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GUEST EDITOR'S INTRODUCTION

Measuring ocean waves from space has long been recognized as a promising possibility of satellite oceanography. From the summary statement of the proceedings of a 1965 Woods Hole symposium on *Oceanography from Space*[1]:

> Wind waves and swell constitute another field which requires the extended perspective of an elevated viewpoint for complete observations. Attempts to derive the wave field from data taken at a few discrete points are always hopelessly incomplete. What is needed is the directional and energy spectrum of waves on a two-dimensional surface, and for this the vantage point offered by a satellite is ideal. It is within the capability of present day technology to give a complete description of the sea surface. The usefulness of such information both to the theoretical oceanographer and to the marine engineer would be difficult to overestimate.

Fourteen years later, as an experimental adjunct on Seasat in 1978, NASA launched a high-resolution synthetic aperture radar (SAR) to monitor the spatial patterns of "waves on a two-dimensional surface" or, in more precise oceanographic terms, to monitor the spatial evolution of the surface-wave directional energy spectrum. Throughout most of the short lifetime of Seasat, the SAR did indeed reveal a remarkable abundance of ocean-surface patterns that included countless images of ocean waves. But in spite of an initial euphoria, no clear consensus emerged on the practical value of spaceborne SAR for making quantitatively useful estimates of the directional wave spectrum. On the contrary, scientific debate on the subject intensified with the new data set.

Then, in late 1984, with its second Shuttle Imaging Radar experiment (SIR-B), NASA provided another opportunity to collect extensive SAR ocean-wave imagery from space. This time, some of the SAR imagery was gathered over an ocean site monitored simultaneously with newly developed aircraft radar sensors capable of estimating the directional energy spectrum with a spectral resolution greater than any of the conventional in-situ (wet) techniques. Motivated largely by these new SIR-B spectral intercomparisons, a symposium, "Measuring Ocean Waves from Space," was held at the Applied Physics Laboratory on April 15–17, 1986. Its three major objectives were to re-examine the scientific and operational motivation for measuring ocean waves from space, to review the SIR-B results and their implications, and to explore and debate the benefits of a global wave-monitoring capability.

The three objectives are mirrored in the thematic sections in this record. The first section addresses how an understanding of ocean waves is directly related to some important scientific and operational questions. The second describes some recent advances in directional wave-measurement techniques, emphasizing especially the SIR-B results and their implications. The third section explores various aspects of one potential satellite wave-measuring concept. In a transcript of the concluding panel discussion, members of the first group of authors respond to the recent results and to future concepts presented by members of the second and third groups of authors. The entire collection of articles is introduced and summarized in the overview authored by two of the symposium participants.

Why was the symposium held at APL and its results published herein rather than in one of the more conventional journals? Because further progress now depends on unprecedented international and interdisciplinary cross-fertilization among theorists, wave modelers, experimentalists, users, and implementers; because, as a major participant in the SIR-B oceanography investigations, APL could serve to catalyze the ideas of various disciplines; and because no other established journal would publish such an apparently disparate, but comprehensive collection of articles on a single subject in a single issue.

Many people contributed to make both the symposium and this permanent record possible: the Space Shuttle Challenger 41-G crew from NASA/Johnson Space Flight Center and the SIR-B Experiment Team from the NASA/Jet Propulsion Laboratory, who provided a truly unique data set in spite of a long and largely untold sequence of adversities; the symposium speakers, most of whom interrupted their own activities to participate and, more important, to commit their thoughts to paper; the Editorial Board of the *Johns Hopkins APL Technical Digest* (particularly the former chairman, Walter G. Berl, who actively supported this unique expansion of the normal format); and most of all, the members of the production staff, who finally had to produce this noteworthy issue, all the while maintaining their customary high standards and good humor.

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[1] *Oceanography from Space,* G. C. Ewing, ed., Woods Hole Oceanographic Institution (1965).