A.2 ASTROPHYSICS DATA ANALYSIS

1. Scope of Program

This NRA solicits proposals to the Astrophysics Data Program (ADP) for research involving NASA space astrophysics data that are currently archived in the public domain. Abstracts of currently funded ADP projects can be found online at http://spacescience.nasa.gov/ (select "Research Solicitations," then "Past/Archive Solicitations and Selections").

There are two defined types of proposals that may be submitted to this program: Type 1 and Type 2. All proposals will compete together in the same science panels regardless of Type. The period of performance for Type 1 and Type 2 proposals is up to three years.

- *Type1: Proposals for the Analysis of Archival Data*

Type 1 proposals are defined as those whose dominant emphasis is the analysis and interpretation of NASA space astrophysics data that are archived in the public domain at the time of proposal submission. Most of these data have undergone considerable reduction and refinement by way of calibrations and ordering, and extensive data analysis software tools often exist for these data. The following space astrophysics missions are a representative, but not complete, alphabetical list of missions that have such mature data archives (note that, for the purpose of this program, the 2MASS data archive is considered NASA space astrophysics data):

- Advanced Satellite for Cosmology and Astrophysics (ASCA)
- Astro Shuttle Experiments [the Hopkins Ultraviolet Telescope (HUT), the Wisconsin Ultraviolet Photopolarimetry Experiment (WUPPE), the Ultraviolet Imaging Telescope (UIT), and the Broad-Band X-Ray Telescope (BBXRT)]
- Beppo Satellite di Astronomia X (BeppoSAX)
- Compton Gamma-Ray Observatory (CGRO)
- Cosmic Background Explorer (COBE)
- European X-Ray Astronomy Satellite (EXOSAT)
- Extreme Ultraviolet Explorer (EUVE)
- Far Ultraviolet Spectroscopic Explorer (FUSE)
- Ginga
- High Energy Astronomy Observatories (HEAO-1, 2, and 3)
- High Energy Transient Explorer 2 (HETE-2)
- Infrared Astronomical Satellite (IRAS)
- Infrared Space Observatory (ISO)
- International Ultraviolet Explorer (IUE)
- Midcourse Space Experiment (MSX)
- ORFEUS-SPAS I and II
- Roentgen Satellite (ROSAT)
- Rossi X-ray Timing Explorer (RXTE)

- Ramaty High Energy Solar Spectroscopic Imager (RHESSI) [limited to analysis of X-ray and γ-ray emission NOT from the Sun or Solar System objects.]
- Two Micron All Sky Survey (2MASS)
- Submillimeter Wave Astronomical Satellite (SWAS)
- Ulysses (Galactic Cosmic Ray and Gamma Ray data)
- Voyager Ultraviolet Spectrometer (UVS)
- X-ray Multi-Mirror-Newton (XMM-Newton)
- Swift (non-GRB science only; see Section A.7 of this NRA).

Most NASA space astrophysics data may be found in one or more of the NASA astrophysics data centers. NASA astrophysics data centers include:

- Astrophysics Data System (ADS) (http://adswww.harvard.edu/)
- High Energy Astrophysics Science and Analysis Data Center (HEASARC) (http://heasarc.gsfc.nasa.gov/)
- Infrared Science Archive (IRSA) (http://irsa.ipac.caltech.edu/
- Multimission Archive at Space Telescope (MAST) (http://archive.stsci.edu/
- NASA/IPAC Extragalactic Database (NED) (http://nedwww.ipac.caltech.edu/
- Legacy Archive for Microwave Background Data Analysis (LAMBDA) (http://cmbdata.gsfc.nasa.gov/

Note that proposals for archival research exclusively using data from the Hubble Space Telescope (HST) and/or the Chandra X-Ray Observatory (CXO) are solicited through separate announcements and should not be submitted in response to this solicitation.

• *Type 2: Proposals for the Analysis of Archival Data Requiring the Development of Information Technology Tools*

Type 2 proposals are those for the analysis of archival data that require the development of new Information Technology (IT) tools that hold the promise of use and application by other researchers. The primary emphasis of a proposal of this type must be a science investigation requiring the analysis and interpretation of substantial NASA space astrophysics data that are archived in the public domain at the time of proposal submission. Proposals of this type must require the development of a new data analysis, data mining, data archiving, or other IT tool that can be applied more generally than the proposed science investigation. Proposals of this type that make use of data archives from more than one of the NASA astrophysics data centers (see above) are especially encouraged. Proposals to develop tools that substantially duplicate existing tools are not solicited.

Proposals of this type are required, as part of the funded activity, to make the developed IT tool publicly available through a NASA astrophysics data center (see list above). Therefore, selected investigators are expected to work directly with an appropriate NASA data center in developing, using, and archiving their IT tools, as well as any high-order data products that are developed in the course of the science investigation. The proposal must describe the plan for archiving the new IT tool.

General Requirements

In support of either of these two types of ADP proposals, but as a secondary emphasis and only as needed to interpret the data, the proposed research may include theoretical research or numerical modeling, use of existing data from ground-based or suborbital observations, and/or laboratory astrophysics measurements. In addition, NASA will consider requests for support for new ground-based observations provided that the requests are clearly described, the observations are important to the success of the proposed ADP effort, and their expense (including salary, travel, etc.) constitutes no more than ten percent of the proposal's total budget.

Proposers to this NRA should note that the ADP is not intended to support:

- Investigations whose primary emphasis is theoretical research, numerical modeling, laboratory astrophysics measurements, or detector development, since there exist other NASA programs that support these research activities;
- Investigations whose primary focus is on solar system objects or on the solar-terrestrial interaction, since other NASA programs support this kind of research;
- Proposals primarily for the education and training of students (this does *not* mean graduate students doing research);
- Proposals for the organizing and/or hosting of scientific meetings; or
- Proposals for the acquisition of substantial computing facilities or resources beyond nominal workstation or network requests.

Prospective submitters should also be aware that considerable research has already been done using these archival data sets by the original mission science teams, as well as by previously selected participants in the ADP. Therefore, proposals must demonstrate how the proposed research clearly extends the frontier of existing knowledge in a fundamental and important manner rather than merely repeating a type of analysis on heretofore unstudied objects of some class or type. If a new proposal for this program element is itself based on a previously funded research effort, the proposal must identify that work and clearly summarize all significant results from it.

Proposals are judged on three criteria: Scientific merit of the proposed work, cost realism, and relevance of the proposed work to NASA missions and science goals. To enable the NASA Office of Space Science to properly evaluate the relevance of proposals submitted to its programs, as well as track its progress towards achieving its goals as mandated by the Government Performance Review Act (GPRA), it is mandatory that all research supported by NASA's programs demonstrate its relationship to NASA Goals and Research Focus Areas (RFAs) as stated in the latest version of its Agency and/or OSS Strategic Plans (follow links from the Web site http://spacescience.nasa.gov/); see also the discussion in Section I of the *Summary of Solicitation* of this NRA. Therefore, all proposers must explain the relevance of their proposed work not only with expository text in the main body of their proposal, but also in terms of the Goals, Science Objectives, and RFAs given in Table 1 found in the *Summary of Solicitation* of this NRA.

In particular, this program element is designed to help fulfill any of the RFAs for all of the Science Objectives for Goal II of both the science theme "Astronomical Search for Origins" and "Structure and Evolution of the Universe." The appropriate place for this latter statement of relevancy is in the introduction to the proposal's "Scientific/Technical/Management" section (see Section 2.3.5 in the *Guidebook for Proposers*). The index numbers in this table may be used to identify a specific RFA, for example, "Goal I, Sun-Earth Connection Theme, RFA 1(c)" or "Goal II, Astronomical Search for Origins, RFA 3(b)."

2. Proposal Type, Data Sets, and Research Area

Each ADP proposal must be identified as Type 1 or Type 2 by checking the appropriate box on the *Cover Page* (see the *NASA Guidebook for Proposers*). For all Types of proposals, the *Cover Page* also provides for designation of the data sets proposed for analysis and also of the Research Area, as defined below, that designates the primary focus of the proposal. Identification of the appropriate Research Area facilitates the assignment of each proposal, regardless of Type, to the appropriate review panel. Note that each proposal, regardless of Type, must identify one primary Research Area (a secondary Research Area may be designated, if necessary). In any case, NASA reserves the right to reassign a proposal to a different primary or secondary Research Area. The nine defined Research Areas are:

1. *Solar System, including the Sun* (Note: proposals whose primary focus is solar system research using the IRAS Asteroid and Comet Survey or Voyager data should be submitted to other NRAs or other program elements in this NRA that are relevant to those objectives; for ADP the only acceptable solar observations are those of high-energy spectral and temporal studies of solar flares utilizing CGRO data);
2. *Star Formation and Pre-Main Sequence Stars* (including star-forming clouds, protoplanetary and debris disks, protostars, and T Tauri stars);
3. *Main Sequence Stars*;
4. *Post-Main Sequence Stars and Collapsed Objects* (including giants, isolated white dwarfs, isolated neutron stars, central stars of planetary nebulae, and gamma-ray bursts);
5. *Binary Systems* (including cataclysmic variables, x-ray binaries, and black hole binaries);
6. *Interstellar Medium and Galactic Structure* (including supernova remnants, dark clouds, interstellar dust, H II regions, diffuse galactic emission, and planetary nebulae);
7. *Normal Galaxies*;
8. *Active Galaxies and Quasars* (including interacting galaxies, starburst galaxies, Seyfert galaxies, radio galaxies, AGNs, and quasars); and
9. *Large Scale Cosmic Structures* (including clusters of galaxies, galaxy environment and evolution, intracluster medium, diffuse x-ray background, and cosmology);

3. Programmatic Information

It is anticipated that approximately $2.0M will be available through this Announcement for the funding of new awards for the Astrophysics Data Program to fund proposals of a maximum of three years duration. The average level of support per year is expected to be in the range of $60K.

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement – 2004* (or *NASA Guidebook for Proposers* for short) that is accessible by opening URL http://research.hq.nasa.gov, and linking through the menu item "Helpful References," or may be directly accessed online at URL http://www.hq.nasa.gov/office/procurement/nraguidebook/. This NRA's Summary of Solicitation also contains the schedule and instructions for the electronic submission of a *Notice of Intent* (NOI) to propose and a proposal's *Cover Page/Proposal Summary*, which now also includes the required *Budget Summary*, and the mailing address for the submission of a proposal.

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