

NSF LOWER ATMOSPHERIC OBSERVING FACILITIES USER GUIDE

A. BACKGROUND

Researchers, students and teachers who want to understand and describe the earth system require high quality observations of the atmosphere, ocean, biosphere and the Sun. Making these observations requires state-of-the-art instruments and systems often carried on highly capable research platforms.

The National Science Foundation (NSF), through their Division of Atmospheric Sciences (ATM), provides multi-user national facilities through their Lower Atmospheric Observing Facilities (LAOF) Program in support of the geosciences community. These facilities, which include research aircraft, radars, lidars and surface and sounding systems, receive NSF base funding and are eligible for deployment pool funding. While the program management resides within ATM in the UCAR and Lower Atmospheric Facilities Oversight Section (ULAFOS), the facilities are managed and operated by the National Center for Atmospheric Research (NCAR), Colorado State University (CSU) and the University of Wyoming (UWY). The facilities included in the LAOF Program are described in more detail in Appendix I.

B. NSF'S LOWER ATMOSPHERIC OBSERVING FACILITIES

The research facilities currently sponsored by NSF are summarized in Table 1 and described in more detail in Appendix I. The Earth Observing Laboratory (EOL) of NCAR manages and operates the majority of these facilities, while CSU and UWY provide additional ground-based and airborne radars, as well as an aircraft. All three institutions provide support directly to the science community on facility needs and capabilities, as well as process their requests for use in coordination with NSF.

C. HOW TO REQUEST NSF NATIONAL FACILITIES

Observational facilities are available on a competitive basis to all qualified researchers from universities, NCAR and other government agencies requiring these research platforms and associated services to carry out their research objectives. The deployment of all facilities is driven by the scientific merit and capabilities of a specific facility to carry out the proposed observations and scheduling for the requested time.

The process for considering requests and setting priorities is determined on the basis of facility deployment costs and/or the complexity of the field component of the research. Requests that seek deployment pool funds on the order of \$1M will be defined as “**large**” requests, while those requests for less than this amount are considered “**small**” requests. Very complex programs (e.g., those which involve many facilities, require difficult deployment logistics or require

interagency or international coordination) also may be required to follow the review process for “large” programs. Average costs of domestic and international deployments of the various NSF facilities are available from the EOL website at <http://www.eol.ucar.edu/requests.html>. Please note that exceptions to these general guidelines will occur. **It is therefore essential that Principal Investigators discuss all proposed field activities with their relevant NSF Program Officer, as well as Facility Managers, in a timely manner.**

Table 1: NSF Lower Atmospheric Observing Facilities

Facility Type	Facility	Managing Organization	Comments
Aircraft	EC-130Q Hercules	NCAR/EOL	
	Gulfstream G-V	NCAR/EOL	
	NP-3D Orion (154587)	NRL through NCAR/EOL	<i>The aircraft is managed and operated by the Flight Support Detachment Project Office of the Naval Research Lab in Patuxent River, Maryland. NCAR/EOL only coordinates the requests for this airplane in combination with ELDORA radar requests.</i>
	King Air	UWY	
Airborne Remote Instrumentation	ELDORA	NCAR/EOL	<i>Operated on the NRL P3.</i>
	Wyoming Cloud Radar (WCR)	UWY or NCAR/EOL	<i>University of Wyoming is the main contact. Requests should go through EOL only if radar installation is desired on the NSF C-130 or NRL P3.</i>
Ground-based Remote Sensing	S-band Dual Polarization Doppler radar (S-Pol)	NCAR/EOL	
	CSU CHILL	CSU	<i>Primarily on-site at Greeley, CO.</i>
	REAL	NCAR/EOL	<i>Not covered by Deployment Pool funds.</i>
Surface and Sounding Systems	Integrated Sounding System (ISS)	NCAR/EOL	<i>4 systems – 3 fixed and 1 mobile; Option of Multiple Antenna Profiler (MAPR).</i>
	GPS Advanced Upper Air Sounding System (GAUS)	NCAR/EOL	<i>4 systems – 2 fixed and 2 mobile.</i>
	Integrated Surface Flux Facility (ISFF)	NCAR/EOL	<i>Former PAM and ASTER; 9 stations available.</i>
	GPS Dropsonde System	NCAR/EOL	<i>Airborne as well as ground-based reference radiosonde and driftsonde in development.</i>

C.1. Procedure to Request Facilities for “Small” Field Campaigns (Deployment costs <\$1M)

To be eligible for a facility allocation, all projects requesting NSF facility support must be associated with one or more peer-reviewed scientific proposals submitted to NSF, NCAR, or an equivalent funding agency. Initial contact among a Principal Investigator and the NSF Program Officers, as well as the relevant Facility Managers, should be made as early as possible to allow time for early discussions regarding the best use of the facility, feasibility analysis, cost estimates and schedule conflict adjustments.

Due dates for Facility Requests:

For small projects, NSF facilities can be requested twice annually. Due dates for receipt of requests for consideration are:

1 December (for use of a facility between 1 Apr and 30 Sep of the next fiscal year)

1 July (for use of a facility between 1 Oct and 31 Mar of the next fiscal year).

For example, requests for use of a facility between 1 October 2007 and 31 March 2008 will be due by 1 July 2006, and requests for use of a facility between 1 April and 30 September 2008 will be due 1 December 2006. **Please note that these deadlines are strictly enforced.**

The following material has to be provided electronically by the Principal Investigator to the appropriate facility point of contact (see F. Contacts):

1. One electronic copy of the completed **Facility Request Form(s)**. NSF and the OFAP consider the request forms to be the most important documents in determining the feasibility of the proposed project. It is therefore important that each question on the request forms be answered as completely and as accurately as possible. Please note that the forms are different for NCAR/EOL, UWY, and CSU. Request forms are available from the EOL website www.eol.ucar.edu/requests.html.
2. One electronic copy of the completed **Scientific Grant Proposal** (submitted to NSF, another funding agency), which justifies scientifically why the facility is needed.
3. Three **presentation slides** in electronic form that summarize the scientific hypotheses to be tested, the resources needed to accomplish the scientific goals and in case of multiple facilities, a table that describes how the requested facilities correspond to the individual science goals.

NCAR Investigators only:

Please note that the rules are slightly different for facility requests submitted by NCAR investigators only, i.e., project requests *without* NSF-funded university PI participation. Since there is no NSF-funded **research proposal** relevant to the requested facility, the NCAR PI is required to submit a similar document to the EOL Director by no later than 31 January and 31 August, respectively. EOL will send out the proposal for peer-review before the OFAP meeting, mirroring the NSF review process. The outcome of these reviews is shared with NSF and taken into consideration when final allocation decisions are made by the NSF program managers.

NCAR investigators also have to provide an **Endorsement Letter** from the PI's Division/Laboratory Director confirming financial and institutional support of the proposed research.

C.2. Procedures to request “Large” Field Programs (Deployment costs >\$1M or Complex Programs)

Large or complex research programs require that researchers submit two separate, but complementary documents to NSF and EOL before submitting individual scientific proposals to NSF and facility requests to NCAR and/or the universities. One is the Scientific Program Overview (SPO) and one is the Experimental Design Overview (EDO).

Scientific Program Overview (SPO). The purpose of the SPO is to establish the overall scientific justification of the program. Guidelines for writing an SPO are summarized in Section C.3. The SPO will have to be submitted in the form of a formal proposal to NSF via Fastlane following the requirements specified in the NSF Grant Proposal Guide (<http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg>). Given that the SPO is a formal proposal to NSF, and such proposals are not public information, the PI may, but is not required to, provide an exact electronic copy of the SPO to EOL and the Facility Managers (see Section F. Contacts). However, the PIs must provide to EOL and the Facility Managers a document that contains a description of the program's scientific objectives that is sufficiently complete to allow a proper evaluation of the EDO (see below), which cannot be reviewed without a thorough understanding by the reviewers of the scientific issues that will be addressed via the fieldwork. Please note that the number of Co-PIs that are officially listed on the SPO should be limited to normally no more than two individuals. If the number of Co-PIs exceeds two people, the PIs should contact the NSF Program Officer for further discussion and advice.

Experimental Design Overview (EDO): The purpose of the EDO is to describe the overall concept of the experimental design, resource needs and management of the field campaign. Guidelines for writing the EDO are contained in Section C.4. The EDO will have to be submitted to the LAOF Program Manager at NSF and EOL with an electronic copy to the relevant Facility Managers and NSF Program Officers (see Section F. Contacts). Please note that the PIs listed on the EDO should be the same as the ones listed on the SPO.

Due dates for SPOs, EDOs and Facility Requests:

For large programs, there will be only one target date per year for submission of the required EDO and SPO documents: Both documents are due on 15 January, two years ahead of the fiscal year in which the project will be carried out. If the EDO and SPO have received favorable consideration by the OFAP and NSF, the PI will be encouraged by the appropriate NSF Program Manager to submit the facility requests associated with the field program. The deadline for submitting facility requests is 1 August, two years ahead of the fiscal year in which the program will be conducted (referred to as FY-2). For example, if the deployment phase will take place between 1 October 2008 and September 2009 (FY09), the deadline for submitting the EDO and SPO is 15 January 2007 and the facility requests will be due on 1 August 2007.

15 January: SPO via Fastlane to NSF

15 January: EDO to NSF LAOF Program Manager and EOL Director

1 August: Facility Requests associated with Field Program to relevant Facility managers.

To request specific facilities, the following material has to be provided electronically by the Principal Investigator to the appropriate facility point of contact:

1. By 15 January: One electronic copy of the SPO via Fastlane to NSF with email copy to appropriate NSF Program Manager and EOL Director.
2. By 15 January: One electronic copy of the EDO to the NSF LAOF Program Manager and EOL Director via email.
3. By 15 January: Three to five presentation slides in electronic form to EOL. The slides should summarize the scientific hypotheses to be tested, the resources needed to accomplish the scientific goals and a table that describes how the requested facilities correspond to the individual science goals.
4. By 1 August: One electronic copy of the completed **Facility Request Form(s)**. NSF and the OFAP consider the request forms to be important documents in determining the feasibility of the proposed project. It is, therefore, important that each question on the request forms be answered as completely and as accurately as possible. Please note that the forms are different for NCAR/EOL, UWY, and CSU. Request forms are available from the EOL website www.eol.ucar.edu/requests.html.
5. By 1 Jul: One electronic copy of the completed **Scientific Grant Proposal**, or an equivalent funding agency, which justifies scientifically why the facility is needed. Proposals can be submitted without the cover and budget pages.

For more details also see “New Policies, Procedures and Guidelines for Science Programs that Require Field Facilities” in Appendix II of this document.

C.3. Guidelines for Writing a Scientific Program Overview (SPO)

Principal Investigator(s) are required to contact the relevant NSF Program Officer before submitting a SPO to NSF. This initial contact should occur at least two months prior to the submission of the SPO.

The SPO will be in the form of a formal proposal to NSF, and must follow the requirements specified in the NSF Grant Proposal Guide (<http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg>). Because field programs can differ significantly in organization and complexity, overview documents may vary considerably. Nonetheless, the SPO should provide the following information in the cited sections of the proposal:

Section D “Project Description” should contain:

- Overall scientific rationale and goals of the project.
- The scientific issue(s) to be addressed, including hypotheses to be tested.

- How the research will be conducted, including a brief description of the experimental techniques and distribution and use of observing systems and platforms (a more complete description is to be provided in the EDO). Additionally, the PI should state the optimal time frame for field operations.
- A section on related prior field campaigns, and a discussion of how the proposed effort will advance scientific knowledge beyond what was learned from the prior research, and in what ways the proposed data collection effort will be superior to existing data.

Section G “Budget”

The budget may contain a nominal request for funds to support program planning and execution (e.g., nominal salary and travel support for PI; funds for site surveys. Contact the NSF Program Officer to discuss budget before submitting proposal.).

Section I “Facilities, Equipment and Other Resources”

A table should be included that shows all field facilities to be requested (from all sources), the anticipated sponsors of those facilities (organization and a specific contact person), and the status of those requests (e.g., to be submitted, under consideration, approved). For all facilities that NSF will be asked to sponsor, this table also must contain an estimate of the cost of deploying this facility. This estimate must be made by the relevant Facility Manager. The PI is responsible for requesting this estimate from the Facility Manager in a timely manner (at least two months before submission of EDO). PIs also should be aware that Facility Managers can provide invaluable advice to the proposed program in the planning stages, so the PIs are strongly urged to contact the relevant Facility Managers early in the planning process.

Section J “Special Information and Supplementary Documentation”

This section should contain information on scientific participants and sponsors. This information will be limited to one page per participant, and should include a brief description of the role the participant will play in the project and their anticipated sponsor. For investigators who will be submitting proposals to NSF, an estimated cost of their research and field support should be included.

Sections F and H “Biographical Sketches and Current and Pending Support”

These sections are required only for the PI, Co-PI and senior personnel of the SPO, and not for every participant in the program.

NSF will conduct a review the SPO via the standard NSF review process. In addition to the normal NSF review criteria, reviewers of the SPO will be asked to comment on:

1. Importance/uniqueness of the research
2. Adequacy of experimental and research plan for hypothesis testing or problem definition. (The experimental design also will be thoroughly reviewed by the OFAP in their review of the EDO.)
3. Readiness
4. Structure of program
 - A. Major gaps or flaws (if any)
 - B. Essential components of the overall effort
5. Qualifications of all participants

C.4. Guidelines for Writing an Experiment Design Overview

Principal Investigator(s) are required to contact the relevant Facility Managers before submitting an Experimental Design Overview (EDO) to OFAP.

As noted previously, it will not be possible for the PI to develop an EDO without early involvement of the relevant Facility Manager(s). In the context of the scientific objectives, the EDO is the primary vehicle for review of the project's overall experimental design by the OFAP. It is the intent for the EDO to be holistic in nature; therefore, NSF and non-NSF facilities should be treated in the EDO in the same manner. The review procedures and criteria used by the OFAP can be found in the *OFAP Terms of Reference and Operating Procedures* (Appendix III). The EDO should briefly explain the scientific issues to be addressed (Note: the OFAP will have access to the SPO or equivalent document) and provide substantial details of experimental design and program management. If non-NSF facilities also will be part of the overall project, the EDO should describe the role of these facilities in the experimental design.

A suggested outline for the overview document is provided below, although the PIs may adjust the format as necessary. The page limits for each section are provided for guidance only. **The overall page limit for the EDO, however, is twenty-five (25) pages, and this limit will be strictly enforced** (page limit does not include figures, tables, references and the copies of Sections I and J of SPO, see below). Additionally, each page must have no less than 2.5 cm margins at the top, bottom and on each side. Type size must not be smaller than 10 point. An electronic copy of the EDO should be submitted to the LAOF Program Manager with a copy to the relevant Facility Managers and NSF Program Officers.

Suggested Outline

Executive Summary	1 page
Program Rationale and Scientific Hypotheses	2 pages (May refer to SPO)
Scientific Objectives	2 pages (May refer to SPO)
Experimental Design and Observational Requirements	10 pages
<i>This section should include information on all facilities to be involved in the field campaign, not just NSF supported facilities. Also, a description of the research objectives to be satisfied by the deployment of each facility should be included. This section must specify the time period of the field campaign and discuss possible alternate times and time flexibility.</i>	
Project Management including Management in the Field	5 pages
Data Management Plan	5 Pages
Section I of SPO	No Page Limits
Section J of SPO	No Page Limits

C.5. Out-of-Cycle Requests

Any field program not meeting the above-described schedules will be considered "out-of-cycle" requests. As the situation allows, these will be accommodated on a non-interference basis with fully approved projects. Out-of-cycle requests also will have low priority for deployment pool funds.

D. HOW FACILITY REQUESTS ARE REVIEWED AND NATIONAL FACILITIES ARE ALLOCATED

NSF allocates the use of NCAR and university facilities twice annually based on the outcome of the NCAR-driven Observing Facility Assessment Panel (OFAP). The OFAP provides technical assessments of facility requirements to EOL and university facility managers in order to optimize support of NSF-sponsored observational science. In this capacity, the OFAP interacts with the user community, facility providers and the funding agencies by providing valuable information and input concerning experiment design and facility usage. The feedback and technical evaluation presented by the OFAP, together with feasibility analyses and cost estimates provided by EOL or university facility managers, are taken into consideration before a final decision is made by individual NSF program officers whether to support or decline funding for a project.

Composition

The OFAP is composed of a pool of 18 scientists with broad-based experience in observational studies of the atmospheric and oceanic sciences. Members are appointed by the EOL Director based on recommendations by NSF program officers, current OFAP members, facility managers and NCAR staff. They serve staggered, four-year terms. Attendance is requested from a subset of the OFAP pool, depending on the number of facility requests received, areas of expertise required, and existing conflicts-of-interest. The usual size of the committee is 15 people and OFAP members will attend an average of six meetings during their term. The meeting is headed by the EOL Director and the OFAP chairs, who are elected by the OFAP members. The OFAP chair is expected to serve as a regular member for the first year before taking over vice-chair and chair duties during the second and third year. During the fourth year, the individual will go back to regular duties while providing guidance to the new chair if needed. OFAP members who are principal or co-investigators are automatically excluded from meetings in which their requests are considered. In those cases where a panel member has a conflict of interest (see Appendix 2) with one or more of the requested projects, s/he is excluded from participating in the deliberations and asked to leave the room for the duration of the discussion.

OFAP Process

The OFAP primarily evaluates two types of requests for facility support: those requests in support of NSF-sponsored research, which have awards from an NSF grants program or written endorsements from the appropriate NCAR division director and are eligible for NSF/ATM Deployment Pool (DP) funds¹ support, and those for non-NSF-sponsored activities, which are funded by other agencies. In addition, the OFAP also reviews requests for a small number of NCAR facilities that are not currently covered by the DP but require special funds from the

¹ The NSF deployment pool is funding dedicated to the exclusive support of expenses directly associated with the deployment of the NSF Lower Atmospheric Observing Facilities for NSF-supported research. Allowable expenses include extraordinary salaries and benefits, aircraft /field system operations, travel, materials and supplies, purchased services including equipment rental. Non-allowable expenses include regular salaries and benefits, operation and maintenance, research and development costs, PI expenses, non-NSF supported instruments and observing systems.

sponsoring NSF program officer. In all cases, NSF-sponsored research takes precedence over other requests.

Meetings

The OFAP meets twice per year at NCAR/EOL in Boulder, Colorado. Meetings are held in spring (May) and fall (November) over a three day period. The main purpose of the meeting is to evaluate all facility requests and EDOs received for a given deployment time frame. As time allows, meetings may also include information items from NSF, NCAR and the universities, as well as technical/scientific briefings on past and future field programs and new observing system developments and upgrades.

Preparation for Meeting: NCAR/EOL is responsible for handling all organizational, logistical, and clerical support for the meeting. In this capacity, EOL coordinates and distributes all materials, maintains the OFAP web site, develops the meeting agenda, maintains and updates long term facility request schedules, and assists the OFAP chair and vice-chair in conducting the meeting. All responsibilities are carried out in consultation and close coordination with the NSF ULAFOS Program Officer, the OFAP chairs, facility managers, and others as appropriate.

Feasibilities and Cost Estimates: Once the PI(s) have sent a facility request to EOL and/or the universities via email to the appropriate contact person (Appendix IV), the material is posted on the OFAP website. The OFAP web site is password protected and only accessible to NSF and NCAR/EOL staff, university facility managers and OFAP members. Facility managers identify one “Project Facilitator” for each project, who is an EOL/university employee and usually responsible for preparing the feasibility analysis. At the same time, EOL, in consultation with the universities, produces a global feasibility analysis that takes into consideration staffing and facility resources, and lays out all possible project combinations that can be accommodated. The global feasibility, together with cost estimates and feasibility analyses, is forwarded for review to NSF two months before the OFAP meeting. At the same time, copies of the cost estimates and feasibility analyses are provided to the requesting PI(s).

OFAP Responsibilities: Each OFAP member has access to all facility requests, feasibility analyses and cost estimates as well as other necessary information via the web site. OFAP members are queried for their review preferences and conflicts-of-interest (Appendix V) before they are assigned by EOL as reviewers for requests in their area of expertise. EOL management assigns one lead and two to three additional reviewers from the OFAP for each major request. About one month before the meeting, each reviewer receives copies of the relevant materials, including requests, portions of the scientific proposal, feasibilities, cost estimates, presentations and other information relevant to each assigned facility request. Reviewers are encouraged to contact PIs through the project facilitators prior to or during the panel meeting to clarify all aspects of the request.

Reviewers are asked to evaluate each request on the basis of the following criteria:

(1) Importance/Uniqueness of Project: While it is not intended for the OFAP to supplant or second-guess the normal peer-review process for the scientific proposals associated with a facility request, the evaluation of a facility request can only be reasonably accomplished in the context of the overall scientific plan.

(2) *Experiment Design*: Special consideration is given to the entire program perspective, the adequacy of the plan for hypothesis testing or problem definition, the readiness and structure of the program, strengths/weaknesses of the experiment design and its adequacy to achieve the stated scientific objectives. Attention is also paid to requested resources (e.g., flight hours) and whether they are appropriate to accomplish the scientific objectives, and safety considerations.

(3) *Project Management*

(4) *Data Management and Dissemination*

(5) *Educational Benefits*: The educational benefits derived from the project are addressed. Special attention is paid to the involvement of graduate and/or undergraduate students in a meaningful way.

(6) *Qualifications of the Proposer (s)*.

(5) *Other*: Any other comments/concerns.

Each reviewer provides a short summary of his/her comments to EOL via email a few days ahead of the meeting. These comments are distributed at the start of the OFAP deliberations to the panel, NSF representatives and EOL/university management.

Request Evaluation Process during Meeting: All requests and EDOs are evaluated in executive session and the OFAP chair and the EOL director reserve the right to limit participation. Participants in the deliberations usually include OFAP members, NSF representatives, EOL and university management, project facilitators, project managers and facility administrators. In case of major, multi-agency field programs, other federal program managers may be invited to attend as well.

At the beginning of the evaluation, the NSF Lower Atmosphere Research Section (LARS) representative comments on the status of the NSF research proposal associated with each facility request. If the request is from an NCAR scientist, an NCAR division director or designee comments or provides a letter and approval of any required additional support (e.g., divisional support, travel funds). In the case of major facility requests, EOL in consultation with NCAR scientific division directors orally summarize the results of an anonymous peer review. In situations where major scheduling or funding conflicts exist among the requests under consideration, NSF provides priority guidance to EOL. If NSF has decided not to support a project or if a project has failed to receive endorsement of an NCAR division director, it will be removed from formal consideration by the OFAP, although suggestions for improvement or other helpful comments from the OFAP are still appropriate.

The OFAP chair then finalizes the order in which the requests are introduced, considering such factors as conflicts-of-interest (Appendix V), availability of project facilitators and reviewers and effective use of the panel's time.

Each request is introduced by the lead OFAP reviewer who will summarize the scientific objectives and hypotheses in a short presentation (provided by the PI), followed by a summary of the technical feasibility presented by the NCAR/university project facilitator. Each assigned OFAP reviewer then presents his/her evaluations using the criteria listed above before the discussions are expanded to all attendees (including facility managers, project facilitators and

EOL project managers). If a question arises that requires clarification, the EOL project facilitator may contact the PI for details.

The OFAP considers all NSF pending and supported requests before finalizing its findings. For each request, the OFAP provides a written assessment to EOL management regarding deployment of a requested facility, which will be shared with the NSF ULAFOS Program Officer. Summaries will focus on, but are not limited to, a specific allocation of facility usage (e.g., days in the field and/or number of flight hours), the amount of deployment funds, suggested adjustments to the experiment design (e.g., alternate flight plans, scan strategies, increases/decreases of flight hours) and possible schedule modifications, if necessary.

Under certain circumstances, NSF-sponsored observing facilities may be allocated for use by non-NSF-sponsored projects on a cost-recovery basis. All costs for these projects must be covered by the sponsoring agency and are recovered by the divisional and/or university facility. To be allocated, such non-NSF projects must meet the principle of there being a "net benefit to the NSF community", which can be based on, but not limited to, one or more of the following criteria:

- The project supports or enhances the science objectives of the NSF-sponsored community.
- The project provides desirable practical training and experience for facility staff.
- The project provides revenues that significantly enhance the objectives of an NSF-sponsored facility development.
- The project meets a national need to which NCAR or other NSF-sponsored facilities can uniquely contribute.

The procedures for OFAP review and assessment of facility requests associated with non-NSF-sponsored projects are similar to those described earlier for NSF-sponsored programs. NCAR management shall only be concerned with such requests and associated OFAP findings from the aspect of ensuring that the requests are not in conflict with funded NSF programs. EOL management, in consultation with NSF will then determine whether a facility can be made available to non-NSF projects. Non-NSF sponsored requests for the University of Wyoming King Air are handled by the University of Wyoming without OFAP involvement. Under certain circumstances, the OFAP review for a cost recovery project can be waived at NSF's discretion.

Post-meeting Procedures: Immediately following the meeting, the OFAP assessments are shared with the PIs, the Facility Managers, the NSF LARS Program Officer and other attending NSF representatives. While the OFAP assessment is an important part of the facility allocation decision, the funding decision for a field deployment is solely the responsibility of the individual NSF program officers, and is dependent on the successful review of the supporting science proposals. Allocation decisions for NCAR-sponsored projects will be made by NSF dependent on the successful review of the supporting science proposal(s) and resources available. Once EOL and the university managers receive notice from NSF about a funding decision, a letter is sent to the requesting PI(s) informing him/her whether the requested facility will be made available or not. The support letter includes details about the amount of resources allocated, the

time frame for the project, the name of the responsible facilities project manager and any other pertinent information.

E. USER CLASSIFICATION

Principal Investigators with approved NSF science research grants have first priority, and receive full deployment pool allocation funding for the facilities requested. Other requests are considered based on scientific merit and facility availability, with the deployment costs varying from full cost recovery to full or partial support by the deployment pool. NSF has used the following guidelines to classify users based on the source of funding and to allocate costs:

- NSF-funded programs needing facility support are funded by allocation from the field deployment fund. NSF-funded programs are given the highest priority.
- Programs for which funding is provided by NSF and other agencies will be charged an amount which has been agreed upon through negotiations between NSF, NCAR and the agencies involved.
- Programs funded entirely by government agencies other than NSF (i.e., NASA, NOAA, DOD) or non-governmental organizations will be charged on a full cost-recovery basis. Costs include all operational expenses, maintenance and UCAR/NCAR overhead. Maintenance and overhead is charged through application of overhead and facility use rates approved on an annual basis by NSF. Currently approved rates are available from EOL.

In the case where collateral research support is sought from a sponsoring agency, commitments may be contingent upon funding availability from the agency. In such cases, the requesting scientist must promptly forward a copy of the agency award or declination letter to NSF. The OFAP may suggest award support on the condition that the requestor complete certain actions such as those aimed at making more productive use of the support, or those aimed at providing additional assurances that the planned experiment is an appropriate use of the limited resources available.

The national facilities support single investigators as well as international, multi-agency and multi-system projects. On average, just over 60% of the users are university-based; approximately 8% are joint university-NCAR programs.

APPENDIX I: NSF'S LOWER ATMOSPHERIC OBSERVING FACILITIES

The following NSF-sponsored research facilities receive NSF base funding and are eligible for NSF deployment pool funds:

Lockheed Hercules C-130: The C-130 turboprop aircraft has a 10-hour flight endurance, a 2,900 nautical mile range at up to 27,000 feet and a maximum duration payload of 13,000 lb. In addition to a large suite of standard state parameter measurements, the C-130 has a roomy fuselage payload area (414 sq. feet) and many versatile inlets and optical ports. The aircraft carries instruments and sensors in pods and pylons on both wings, and routinely flies the Scanning Aerosol Backscatter Lidar (SABL) and the GPS Dropsonde system, along with other specialized instruments provided by users.

University of Wyoming King Air: The University of Wyoming (UWY) has operated a Raytheon Beech King Air 200T as an NSF-supported facility since 1988. The twin-engine turboprop is instrumented primarily to support research in cloud physics and boundary layer processes. Maximum flight altitude is 35,000 ft, and a typical duration is four-to-five hours.

Gulfstream GV (HIAPER – High-performance Instrumented Airborne Platform for Environmental Research): A fully modified Gulfstream V, high-altitude business jet was delivered to NCAR in 2005 and carried out its first research deployments in winter 2006. The G-V is capable of attaining 51,000 feet, flying for 10 hours and covering 6,000 nautical miles. Modifications include one up- and two-downward looking optical ports, aperture pads, inlet apertures and wing and fuselage hard points. Depending on the combination of crew, range and altitude, HIAPER can carry a scientific payload of up to 6,600 lb.

Electra Doppler Radar (ELDORA): This airborne X-Band Doppler radar operates at a wavelength of 3.2 cm, has 45kW peak power, a complex transmitted waveform, a beam width of 1.8 degree and 38.7 dB antenna gain. The radar uses two beams - one pointed 18 degrees forward and the other 18 degrees aft of a plane perpendicular to the aircraft heading – to collect reflectivity and dual Doppler information up to 70 km from the aircraft as it flies near or through storms.

An agreement between NSF and the Navy in 2001 led to the transfer of the ELDORA radar to a ***NP-3D Orion*** aircraft. The aircraft is maintained and operated by the Naval Research Lab (NRL) Flight Support Detachment, located at NAS Patuxent River, MD. The NRL P3 has a flight endurance of up to 12 continuous hours, a range of up to 3,900 nautical miles and supports scientific missions at altitudes ranging from 200 ft to 31,000 ft. Currently the plane is being outfitted with a GSP dropsonde system, and includes a suite of basic state parameters measurements. The internal ELDORA payload is approximately 4,500 lb.

Wyoming Cloud Radar: The observational capabilities of the UWY King Air and the NSF/NCAR C-130 may be enhanced in cloud studies by the Wyoming Cloud Radar (WCR). The WCR is an airborne 95 GHz dual-polarized Doppler radar that was developed jointly by UWY

and the University of Massachusetts. The WCR includes dual polarization and Doppler capabilities.

S-Band Dual Polarization Doppler Radar (S-Pol): NCAR's S-Pol radar is a transportable, advanced, ground-based weather radar that operates in the S-band (10 cm) wavelength range, using a high-performance transmitter built around the FAA's ASR-9 system and a high-quality, parabolic antenna with 44.5 dB gain. S-Pol provides dual polarization capabilities. Dual-channel receivers collect and discriminate co-polar and cross polar responses simultaneously, allowing use of diverse polarization data to identify hydrometeor properties and to improve precipitation quantification. In 2004, S-Pol was equipped with a second frequency in the Ka-band.

Colorado State University CHILL Radar: Located in Greeley, CO, CHILL is an 11-cm wavelength, multiple polarization research precipitation radar system. It uses a matched dual-transmitter and dual-receiver configuration, mated to a custom-designed 28-ft diameter (1 degree beam width) parabolic antenna, to maximize data collection capabilities. A state-of-the-art digital signal processor handles both the co- and cross-polar return signal components, providing the investigator with a full complement of digitally recorded output data, including standard meteorological moments (dBZ, ZDR, LDR etc.), as well as complex covariances and pulse-by-pulse in phase and quadrature voltage time series.

GPS Advanced Upper Air Soundings System (GAUS):

GAUS is a balloon-borne, rawinsonde system that allows researchers to supplement operational soundings by placing sounding systems in essential locations and by launching sondes at higher or variable frequencies. Through GPS technology, the GAUS provides high vertical resolution measurements of temperature, humidity and winds at worldwide locations. Each GAOS unit includes a meteorological observing station to record thermodynamic data at the surface and the infrastructure to provide local data processing, display and communications. Data from GAUS can be transferred by phone, internet or the global telecommunication system (GTS). GAUS can be deployed from a mobile van (MGAUS), from fixed locations and in a tethered manner.

Integrated Sounding System (ISS): The ISS combines surface, sounding and remote sensing instrumentation to provide a comprehensive description of lower atmospheric thermodynamics and winds, with enhanced measurements in the boundary layer and lower troposphere. The ISS includes a fully integrated set of the following instruments: a GAUS rawinsonde system; a 915 MHz Doppler clear air wind profiling radar that provides near continuous, high-resolution measurements of horizontal and vertical wind components from the surface to the mid-troposphere; a Radio Acoustic Sounding System (RASS) that provides profiles of virtual temperature up to one or two kilometers in altitude with the same time coverage as the Doppler wind profiles; and an enhanced surface meteorological station that collects radiation and precipitation data, in addition to standard measurements of temperature, pressure, humidity and wind. In addition, EOL has developed the Multiple Antenna Profiler (MAPR), which uses spaced antenna techniques to measure wind profiles. MAPR makes very high-time resolution measurements as short as 30 seconds, compared with 15 minutes or longer from traditional wind profilers.

Integrated Surface Flux Facility (ISFF): ISFF combines the capabilities of a surface weather station network with the ability to support intensive micrometeorological research at a single site. Investigators can configure ISFF resources to match research objectives of individual field projects. In network mode, multiple sites can be instrumented to measure near-surface wind, temperature, humidity, pressure and precipitation. As needed, scientists can also request measurements of momentum fluxes, sensible and latent heat fluxes, short-wave and long-wave radiation, soil temperature, soil moisture and soil heat flux at each station (e.g., to determine the surface thermal energy budget). For intensive operating modes, multiple sensors can be deployed on an array of towers at a single site for detailed examination of the turbulence structure of the atmospheric surface layer. Solar power, RF modems and satellite data transmission permit ISFF to operate almost anywhere research requires.

GPS Dropsonde System: Aircraft researchers often require dropsondes to determine atmospheric structure in data sparse regions such as over oceans or above remote mountain or polar regions. EOL's GPS Dropsonde System provides unprecedented 0.5 second resolution of pressure, temperature, humidity and winds from the drop elevation down to the surface. U.S. Air Force, NOAA, Canadian, British and German aircraft carry the EOL Dropsonde System. Many of these aircraft use EOL's improved transmitter system that allows simultaneous deployment and tracking of up to eight sondes.

ADDITIONAL OBSERVING FACILITIES NOT IN THE DEPLOYMENT POOL

EOL provides additional instruments that are available upon request to the research community, but which not covered by the Deployment Pool (DP). Although the OFAP reviews the technical feasibility of these systems for programs, special funds from NSF outside the DP are needed on a project-specific basis to deploy.

Raman-shifted Eye-safe Aerosol Lidar (REAL): NCAR's new REAL is a high-pulse energy, rapid-scanning, eye-safe, elastic-backscatter lidar, ideal for imaging boundary layer structure and evolution. REAL is novel in that it operates at 1.54 microns wavelength. REAL currently transmits 10 pulses per second (about 200 mJ/pulse), and employs a single receiver channel with samples at 3 m resolution. The EOL lidar team is currently working to increase REAL's PRF to 50 Hz, with higher pulse energy (>300 mJ/pulse), and a two channel receiver for backscatter depolarization ratio measurements.

Multichannel Cloud Radiometer (MCR): MCR is a seven-channel scanning radiometer, originally designed and built at the NASA/Goddard Space Flight Center in March 1997. The MCR is available to users of the C-130 to obtain narrow bandwidth spectral radiance measurements at seven wavelengths in the visible, near infrared and infrared portions of the electromagnetic spectrum. Research applications include the remote retrieval of cloud and aerosol layer optical thickness and water vapor amounts, cloud phase and particle size studies, and visible and thermal mapping of surfaces and of cloud layer tops.

APPENDIX II: POLICY, PROCEDURES AND GUIDELINES FOR SCIENCE PROGRAMS THAT REQUIRE FIELD FACILITIES

(17 May 2006)

I. OVERVIEW

The Atmospheric Sciences Division (ATM) of the National Science Foundation (NSF) has limited funds to support the science and facilities required to accomplish field research. ATM desires to optimize the process for coordinating with the scientific community and other sponsors of scientific research in order to effect the best allocation of facility resources in support of meritorious science. This optimization also allows more effective planning for maintenance and technical improvements to the NSF Facilities. Accordingly, the following procedures have been established.

II. APPROACH

In carrying out its responsibility for establishing priorities and resolving resource allocation conflicts, ATM seeks to obtain as much input as possible regarding the merits and feasibility of proposed projects. Procedures for resolving conflicts and establishing priorities take into account scientific merit evaluated through standard NSF procedures, programmatic considerations, and evaluation of experimental design from Facility Managers and the Observing Facility Assessment Panel (OFAP).

The process for considering requests and setting priorities differs on the basis of the cost of deploying NSF supported facilities and/or the complexity of the field component of the research. With respect to costs, generally requests that seek deployment pool funds on the order of \$1.0 Million will be defined as “large” requests (Section IV), while those requests for less than this amount typically will be referred to as “small” requests (Section V). Very complex programs (e.g., those which involve many facilities, require difficult deployment logistics or require interagency or international coordination) also may be required to follow the review process for “large” programs. Exceptions to these general guidelines will occur. Principal Investigators should discuss all proposed field activities with the relevant NSF Program Officer and Facility Managers in a timely manner.

III. ROLES OF NSF, NCAR/EOL, FACILITY MANAGERS, and OFAP

NSF is solely responsible for the conduct of the scientific review of all submitted NSF proposals and, with concurrence from Facility Managers, for final decisions on support of all aspects of research involving field campaigns (including deployment of observational assets). In the case where only National Center for Atmospheric Research (NCAR) scientists are involved, the relevant NCAR Division Director is responsible for review of the program and appropriate coordination with NSF Program Officers and Facility Managers. Input to the NSF decision process includes scientific peer review using normal NSF procedures, and advice and analysis from Facility Managers and the OFAP.

Facility Managers provide planning recommendations and consultation to the research community and to NSF. Facility Managers provide feasibility analyses to NSF and OFAP for each facility request as well as preliminary cost estimates for proposed projects. They have

primary responsibility for the safe execution of field campaigns.

In the context of the scientific objectives, the OFAP provides assessment to the management of NCAR's Earth Observing Laboratory (EOL), the University of Wyoming and Colorado State University concerning experimental design, optimal asset utilization and resource issues, which will be shared with the NSF Program Managers. This and other OFAP responsibilities are provided in the *OFAP Terms of Reference and Operating Procedures* (http://www.atd.ucar.edu/dir_off/OFAP/info/procedures.html).

IV. LARGE FIELD PROGRAMS (DEPLOYMENT COSTS >\$1.0 MILLION; OR COMPLEX PROGRAMS)

For large programs, before submission of individual scientific proposals, researchers will be required to submit two antecedent documents: a Scientific Program Overview (SPO) and an Experimental Design Overview (EDO). The SPO and the EDO are considered complementary documents.

The purpose of the SPO is to establish the overall justification of the scientific program (Section IV.B). The SPO will be submitted to NSF via Fastline following the requirements specified in the NSF Grant Proposal Guide. The PI is also required to provide a copy of the SPO or an equivalent document to EOL and the relevant Facility Managers (see Appendix A for the requirements of an "equivalent" document).

The EDO describes the overall concept of the experimental design, resource needs and management of the field campaign (Section IV.C). The EDO will be submitted to the LAOF Program Manager at NSF and the NCAR/EOL director with a copy to the relevant Facility Managers and NSF Program Officers.

A. Timeline for Major Field Campaigns:

There will be only one target date per year for submission of required documents. FY is the fiscal year in which the field campaign will be conducted and, for example, FY-2 is the year of the field campaign minus two years.

- *Fall of FY-3 or earlier.* Initial contacts between Principal Investigators and NSF Program Officers and Facility Managers. Please note that it will not be possible for the Principal Investigators to construct the SPO or the EDO without consultation with NSF Program Officers and Facility Managers. The Principal Investigators, therefore, must contact the relevant NSF Program Officers and Facility Managers in a timely manner, so that feedback can be developed and considered before submission of the SPO and EDO.
- *15 January of FY-2.* SPO and EDO submitted to NSF and NCAR/EOL, respectively with copies of each to relevant Facility Managers.
- *May of FY-2.* Review of SPO by NSF and evaluation of EDO by OFAP completed. OFAP assessment transmitted to PIs, Facility Managers and NSF Program Officers.
- *June of FY-2.* Final NSF action on SPO. Anonymous reviews of SPO and EDO evaluation

transmitted to PIs. At this time NSF will encourage or discourage submission of proposals associated with the SPO.

- *August of FY-2.* If appropriate, facility requests submitted to Facility Managers.
- *August of FY-2.* If appropriate, individual science proposals submitted to NSF.
- *November of FY-1.* OFAP considers facility requests and provides assessment to NCAR/EOL management and Facility Managers with copy to NSF.
- *January of FY-1.* Final actions on proposals and facility requests.
- *FY (October – September).* Field campaign conducted.

B. Scientific Program Overview:

Principal Investigator(s) are required to contact the relevant NSF Program Officer before submitting a SPO to NSF. This initial contact should occur at least two months prior to the submission of the SPO. The SPO will be in the form of a formal proposal to NSF and must follow the requirements specified in the NSF Grant Proposal Guide (<http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg>). The number of Co-PIs that are officially listed on the SPO should be limited to normally no more than two. If the number of Co-PIs exceeds two, the PI should contact the NSF PO for further discussion and advice. Because field programs can differ significantly in organization and complexity, overview documents may vary considerably. Nonetheless, the SPO should provide the following information in the cited sections of the Proposal:

- Section D, *The Project Description*, should contain:
 - Overall scientific rationale and goals of the project.
 - The scientific issue(s) to be addressed including hypotheses to be tested.
 - How the research will be conducted including a brief description of the experimental techniques and distribution and use of observing systems and platforms (a more complete description is to be provided in the EDO). Additionally, the PI should state the optimal time frame for field operations.
 - A section on related prior field campaigns and a discussion of how the proposed effort will advance scientific knowledge beyond what was learned from the prior research and in what ways the proposed data collection effort will be superior to existing data.
- Section G, *Budget*. The budget may contain a nominal request for funds to support program planning and execution (e.g., nominal salary and travel support for PI; funds for site surveys. Contact NSF Program Officer to discuss budget before submitting proposal).
- Section I, *Facilities, Equipment and Other Resource*. A table should be included that shows all field facilities to be requested (from all sources), the anticipated sponsors of those facilities (organization and a specific contact person), and the status of those requests (e.g., to be submitted; under consideration; approved). For all facilities that NSF will be asked to sponsor, this table also must contain an estimate of the cost of deploying this facility. This estimate must be made by the relevant facility manager. The Principal Investigator is responsible for requesting this estimate from the facility manager in a timely manner (at least two months before submission of EDO). Principal Investigators also should be aware that Facility Managers can provide invaluable advice to the proposed program in the planning stages, so the Principal Investigators are strongly urged to contact the relevant Facility

Managers early in the planning process.

- Section J, *Special Information and Supplementary Documentation*, should contain information on scientific participants and sponsors. This information will be limited to one page per participant and should include a brief description of the role the participant will play in the project and their anticipated sponsor. For investigators who will be submitting proposals to NSF an estimated cost of their research and field support should be included.
- Sections F and H, *Biographical Sketches* and *Current and Pending Support*, are required only for the PI, Co-PI and Senior Personnel of the SPO and not for every participant in the program.

In addition to the normal NSF review criteria, reviewers of the SPO will be asked to comment on:

- Importance/Uniqueness of the Research
- Adequacy of experimental and research plan for hypothesis testing or problem definition. (The experimental design also will be thoroughly reviewed by the OFAP in their review of the EDO)
- Readiness
- Structure of program
 - Major gaps or flaws (if any)
 - Essential components of the overall effort
- Qualifications of all participants.

C. Experimental Design Overview:

Principal Investigator(s) are required to contact NCAR/EOL and relevant Facility Managers before submitting an Experimental Design Overview (EDO) to OFAP. As noted previously, it will not be possible for the Principal Investigator to develop an EDO without early involvement of the relevant Facility Managers. In the context of the scientific objectives, the EDO is the primary vehicle for review of the project's overall experimental design by the OFAP. It is the intent for the EDO to be holistic in nature; therefore, NSF and non-NSF facilities should be treated in the EDO in the same manner. The review procedures and criteria used by the OFAP can be found in the *OFAP Terms of Reference and Operating Procedures* (http://www.eol.ucar.edu/dir_off/OFAP/info/procedures.html). The EDO should briefly explain the scientific issues to be addressed (note that the OFAP will have access to the SPO or equivalent document) and provide substantial details of experimental design and program management. If non-NSF facilities also will be part of the overall project, the EDO should describe the role of these facilities in the experimental design.

A suggested outline for the overview document is provided below although the Principal Investigators may adjust the format as necessary. The page limits for each section are provided for guidance only. **The overall page limit for the EDO, however, is twenty-five (25) pages and this limit will be strictly enforced** (page limit does not include figures, tables, references and the copies of Sections I and J of SPO, see below). Additionally, each page must have no less than 2.5 cm margins at the top, bottom and on each side. Type size must not be smaller than 10 point. The EDO should list exactly the same PI and Co-PIs as the SPO. An electronic

copy of the EDO should be submitted to the NSF/LAOF Program Officer and NCAR/EOL with a copy to the relevant Facility Managers and NSF Program Officers.

Suggested Outline of the EDO:

Executive Summary	1 page
Program Rationale and Scientific Hypotheses	2 pages (May refer to SPO)
Scientific Objectives	2 pages (May refer to SPO)
Experimental Design and Observational Requirements	10 pages
<i>This section should include information on all facilities to be involved in the field campaign, not just NSF supported facilities. Also a description of the research objectives to be satisfied by the deployment of each facility should be included.. This section must specify the time period of the field campaign and discuss possible alternate time sand time flexibility.</i>	
Project Management including Management in the Field	5 pages
Data Management Plan	5 Pages
Section I of SPO	No Page Limits
Section J of SPO	No Page Limits

V. “SMALL” FIELD CAMPAIGNS (DEPLOYMENT COSTS <\$1.0 M)

Principal Investigators are encouraged to contact NSF Program Officers and relevant Facility Managers before submitting proposals and facility requests.

A. For Deployments between October and March of the Fiscal Year (FY):

- *1 July of FY-2* – Facility requests submitted to appropriate Facility Managers.
- *August of FY-2* – Individual science proposals submitted to NSF.
- *November of FY-1* – Facility requests evaluated by OFAP completed. OFAP assessment transmitted to PIs, Facility Managers with copy to NSF.
- *January of FY-1* – Final NSF action on proposals.
- *October of FY through March of FY* – Field campaign conducted.

B. For Deployments between April and September of the Fiscal Year (FY):

- *1 December of FY-2* – Facility requests submitted to appropriate Facility Managers.
- *15 January of FY-1* – Individual science proposals submitted to NSF.
- *May of FY-1* – Facility requests evaluated by OFAP. OFAP assessment transmitted to PIs and Facility Managers with copy to NSF.
- *July of FY-1* – Final NSF action on proposals.
- *April to September of FY* – Field campaign conducted.

VI. OUT OF CYCLE REQUESTS

Any field program not meeting the above-described schedules will be considered “out of cycle” requests. As the situation allows, these will be accommodated on a non- interference basis with fully approved projects. Out of cycle requests also will have low priority for deployment pool funds.

VII. COST RECOVERY PROJECTS

Cost recovery projects will be considered for support on a non-interference basis as described in the OFAP Terms of Reference.

APPENDIX A – EQUIVALENT DOCUMENT:

The EDO cannot be reviewed without a thorough understanding by the reviewers of the scientific issues that will be addressed via the fieldwork. The Principal Investigators, therefore, must provide to NCAR/EOL the Facility Managers a document that contains a description of the program's scientific objectives that is sufficiently complete to allow a proper evaluation of the EDO. The SPO will satisfy this requirement, but, given that the SPO is a formal proposal to NSF and such proposals are not public information, the PI is not required to provide an exact copy of the SPO to NCAR/EOL or the Facility Managers. If the SPO is not provided, then the Principal Investigators must supply an equivalent document that adequately describes the scientific content of their program.

APPENDIX III: CONTACTS

NSF Program Official for the Lower Atmospheric Observing Facilities

Dr. James R. Huning Program Coordinator, UCAR and LAF Oversight Section	Atmospheric Sciences Division 775 National Science Foundation 4201 Wilson Blvd Arlington, VA 22230	Phone: (703) 292-8521 Email: jhuning@nsf.gov
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EOL Director

Dr. Roger Wakimoto (Director)	NCAR/EOL P.O. Box 3000 Boulder, CO 80307	Phone: (303) 497-2040 Email: wakimoto@ucar.edu
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OFAP Coordination and Process, Field Project Services

Ms. Brigitte Baeuerle (Manager)	NCAR/EOL P.O. Box 3000 Boulder, CO 80307	Phone: (303) 497-2061 Email: baeuerle@ucar.edu
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NSF/NCAR Research Aviation Facility (C-130, G-V)

Dr. Jeff Stith (Manager)	NCAR/EOL P.O. Box 3000 Boulder, CO 80307	Phone: (303) 497-1032 Email: stith@ucar.edu
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NCAR Integrated Surface Facility (ISS, ISFF, GAUS, Dropsondes)

Dr. Steve Cohn (Manager)	NCAR/EOL P.O. Box 3000 Boulder, CO 80307	Phone: (303) 497-8826 Email: cohn@ucar.edu
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NCAR Remote Sensing Facility (SPOL, ELDORA)

Dr. Jothiram Vivekanandan (Manager)	NCAR/EOL P.O. Box 3000 Boulder, CO 80307	Phone: (303) 497-8402 Email: vivek@ucar.edu
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CSU-CHILL Radar

Dr. Steven Rutledge	Dept. of Atmospheric Science Colorado State University Fort Collins, CO 80523	Phone: (970) 491-8283 Email: rutledge@colostate.edu
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Wyoming King Air

Dr. Al Rodi	Dept. of Atmospheric Science University of Wyoming Laramie, WY 82071	Phone: (307) 766-4945 Email: rodi@uwyo.edu
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APPENDIX IV Observing Facilities Assessment Panel (OFAP) Terms of Reference and Operating Procedures (17 May 2006)

PURPOSE

Geosciences research requires specialized facilities, instrumentation and field support services to carry out scientific field work that is needed to understand complex, interdependent geophysical processes. The National Science Foundation (NSF), Division of Atmospheric Sciences (ATM), Lower Atmospheric Observing Facilities (LAOF) Program, through the National Center for Atmospheric Research (NCAR) / Earth Observing Laboratory (EOL), the University of Wyoming (UWY) and the Colorado State University (CSU) sponsors these facilities and maintains and deploys them for the NSF-funded geosciences research community.

The primary function of the Observing Facility Assessment Panel (OFAP) is to provide technical assessments of facility requirements to EOL and university facility managers in order to optimize support of NSF-sponsored observational science. In this capacity, the OFAP interacts with the user community, facility providers and the funding agencies by providing valuable information and input concerning experiment design and facility usage. The feedback and technical evaluation presented by the OFAP, together with feasibility analyses and cost estimates provided by EOL or university facility managers, are taken into consideration before a final decision is made by individual NSF program officers whether to support or decline funding for a project.

COMPOSITION

The OFAP is composed of a pool of 18 scientists with broad-based experience in observational studies of the atmospheric and oceanic sciences. Members are appointed by the EOL Director based on recommendations by NSF program officers, current OFAP members, facility managers and NCAR staff. They serve staggered, four-year terms. Attendance is requested from a subset of the OFAP pool, depending on the number of facility requests received, areas of expertise required, and existing conflicts-of-interest. The usual size of the committee is 15 people and OFAP members will attend an average of six meetings during their term. The meeting is headed by the EOL Director and the OFAP chairs, who are elected by the OFAP members. The OFAP chair is expected to serve as a regular member for the first year before taking over vice-chair and chair duties during the second and third year. During the fourth year, the individual will go back to regular duties while providing guidance to the new chair if needed. OFAP members who are Principal or co-investigators are automatically excluded from meetings in which their requests are considered. In those cases where a panel member has a conflict of interest with one or more of the requested projects, s/he is excluded from participating in the deliberations and asked to leave the room for the duration of the discussion.

OFAP Process

The OFAP primarily evaluates two types of requests for facility support: those requests in support of NSF-sponsored research, which have awards from an NSF grants program or written endorsements from the appropriate NCAR division director and are eligible for NSF/ATM

Deployment Pool (DP) funds¹ support, and those for non-NSF-sponsored activities, which are funded by other agencies. In addition, the OFAP also reviews requests for a small number of NCAR facilities that are not currently covered by the DP but require special funds from the sponsoring NSF program officer. In all cases, NSF-sponsored research takes precedence over other requests.

Meetings

The OFAP meets twice per year at NCAR/EOL in Boulder, Colorado. Meetings are held in spring (May) and fall (November) over a three day period. The main purpose of the meeting is to evaluate all facility requests and EDOs received for a given deployment time frame. As time allows, meetings may also include information items from NSF, NCAR and the universities, as well as technical/scientific briefings on past and future field programs and new observing system developments and upgrades.

Preparation for Meeting: NCAR/EOL is responsible for handling all organizational, logistical, and clerical support for the meeting. In this capacity, EOL coordinates and distributes all materials, maintains the OFAP web site, develops the meeting agenda, maintains and updates long term facility request schedules, and assists the OFAP chair and vice-chair in conducting the meeting. All responsibilities are carried out in consultation and close coordination with the NSF ULAFOS Program Officer, the OFAP chairs, facility managers, and others as appropriate.

Facility Request Procedures: Request procedures depend on the overall cost of a project. Facility requests for “small projects” defined as requests for deployment pool funds under \$1 million can be submitted for either the spring or fall meeting, one year ahead of the deployment phase. “Large projects”, defined as requests costing more than \$1 million in DP funds or as projects of significant complexity (as judged by the responsible NSF program officer), require additional supportive documentation, specifically an Experiment Design Overview (EDO) and a Scientific Project Overview (SPO). While small projects are considered at both meetings, EDOs for large projects are only considered once per year during the spring meeting two years ahead of the requested field program. If encouraged by the appropriate NSF program officers, facility requests for large projects are then evaluated during the following fall meeting (for more details see “Appendix II: New Policies, Procedures and Guidelines for Science Programs that Require Field Facilities” in this document).

Feasibilities and Cost Estimates: Once the PI(s) have sent a facility request to EOL and/or the universities via email to the appropriate contact person (<http://www.eol.ucar.edu/requests.html>), the material is posted on the OFAP website. The OFAP web site is password protected and only

¹ The NSF deployment pool is funding dedicated to the exclusive support of expenses directly associated with the deployment of the NSF Lower Atmospheric Observing Facilities for NSF-supported research. Allowable expenses include extraordinary salaries and benefits, aircraft /field system operations, travel, materials and supplies, purchased services including equipment rental. Non-allowable expenses include regular salaries and benefits, operation and maintenance, research and development costs, PI expenses, non-NSF supported instruments and observing systems.

accessible to NSF and NCAR/EOL staff, university facility managers and OFAP members. Facility managers identify one “Project Facilitator” for each project, who is an EOL/university employee and usually responsible for preparing at least one feasibility analysis. At the same time, EOL, in consultation with the universities, produces a global feasibility analysis that takes into consideration staffing and facility resources, and lays out all possible project combinations that can be accommodated. The global feasibility, together with cost estimates and feasibility analyses, is forwarded for review to NSF two months before the OFAP meeting. At the same time, copies of the cost estimates and feasibility analyses are provided to the requesting PI(s).

OFAP Responsibilities: Each OFAP member has access to all facility requests, feasibility analyses and cost estimates as well as other necessary information via the web site. OFAP members are queried for their review preferences and conflicts-of-interest before they are assigned by EOL as reviewers for requests in their area of expertise. EOL management assigns one lead and two to three additional reviewers from the OFAP for each major request. About one month before the meeting, each reviewer receives copies of the relevant materials, including requests, portions of the scientific proposal, feasibilities, cost estimates, presentations and other information relevant to each assigned facility request. Reviewers are encouraged to contact PIs through the project facilitators prior to or during the panel meeting to clarify all aspects of the request.

Reviewers are asked to evaluate each request on the basis of the following criteria:

- (1) *Importance/Uniqueness of Project:* While it is not intended for the OFAP to supplant or second-guess the normal peer-review process for the scientific proposals associated with a facility request, the evaluation of a facility request can only be reasonably accomplished in the context of the overall scientific plan.
- (2) *Experiment Design:* Special consideration is given to the entire program perspective, the adequacy of the plan for hypothesis testing or problem definition, the readiness and structure of the program, strengths/weaknesses of the experiment design and its adequacy to achieve the stated scientific objectives. Attention is also paid to requested resources (e.g., flight hours) and whether they are appropriate to accomplish the scientific objectives, and safety considerations.
- (3) *Project Management*
- (4) *Data Management and Dissemination*
- (5) *Educational Benefits:* The educational benefits derived from the project, especially the involvement of graduate and/or undergraduate students in a meaningful way, is addressed.
- (6) *Qualifications of the Proposer (s).*
- (5) *Other:* Any other comments/concerns.

Each reviewer provides a short summary of his/her comments to EOL via email a few days ahead of the meeting. These comments are distributed at the start of the OFAP deliberations to the panel, NSF representatives and EOL/university management.

Request Evaluation Process during Meeting: All requests and EDOs are evaluated in executive session, and the OFAP chair and the EOL director reserve the right to limit participation. Participants in the deliberations usually include OFAP members, NSF representatives, EOL and university management, project facilitators, project managers and facility administrators. In case

of major, multi-agency field programs, other federal program managers may be invited to attend as well.

At the beginning of the evaluation, the NSF Lower Atmosphere Research Section (LARS) representative comments on the status of the NSF research proposal associated with each facility request. If the request is from an NCAR scientist, an NCAR division director or designee comments or provides a letter and approval of any required additional support (e.g., divisional support, travel funds). In the case of major facility requests, EOL in consultation with NCAR scientific division directors orally summarize the results of an anonymous peer review. In situations where major scheduling or funding conflicts exist among the requests under consideration, NSF provides priority guidance to EOL. If NSF has decided not to support a project or if a project has failed to receive endorsement of an NCAR division director, it will be removed from formal consideration by the OFAP, although suggestions for improvement or other helpful comments from the OFAP are still appropriate.

The OFAP chair then determines the order in which the requests are introduced, considering such factors as conflicts-of-interest (see Appendix 2), availability of project facilitators and reviewers and effective use of the panel's time.

Each request is introduced by the lead OFAP reviewer who will summarize the scientific objectives and hypotheses in a short presentation, followed by a summary of the technical feasibility presented by the NCAR/university project facilitator. Each assigned OFAP reviewer then presents his/her evaluations using the criteria listed above before the discussions are expanded to all attendees (including facility managers, project facilitators and EOL project managers). If a question arises that requires clarification, the EOL project facilitator may contact the PI for details.

The OFAP considers all NSF pending and supported requests before finalizing its findings. For each request, the OFAP provides a written assessment to EOL management regarding deployment of a requested facility, which will be shared with the PI, the NSF ULAFOS Program Officer and the Facility Managers. Summaries will focus on, but are not limited to, a specific allocation of facility usage (e.g., days in the field and/or number of flight hours), the amount of deployment funds, suggested adjustments to the experiment design (e.g., alternate flight plans, scan strategies, increases/decreases of flight hours) and possible schedule modifications, if necessary.

Under certain circumstances, NSF-sponsored observing facilities may be allocated for use by non-NSF-sponsored projects on a cost-recovery basis. All costs for these projects must be covered by the sponsoring agency and are recovered by the divisional and/or university facility. To be allocated, such non-NSF projects must meet the principle of there being a "net benefit to the NSF community", which can be based on, but not limited to, one or more of the following criteria:

- The project supports or enhances the science objectives of the NSF-sponsored community.
- The project provides desirable practical training and experience for facility staff.

- The project provides revenues that significantly enhance the objectives of an NSF-sponsored facility development.
- The project meets a national need to which NCAR or other NSF-sponsored facilities can uniquely contribute.

The procedures for OFAP review and assessment of facility requests associated with non-NSF-sponsored projects are similar to those described earlier for NSF-sponsored programs. NCAR management shall only be concerned with such requests and associated OFAP findings from the aspect of ensuring that the requests are not in conflict with funded NSF programs. EOL management, in consultation with NSF will then determine whether a facility can be made available to non-NSF projects. Non-NSF sponsored requests for the University of Wyoming King Air are handled by the University of Wyoming without OFAP involvement. Under certain circumstances, the OFAP review for a cost recovery project can be waived at NSF's discretion.

Post-meeting Procedures: Immediately following the meeting, the OFAP assessments are shared with the PI, the Facility Managers, the NSF LARS Program Officer and other attending NSF representatives. While the OFAP assessment is an important part of the facility allocation decision, the funding decision for a field deployment is solely the responsibility of the individual NSF program officers, and is dependent on the successful review of the supporting science proposals. Allocation decisions for NCAR-sponsored projects will be made by NSF dependent on the successful review of the supporting science proposal(s) and resources available. Once EOL and the university managers receive notice from NSF about a funding decision, a letter is sent to the requesting PI(s) informing him/her whether the requested facility will be made available or not. The support letter includes details about the amount of resources allocated, the time frame for the project, the name of the responsible facilities project manager and any other pertinent information.

At the end of each project, the PI is required to fill out an EOL/university evaluation form to provide feedback on the actual field deployment and staff performance.

APPENDIX V: CONFLICT OF INTEREST GUIDELINES FOR THE NCAR OBSERVING FACILITIES ASSESSMENT PANEL (OFAP), PROJECT FACILITATORS AND OTHER OFAP PARTICIPANTS

(April 2006)

Purpose

It is NCAR policy that the Observing Facilities Assessment Panel (OFAP) procedures for evaluating National Science Foundation (NSF) observing facility requests are fair and equitable to all requestors, and protect the integrity of the research, science, the NSF and NCAR. Recommendations are to be based on objective judgments of merit without regard to subjective personal biases. The guidelines and ethical standards presented here provide a framework by which conflict of interest (COI) situations can be identified and resolved, thus minimizing the level of personal bias in the facility use and field project assessment process.

A conflict of interest is a clash between an individual's concern for the public interest or the best interest of NCAR and his or her private interests or allegiances. Conflicts of interest, actual or perceived, may compromise NCAR's integrity and standing in the research community, its sponsors, and the professional reputations of individuals. They also compromise the effectiveness of the decision-making process by warping and biasing such effectiveness. As such, conflicts of interest must be scrupulously avoided.

Individuals involved with OFAP activities shall act impartially and not give preferential treatment to any individual or organization, may not use their position on OFAP or knowledge gained through OFAP activities, to obtain a personal advantage either for themselves or for any other person or entity in whom or in which they have a financial or other vested interest. Potential and actual conflicts of interest, or the appearance of such, must be managed so that NCAR's assessment process is not compromised, research conducted through NCAR is free from bias, the investment of the public is protected, and confidence in the integrity of NCAR's activities is maintained.

Conflicts of interest are common and even inevitable, so that a disqualification to review should be understood to be a positive solution and in no way is a reproach. Whether particular circumstances create an appearance that the ethical standards outlined in this document have been violated shall be determined from the perspective of a reasonable person with knowledge of the relevant facts.

Responsibilities of Members

Appointment as an OFAP member requires awareness of COI situations that may arise during the evaluation of facility requests.

Conflicts of interest may arise, for example, in the following situations: professional and personal relationship with a requestor or requestor's department; use of inside information or access to such information; financial, investment, or other ownership interests; use of confidential information; subcontracts with employees their immediate families and their business associates; work with UCAR/NCAR contractors; involvement in legal actions against

the Federal government and other sponsors; improper use of the UCAR or NCAR name or affiliation; and improper use of NCAR facilities and resources.

The procedures followed with regards to COIs and OFAP activities are those of Disclosure, Avoidance, and Removal.

Disclosure. In some instances, a COI is known only to the individual panel member. Each panel member is responsible to declare immediately each COI and to bring the matter promptly to the attention of the OFAP chair (Chair). The Chair, acting as an objective disinterested third party, determines how the matter should be handled and additional steps, if any, to take. Simply stating and documenting the existence of a conflict of interest does not suffice to eliminate it. A written record of how each conflict was resolved for each OFAP panelist shall be compiled by the Chair as part of the official record of the meeting.

Avoidance. Members should avoid all conflicts or interest or the appearance of such. In the course of their duties with OFAP, members should avoid situations in which they can influence or appear to influence a decision or course of action, as well as any actions that may give monetary gain or personal benefit to themselves or to those with whom they are associated professionally and personally, as covered under the relationships discussed infra.

Removal. In instances where the Chair has judged that a COI exists between an OFAP panelist and a particular proposal (such as through institutional affiliation or relationship), the conflicted panel member shall physically leave the room during discussion of the proposal. A conflicted member shall be allowed back into the meeting room after conclusion of the discussion of the conflicted request and may be present for the panel summary of all requests but may not comment on any requests for which (s)he is conflicted. In those instances in which an OFAP panelist is a Principal Investigator (PI) or Co-Principal Investigator (CO-PI) on a current facility request, that panelist shall be excused from attending the entire OFAP meeting to avoid being part of the evaluation process. In other instances in which a COI is disclosed, and the Chair has judged it to be minor, the panelist may continue to participate in the discussions.

Project Facilitators are considered a critical part of the OFAP process by serving as technical advisors to the panel. To avoid possible conflicts, their advice to the OFAP shall be limited to technical aspects of the facility request related to implementation of the field program such as timing, costs, and technical feasibility. A Project Facilitator may present the scientific goals underlying the facility request but shall not discuss the scientific merits surrounding the facility request.

Examples of Conflict of Interest Situations

Conflicts of Interests exist for any of the relationships below:

- (1) **Affiliations with a requestor's institution:**
 - Current employment (formal or informal) within the same department or institution. In case of UCAR/NCAR employees, conflicts exist within the same division, Institute or Laboratory.

- Any affiliation with the requestor institution including, but not limited to, current membership on a visiting committee or similar body at the requestor's department, holder of any office, governing board membership, or relevant committee chairpersonship in the requestor's department.
- Currently seeking employment with the institution.

(2) Relationships with an Investigator or other person who has a personal and/or financial interest in the request and/or proposal:

- Known family or marriage relationship.
- Business or commercial partnership.
- Present association as primary thesis advisor or thesis student or past association in such a capacity over the last ten years.
- Professional collaboration involving research and publication over the past four years or as Principal Investigator and Co-Principal Investigator on a current facility request.

(3) Other relationships with the requestor or the request:

The interests of the following persons are to be treated as if they were the panel member's own:

- A competitive relationship, such as would exist if the panel member was a PI or Co-PI on a proposal or facility request that competes for schedule, facilities, or other resources with the program under consideration by the OFAP.
- Any other relationship, such as close personal friendship that might affect the member's judgments, or be seen as doing so by a reasonable person familiar with the relationship.
- Any other conflicts known to the panel member that would prevent him/her from reviewing a project in a non-biased, fair and objective way.

OFAP participants are encouraged to seek guidance on these conflict of interest guidelines at any time. For UCAR/NCAR employees other policies may apply, including: Conflict of Interest (1-1-4), Ethical Conduct (1-1-23), and Investigator Financial Disclosure (1-1-27).

APPENDIX VI: STANDARD INFORMATION TO COST ESTIMATES

(1 October 1996)

1. The National Center for Atmospheric Research (NCAR) is operated by the University Corporation for Atmospheric Research (UCAR), under the sponsorship of the National Science Foundation (NSF). UCAR rates are approved annually by NSF, our cognizant audit agency. Out-year rates are estimated based on current rates and are subject to change. During certain time periods, budgets may include proposed rates, which are subject to review and approval of NSF.
2. The salary budget includes direct labor charges only for time worked. The employee benefit rate includes direct charges for non-work time of vacation, sick leave, holidays and other paid leave, as well as standard staff benefits. The casual benefit rate applies to casual employees who do not receive the full benefit package.
3. Indirect costs are applied to all modified total direct costs (MTDC). Excluded from MTDC are items of equipment costing \$5000 or more, participant costs and individual subcontract amounts in excess of at least \$25,000 per fiscal year.
4. The UCAR Management Fee is a fixed fee, calculated as a percentage of proposed MTDC and NCAR applied indirect costs.
5. The budget may include a charge for scientific computing and networking support in accordance with OMB circulars and NCAR management policy allocating the costs of scientific computing system infrastructure.
6. Co-sponsorship of Non-NSF and NSF Special Fund research at NCAR is monitored by our sponsor, the National Science Foundation, in accordance with criteria and guidelines approved by NSF Division of Atmospheric Sciences.
7. For federal interagency agreement fund transfers, NSF administrative cost recovery is applied at the current rate to total transfers. As a condition of NSF's entering into an interagency agreement or fund transfer, other federal agencies must agree to the following conditions:

NSF will implement the agreement by a Scientific Program Order/Amendment issued to the University Corporation for Atmospheric Research under Cooperative Agreement No. ATM-9209181, or any successor agreement, and NSF will not, itself, be directly responsible for the provision of the goods or services contemplated under NCAR's proposal to the other federal agency. NSF assumes no liability for any costs above the funds obligated against program orders. NSF may recover administrative costs consistent with foundation policy.

For funds provided by federal interagency agreement or fund transfer with NSF, the contact is Mr. Brian Mannion, Contracting Officer, Division of Grants and Agreements, National Science Foundation, 4201 Wilson Boulevard, Room 495, Arlington, VA 22230; Telephone (703) 306-1213, FAX (703) 306-0275. If a proposal was written with the expectation of being funded by interagency transfer, the total funds requested include funds to cover NSF's administrative costs,

based on NSF's current rate, related to undertaking this activity. The following language should be included in the interagency transfer documentation:

"This agreement includes funds to cover NSF's administrative costs related to undertaking this activity." Please refer to the NCAR proposal number on all correspondence with NSF.

For funds provided by direct agreement with UCAR, contractual arrangements should be made with Mrs. Melissa Miller, Director, UCAR Contracts, P.O. Box 3000, Boulder, CO 80307-3000; Telephone: (303) 497-8575, FAX (303) 497-8501. Please refer to the NCAR proposal number on all correspondence with UCAR.