



NASA ASTROBIOLOGY INSTITUTE ANNUAL REPORT YEAR



[July 2001 – June 2002]

Project Report: Delivery of Organic Materials to Planets

Focus Group Chair(s): Ronald Greeley

Executive Summary

The Europa Focus Group (EFG) was organized to foster research dealing with the Jupiter moon Europa, and its potential as a habitat for past or present life. In addition, the EFG considers the principal science objectives for the future exploration of Europa by spacecraft, including the critical measurements needed to understand its astrobiological significance.

Membership in the EFG includes planetary scientists, biologists, terrestrial sea-ice experts, oceanographers, and space science technologists. The EFG is open to all interested members of the scientific community and functions primarily through open workshops. The workshops provide a venue in which participants can share relevant research results and establish collaborations that might not otherwise occur. During the workshops the participants also address specific issues important for the exploration of Europa, such as defining the kinds of instruments to fly on future missions.

Two workshops were held in this reporting period. At the September 2001 workshop, the scientific strategy for the exploration of Europa was discussed, and the objectives for a landed mission were formulated. Specific investigations and measurements were identified and prioritized. The results were then presented to the National Academy of Sciences (National Research Council) study team responsible for formulating an exploration strategy for the outer planet satellites in the coming decade. The results from the EFG were incorporated into the NRC final report, currently in review.

The May 2002 workshop refined the science strategy developed at the previous workshop and expanded the discussions to include the potential contributions from orbiting spacecraft. In addition, "splinter groups" discussed topics of specific interest, centered on; (1) potential landing sites on Europa, (2) laboratory studies needed to understand the Europa environment, (3) geophysical measurements to be made on Europa during future missions, (4) definition of potential biomarkers for Europa, and 5) the role of terrestrial analogs in understanding Europa. Initial plans for a future EFG field conference, tentatively to be held on Arctic Ice in 2003, were also discussed.

Focus Group Description & Activities

Two workshops were held in the Year 4 reporting period. The abstracts from these workshops are available at <http://astrobiology.asu.edu/focus/europa/discuss/discuss.html>. Consistent with

the EFG goal of fostering collaborative research dealing with Europa, at least eight collaborative groups have been established, involving a total of about 18 scientists who might not otherwise have worked together.

In addition, the results from Workshop 2 dealing with the development of a scientific strategy for the exploration of Europa were presented to the National Academy of Sciences (National Research Council) study panel for future Solar System Exploration, with parts of the EFG deliberations being incorporated into the final report.

Roadmap Objectives

- [Objective No. 5: Linking Planetary Biological Evolution](#)
- [Objective No. 7: Extremes of Life](#)
- [Objective No. 9: Life's Precursors Habitats](#)
- [Objective No. 11: Origin of Habitable Planets](#)
- [Objective No. 12: Effects of Climate Geology on Habitability](#)

Mission Involvement

Mission Class*	Mission Name (for class 1 or 2) OR Concept (for class 3)	Type of Involvement**
2	Europa orbiter under study	Science definition
1	Galileo	Science team membership; data analysis
3	Europa lander concept stage	Science definition

* Mission Class: Select 1 of 3 Mission Class types below to classify your project:

1. Now flying OR Funded & in development (e.g., Mars Odyssey, MER 2003, Kepler)
2. Named mission under study / in development, but not yet funded (e.g., TPF, Mars Lander 2009)
3. Long-lead future mission / societal issues (e.g., far-future Mars or Europa, biomarkers, life definition)

** Type of Involvement = Role / Relationship with Mission

Specify one (or more) of the following: PI, Co-I, Science Team member, planning support, data analysis, background research, instrument/payload development, research or analysis techniques, other (specify).

The Europa Focus Group has discussed the science goals, objectives, and investigations for future missions to Europa. With the cancellation of the Europa Orbiter project earlier this year, there is an opportunity to revisit the overall exploration strategy. In part, the plans for Solar System exploration, including Europa, will be guided by the "Decadal Survey" being conducted by the National Research Council; its report, along with recommendations, will be released later this year. Three members of the EFG are on the NRC panel (two on the steering group, one on the large-satellites panel). Results from the

EFG discussions for the science strategy for Europa have been input to the NRC panel as part of the community involvement in planning for future exploration.