

ADAPTIVE OPTICS DEVELOPMENT PROGRAM (AODP)

FY04 Program Announcement and Proposal Solicitation



Synopsis of FY04 Program

In this FY04 program announcement, the AODP solicits proposals in the area of AO system concept development, especially for Extremely Large Telescopes (ELTs) such as the Giant Segmented Mirror Telescope (GSMT). See full text of this announcement below for more information.

Due Date for Letters of Intent (Required)

August 2, 2004: Letters of Intent (required) are due by August 2, 2004.

Deadline for Full Proposals

November 5, 2004: Full proposals must be received by 5:00 P.M. (proposer's local time)
November 5, 2004

Electronic Submission Required

Full proposals must be submitted electronically in a single .pdf file to syspo@noao.edu or to the secure ftp site described below. Length of proposal narrative (excluding budget pages) may not exceed 30 pages.

Additional Required Documents

The standard NSF Cover/Certification page and NSF budget forms are required. Samples are attached to this solicitation. Electronic templates are available from the NOAO System Project Office.

Program Contacts

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Contracts.....	Andy Commissaris, NOAO, e-mail: andyc@noao.edu
System Project Office	http://www.noao.edu/system/ E-mail: syspo@noao.edu
AODP Web Site.....	http://www.noao.edu/system/aodp/
FAQ	http://www.noao.edu/system/aodp/aodp_faq.html

Eligibility Information

With the exception of NOAO, the AODP is open to all U.S. institutions/organizations with the capability to undertake research and development in adaptive optics.

Award Information

Subject to the availability of funding, it is expected that the FY04 program will be able to fund one to two substantial multi-year programs similar in scale to those funded in the 2003 program. (For FY03 awards, see <http://www.noao.edu/system/aodp/03awards.pdf>)

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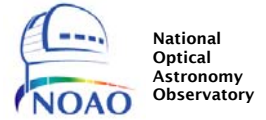


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I. PROGRAM BACKGROUND

In the National Research Council's 2000 decadal survey report, *Astronomy and Astrophysics in the New Millennium*, the panel on Optical and Infrared Astronomy from the Ground recommended that an adaptive optics development program be undertaken in conjunction with the development of a Giant Segmented Mirror Telescope (GSMT)—the highest-priority initiative for ground-based astronomy in the coming decade—with funding on the order of \$5M per year for ten years. The panel noted that Adaptive Optics (AO) development work will also enhance dramatically the power of existing large telescopes. In a subsequent position paper on adaptive optics, the AURA Coordinating Council of Observatory Research Directors (ACCORD) unanimously endorsed the view that implementation of reliable, high performance AO systems is of critical importance to the future of U.S. ground-based astronomy. In particular, ACCORD supported the community-based white paper, “A Road Map for the Development of Astronomical Adaptive Optics.” (See <http://www.noao.edu/dir/ao/> and a recent update arising from a meeting in Tucson earlier this year at http://www.noao.edu/system/aodp/04road_map.pdf). The challenge now is to achieve the technical goals set out in that road map.

The AO Imperative

Adaptive optics on large ground-based telescopes will revolutionize infrared and optical astronomy. Originally proposed and developed in the U.S., AO will permit diffraction-limited imaging on ground-based telescopes using state-of-the-art electro-optical technology to correct the wavefront distortion and hence image blurring caused by the Earth's atmosphere. Since in many applications the effectiveness of a telescope is proportional both to its collecting area and the inverse square image size, adaptive optics on large aperture telescopes offers enormous gains in capability. Furthermore, these gains can be achieved at costs that are relatively modest compared to the investment (more than \$500 mil.) already made in the current generation of 6-12-m class telescopes. Major efforts in AO are well underway in Europe, with strong governmental financial support. If U.S. astronomy is to maintain its competitive position, it is essential that a program be put in place to exploit the potential of AO.

Current Status of AO Development

While the basic concept of AO correction has been understood for decades, it is only relatively recently that practical implementations have become possible. Astronomical results published over the last several years have demonstrated the enormous potential of AO systems. As a consequence, AO systems are now considered essential to achieving the full potential of both current generation telescopes and future Extremely Large Telescopes (ELTs). To realize the full potential of AO in the future requires an investment in both advanced components (e.g., lasers; deformable mirrors, sophisticated simulations) and new systems concepts. The need now is for about a five-year period of second-generation AO component and system development, followed by a roughly five-year period of implementation of robust AO systems, at least at the major U.S. optical/infrared astronomical observatories. The goal of the NSF-sponsored Adaptive Optics Development Program (AODP), now in its second year, is to provide the funding for sustained efforts in these areas.

II. PROGRAM DESCRIPTION

Categories of AODP Funding

Two categories of proposal funding are anticipated for the AODP: (1) development proposals and (2) implementation proposals. (NB: Implementation proposals are *not* being solicited at this time.)

- **Development proposals** are proposals for the development of AO system concepts and associated critical ELT technologies. Examples include:
 - Ground Layer Adaptive Optics (GLAO): e.g., atmospheric measurements
 - Multi Conjugate AO: e.g., tomography, low-order natural guide star (NGS) wavefront sensing (WFS)
 - Multi-object Adaptive Optics (MoAO): e.g., open loop tomography, low-order NGS WFS, hi-actuator count MEMS
 - Laser Tomography Adaptive Optics (LTAO)
 - Extreme Adaptive Optics (ExAO): e.g., WFS, coronagraphs/nullers (for segmented-pupil ELTs, moderately to massively segmented), hi-actuator count MEMS
 - Optically powered deformable mirrors: e.g., deformable secondary mirrors
 - Alternative wavefront analyzers: e.g., pyramid, interferometric
 - Mid-infrared adaptive optics

Development proposals must have clear staffing and budgeting profiles, as well as explicit schedules for development of the proposed technology. A well-defined management plan with explicit milestones is essential. Multi-year proposals should be divided into (1) a concept and design phase, and (2) a development and test phase. Staffing and budgeting profiles for the two phases should be distinct. Proposals should contain full costs for both phases, and sources of uncertainty or needs for contingency should be clearly explained. Proposals should also contain a science justification explaining how the proposed development fits into the overall context of the adaptive optics road map developed by the U.S. astronomical community. Proposals may reference scientific priorities and needs as stated in various community studies or workshops. (See, for example, the community-based Adaptive Optics Road Map, recently updated at: <http://www.noao.edu/system/aodp/>)

- **Implementation proposals** are proposals for implementation of AO systems on existing large telescopes. Proposals for AO implementation will be required to provide community observing time equivalent in value to 50% of the NSF-funded cost of the improvements. Though implementation proposals are not being solicited for the FY04 AODP, *AO implementation proposals for existing large telescopes may be considered by the NSF-sponsored Telescope System Instrumentation Program*. (See <http://www.noao.edu/system/tsip/> for the TSIP program.)

Community Benefit from AODP Awards

Because the AODP will achieve maximum impact when AO is implemented on large telescopes, implementation will be of benefit principally to the operators/users of such large systems. In order that the community as a whole can derive benefit from the proposed AODP investment, the following requirements have been adopted:

- AODP development awards will require the recipient(s) to provide detailed technical reports on the results achieved; these will be made available to the entire U.S. community.

- Development studies should be verified (a) in the laboratory or (b) if necessary, on the sky, either through prototype examples or otherwise.

Focus of FY04 Funding

The current solicitation seeks proposals primarily in the area of AO system concept development. Funding will be awarded on the basis of technical promise, with a goal of demonstrating the viability of technical and systems approaches that offer significant advances in performance, robustness, and cost-effectiveness—primarily for extremely large telescopes (ELTS; $d \geq 20$ m) such as the Giant Segmented Mirror Telescope (GSMT). Awards will also be made for concept validation by laboratory and on-telescope testing of critical ELT technologies, and for small/low-cost and/or risky developments with potential high leverage.

Duration of Proposed Funding

AODP proposals may request funding for up to five years of effort. The standard NSF budget form (attached) must be submitted for each year of funding requested, as well as a cumulative budget form for multi-year proposals. See below under “Required Sections and Page Limits for Full Proposals”

Funding is provided in advance, contingent on satisfactory progress as determined by an annual external progress review which is coordinated by NOAO and approved by NSF.

Estimated FY04 Funding Level

Subject to the availability of funding, it is expected that the FY04 program will be able to fund one to two substantial multi-year programs similar in scale to those funded in the 2003 program. (For FY03 awards, see <http://www.noao.edu/system/aodp/03awards.pdf>.) For 2003 and 2004, the AODP funding level has been nearly \$2.9M per year, and in 2003, the funded projects fell in the range \$165K to \$740K per year, with durations from one to five years

Successful AODP awards are fixed price agreements with proposing institutions that are administered as sub-awards from NOAO. Projects are funded in advance, typically on an annual basis, subject to satisfactory progress reviews and availability of funds.

Program Administration

The AODP is administered by the System Project Office (<http://www.noao.edu/system/>) of the National Optical Astronomy Observatory (NOAO) on behalf of the NSF Division of Astronomical Sciences (<http://www.nsf.gov/mps/divisions/ast/start.htm>). NOAO’s role is limited to soliciting and processing proposals; organizing, coordinating, and providing support for the external review meetings, and—subject to final NSF approval—announcing awards, negotiating and executing agreements with sub-awardees, disbursing funds, and monitoring the progress of awarded projects. To eliminate conflicts of interest, NOAO staff are not eligible for funds under the AODP and are excluded from proposal reviews. (This does not preclude university groups which are in partnership with NOAO from proposing and receiving AODP awards, but NOAO may not be a party to such proposals.)

Eligibility Information

With the exception of NOAO, the AODP is open to any U.S. institution/organization with the capability to undertake research and development in adaptive optics.

III. PROPOSAL PREPARATION AND SUBMISSION REQUIREMENTS

Letters of Intent (Required)

Letters of Intent to propose to the AODP are required. Letters of Intent may be submitted in electronic version, paper copy, or both. Acceptable formats for the electronic versions are plain ASCII text, MS Word, Adobe PDF, or Postscript formats. Letters of Intent will be acknowledged within 12 hours of receipt. If submitted electronically, send by e-mail or e-mail attachment to syspo@noao.edu. If submitted by mail, Letters of Intent should be sent to:

Adaptive Optics Development Program
National Optical Astronomy Observatory
P.O. Box 26732 — 950 North Cherry Avenue
Tucson, AZ 85726-6732

➤ **The due date for Letters of Intent is August 2, 2004.**

Content of Letters of Intent

The purpose of obtaining Letters of Intent is to assist in assembling a peer review panel with no conflicts of interest and with expertise appropriate to the anticipated proposals.

Letters of Intent should include (a) names, institutions, and e-mail contacts for the PI and Co-Is, (b) general description of the planned AO technology development, including associated laboratory or telescope testing, if applicable, (c) anticipated duration of funding, (d) estimated total funding to be requested in the proposal.

Questions about proposals, content, administration, and awards should be sent electronically to the System Project Office at syspo@noao.edu. All questions will be given immediate attention; collected questions and answers (excluding confidential or proprietary content) deemed useful to other proposers will be posted on the AODP FAQ Web page:
http://www.noao.edu/system/aodp/aodp_faq.html

Full Proposals (Electronic Submission Required)

Full proposals must be submitted electronically as a single .pdf file that contains all required sections, including the standard NSF budget page(s) and the Cover and Certification page.

There are two ways to submit AODP proposals electronically: (1) the electronic file can be sent as a .pdf attachment to syspo@noao.edu or (2) the electronic file can be posted to a secure ftp site to be created for AODP proposals. (The latter option is needed only if the proposal file is too big to be sent as an e-mail attachment.) In either case, proposals must be received by 5:00 P.M. (proposer's local time) on the date due.

Acceptable file formats for AODP proposals are Adobe PDF or PostScript. The NSF-style budget pages, for which EXCEL templates will be provided to all proposers, should also be submitted as .pdf files, *one budget page for each year of requested funding*, plus a cumulative budget page showing total funding requested (for multi-year proposals). Proposals will be individually acknowledged within 12 hours of receipt.

➤ **The deadline for full proposals is 5:00 P.M. (proposer's local time), November 5, 2004.**

Required Sections and Page Limits for Full Proposals

Cover and Certification Page

The standard NSF Cover/Certification page should be attached as the first page of each proposal. A sample Cover/Certification page is included in this Proposal Solicitation. WORD versions of the Cover/Certification page are also available from the System Project Office (syspo@noao.edu).

Signed copies of the Cover/Certification page must be received by mail (or by fax to 520-318-8170) by the System Project Office within five days of proposal submission.

Proposal Narrative

The proposal narrative must contain four sections: (1) Science, (2) Technical, (3) Management, and (4) Budget. The length of the entire proposal without the Budget section may not exceed 30 pages. There are no page limitations on the Budget section.

(1) The **Science** section describes the scientific capability that the proposed development provides or enables. It may refer to scientific motivations for particular capabilities derived from community meetings or other topical workshops (e.g., the community-based Adaptive Optics Road Map; see: <http://www.noao.edu/dir/ao/>)

(2) The **Technical** section must describe the technical approach that will be used in order to provide the proposed capability. The intent of this section should be to convince the review committee that the technical approach is viable and that the proposing team has the resources and expertise to carry it out. This section should include an overview of the AO development, including optics, mechanical design, electronics, and software. It should present a discussion of the technical issues or concerns, and strategies for addressing them. It should also describe the flow down from scientific goals to functional performance requirements, and should provide evidence that the proposed development will satisfy these requirements.

(3) The **Management** section must describe the management approach to be used on the proposed project, including:

- Overall project structure and organization, including an organization chart
- Project risks and key challenges and strategies for addressing them
- Procedures and process to be used to manage the project, including:
 - Procedures to assign tasks and to control project personnel
 - Metrics to monitor and assess progress
 - Procedures and tools to plan and organize the project work
 - Plant and equipment
 - Personnel or subcontractors
 - Dependencies among aspects of development, design, or fabrication
 - Project management documentation to be generated
- A Work Breakdown Structure (WBS), including a schedule derived from the WBS, with an explicit timeline of major tasks, resource loading, task durations, and task costs built up to the overall project cost
- Dates of planned meetings and reviews and other critical milestones
- Quality assessment and control

- Proposed mechanisms to facilitate NOAO oversight activities (see section below on Award Administration and Program Oversight)

(4) The **Budget** section will give the total cost of the project, including an annual payment schedule or funding profile for the funds requested from AODP. The payment schedule should be justified on the basis of the Work Breakdown Structure and planned commitments for large capital items. The budget should explicitly identify payroll, benefits, non-payroll, and agency-agreed overhead costs as they would be defined in a proposal to NSF.

Annual summary budgets and a cumulative budget page (for multi-year proposals) must be submitted using the formats and categories found in the standard NSF budgets specified in the NSF Grant Proposal Guide (See: <http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg>) Samples of the NSF budget pages are attached to this Proposal Solicitation, and EXCEL templates are available from the NOAO System Project Office at syspo@noao.edu.

Formatting Guidelines for Full Proposals

- **Page Limits:** Excluding the Budget section, the proposal narrative should not exceed 30 pages. There is no limit on the number of pages for the Budget section.
- **Margins and Spacing:** Proposals should be single or double-spaced and formatted with margins of *at least* 1.0 inch (2.5 cm) at the top, bottom, right, and left sides of the page. Type size may not be smaller than 10 point, and tables and charts (especially Gantt charts) should be clear and easily legible in .pdf form. Proposers are urged to proofread the .pdf versions of their proposals before submission to check the legibility of tables, charts, and budget pages.
- **Budget Forms:** The standard NSF budget page (sample attached) is required. Each proposal must include a single budget page in this format for each year of support requested, as well as a cumulative budget page (for multi-year proposals only) showing the total funding requested over the full term of proposed support. Explicit definitions of the budget categories required in the NSF budget form can be found in the NSF Grant Proposal Guide, section II.C.g: “Proposal Contents–Budget,” <http://www.nsf.gov/pubs/2003/nsf032/start.htm>

The budget form(s) must be submitted as single-page .pdf documents that are integrated into the main proposal file. Budgets should not be submitted as separate EXCEL files or as EXCEL worksheets/workbooks.

- **Size of Submitted Electronic Files.** Proposers are urged to compress images, pictures, and other graphics such that the size of the .pdf file can be successfully mailed electronically to the syspo@noao.edu address. All submissions will be acknowledged by the System Project Office within 12 hours of receipt; if your submission is not acknowledged, it is very likely that the file was too big to be transmitted successfully.

For files too large to be successfully transmitted as attachments to syspo@noao.edu, a secure ftp site to which the file can be uploaded will be established.

Questions About Proposal Preparation

Scientific and technical questions on proposal preparation should be documented and sent to the System Project Office at syspo@noao.edu. All questions will be given immediate attention; those judged of interest to other proposers (excluding all proprietary or confidential information) will be published on the AODP FAQ page: see, for example: http://www.noao.edu/system/aodp/aodp_faq.html

Purely administrative questions can be addressed to the AODP administrative manager at (520) 318-8124 (diane@noao.edu)

AODP Program Contacts

Science/Technical	Stephen T. Ridgway, NOAO, e-mail: ridgway@noao.edu or syspo@noao.edu
Administration.....	Diane Brouillette, NOAO, e-mail: diane@noao.edu or syspo@noao.edu
Contracts	Andy Commissaris, NOAO, e-mail: andyc@noao.edu
System Project Office	http://www.noao.edu/system/ E-mail: syspo@noao.edu
AODP Web Site	http://www.noao.edu/system/aodp/
FAQ	http://www.noao.edu/system/aodp/aodp_faq.html

IV. PROPOSAL REVIEW

Review Criteria

Review, ranking, and recommendations on funding for AODP proposals are carried out by an external peer review panel assembled by NOAO and pre-approved by NSF. (NOAO staff are excluded from membership on the review panel.) The review meeting typically takes place within three weeks following the receipt of proposals. Review comments will be returned to all proposers following the review panel meeting. The merit review criteria for AODP proposals are the same as for all proposals submitted to NSF, i.e.,

➤ **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

➤ **What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

For representative examples of the NSF “Broader Impacts” merit review criterion, see: <http://www.nsf.gov/pubs/2003/nsf032/bicexamples.pdf>

➤ **Additional review criteria specific to AODP proposals:**

- Likelihood that the proposed work will advance AO technology towards milestones identified in the AO road map: <http://www.noao.edu/system/aodp/roadmap.html>
- Overall quality of the management and technical plans for accomplishing the goals
- Broader impacts of the proposed effort on, for example, the improvement of infrastructure for education through involvement of students in the proposed efforts, or the improvement of research infrastructure through the training of graduate students.

Based on the review panel rankings, recommendations, and available funding, NOAO will request formal NSF approval of the successful proposal(s).

V. AWARD ADMINISTRATION AND OVERSIGHT

Following NSF approval of the AODP sub-awards, the NOAO Contracts office will negotiate contracts with the selected proposers. Each contract will include the following elements:

- Description of the adaptive optics development
- Timeline, including milestones and payments
- Management plan
- Reporting and review schedule

NOAO's role is to provide ongoing oversight of the progress of awarded projects. Listed below are some examples of project oversight activities in which NOAO is typically involved. NOAO makes every effort to accommodate its oversight process to the awardee's project management schedules, formal reviews, and periodic reporting mechanisms already in place.

1. Approval of Management Plan

The Technical Project Manager of the NOAO System Project Office will review and approve the management plan for the work. This is to ensure that sufficient project management is being provided by the proposing institution, that sufficient resources are identified to carry out the work, and that the budget and schedule are credible. An acceptable management plan is required before a sub-award can be recommended to NSF for approval.

2. Regular Periodic Reports

During the course of the awarded program, the PI or Project Manager will be required to submit monthly reports to keep the NOAO System Project Office informed of progress and problems. These reports will summarize work completed, equipment or parts purchased, issues identified, and progress relative to the accepted management plan. All reports and review results will be publicly available on the NOAO System Web site.

3. Semi-annual Reviews for Development Projects

It is expected that development projects will have formal management and will include regular reviews, typically every three months. These will be attended by the Adaptive Optics Development Program Technical Manager and any associated technical personnel who might provide needed expertise. The review documentation and response to the review will be publicly available.

4. Annual Project Status Reports

At each annual meeting of AODP external review panel, the reviewers evaluate the progress of ongoing (previously-funded) AODP projects, in addition to reviewing new proposals. These annual reports, which are usually submitted to the AODP Office by the due date for new proposals, should describe work completed in the past year, work planned for the next year, progress relative to the original proposal, and problems encountered.



ADAPTIVE OPTICS DEVELOPMENT PROGRAM (AODP)
Proposal Cover and Certification Sheet

➤ **Attach this document as the cover page of your proposal**

Title of Proposed Project		
Requested Funding Amount (\$)	Proposed Duration (in Months)	Requested Starting Date
Name of Principal Investigator/Project Director		PI/PD Electronic Mail Address
PI/PD Institution		PI/PD Telephone Number
Address of Awardee Institution/Organization		
Signature of Principal Investigator		Date
Name of Co-Principal Investigator/Project Director		Co-PI/PD Electronic Mail Address
Co-PI/PD Institution		Co-PI/PD Telephone Number
Signature of Co-PI/PD		Date

Certification for Authorized Institutional Representative

By signing this certification and submitting this proposal, the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with AURA award terms and conditions if an award is made as a result of this proposal application. Further, the applicant is hereby providing certification regarding debarment and suspension and lobbying activities, as set forth in the National Science Foundation Grant Proposal Guide (GPG). Willful provision of false information in this proposal application and its supporting documents, or in reports required under an ensuing award is a criminal offense (U.S. code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with National Science Foundation Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to AURA.

Name/Title of Authorized Institutional Representative	Signature	Date
Telephone Number	Electronic Mail Address	Fax Number
Name and Address of Authorizing Institution		

➤ **Please mail or fax a signed hard copy of this document:**

The AODP Program at NOAO
 National Optical Astronomy Observatory
 POB 26732 – 950 N. Cherry Ave.
 Tucson, AZ 85726-6732 Fax (520) 318-8170

Adaptive Optics Development Program - Budget Forms
Use 1 Form for Each Year of Requested Funding

YEAR **1**

FOR NOAO USE ONLY

ORGANIZATION Your Organization Name Here				PROPOSAL NO.		DURATION (IN MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR PI Name Here				AWARD NO.		Proposed	Granted
A. SENIOR PERSONNEL: PI/PD, Co-PI'S, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NOAO Funded Person-Months			Funds Requested By Proposer
0.	First Name	M	Last Name	Title	CAL	ACAD	SUMR
1.					0.00	0.00	0.00
2.					0.00	0.00	0.00
3.					0.00	0.00	0.00
4.					0.00	0.00	0.00
5.					0.00	0.00	0.00
6.					0.00	0.00	0.00
(0) TOTAL SENIOR PERSONNEL (1-6)							\$0
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1.	() POST DOCTORAL ASSOCIATES				0.00	0.00	0.00
2.	() OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3.	() GRADUATE STUDENTS						\$0
4.	() UNDERGRADUATE STUDENTS						\$0
5.	() SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						\$0
6.	() OTHER						\$0
TOTAL SALARIES AND WAGES (A+B)							\$0
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)							\$0
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000)							
							\$0
TOTAL EQUIPMENT							\$0
E. TRAVEL							
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							\$0
2. FOREIGN							\$0
F. PARTICIPANT SUPPORT COSTS							
1.	STIPENDS						\$0
2.	TRAVEL						\$0
3.	SUBSISTENCE						\$0
4.	OTHER						\$0
(0) TOTAL NUMBER OF PARTICIPANTS							\$0
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							\$0
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							\$0
3. CONSULTANT SERVICES							\$0
4. COMPUTERS SERVICES							\$0
5. SUBAWARDS							\$0
6. OTHER							\$0
TOTAL OTHER DIRECT COSTS							\$0
H. TOTAL DIRECT COSTS (A THROUGH G)							
I. INDIRECT COSTS (SPECIFY RATE AND BASE)							
Name of indirect cost item		Amount	Rate				
FirstIndirectCostItem		\$0	0%	0			
TOTAL INDIRECT COSTS							
TOTAL INDIRECT COSTS							\$0
J. TOTAL DIRECT AND INDIRECT COSTS (H+I)							
TOTAL DIRECT AND INDIRECT COSTS (H+I)							\$0
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)							
RESIDUAL FUNDS							\$0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							
AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$0
M. COST SHARING: PROPOSED LEVEL							
PROPOSED LEVEL				AGREED LEVEL IF DIFFERENT \$			
PROPOSED LEVEL							\$0
PI/PPD TYPED NAME & SIGNATURE*				FOR NOAO USE ONLY			
PI Full Name				INDIRECT COST RATE VERIFICATION			
INST. REP. TYPED NAME & SIGNATURE*				Date Checked	Date Rate of Sheet	Initials-ORG	
InstRepFullName							

*SIGNATURES REQUIRED ONLY FOR REVISED BUDGET (GPG III.B)