



## Office of Space Science

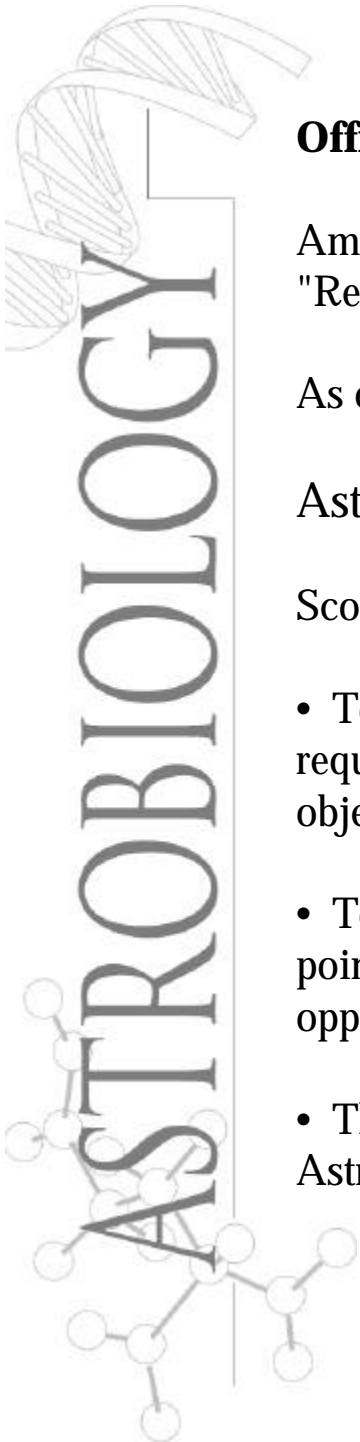
Amendment to NASA Research Announcement (NRA) 00-OSS-01,  
"Research Opportunities in Space Science (ROSS) - 2000"

As of October 18, 2000

Astrobiology Science and Technology Instrument Development (ASTID)

Scope of Program

- To develop instrumentation capabilities that will help meet Astrobiology science requirements on future space flight missions, as well as unique Astrobiology science objectives on Earth
- To advance the development of scientific instruments or instrument components to the point where the instruments could be credibly proposed in response to future flight opportunity announcements
- The development of laboratory instruments designed to significantly advance Astrobiology science will also be considered.





## Scientific goals and objectives for Astrobiology

- "How does life begin and evolve?"
- "Does life exist elsewhere in the Universe?"

### Specific objectives that could be addressed by new spacecraft instrumentation:

- To determine whether the atmosphere of the early Earth, hydrothermal systems, or exogenous matter were significant sources of organic matter;
- To search for evidence of ancient climates, extinct life, and potential habitats for extant life on Mars; and
- To determine the presence of chemical precursors and potential habitats for life in the outer Solar System.

Major targets of Astrobiology interest include Mars, Europa, Titan, comets, Space Station, and Earth

### Support can be provided for

- Long lead-time definition studies
- Innovative approaches that may provide entirely new classes of instruments
- Development of new enabling technologies for missions further in the future, and/or for development studies that may advance the technology for a wide range of instrumentation applications
- NASA also recognizes that some approaches may require field testing to improve instrument utility and robustness.





## **ASTID Goals for Flight Instruments and Technologies**

- Successful instruments will have to operate in environments characterized by extremes of temperatures, pressures, dormant periods while in transit to other worlds, gravity, high-g landing impacts, vibration, and/or high radiation
- Sensors already exist that range from fingernail to matchbook sizes, and a wide array of miniaturized chemical laboratories exist that can fit on a compact disk; however, relatively few are ready to be proposed successfully for space flight.

Proposals in all areas relevant to Astrobiology goals and objectives will be considered for the ASTID program, although a particular need in the following areas is recognized:

- The handling of samples collected for Astrobiological objectives
- In situ detection of possible biomarkers such as isotopic and organic measurements, and
- Development of novel access technologies such as drilling into rock or deep drilling into the subsurface—bedrock, soil, or ice.





**ASTID proposals are sought at three general levels:**

- (i) feasibility study and instrument definition (i.e., proof of concept),
- (ii) instrument development and definition (i.e., the bread board stage), and
- (iii) development of instruments to the point where they may be proposed in response to future announcements of flight opportunities (the brass board stage).

- Proposals to define or develop one or more instrument components, rather than whole instruments, are allowed, particularly for immature or very complex new instruments. However, at least one or more likely scenarios for possible follow-on instrument development activities must be described in the case of component-only proposals.

- Scientific objectives of proposed instruments or components must be discussed in the proposal, and proposers are encouraged to relate their proposals as closely as possible to future missions of interest to the Astrobiology Program and demonstrate how their technology addresses their goals and objectives.





## Examples of Future Missions

Comet Missions

Mars Surveyor Missions

Outer Solar System Missions

- Possible missions to Europa include the Europa Orbiter, Europa Lander, Europa Ocean Observer, and Europa Lander Network.
- Instrument development proposals for the Europa Ocean Observer and Europa Landers are appropriate under this ASTID program element, for example:
  - miniaturized in situ robotics and other instruments for icy bodies, including chemical and exobiological analyses;
  - sample targeting, acquisition, and handling, including sampling of the dark (linea, etc.) surface features;
  - orbital flight instruments to determine the inventory of organic compounds and biogenic elements on Europa's surface; and
  - for the Europa Ocean Observer, which might include a penetrator for melting through the ice to reach the purported subsurface ocean, a "hydrobot" that could then be released to explore the ocean in search of biomarkers as possible evidence of life, characterization of the water column, and subsurface sediments.





## **Availability and Size of Awards:**

- Up to \$6M may be available for support of selections for the ASTID program.
- Awards are expected to range from \$30,000 to \$300,000 per year
- Submission of Proposal -

Due date by close of business: January 19, 2001

## **Contact for further information:**

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