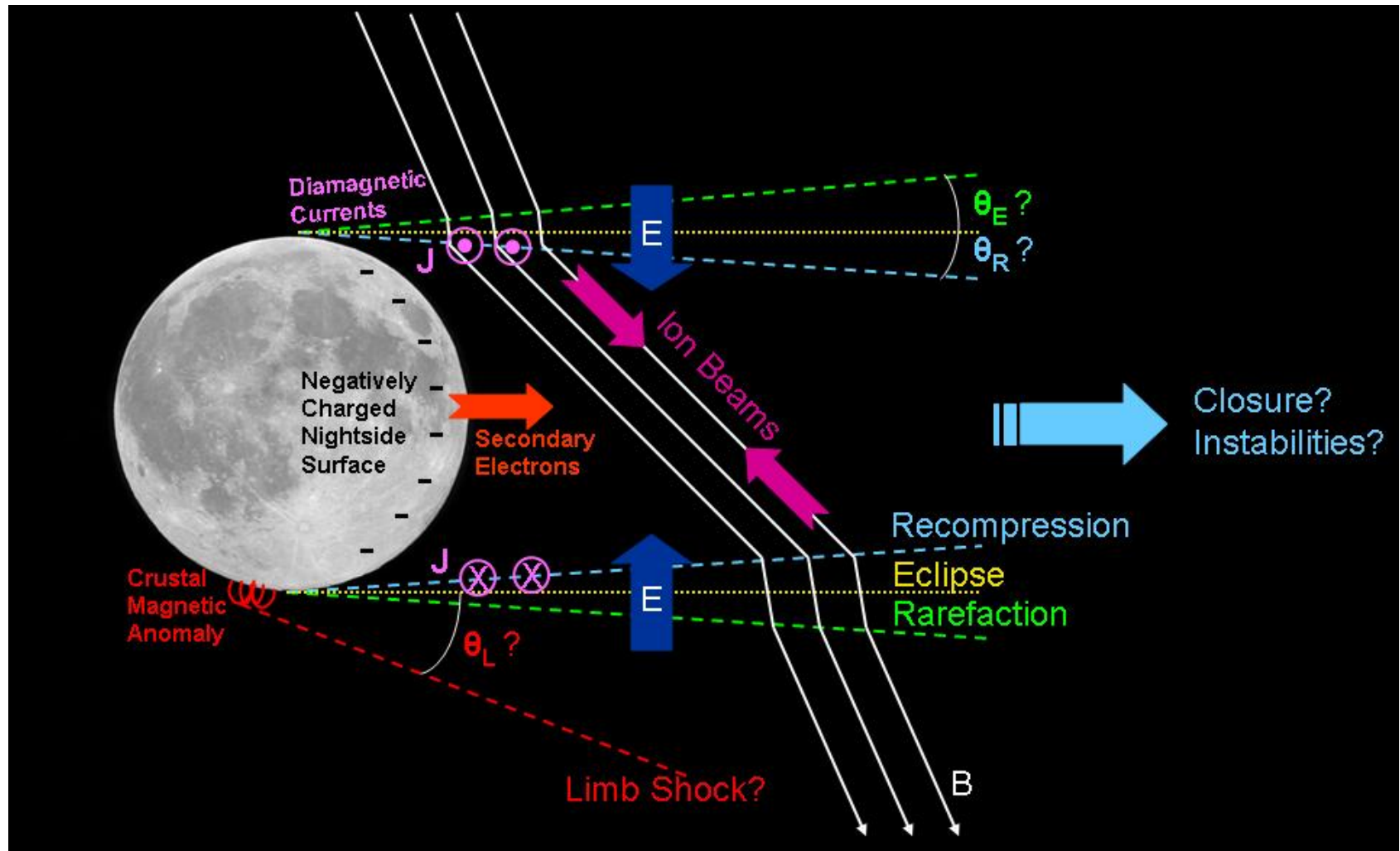


Examples of Interaction Type

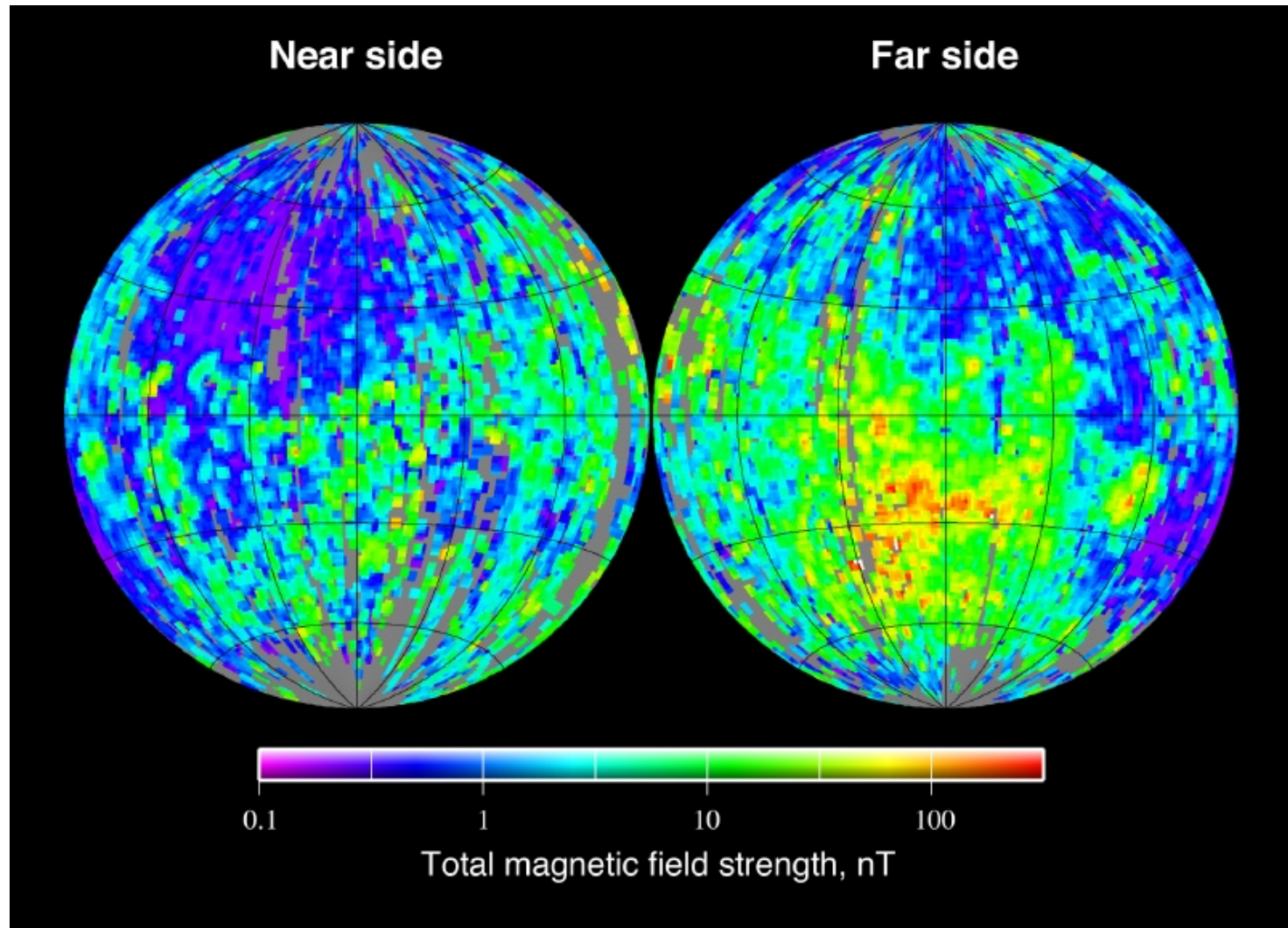
- ✧ The Moon (of the Earth)
- ✧ Most asteroids



Solar Wind Interaction with the Moon (of the Earth)



Solar Wind Interaction with the Moon (of the Earth)



Outline

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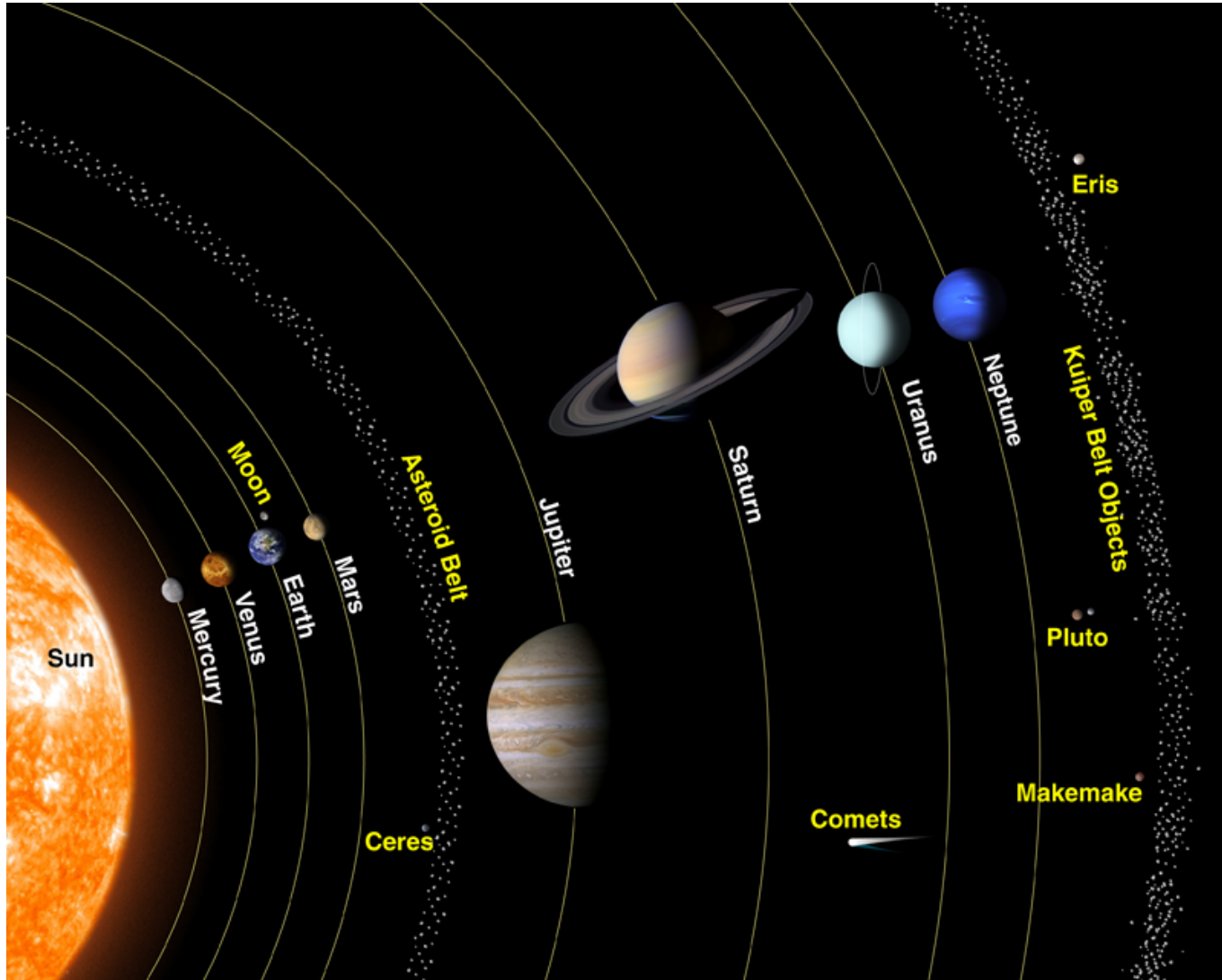
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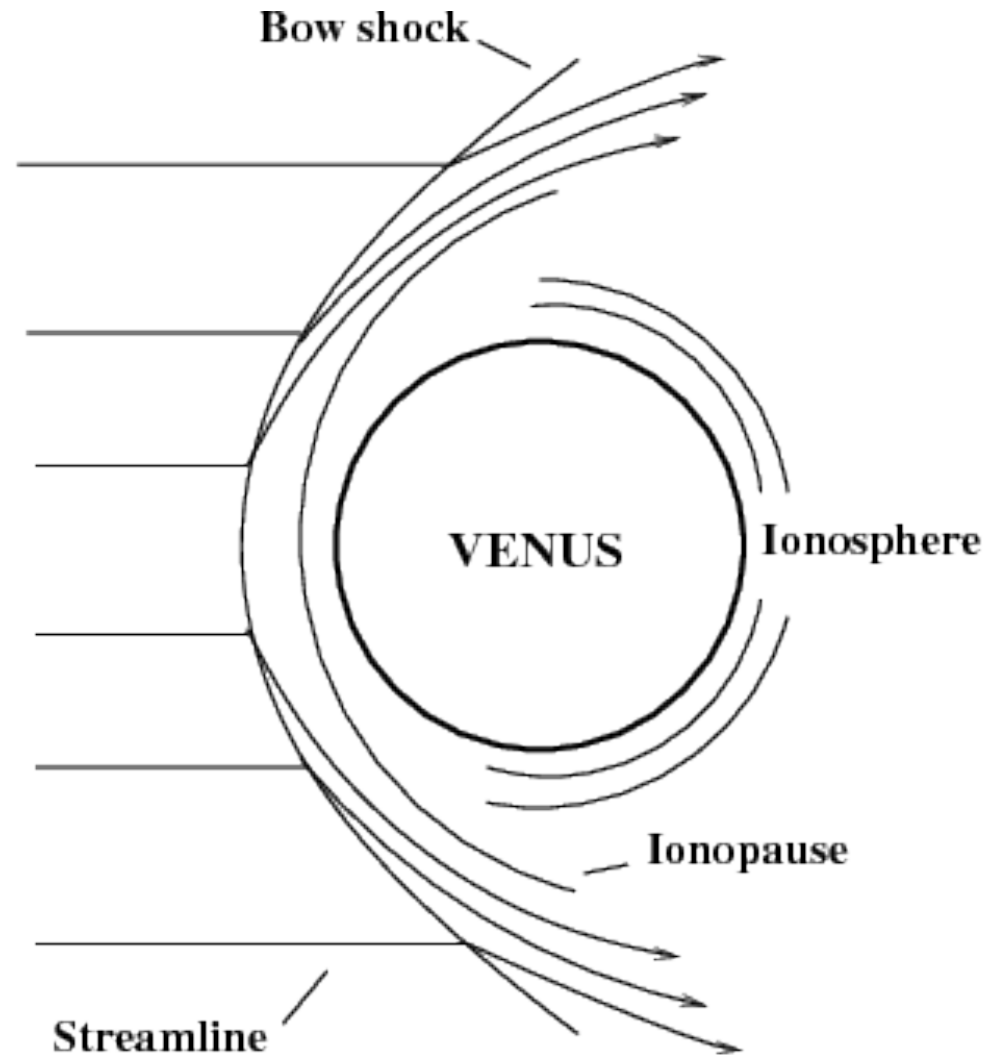
Friday: Introduction to space mission design

Bodies in the Solar System

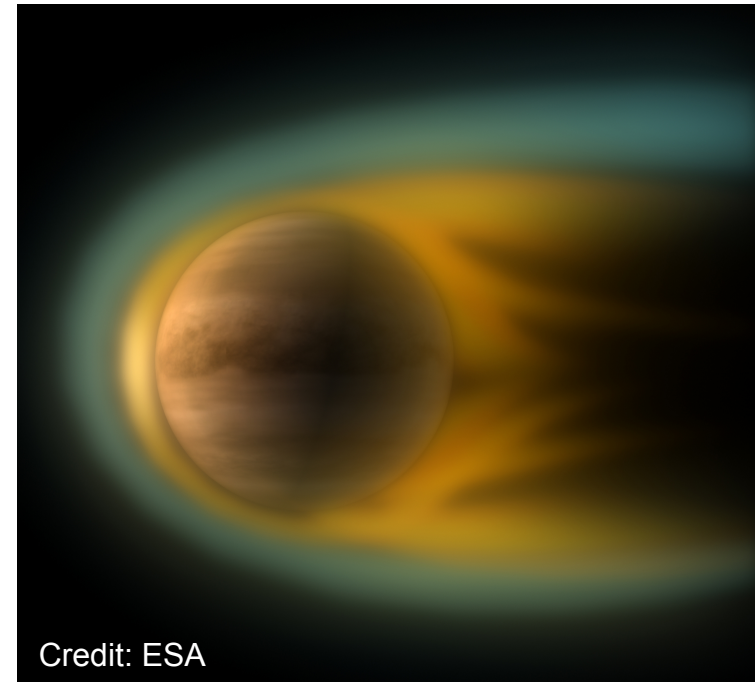
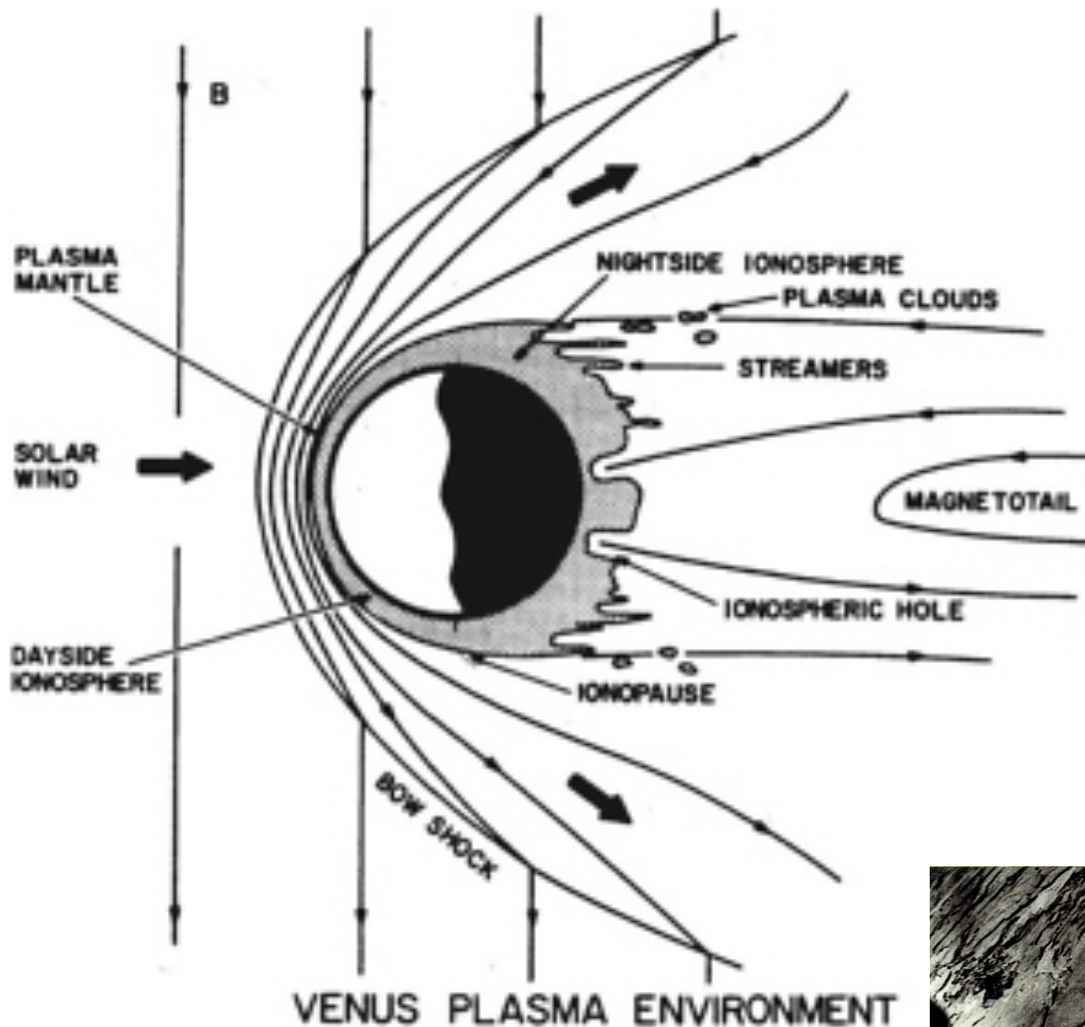


Examples of Interaction Type

- ✧ Venus
- ✧ Mars
- ✧ Pluto

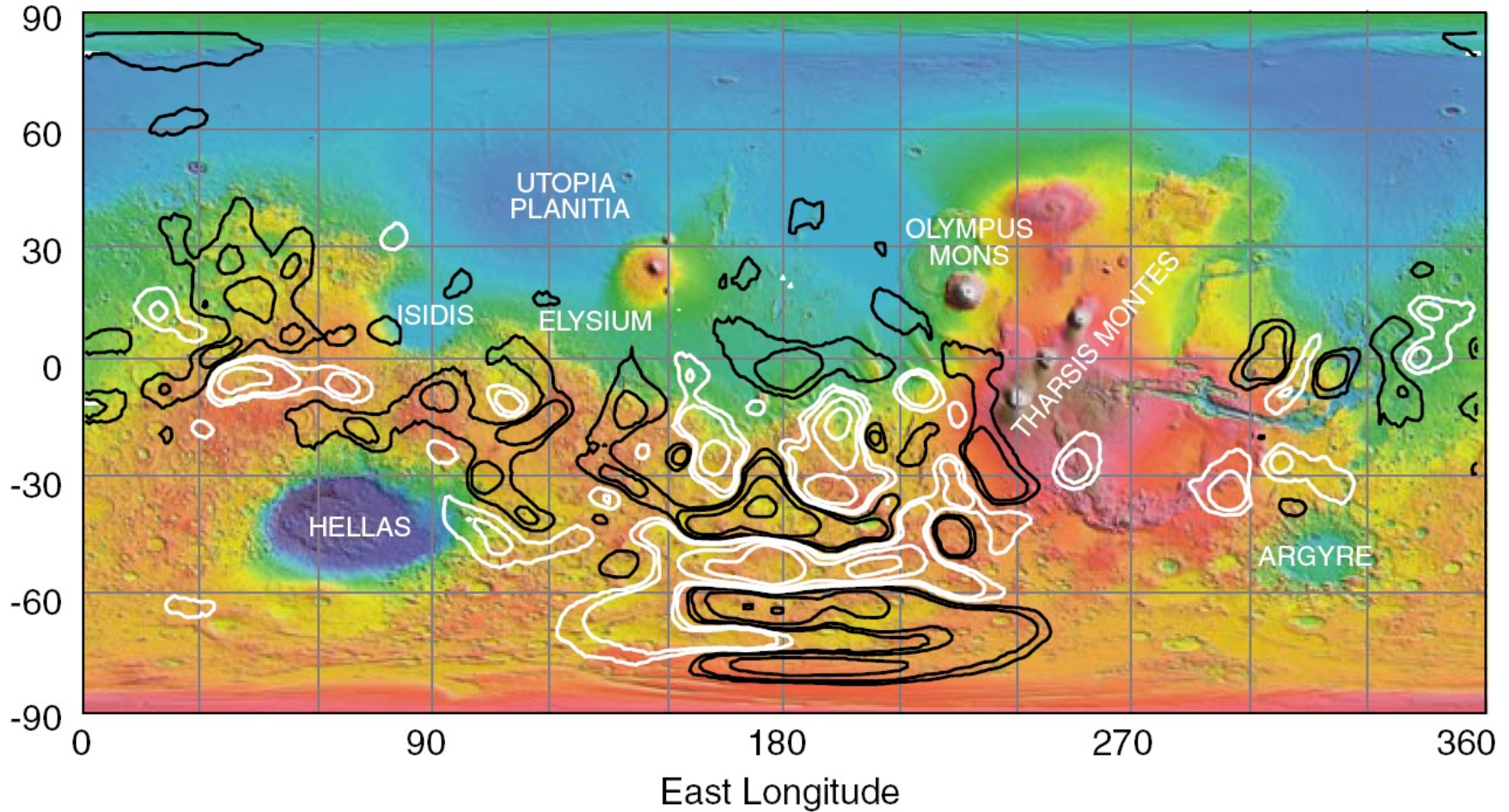


Solar Wind Interaction with Venus

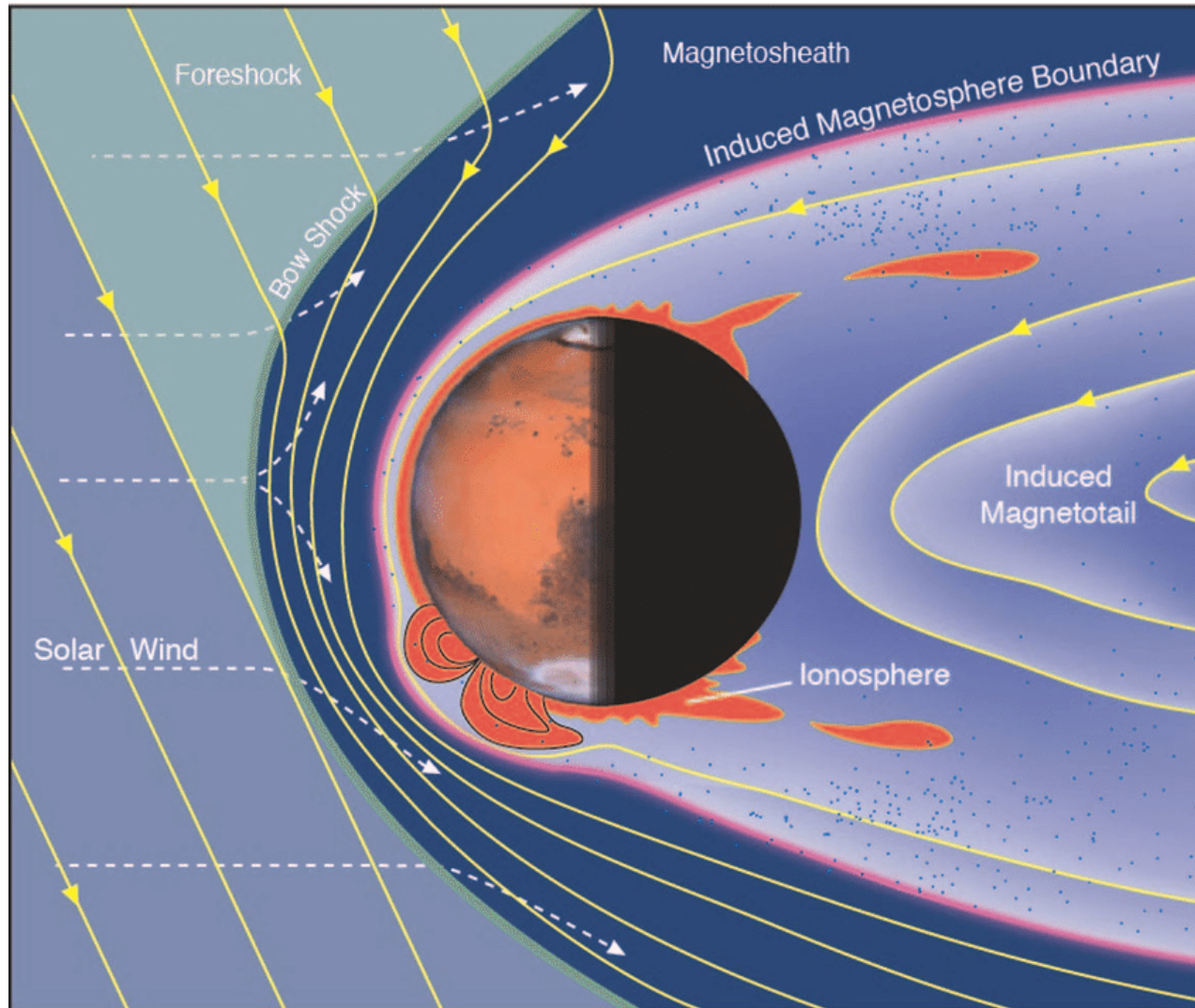


ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС

Solar Wind Interaction with Mars



Solar Wind Interaction with Mars



From Brain et al. (GRL, 2015)

Outline

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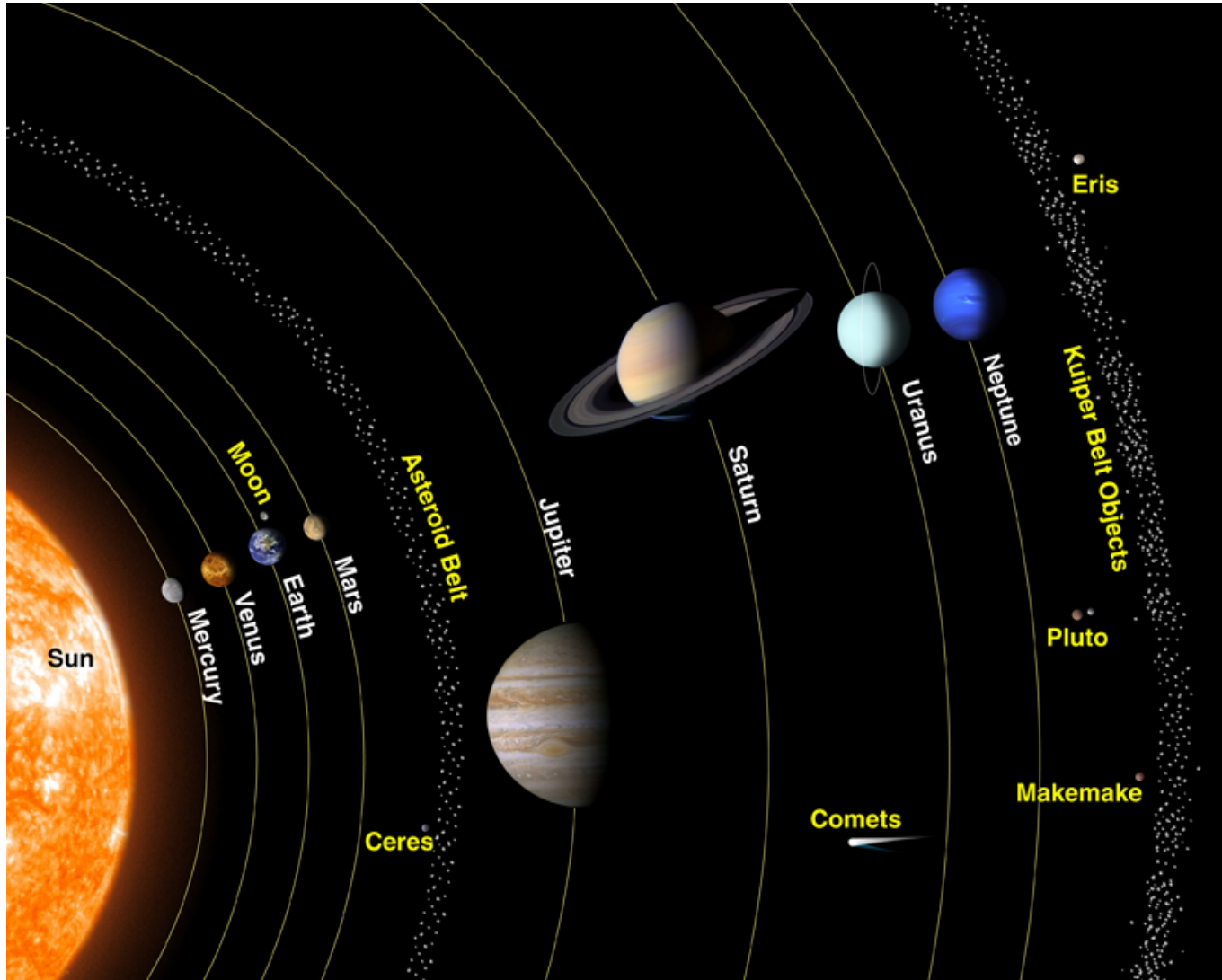
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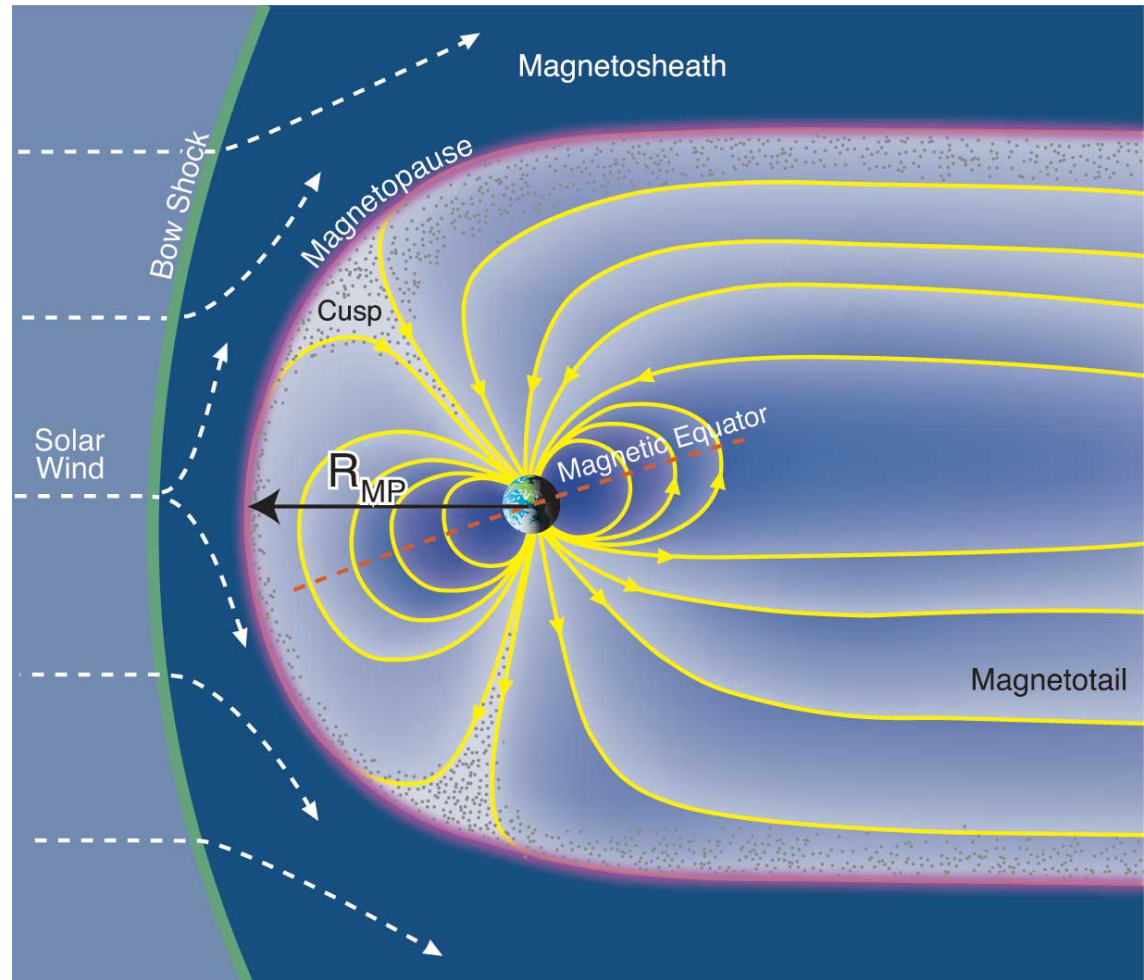
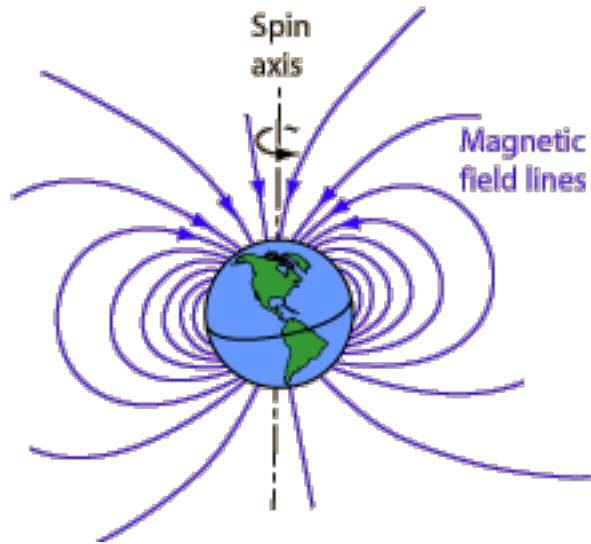
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Friday: Introduction to space mission design

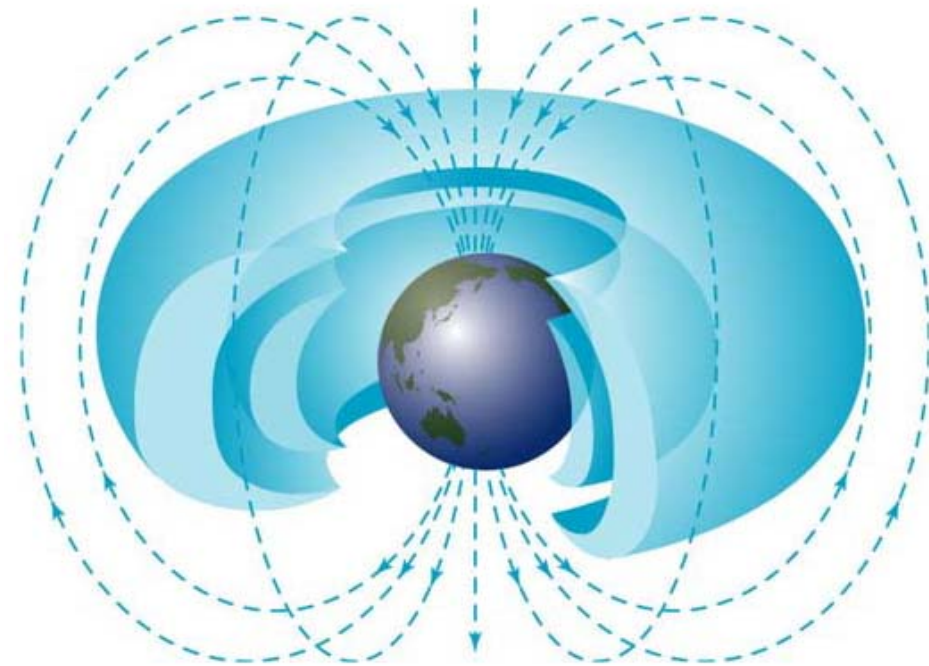
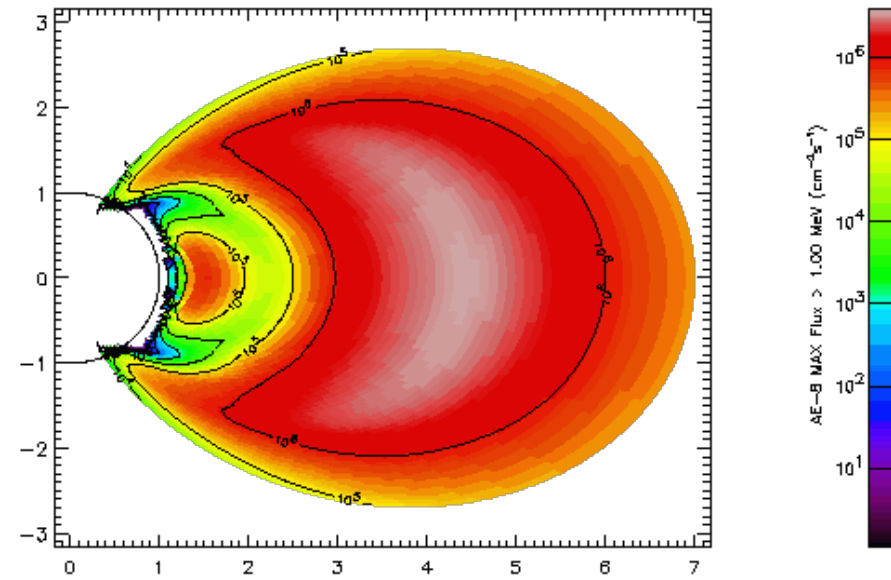
Bodies in the Solar System



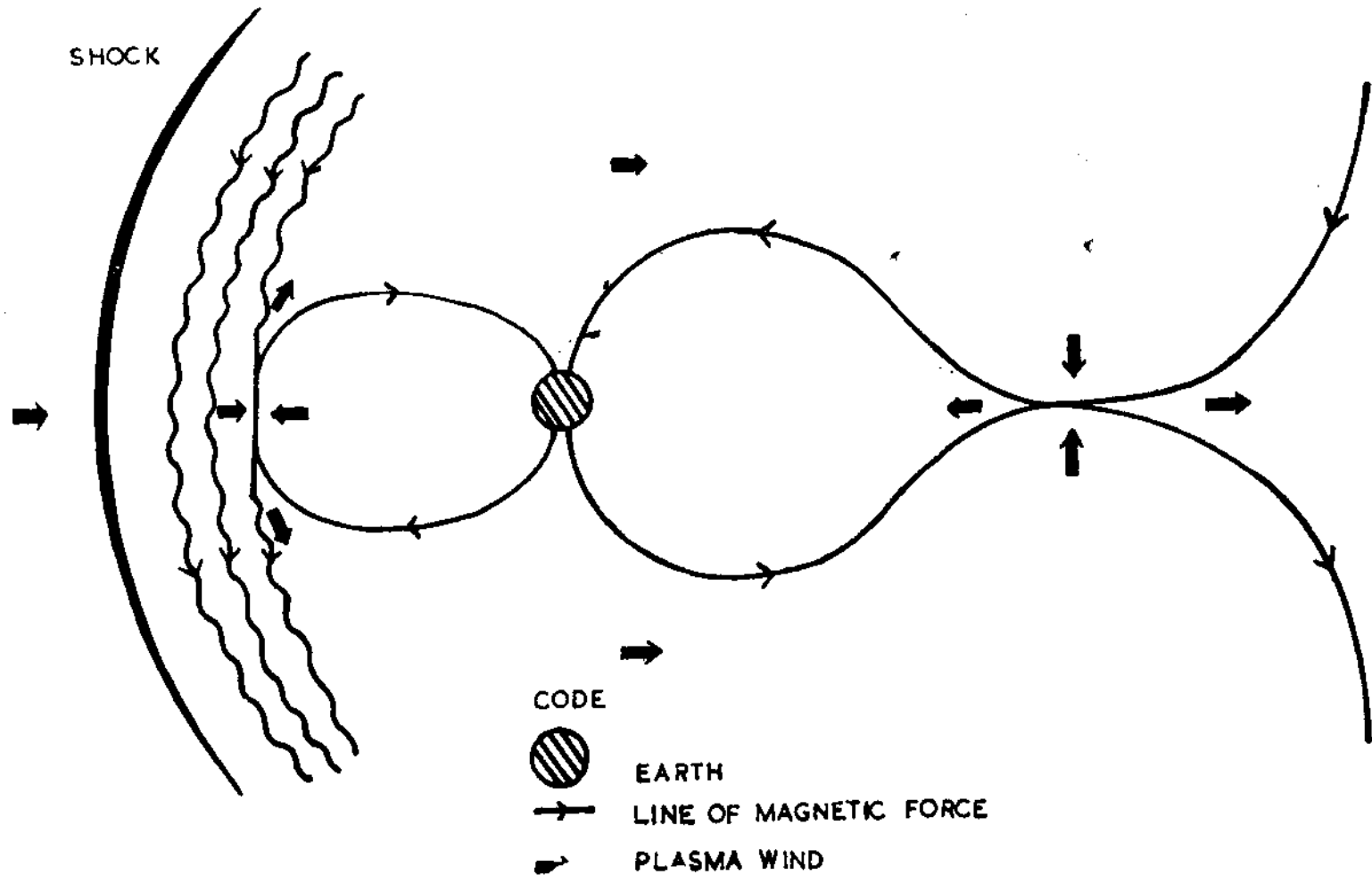
Structure of Earth's "Magnetosphere"



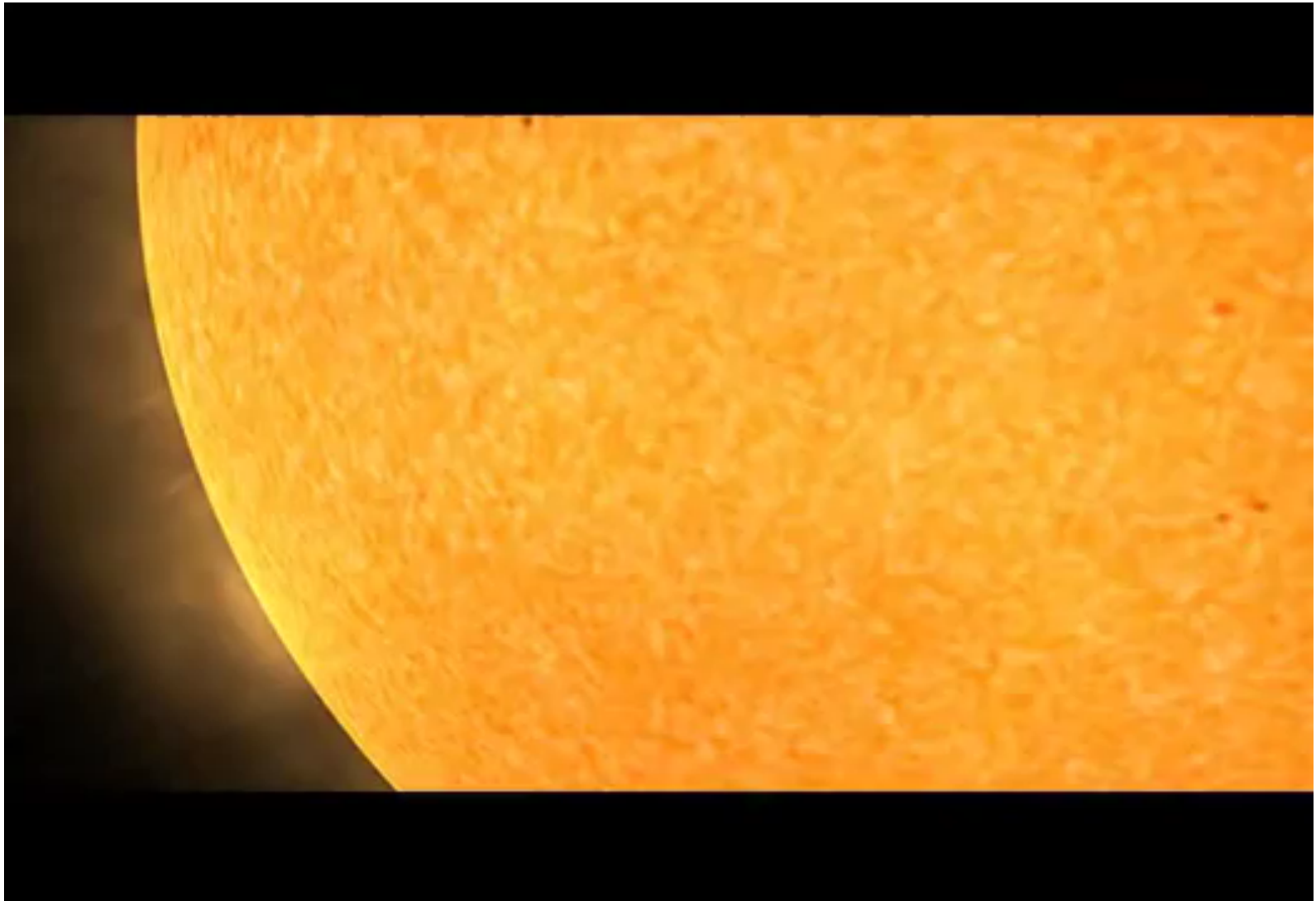
The Radiation Belts



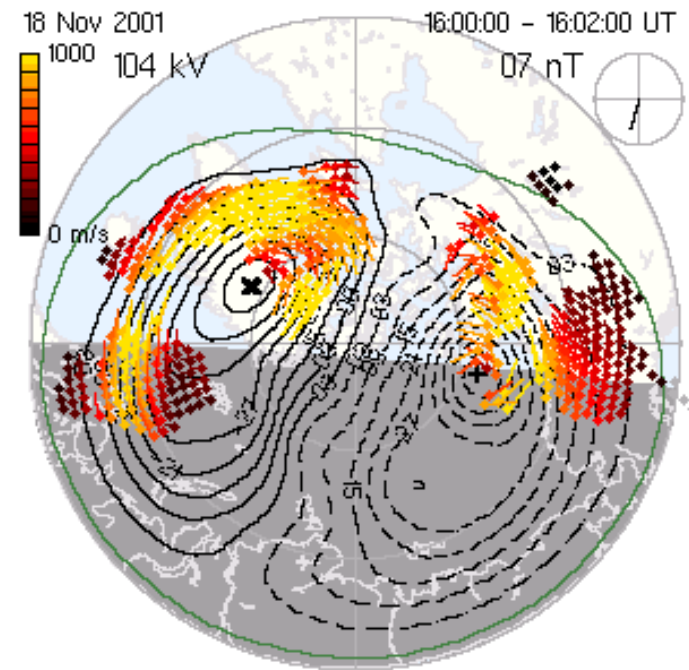
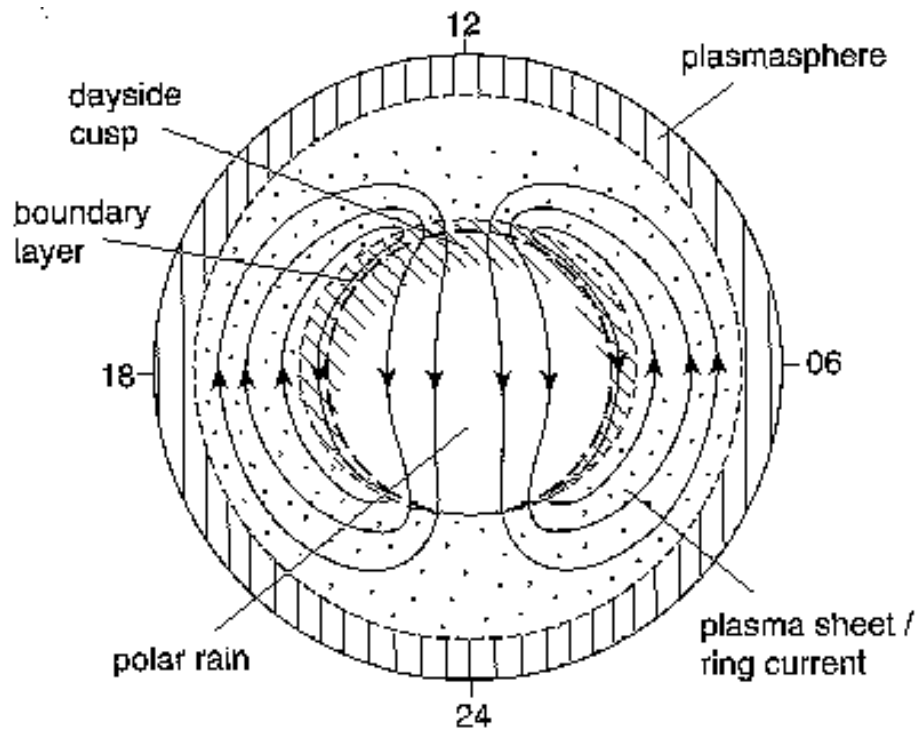
The Dungey Cycle



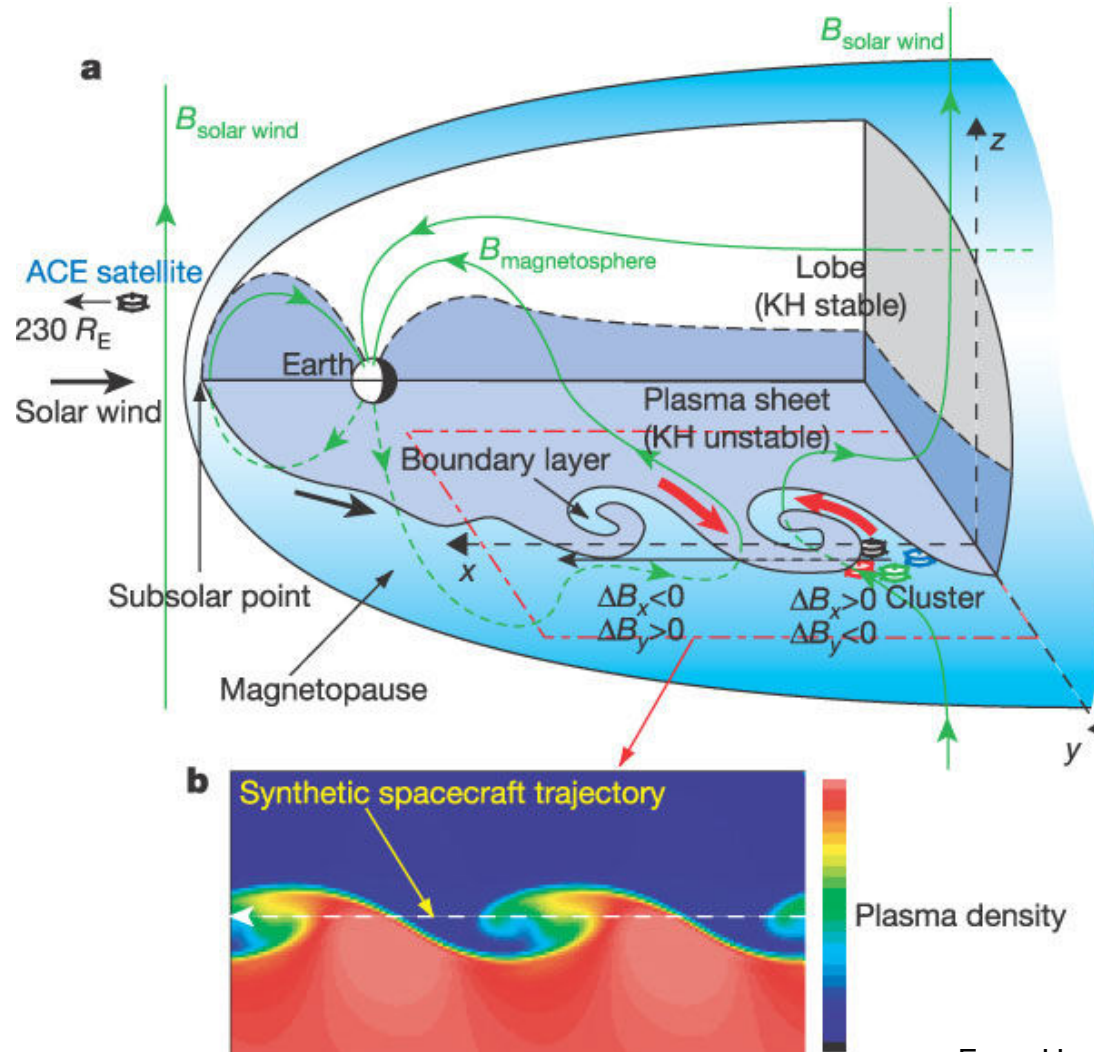
The Dungey Cycle



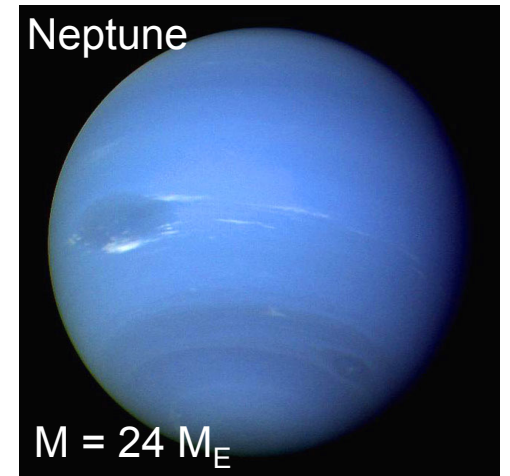
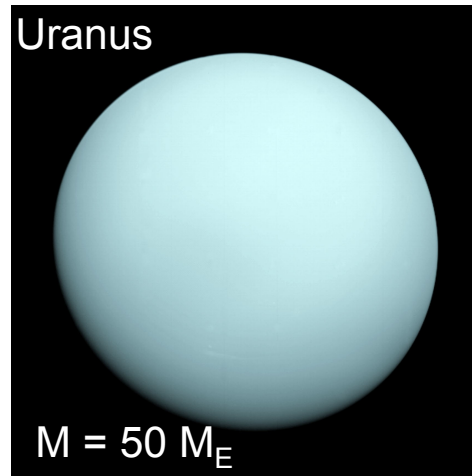
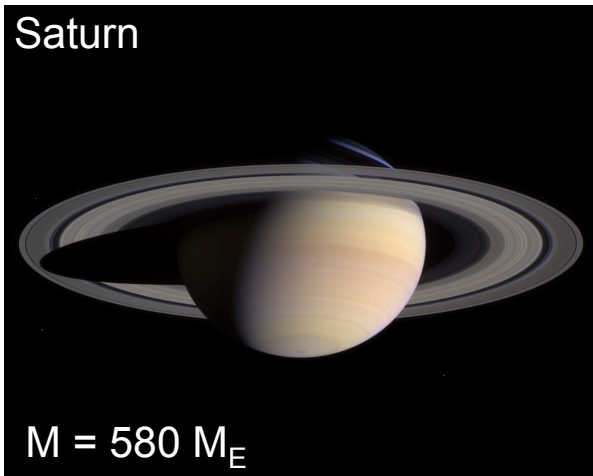
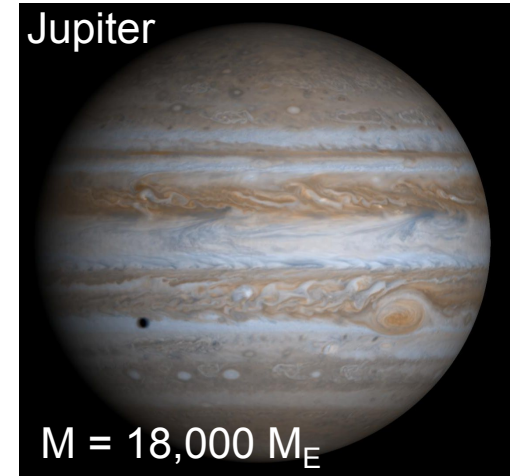
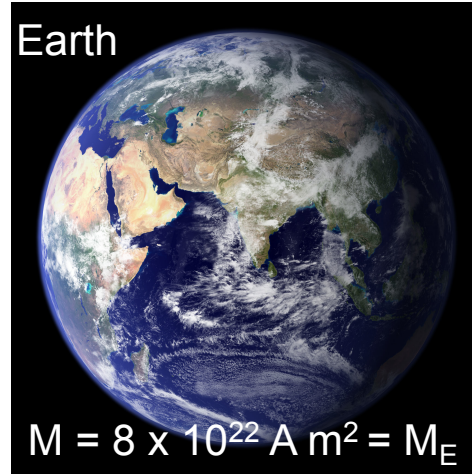
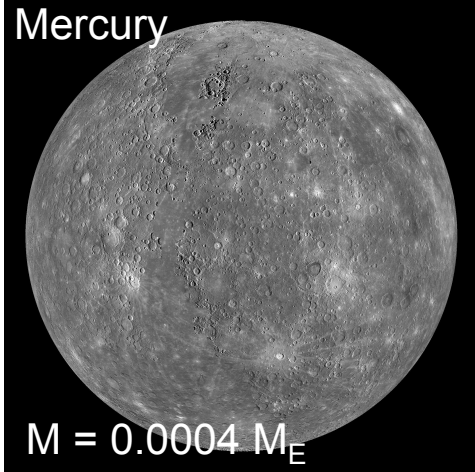
Ionospheric Flow Patterns



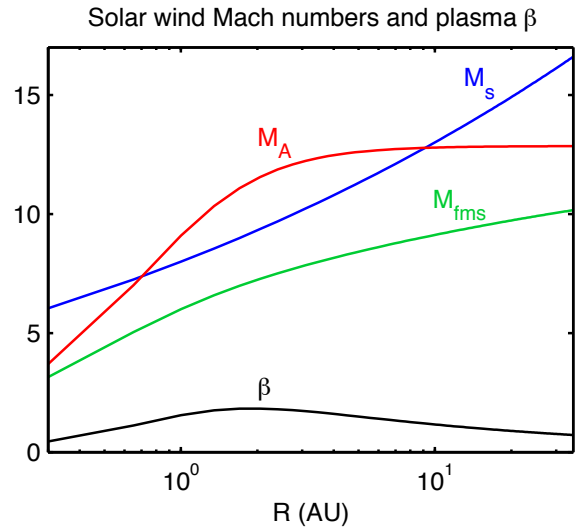
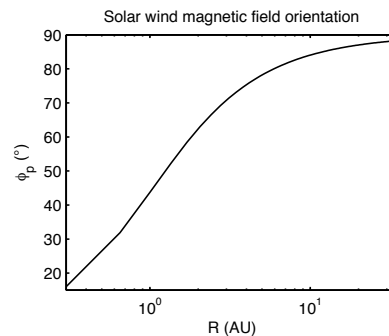
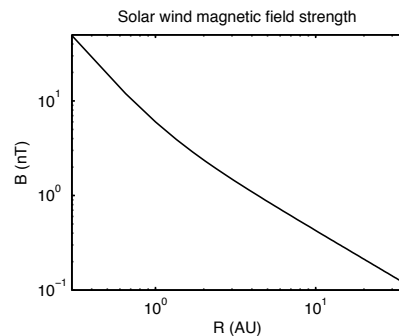
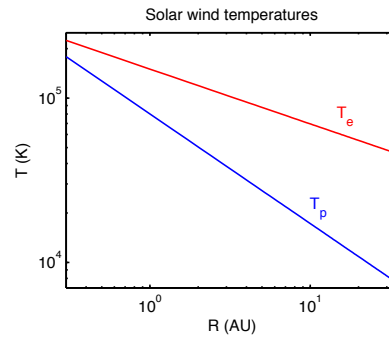
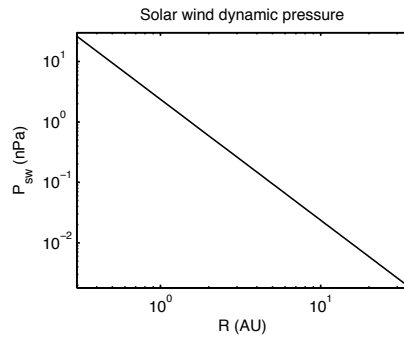
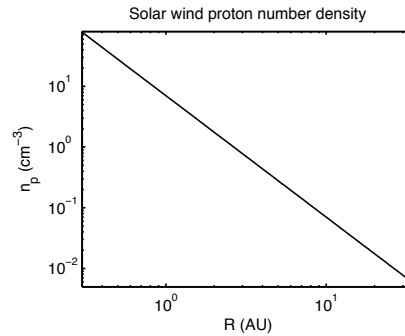
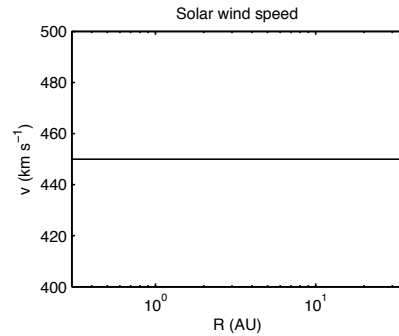
The “Viscous-Like” Interaction



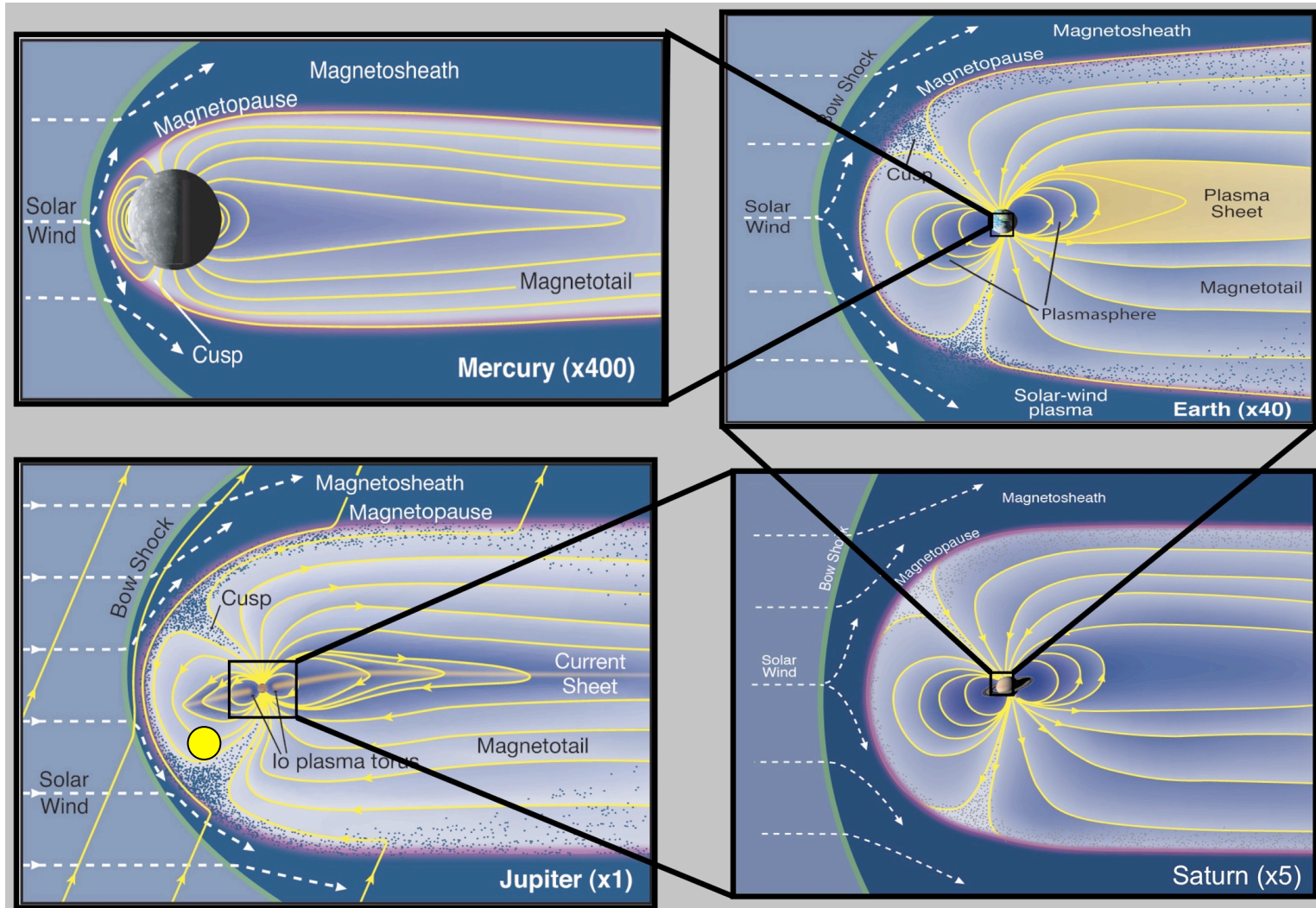
Magnetised Planets Throughout the Solar System



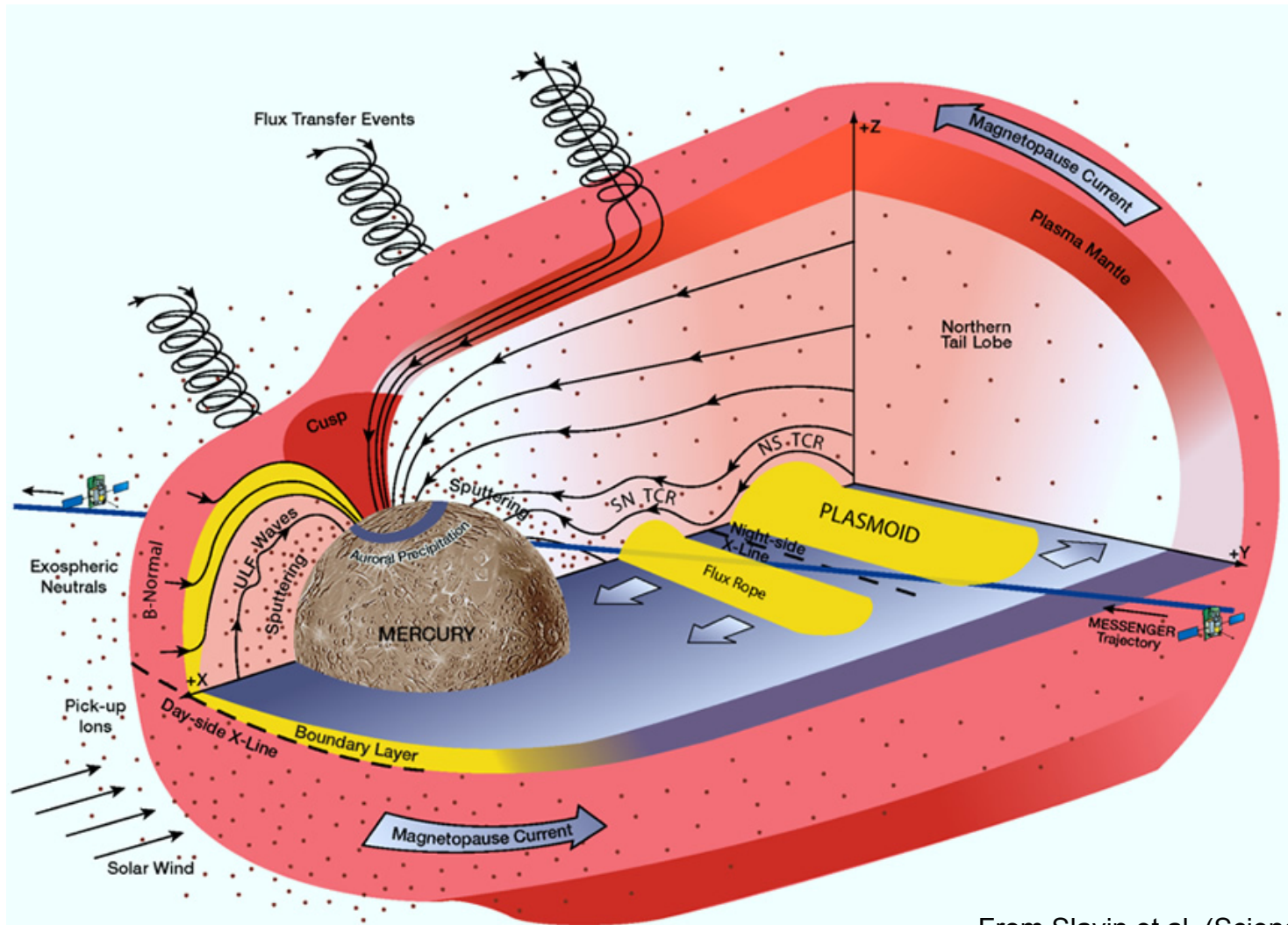
Reminder: Typical Solar Wind Properties



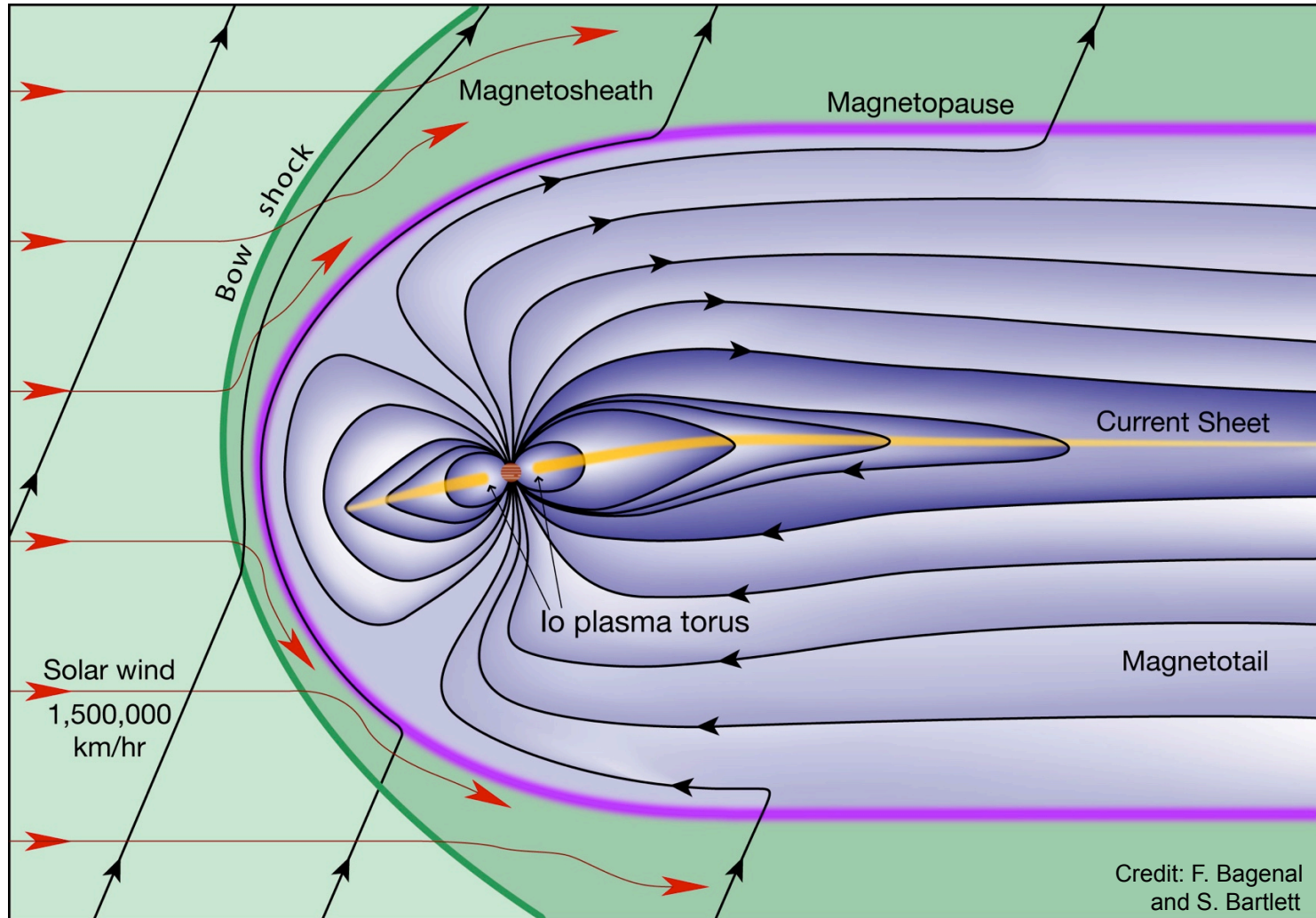
Magnetospheres Throughout the Solar System



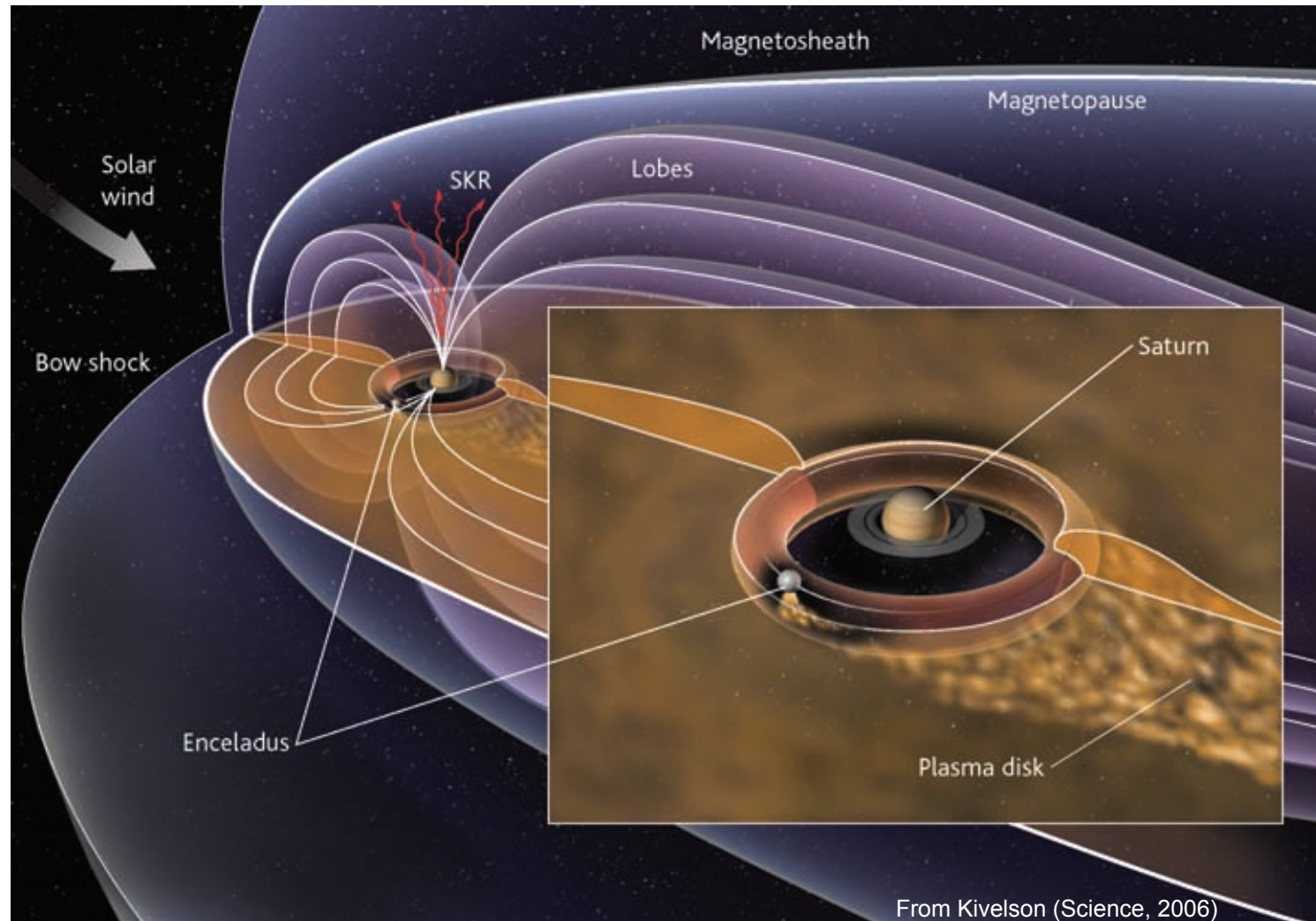
Mercury's Magnetosphere



Jupiter's Magnetosphere

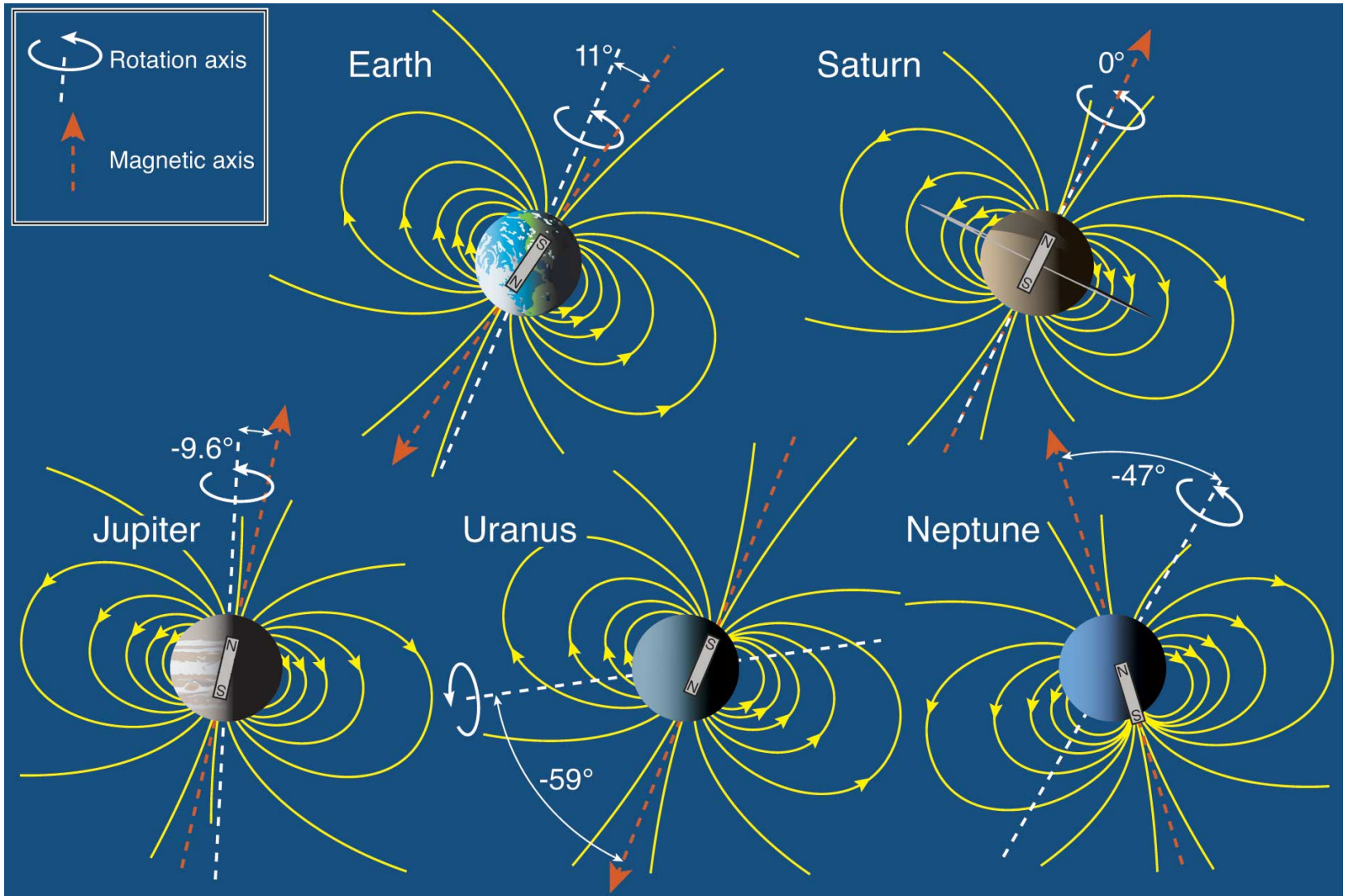


Saturn's Magnetosphere



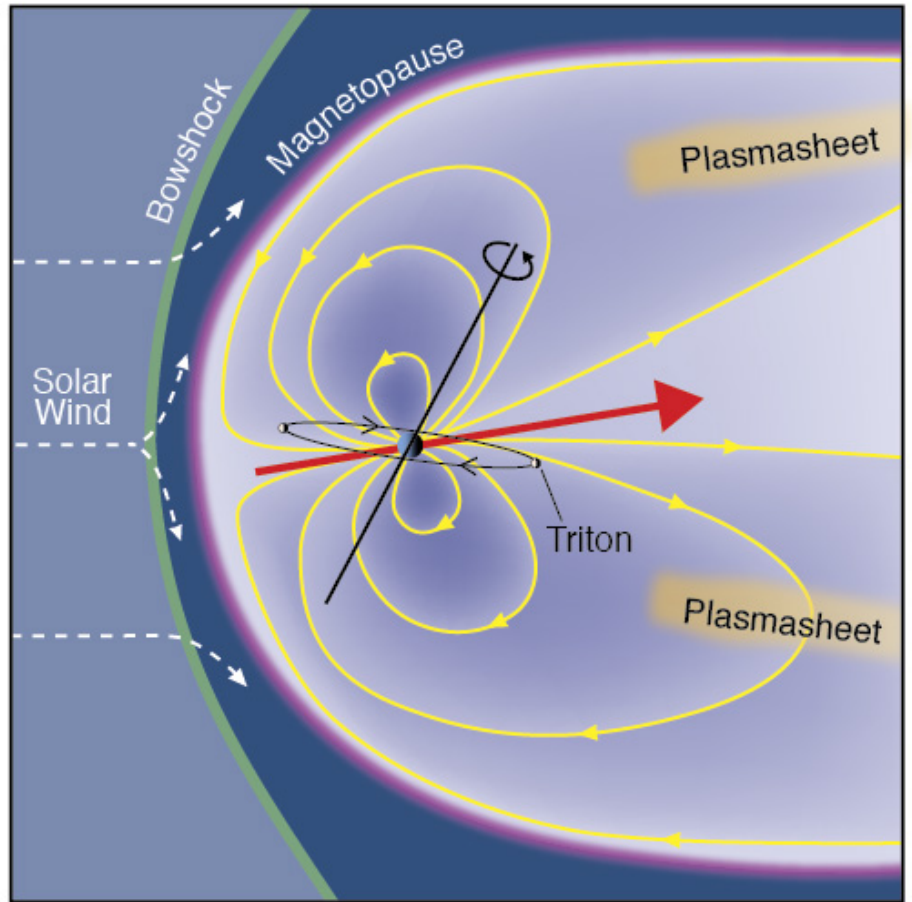
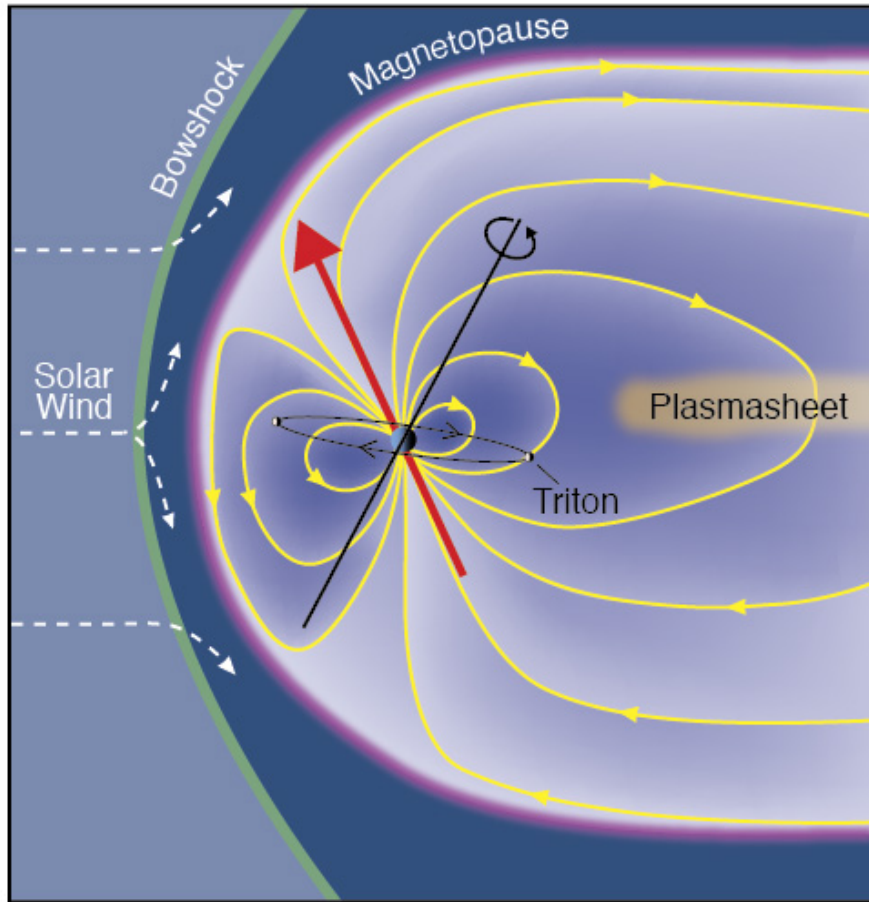
From Kivelson (Science, 2006)

Uranus' and Neptune's Magnetospheres

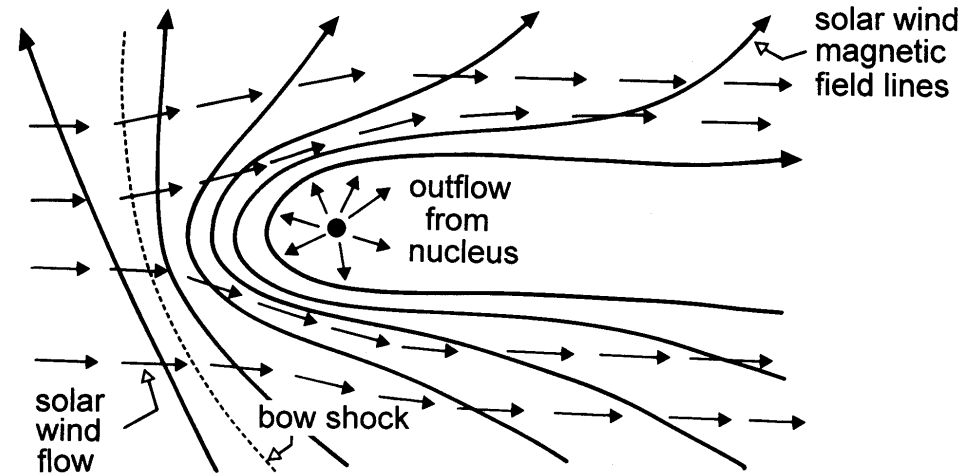
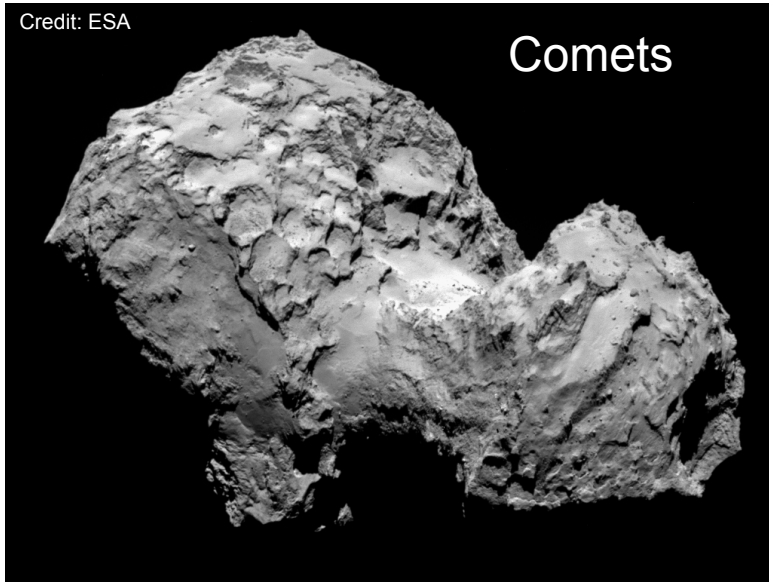
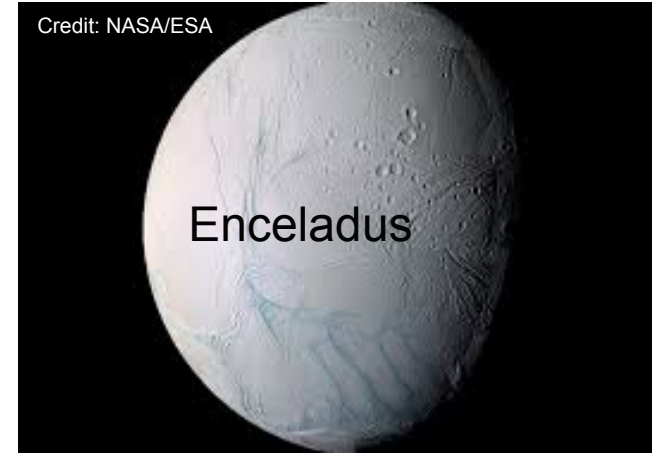
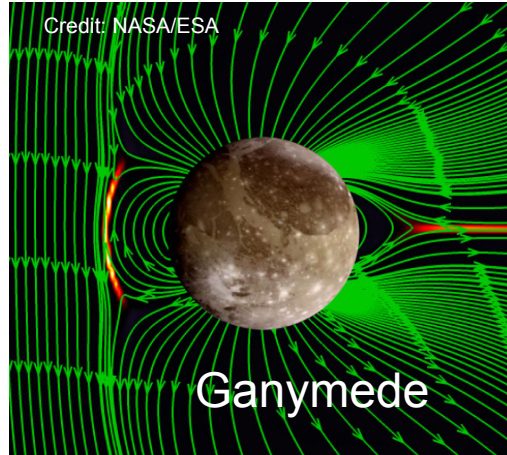
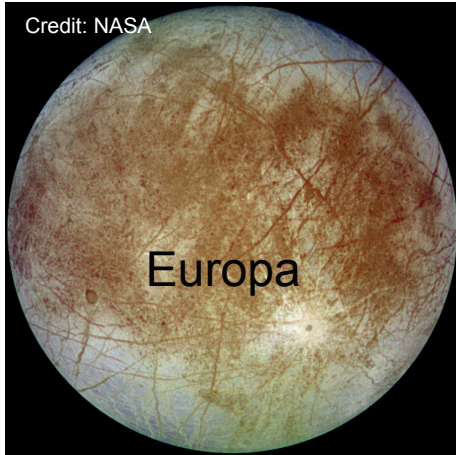


Uranus' and Neptune's Magnetospheres

Neptune's magnetosphere re-configuring



Unusual & Other Cases



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Jupiter Icy Moons Explorer

