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9) FINAL REPORT

Submitted to:

Office of Naval Research

Arctic and Earth Sciences Division

Geography Programs

Coordination of Marine Remote Sensing Activities

With Special Emphasis on MARSEN

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Introduction

Rapid developments in application of remote sensing techniques to oceanography came about because of the Seasat-1 initiative, the first oceanographic satellite designed to demonstrate such proof of concept. Simultaneous with and complementary to the Seasat objective, large-scale experiments were conducted to provide insight on the interaction between electromagnetic waves and the ocean surface. The Marineland and West Coast Experiments were the forerunners of such experiments. MARSEN was conducted during 15 August - 15 October, 1979 as the third of such large scale experiments. The present effort was staged to provide communication between and coordination of the various elements involved in the MARSEN field operations.

Activities and Accomplishments

The successful planning and execution of the MARSEN Experiment is the most significant accomplishment of the effort reported here. In the following the important specific events are listed:

1. Initiated discussions that formulated the concept, objectives and scope of the MARSEN Experiment. The concept was formalized at a meeting held in Hamburg in December 1977. At this meeting Klaus Hasselmann accepted to be the Principle Investigator of MARSEN.
2. Wrote the "MARSEN Test Plan" which was published in April 1978.
3. Participated in the meeting held in St. Croix, Virgin Islands, in April 1978, to coordinate efforts associated with NORSEX and MARSEN.

4. Presented the MARSEN Plan to the NATO Special Program Panel on Air-Sea Interaction held in Brussels in April 1978. At this meeting support for the MARSEN field operations was requested.
5. Met with the NORSEX Principle Investigators in Bergen, Norway in April 1978 to determine the NORSEX aircraft requirements in April 1978.
6. Met with United Kingdom scientists in April 1978 to define the scope and objectives of the oceanic front experiment. The results of this meeting were incorporated in the revised "MARSEN Test Plan" which was produced in June 1978.
7. Prepared the proposal for NASA participation in MARSEN. The proposal incorporated participations from the various NASA centers and was submitted to NASA Headquarters in June 1978.
8. MARSEN progress was presented to NATO Special Program Panel on Air-Sea Interaction held in Brussels in October 1978.
9. Additional meteorological capabilities were solicited for MARSEN. Dr. Kristina Katsaros was asked to coordinate all atmospheric related experiments.
10. Support for the proposed MARSEN proposal was secured from NASA Headquarters. The NASA support covered all elements of the proposal in (7).
11. The Test Director for MARSEN was identified. Mr. Jim Blee was selected for his successful contributions (in similar capacity) to the Marineland and West Coast Experiments.

12. Coordination of all U. S. investigations in MARSEN was accomplished in a meeting held in February 1979 at Wallops Flight Center. A summary of proceedings was produced and attached to the MARSEN Test Plan as an Appendix.
13. Progress report on MARSEN was given at the ONR - Geography Programs Annual meeting held in Baton Rouge, Louisiana in May 1979.
14. Progress report on MARSEN and NORSEX were given at the NATO - Special Programme Panel on Air-Sea Interaction meeting held in Woods Hole in May 1979.
15. Developed detailed plans for CV-990 flights in MARSEN and NORSEX in collaboration with staff personnel at NASA - Ames Research Center.
16. Participated in formulation of plans for USAFE: RF-4C flights in MARSEN. Meetings with ERIM and Ramstein personnel were held.
17. Noordwijk tower activities were coordinated in a meeting with responsible Dutch MARSEN participants. Professor Longuet-Higgins was invited to join MARSEN with a wave breaking buoy.
18. The field operations of MARSEN were executed exactly as specified in the Test Plan. A coordination center was established in Westerland Sylt. Numerous meetings were held in various areas to insure success of field activities.
19. Noordwijk tower investigations were extended to expand data base to cover high wind conditions. The field operations were finally terminated on 30 November 1979.

20. A post experiment meeting of U. S. Investigators was held in Washington, D. C. to coordinate initial data analysis in advance of the general MARSEN Investigator's meeting.
21. MARSEN Data Analysis Workshop was held in Pasadena in January 1980. Thirty-one data sets and twenty-two research topics were outlined. A report on the proceedings of this meeting was produced.
22. A poster session on MARSEN was held at the American Meteorological meeting held in Los Angeles in January 1980. Successful reporting of MARSEN activities to the scientific community was accomplished.

Summary and Conclusions

The careful and advance planning for the MARSEN Experiment achieved unprecedented success in soliciting financial support for this complex experiment. The experiment was successfully executed according to the MARSEN Test Plan. It is estimated that 90 - 95% of all data sought after was acquired. The extensive data sets and research topics are summarized in a Data Analysis Plan which will serve as a guide for the data analysis phase until the results are reported in the technical journals.

Hours Expended for the Research Effort

Over a period of 24 months a total of 700 hours were expended on this research effort.