

these data with the *International Tables*. The two data sets are incompatible because they are (1) derived from experiments on seawaters that did and did not vary in ionic content as a function of salinity and (2) based on different 'definitions' of salinity. In one case a constant times chlorinity was used: in the other the weight ratio obtained by diluting/evaporating a 35‰ seawater with distilled water. Then 35‰ water from any ocean was defined in turn as having a conductivity ratio of unity with standard Copenhagen water. In addition, errors in the data have been detected in the vicinity of 0°C.

CTD data reduction equations produced in various attempts to resolve these conflicts yield salinities differing by up to 0.005‰ for the same input in the oceanic range and up to 0.02‰ in coastal waters. With in situ experimental resolutions of $\pm 0.002H_{\text{‰}}$ salinity available it is essential that the existing practices be replaced by a single equation and that the chlorinity-salinity-conductivity ratio ambiguity which exists when ionic ratios change be resolved.

Salinity is frequently used as a route to density, and a 'conductivity ratio' defined salinity scale is better than a 'chlorinity' scale for this purpose because conductivity will respond to changes in any ion, whereas the latter scale is ion specific. Also, it has been demonstrated that in the hands of average observers, conductivity ratio measurements allow density to be predicted with a precision nearly one order of magnitude greater than that allowed by chlorinity measurements. For these reasons the Practical Salinity Scale (1978) breaks the existing chlorinity-salinity tie in favor of a definitive salinity-conductivity ratio relationship; all waters of the same conductivity ratio then have the same salinity. Seawater of 35‰ is not of any particular ionic content and is defined as having a conductivity ratio of unity at 15°C with a standard potassium chloride solution. Nevertheless, to provide continuity with previous scales, the seawater selected for initial comparison with the KCl solutions was from the North Atlantic and had a chlorinity of 19.3740‰. It was this standard, diluted/evaporated by weight with distilled water, that gave the salinity-conductivity ratio data used for the definition of practical salinity.

The argument leading to the Practical Salinity Scale (1978) and its consequences in terms of density calculations for waters of differing ionic content are explored in detail by *Lewis and Perkin* [1978]. We hope to receive comment on the newly proposed scale from interested individuals or agencies before further action is taken. Consideration will be given to all briefs received before July 31, 1979. Please respond to E. L. Lewis, Working Group on Electrical Conductivity of Seawater, or N. P. Fofonoff, Chairman, Joint Panel on Oceanographic Tables and Standards, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543.

References

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- Lewis, E. L. and R. G. Perkin, Salinity: Its definition and calculation, *J. Geophys. Res.* 83, 466-478, 1978.
- Unesco, Table One, in *National Oceanographic Tables*, National Institute of Oceanography, Great Britain and Unesco, Paris, 1966.
- Unesco, Eighth report of the joint panel on Oceanographic Tables and Standards, *Unesco Tech. Pap. Mar. Sci.*, 28, 1978.
- Unesco, Ninth report of the Joint Panel on Oceanographic Tables and Standards, *Unesco Tech. Pap. Mar. Sci.*, XX, 1979.

NSF New Geophysical and Environmental Program

The National Science Foundation has formed a new program for applied research in all the geophysical sciences—earth, oceanographic, and atmospheric. This program is located in the Applied Research Division of the Directorate for Applied Science and Research Applications (ASRA). The objective of the Division of Applied Research is to provide an improved scientific understanding of a range of technical, social, economic, and policy problems and to increase the rate of technological innovation growing out of significant discoveries in various fields of science and engineering.

The program for Applied Geophysical and Environmental Sciences will support research to accelerate the rate of technological innovations based on advances in the atmospheric, oceanographic, and earth sciences. This includes, but is not limited to, new or unique methods of exploring for terrestrial or seabed resources as well as techniques for improving the extraction of resources and mineral processing. Ideas that investigators have for the applied research in the geophysical sciences may be discussed with the program manager prior to submittal or submitted as a proposal. Preliminary proposals are not accepted. Proposals should be in the format described in *Guidelines for Preparation of Unsolicited Proposals—ASRA*, NSF Publication 78-46. Copies of the guidelines may be obtained from the National Science Foundation, Washington, D. C. 20550. The deadline for the submission of proposals in order to meet the date of review by the advisory panel is April 1, 1979 for fall funding. For more information, contact A. Inderbitzen, Program Manager for Applied Geophysical and Environmental Sciences, (202) 634-1607. Proposals regarding extraction or processing technology should be submitted to T. Mukherjee, (202) 634-1615.

UFO's

It's a bird! It's a UFO! Or maybe it's simply a flock of moths setting off a St. Elmo's fire-like corona discharge. This is the message of recent correlations between a series of nocturnal UFO sightings in Utah between 1965 and 1968 and known infestations of spruce budworm moths in that area.

Philip S. Callahan and R. W. Mankin with the U.S. Department of Agriculture (USDA) Research Laboratory in Gainesville, Florida, recently reported in *Applied Optics* on their work showing that when insects are placed in an electric field, an electrical discharge can occur in the immediate vicinity. That discharge, they explain, is accompanied by the emission of visible light that could be mistakenly attributed to a UFO. Likening the process to the phenomenon known as St. Elmo's fire, the USDA researchers point out that ghost stories and tales of apparitions surrounded past sightings of the corona discharge typically seen in stormy weather at church steeples and prominent points of sailing ships.

Perhaps UFO's, a modern apparition, can be explained by similar natural phenomena. Callahan and Mankin detail the moth-to-UFO scenario as follows: Under certain weather conditions, very strong electric fields can be present in the atmosphere. Also, when particulate pollution is high, frictional processes can produce static electric charges and large fields. If the electric field is large enough, electrons can be pulled away from pointed, exposed surfaces. An avalanche of such electrons would then excite atmospheric gas molecules, which subsequently would emit visible light. That light is predominantly blue, indicating that most of the radiation is from nitrogen. Such corona discharges occur only from conductors, such as the body fluids of a

live insect. A fairly large swarm of night-flying insects would be required for a corona discharge to be mistaken for a UFO, since the discharge from a single insect is visible only as far away as 6 meters in a dimly lighted laboratory.

Agricultural records show infestations of spruce budworm moths in Utah for 2 years preceding the outbreak of UFO sightings there. Those sightings took place just when mass migrations of the insects, in clouds 102 km long and 25 km wide, would be expected to occur. Thus Callahan and Mankin believe a significant number of the more than 30,000 sightings reported to the U.S. Air Force could be nocturnal light sightings and that those too might be correlated with insect infestation.

New Publications

The Study of Travelling Interplanetary Phenomena

Astrophys. and Space Sci. Libr., vol. 71, edited by M. A. Shea, D. F. Smart, and S. T. Wu, D. Reidel, Hingham, Mass., xii + 439 pp., 1977, \$38.00.

Reviewed by J. R. Jokipii

This book contains the proceedings of the L. D. de Feiter Memorial Symposium on the Study of Travelling Interplanetary Phenomena, held in Tel Aviv, Israel, June 7-10, 1977.

The book and the symposium were dedicated to L. D. de Feiter, a Dutch space scientist who was active in initiating these studies of travelling interplanetary phenomena, who died in 1975. The book begins with a tribute to de Feiter written by C. de Jager.

The Study of Travelling Interplanetary Phenomena (STIP) is a study established by the International Council of Scientific Unions' Special Committee on Solar-Terrestrial Physics. It is stated in the forward to this book that the scientific objectives of STIP are the study and search for understanding of the quiet and active periods in the interplanetary medium. In other words, STIP concerns itself with essentially all of what is conventionally called 'interplanetary physics.'

The papers published in this volume concern some of the many areas of interest to the study of the interplanetary medium and emphasize the study of the propagating phenomena such as shock waves and turbulence. However, several areas of interplanetary physics could not be included in a volume of this size. Hence this book must be regarded as a statement of current views in a subset of the various areas comprising solar and interplanetary physics. There are six major subdivisions to the book. The first considers various aspects of solar physics as they impinge on interplanetary phenomena. The second concerns radio observations, including interplanetary scintillations. The third considers solar wind theory and observations. The fourth concerns cometary topics. The fifth concerns itself with propagation of solar cosmic rays and particles thought to be accelerated in interplanetary space, and the sixth concerns specific STIP time intervals.

I would disagree with the statement of the editors in which they claim that the papers in this volume are generally of a review nature. Most of the papers must be regarded as being essentially summaries by the various authors of their own current research. The (entirely appropriate) purpose of the volume appears to have been to give these authorities a place where an extended synthesis of a number of their papers could be presented. Most of the papers mention other works only incidentally and are concerned primarily with the research programs of the authors themselves. The chief exception to this case appears to be the excellent paper by Axford, which presents an overview of the current situation in the structure of the interplanetary medium in three dimensions. The paper by Houminer also gives a good summary of the general area of interplanetary scintillations, and the paper by Shea et al. summarizes events during STIP intervals. In most of the other articles the great majority of the references in figures and tables are to papers written by the author or in which the author was a coauthor. This is not inappropriate in such a volume, in which the authors have indeed made substantial and important contributions to the various fields they considered, but the reader should not expect to get an overall review of a field.

The reviewer was unsuccessful in attempting to determine the precise focus of this volume. As was mentioned above, STIP concerns itself with most of interplanetary physics, and what is presented in this volume appears to be a selection of a number of various special topics from the general topic. Thus for example, the general problem of interplanetary waves and turbulence is only discussed in passing by a number of authors. The whole topic of the modulation of galactic cosmic rays by the solar wind is discussed only briefly by Axford. There are three papers on the interaction of the solar wind with comets, and yet there is absolutely no discussion of the interaction of the solar wind with planets or the moon.

I found the individual articles to be of a high caliber and level of competence. The authors are all at the forefront of their particular area of interplanetary research. The reader of this book will obtain from each of the articles an authoritative view of the problem area under consideration. The only real limitation of the book is the fact that it was not possible within the constraints of a finite volume to present all points of view, nor to present discussion of all topics in interplanetary physics. Nonetheless, this reviewer recommends this book as an excellent source reference for current views