

A LONG-RANGE PROGRAM IN SPACE ASTRONOMY

Position Paper
of the
Astronomy Missions Board

July 1969

Edited by
ROBERT O. DOYLE
Harvard College Observatory
Cambridge, Mass.



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PREFACE

The Astronomy Missions Board was established by the National Aeronautics and Space Administration by charter in September 1967 to assist in an advisory capacity in the planning and conduct of all NASA missions to create and operate astronomical experiments in space. The scope of the Board's activities includes: development and review of the scientific objectives and general strategy for space astronomy and associated ground-based astronomy; the formulation of guidelines and specific recommendations for the design of space astronomy missions, and for the various experiments and auxiliary equipment to be developed and used on these missions; the continuing examination of policies relating to the operation of these space observatories once they have been made operational and are available for observations by the scientific community. The work of the Board encompasses the many aspects of space astronomy including direct observations of electromagnetic radiation from astronomical sources, cosmic-ray particles and the supporting research that is necessary, but its scope does not include the study of the Moon and planets from close vantage point or study of the Earth.

The Astronomy Missions Board is presently composed of 18 members of the scientific community with a wide diversity of interests and experience. They are drawn largely from universities, but include members from national laboratories (see appendix for a list of members of the Board and its panels). The Board's activities are supported and supplemented by seven panels and two ad hoc working groups to whom specific areas of responsibility are assigned. The panel compositions are similar to that of the Board itself and involve an additional 31 scientists. This wide membership provides a broad representation of current thought in space astronomy both directly through its membership and from the wider astronomical community by means of letters and discussions.

The activity of the Board has been intensive. With few exceptions, it has met monthly for 2 days at locations appropriate to its current activities. In addition to extensive deliberations and

discussions, the meetings have included reports and résumés from NASA personnel about matters such as the current status of projects then underway, present NASA plans for the future, technical reports on areas of special relevance, and budgetary aspects of current and planned programs. The panels have met several times during the past year and have taken the opportunities for obtaining firsthand information about the activities in space astronomy at various NASA centers relevant to their particular fields of interest. Again, briefings as to technical capabilities and current planning were obtained and the panels prepared detailed programs and recommendations for activities in their areas.

An important continuing activity of the Board is the presentation of specific recommendations to the Associate Administrator of NASA. Many of these recommendations have been ad hoc answers to questions raised by NASA, while others have been of a more general nature and have, in most cases, been incorporated into the body of this report. Many of these ad hoc recommendations were for the purpose of assisting NASA to optimize a low-level program, and should not be construed as approval of such a program by the Board or the scientific community.

The Board has created a long-range national program for space astronomy—including discussions of the major problems of astronomy and astrophysics, an observing program describing the next important measurements from space, and examples of the instruments, spacecraft, and missions needed to make those measurements. Specific mission descriptions are not intended as concrete definitions of future missions, but as part of an exemplary program which is used to establish the best current balance between the subdisciplines. The plan contains sufficient mission priorities and interdependences on which to base AMB advice to NASA at various foreseeable levels of effort, and should enable NASA management to assess the impact on scientific progress of the various future options available to them. The purpose of this position paper is to describe the long-range plan as it appears in July 1969.

Past experience has shown that astronomy is a field full of surprises and the unexpected, and it would be extremely shortsighted to expect this report to remain up to date for very long. This report is not intended to be a static document. It is, rather, a working paper to be updated and altered continuously by the Board as technical capabilities change and scientific opportunities and priorities evolve. Nevertheless, it seems appropriate to publish

this version of the position paper, just as it was submitted to NASA as part of the fiscal year 1971 budget planning cycle, in order to acquaint a wide community of astronomers, astrophysicists, physicists, and other interested scientists with the workings of the Astronomy Missions Board, as well as with the national space astronomy program. NASA and the Astronomy Missions Board hope in this way to continue to improve the mechanisms by which the NASA space astronomy program can get the best assistance from, and give the most help to, the entire community of astronomers and space physicists. From time to time, as the extent of the revisions makes a major part of this work obsolete, the Board will again publish an updated position paper.

The detailed reports on the subdisciplines of space astronomy, authored by the panels and endorsed in substance by the Board, will be found in Part II. Part III describes how the panels' programs were evaluated, and how parts of them were combined into long-range plans at two levels of effort—a minimum balanced program and an optimum program—both of which do not attempt simply to do everything suggested by the subdisciplines, but rather emphasize research on those problems judged astrophysically most important by the greatest consensus of the Board.

A summary of the position paper and key features of the long-range plan will be found in Part VII.

FOREWORD

The Astronomy Missions Board advises the National Aeronautics and Space Administration (NASA) through the Associate Administrator, Dr. Homer E. Newell, on the present and future of the national space astronomy program. The Board has developed a position paper which recommends to NASA an integrated space astronomy program for the Seventies. The position paper was received by NASA on July 5, 1969. Because of current widespread interest this paper is being published in its original form without any evaluation or comment by NASA beyond this statement. While NASA will be guided by the recommendations in this paper, publication of this document by NASA is in no sense either an endorsement of its contents or a commitment on the part of NASA to undertake to carry out all or any part of the proposed astronomy program.

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