



Procedures and Guidelines

DIRECTIVE NO. 900-PG-1710.1.1B
EFFECTIVE DATE: August 30, 2002
EXPIRATION DATE: N/A

APPROVED BY Signature: Original Signed By
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TITLE: Director of Earth Sciences

Responsible Office: 900/Earth Sciences Directorate

Title: Science Research

PREFACE

P.1 PURPOSE

The purpose of this Procedure/Guideline is to define the process of science research in the Earth Sciences Directorate.

P.2 APPLICABILITY

This procedure applies to all science research within the Earth Sciences Directorate.

P.3 AUTHORITY

GPG-8730.3, The GSFC Quality Manual

P.4 REFERENCES

- a. GPG 8730.3, the GSFC Quality Manual
- b. Visiting Committee Reports and Records

P.5 CANCELLATION

900-PG-1710.1.1 Science Research Management

P.6 SAFETY

N/A

P.7 TRAINING

N/A

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P.8 RECORDS

Record Title	Record Custodian	Retention
Employee performance plan	Directorate, Division and Branch Offices	5 CFR 293.404 (a) (I)(i) 4 yrs.
List of published papers	Directorate and Division Offices	Indefinite
Visiting committee reports	Directorate, Division and Branch Offices	5 yrs.
Memos for identifying extraordinary science expertise projects	Directorate Office	Life of project

P.9 METRICS

None identified at this time.

P.10 DEFINITIONS

PROCEDURES

Scientific research (in the limited context of Earth science at the Goddard Space Flight Center) involves the conception, development, fabrication, and operation of Earth science instruments, and the subsequent analysis of their data in the context of theoretical models. It also includes laboratory and field experimentation and theoretical modeling. The ultimate objective is the derivation of fundamental knowledge. By its very nature, scientific research is not amenable to detailed instruction, but is broadly guided by the scientific method. The scientific method is an integral part of advanced education in the physical sciences, so that peer review is the most appropriate mechanism to determine the extent to which research is being performed in accordance with its principles. The Earth science research process responds to national and Agency needs as determined by the Earth science community. Various opportunities are announced for competition publicly, as for example, through an Announcement of Opportunity (AO). Scientists propose for these opportunities and, if successful, are funded for the research.

Earth science research can be categorized into four general areas.

1. In its colloquial definition, theoretical research or data analysis, it refers to research, which is evaluated by external peers. This evaluation is done through peer-reviewed papers and visiting committee reports (See P8. Records).
2. Internal research in the laboratory and field work (in situ, airplanes, balloons, sounding rockets) used to develop new detectors, measurement techniques, data center value added products, etc., has no

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immediate external customer. These processes are not amenable to strict process and/or design control because of the unknown nature of the results. The work, however, eventually leads to better theoretical models or to flight instruments.

3. The third category is the development of flight hardware done within the Directorate that is subject to all the GSFC QMS requirements.

4. The final category is the production of space flight instruments (whole or part) in which an extraordinary level of scientific expertise is necessary beyond which might be achieved by a conventional QMS. The quality of these products can only be assured by the experience, expertise, and personal involvement of eminent scientists who are recognized leaders in their respective fields of science. The QMS system is not sufficiently general to accommodate a fully documented replacement for the expertise of the scientist. These recognized experts validate the integrity and quality of the products. They assure the quality of the instruments so that the requirements of the proposal (customer agreement) will be met. The Director of Earth Sciences will determine when these extraordinary conditions apply, and will issue a memo designating where this applies (See P8. Records).

The validation of scientific research in the Earth Sciences Directorate at the Goddard Space Flight Center requires an appreciation of two different (if not totally separate) aspects: "excellence" and "relevance." "Excellence" is measured primarily on an individual scientist basis. Scientists are held accountable by their supervisors in their performance plans each year to assure that science research results are published with sufficient frequency in peer-reviewed journals; progress is made on multi-year research projects; contributions are made to new proposals; and that the scientist is presenting results at national and/or international scientific meetings. On average, the goals are (1) Major participation in at least one refereed publication. Both internal and external reviews are applied here; no such publications are submitted without the approval of the supervisor (where the supervisor may require additional internal review before submission), and no such submitted papers are published without the approval of external reviewers. (2) Major contribution to a new business initiative (e.g., a proposal or laboratory development activity). Here, again, approval by supervisors (and, therefore, responsibility for quality) is required in advance of proposal submission. (3) A formal oral presentation of personal research to internal or external peers. In general, no formal records are kept of this presentation. The annual employee performance plan reflects the achievement of these specific goals or their equivalent.

"Relevance" is determined on the basis of consistency with the Center and agency strategic plans, and is best measured by continued institutional support. "Excellence" is also important in achieving such support, of course, but "relevance" is necessary. An independent opinion of both of these aspects of research is provided by reviews by visiting committees. These visiting committees consist of respected members of the scientific community who are capable of assessing both how well we do our jobs (excellence) and the extent to which we are doing what the user community wants us to do (relevance). They use whatever standards they deem appropriate to measure our status, and to advise us on how to modify our approach to achieving and maintaining quality.

Generally, the end product of scientific research is the dissemination of derived knowledge to the scientific community through publication and/or presentation. Publications in refereed scientific

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journals comprise the principal products. Publication in non-refereed venues such as scientific conference proceedings and scientific reports constitute an additional set of products.

The list of publications is kept for the Directorate staff by the Directorate Office and by each Division Office for their employees; updated no less frequently than annually. Since all publications are generally available in libraries and have unique reference numbers, it is not necessary for the Directorate or Divisions to keep copies of all publications. Copies of the Visiting Committee Reports are kept in the Directorate Office, Division Offices and some Branch Offices.

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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	April 21, 1999	Initial Release
A	August 26, 1999	Broadened content to science research rather than science research management. Added a category that requires extraordinary science oversight for some instruments.
B	August 30, 2002	Updated P8. RECORDS to reflect who keeps the records. Modified the text at bottom of page 3 for agreement with this change. New PG template.

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