

recommendations of WG 23 should materialize: The workshop on zooplankton fixation and preservation recommended by WG 23 should be held.

Recommendations

1. The Working Group should continue its present work till the experiments can be evaluated and the results be reported, by the end of 1971 or the beginning of 1972. Travel grants for Dr. Steedman's visits to SOSC should be envisaged, and the chairman should be enabled to visit Dr. Steedman in 1971 for discussion of the final report.
2. A workshop should be organized for exchange of information and for application of methods of fixation and preservation. The draft report on the present experiments carried out under the supervision of Dr. Steedman should be critically analyzed before publication. Recent methods, such as deep dry freezing done in mass scale in medicine and food technology, should be discussed and applied to fresh zooplankton during the workshop. Participants should include a few planktonologists, and experts from such fields as medicine, pathology, histology, and food technology, perhaps 10-12 in number. The meeting might be in U.K. West Germany or U.S.A.; adequate facilities and space must be available for the activities of the workshop. Sponsorship by SCOR and UNESCO would be appropriate.
3. Results of the present experiments conducted by WG 23 should be published by UNESCO in the series Monographs on Oceanographic Methodology. The proceedings of the workshop should be included as an annex to enable planktologists to evaluate the results which may serve as a guideline for future research at institutional and individual levels.
4. Although experiments have been initiated on the determination of zooplankton biomass, it is not clear that conclusive results can be obtained at the present level of activity. A report on this problem should be prepared by Drs. Beers and Hansen, for consideration by the SCOR Executive Committee in 1971.
5. In view of the important role of microzooplankton in the secondary production of the ocean, the SCOR Executive Committee should consider whether problems of microzooplankton fixation and preservation should be considered by a separate working group.

Vagn Hansen, Chairman
Phuket, 11 August 1970

ANNEX V

REPORT ON SCOR WORKING GROUP 27 DEEP-SEA TIDES

There have been no formal meetings for the last two years, but the time may be ripe for a new review.

Theoretical efforts to compute the global tides by Pekeris in Israel, Hendershott in the United States, and Zahel in Germany have made considerable progress. I have not learned of the recent results in the Soviet Union where similar work is underway. It is my impression that a meaningful comparison between deep-sea calculations and deep-sea measurements is only a short time away. The boundary dissipation problem has not been solved, but it now looks as if the total energy in the oceans is rather larger than had been estimated; so the relative dissipation is not quite so dramatic. Some connection between the age-old problem of the age of the tides and

tidal dissipation has been established by Christopher Garrett.

The ESSA (Miami) group is getting set for employing Filloux tide gauges during September to study the M_2 node in the Gulf of Mexico and the tide in Yucatan Channel. Current meters will be deployed in the latter location. One principal goal is to study the M_2 - S_2 difference in this location.

The ESSA (Seattle) group under the leadership of Capt. Barbee has been making measurements of internal tides off the continental shelf. Apparently, such internal tides are generated at the break of the shelf by mode coupling and propagating seaward along predictable "rays".

At the Scripps Institution we have occupied stations offshore from California, and these form the basis of the paper by Munk, Snodgrass, and Wimbush: Tides Off-Shore: Transition from California Coastal to Deep-Sea Waters, Geophysical Fluid Dynamics, Vol. 1, pp. 161-235, 1970. I think the work has served to clarify the cotidal structure in this part of the world. We now plan for a special cruise this October to occupy stations surrounding the alleged M_2 amphidrome.

Frank Snodgrass made a successful drop and recovery of three capsules at 40° , 50° and 60° S between Australia and Antarctica. The duration was approximately a month. Most of the equipment worked, and the tides show a sensible continuity between the Antarctic and Australian continents.

Our main emphasis for the next year will be the design and construction of a capsule which is to remain on the sea floor unattended for one year.

Walter H. Munk, Chairman

ANNEX VI

REPORT ON SCOR WORKING GROUP 28
AIR-SEA INTERACTION

Interim Report of Proceedings, 1967-1970

Meetings

The Joint Committee met in Lucerne (September 1967) and in Princeton (January 1969). Minutes of these meetings have been widely circulated. A third meeting planned for Tokyo (September 1970) was postponed until the XV General Assembly (Moscow July/August 1971).

Members of the Committee have met informally on several occasions to discuss particular aspects of the work.

Composition

The Committee is now sponsored by SCOR as well as IAMAP and IAPSO and the terms of reference have been amended accordingly. It is also designated SCOR Working Group 28.

Coordination has been maintained with IOC and WMO and especially with the ICSU/WMO JOC for GARP. At the suggestion of JOC, Dr. K. Bryan and Professor S.S. Zilitinkevich have been co-opted to the Committee.