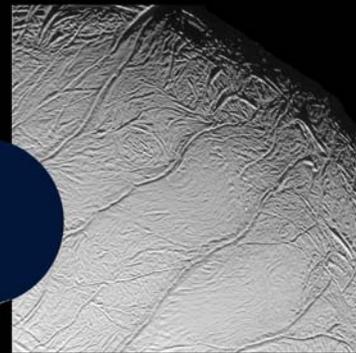
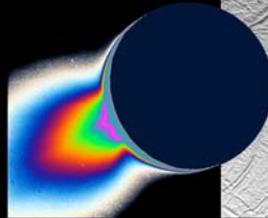
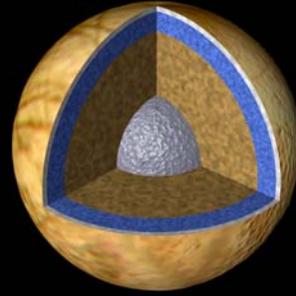
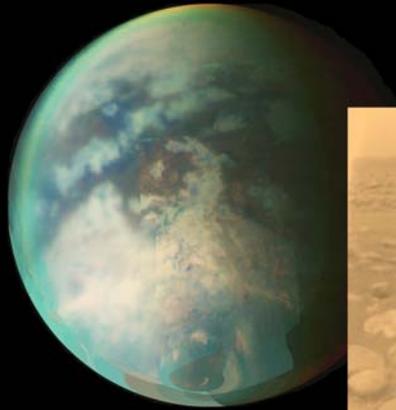


ICY WORLDS FOCUS GROUP NASA Astrobiology Institute



Report to OPAG
November 2007

NAI ICY WORLDS FOCUS GROUP

- Formed in mid-2007
- Merger of NAI Europa, Titan, etc. focus groups
- Goals
 - ◇ Forum for programmatic input
 - ◇ Share research results
 - ◇ Venue for collaborations
- Open to community

NAI ICY WORLDS FOCUS GROUP

First meeting / workshop

- **NASA-Ames Research Center**
20-21 September 2007
- **Primary goal: assess current outer planet “Flagship mission” studies and provide input to study groups**
- **Announced via**
 - ◇ **OPAG**
 - ◇ **General NAI list**
 - ◇ **Previous Focus Group lists**
 - ◇ **DPS list**
 - ◇ ***Boulder Workshop on Ices, Oceans, and Fire: Satellites of the Outer Solar System***
 - ◇ **Planetary Science Newsletter**
- **45 participants**

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NAI ICY WORLDS FOCUS GROUP WORKSHOP

- **Presentations by each study group**
 - ◇ **Europa Explorer (*Pappalardo*)**
 - ◇ **Titan Explorer (*Burr*)**
 - ◇ **Enceladus (*Spencer*)**
 - ◇ **Jupiter System Observer (*Pappalardo for Senske*)**
- **“Real time” written assessment of mission concepts by each participant**
 - ◇ **General strengths and weaknesses**
 - ◇ **Astrobiology strengths and weaknesses**
- **Open workshop discussion after all studies were presented**
- **Compilation and synthesis of results**
- **Forward results to**
 - ◇ **NASA HQ**
 - ◇ **Study leads**
 - ◇ **NAI**
 - ◇ **OPAG**

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NAI ICY WORLDS FOCUS GROUP

Flagship mission studies: consensus

- Europa Explorer
 - ◇ Mature science; well-posed questions
 - ◇ Europa priority (driven in part by astrobiology) documented by OPAG, NRC, “Road Maps,” etc.
 - ◇ Technology mature, but still work to do
 - ◇ Mission concept is conservative
 - ◇ Need surface measurements, especially for astrobiology
 - ◇ Long time for data return (but less than Enceladus and Titan)
- Titan
 - ◇ Exciting solar system object
 - ◇ For astrobiology, focus is more as “early-Earth” pre-biotic analog; less so for current life, etc. (where’s the water?)
 - ◇ Very ambitious and complex mission (*orbiter, balloon, lander*), high-risk; cost exceeds guidelines; could “descope” to orbiter but loses appeal
 - ◇ Landing site in dunes much less interesting than lakes, especially for astrobiology
 - ◇ Long time for data return (late 2020s)

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NAI ICY WORLDS FOCUS GROUP

Flagship mission studies: consensus

- Enceladus
 - ◇ Astrobiology interesting, but science objectives are work in progress (*Cassini* results not mature; will be better next year!)
 - ◇ Focus is on plume, but need to understand plume much better
 - ◇ Issues with plume; how/what to collect, return samples to Earth, etc.
 - ◇ Mission spacecraft concept is work in progress
 - ◇ Long time for data return (late 2020s)
- Jupiter System Observer
 - ◇ Sounds like “*Galileo Mark 2*” without probe
 - ◇ Solid overall science and technology; mature
 - ◇ Not much for astrobiology
 - ◇ Some data for Europa
 - ◇ Three oceans (!): Europa, Ganymede, Callisto
 - ◇ Potential orbit around Ganymede interesting (including astrobiology), but ocean very deep

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