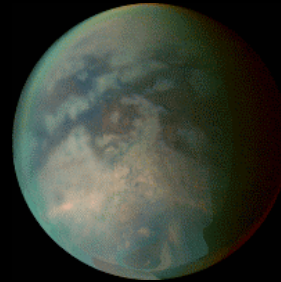
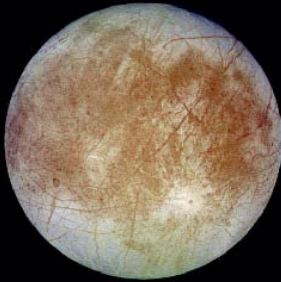




# Outer Planets Flagship Mission Studies



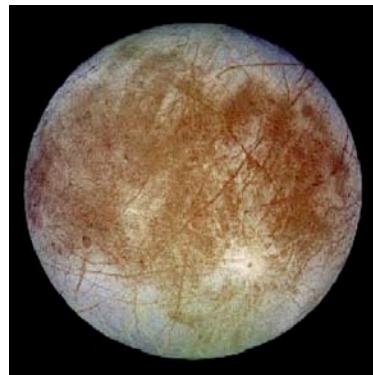
Curt Niebur  
OPF Program Scientist  
NASA Headquarters

Planetary Science  
Subcommittee  
October 3, 2008



## Overview

- ✦ **NASA is currently finishing a nine month long outer planet flagship mission study which is being conducted jointly with ESA. Two missions are being studied:**
  - ✦ Europa Jupiter System Mission (EJSM)
  - ✦ Titan Saturn System Mission (TSSM)
- ✦ **NASA plans to select a single Outer Planet Flagship mission in February 2009 which will be pursued jointly with ESA and other international partners.**





# 2008 JEO Sweet Spot Mission Concept



- **Objectives: Jupiter System, Europa**
- **Launch Vehicle:** Atlas V 551
- **Power Source:** 5 MMRTG or ASRG
- **Mission Timeline:**
  - Launch: 2018 to 2022
  - Jovian system tour phase: ~24-33 months
    - 3-5 Io flybys
    - 8-10 Ganymede flybys
    - 4-6 Callisto flybys
  - Europa orbital phase: 9-12 months
  - Spacecraft final disposition: Europa surface Impact
- **5 Science Objectives**
  - 12 Instruments
  - Radio Science
- **Radiation Dose:** 2.9 Mrad (behind 100 mils Al)



Sweet Spot Analysis

Spacecraft & Technology

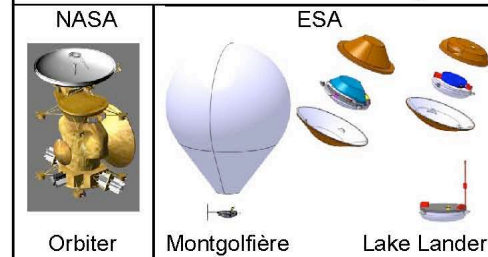
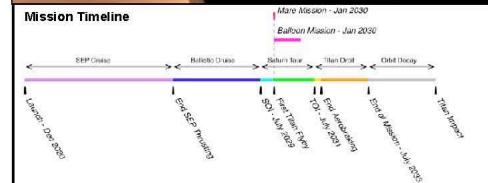


# TSSM Baseline Mission



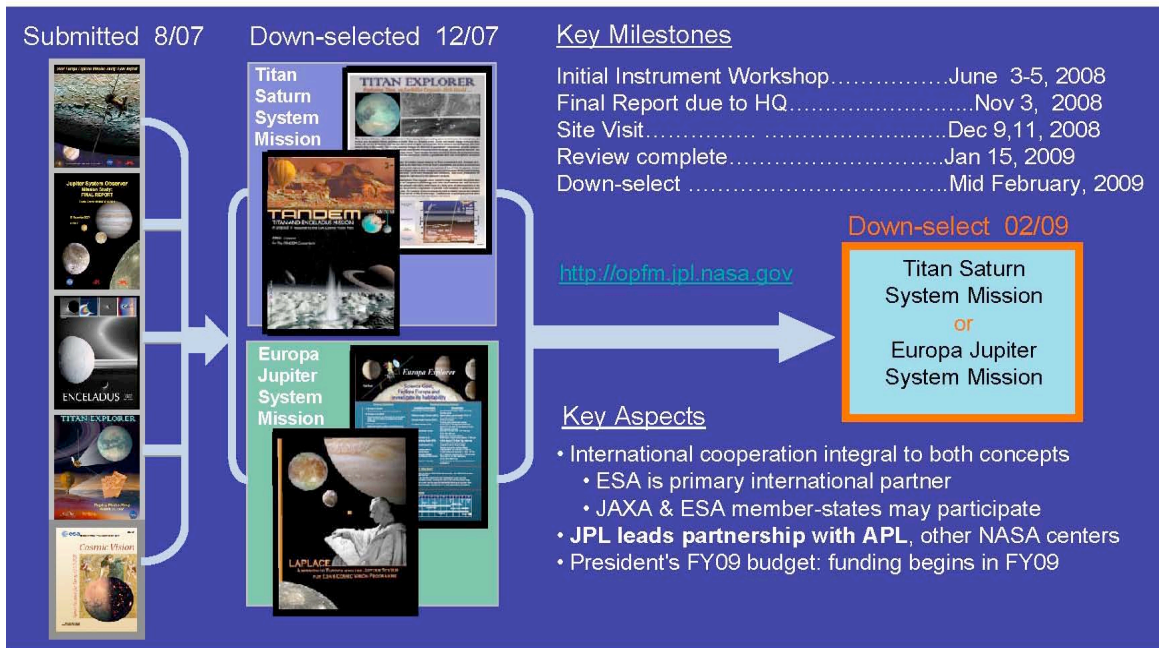
- **Titan Orbit, Saturn system, Enceladus**
- **NASA Orbiter with ESA in situ elements**
  - Chemical orbiter + Solar Electric Propulsion (SEP) stage
  - Lake Lander and Montgolfière Balloon
  - NASA provided Launch Vehicle and RPS
- **Mission Design**
  - 2020 Earth Gravity Assist SEP trajectory
  - 8.8 yr to Saturn arrival
  - SEP stage released 5.8 yr after launch
  - Balloon released on 1<sup>st</sup> Titan flyby, Lander on subsequent flyby
  - ~4 year prime mission: 2 year Saturn tour, 2 mo Titan aerosampling; 18 mo Titan orbit
- **Orbiter payload; 6 Inst. + Radio Science**

*-Optimizes science, cost and risk  
 -Leverages NASA-ESA collaboration*





# NASA-ESA 2008 Outer Planet Flagship Studies Decision Process



## Reporting Requirements and Review Process

- **For each mission concept, the NASA-ESA study teams will produce three reports:**
  - NASA Study Report: a technical report prepared by the NASA study team and JSDT and focused on the NASA contribution
  - ESA Assessment Report: a technical report prepared by ESTEC and the JSDT and focused on the ESA contribution
  - NASA-ESA Joint Summary Report: a less technical summary report describing the joint mission and linkages between NASA and ESA contributions
- **NASA and ESA will each conduct independent reviews of the results of their own studies**
  - NASA will conduct a standard independent STMC review of the NASA Study Reports for EJSM and TSSM
    - Site visits are scheduled for Dec. 9-12 and results will be briefed to HQ in Jan. 2009
  - ESA will conduct review of the ESA Assessment reports tailored to the level of technical detail that is available on the ESA contributions
    - Science will be reviewed by ESA's Solar System Working Group
    - Technical feasibility, cost and risk will be independently reviewed by a team of ESA project managers
- **NASA and ESA management will meet in early 2009 to discuss study results of studies and reviews and select a mission**