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newsletter

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OCEANIC RELATIVITY

Einstein's theory of relativity reformulated the laws of nature so they would be independent of the relative motion of an observer. In a recent article in the journal *Science*, Professor P. K. WEYL considers the problem of the moving reference frame of organisms that drift in the sea. As creatures of the land who are able to observe the sky, we use a grid of latitude and longitude that is fixed by the earth's axis of rotation and by the position of an astronomical instrument at Greenwich, England. The drifting creatures of the sea, plankton, do not have fixed landmarks and their sense of astronomy is limited to the daily cycle of light and dark.

To understand the interaction of plankton with their environment, Weyl points out that we must think along with the plankton. Weyl considers a drift track in the North Atlantic, from the tropical Sargasso Sea southeast of Bermuda, to the Norwegian Sea (Fig. 1). As the plankton drift northward, they experience both seasonal and latitudinal temperature changes. If one starts the journey at the beginning of fall, the temperatures drop rapidly, because seasonal cooling is reinforced by the northward treck. In contrast, leaving at the beginning of spring produces a more uniform temperature regime for the moving organisms; seasonal warming is compensated for by the drift to higher latitudes.

To illustrate temperature changes along the drift, Weyl plotted lines of constant temperature on a space-time diagram along the drift track (Fig. 2). Average drift tracks are indicated by dashed lines. The changing conditions are then related to the changing populations of planktonic organisms. Of particular interest are foraminifera, protozoans whose calcareous shells leave a record of their drift in deep sea sediments. To interpret that record realistically one must take the drifting reference frame into account. Unfortunately, the irregular motions of the sea do not permit the formulation of an exact theory of ocean relativity.

In his paper Weyl explores the foraminiferal record along two tracks in the North Atlantic. One of Professor Weyl's students, Ms. GAIL ERLEBACHER, analyzed the foraminiferal record along tracks in the South Atlantic for her master's thesis research.

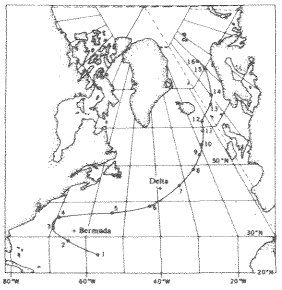


Fig. 1. Drift track with locations of sediment cores analyzed by Weyl.

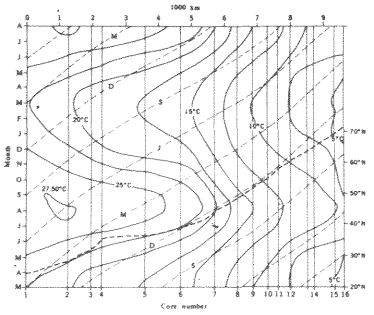


Fig. 2. Average monthly sea surface temperature along drift track shown in Fig. 1.

PROFESSOR OKUBO COMPLETES BOOK

Professor Akira Okubo recently completed his book "Diffusion and Ecological Problems; Mathematical Models" which is to be published in the spring of 1979 by Springer-Verlag. In the book Okubo reviews the mathematics of diffusion and applies different models to a variety of ecological problems including the diffusion of spores, nutrients, fish eggs and larvae, pheromones and migrating animals. Okubo also treats population dynamics in spatial and temporal domains. The book grew out of an earlier volume by Okubo entitled "Ecology and Diffusion," published in Japanese in 1975 by Tsukiji Shokan, Tokyo.

Okubo who is well known for his pioneering work on turbulent diffusion in the ocean, has been directing much of his attention over the past few years to the importance of diffusion in ecological problems. He has published a number of important papers on the swarming behavior of insects and the schooling of fishes. He is spending approximately three months this winter in Japan collaborating with scientists on a variety of problems.

NEW MESP GRADUATES

Twelve students completed requirements for the M.S. degree before the start of the spring semester.

GAIL R. ERLEBACHER, Micropaleontological interpretation of ocean surface climate from selected drift trajectories in the South Atlantic Ocean (Professor P. K. WEYL).

MONTE P. GREGES, Determination of a thermal resistance curve for a representative important species of New York State (Professor J. R. SCHUBEL).

ANDREW D. HAMILTON, Nontidal circulation and mixing processes in the lower Potomac estuary (Professor R. E. WILSON).

RICHARD D. HARRIS, An assessment of options to improve water quality in Reynolds Channel (Professor B. KINSMAN).

DAVID J. HIRSCHBERG, Recent geochemical history of sedimentation in the Northern Chesapeake Bay (Professor J. R. SCHUBEL).

DAVID M. RIPER, Turnover time of chlorophyll in *Skeletonema costatum* (Professor P. FALKOWSKI).

CHRISTOPHER F. SMITH, Aspects of hard clam management in Great South Bay, New York (Professor J. L. McHUGH).

ALEXIS E. STEEN, An application of a strategy to reduce pump entrainment mortalities at three Potomac River power plants (Professor J. R. SCHUBEL).

SCOTT M. SWARTZ, The impact of dredged holes on oxygen demand in the Lower Bay, New York Harbor (Professor B. H. BRINKHUIS).

JOSEPH J. TOKOS, The distribution of chlorophyll-*a* in the New York Bight as determined by continuous *in vivo* fluorometry, August 1977 (Professor W. E. ESAIAS).

RICHARD J. WILKE, Behavior of trace elements in the Peconic River estuary (Professor R. DAYAL).

KUO-CHUIN WONG, An assessment of the effects of bathymetric changes associated with sand and gravel mining on tidal circulation in the Lower Bay of New York Harbor (Professor R. E. WILSON).

SOME RECENT PUBLICATIONS

KASTENS, K. A., C. T. FRAY, and J. R. SCHUBEL. 1978. Environmental effects of sand mining in the Lower Bay of New York Harbor, Phase I. Special Report 15 of the Marine Sciences Research Center, State University of New York at Stony Brook. 139 pp.

MALOUF, R. E. and W. P. BREESE. 1977. Seasonal changes in the effects of temperature and water flow rate on the growth of juvenile Pacific oysters, *Crassostrea gigas* (Thunberg). Aquaculture 12:1-13.

MALOUF, R. E. and W. P. BREESE. 1978. Intensive culture of the Pacific oyster *Crassostrea gigas* (Thunberg), in heated effluents. Publication No. ORESU-T-78-003 of the Oregon State University Sea Grant College. 41 pp.

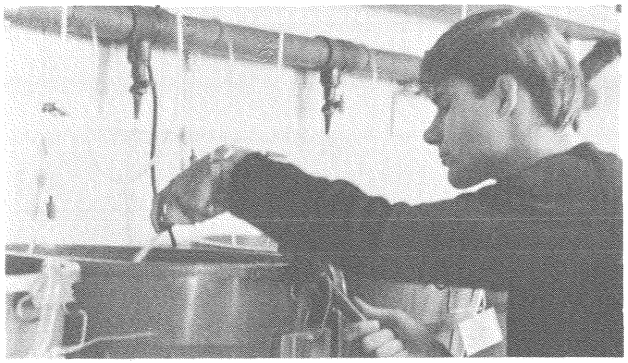
OKUBO, A. 1978. Diffusion problems in ecology: mathematical models. Pages 1-18 *in* Proceedings of the International Symposium on Mathematical Topics in Biology, Kyoto University, Japan.

OKUBO, A. 1978. Horizontal dispersion and critical scales for phytoplankton patches. Pages 21-42 *in* J. H. Steele, ed. Spatial Patterns in Plankton Communities, Plenum Pub. Co., N.Y.

SCHUBEL, J. R., H. H. CARTER, R. E. WILSON, W. M. WISE, M. G. HEATON, M. G. GROSS. 1978. Field investigations of the nature, degree, and extent of turbidity generated by open-water pipeline disposal operations. Tech. Rept. D-78-30, U.S. Army Engineers. 257 pp.

SCHUBEL, J. R. and D. J. HIRSCHBERG. 1978. Estuarine graveyards, climatic change, and the importance of the estuarine environment. Pages 285-304 *in* M. L. Wiley, ed. Estuarine Interactions, Academic Press, N.Y.

VALIELA, I., J. M. TEAL, S. VOLKMANN, D. SHAFER and E. J. CARPENTER. 1978. Nutrient and particulate fluxes in a salt marsh ecosystem: Tidal exchanges and inputs by precipitation and groundwater. Limnol. & Oceanogr. 23:798-812.



MSRC graduate student Ken Kurkowski tends cultures of larval hard clams for use in research projects supported by the N.Y. Sea Grant Institute. Under the direction of Robert Malouf, Sea Grant Professor of Shellfish Biology, Ken and Technical Specialist Charles deQuillfeldt have successfully reared hard clams from fertilized eggs to 5 mm long juveniles. This research, conducted at the Flax Pond laboratory, provides training for students and permits the study of all phases of the clam's life cycle.

PEOPLE AND MEETINGS

A paper by Dr. J. L. McHUGH was read at the January meeting of the American Society of Limnology and Oceanography in Corpus Christi, Texas. Dr. McHugh participated in the meetings of the Mid-Atlantic Fisheries Management Council and its Executive Committee.

Dr. HENRY BOKUNIEWICZ presented an invited paper on the Stability and Fate of Dredged Sediment at the 11th Annual Dredging Seminar in New Orleans November 9, 1978. In December he reported to the NY Sea Grant Institute Advisory Council the results of his research on sand mining in New York Harbor.

Dr. DONALD POWERS presented an invited lecture to the Hudson Valley Audubon Society concerning the possible impact on estuarine food webs of proposed efforts to alleviate existing PCB contamination of the Hudson River. He also presented to the Hudson River Environmental Society's annual meeting PCB research data generated from studies at Flax Pond, Stony Brook.

Dr. RAMESH DAYAL presented an invited seminar at the University of Michigan on December 21, 1978. He also participated in a workshop on "Joint Indo-American Program in Marine Sciences" at the Scripps Institution of Oceanography.

Dr. EDWARD CARPENTER presented a seminar on "N_2 Fixation in the Marine Environment" at the College of Marine Studies, University of Delaware in December.

Dr. J. R. SCHUBEL attended the January meeting of the American Society of Limnology and Oceanography (ASLO) in Corpus Christi, Texas. He invited the participants to the annual meeting scheduled for Stony Brook 18-21 June 1979.

MSRC ASSOCIATES

We welcome as new MSRC Associates

Dr. & Mrs. Stewart Hostetler
Binghamton, New York

Kate Lefferts
St. James, New York

Thomas Roberts
Princeton, New Jersey

Paul Windels, Jr.
St. James, New York

and we welcome as continuing members

Mr. & Mrs. Ted Schubel
Port Austin, Michigan

The MSRC Associates play a vital role in the Center's educational, research, and public service programs. For information, contact Mrs. Jeri Schoof, (516) 246-6543.

AWARDS

MARGARET LOUNSBURY received a one-year Sea Grant Traineeship for master's thesis research on extended jurisdiction. Ms. Lounsbury is working with Dr. J. L. McHUGH.

Dr. J. L. McHUGH received Sea Grant funding to assess the effectiveness of the 1976 law extending U.S. fisheries jurisdiction to 200 miles.

Dr. E. J. CARPENTER was awarded an NSF grant to support his study of nitrogen fixation and denitrification in eelgrass beds of Great South Bay.

GERRY KELPIN received a one-year Sea Grant Traineeship for master's thesis research on the socio-economic impacts of depuration of hard clams on Great South Bay watermen. Ms. Kelpin is working with Dr. J. M. GOODMAN.

Dr. BOUDEWIJN H. BRINKHUIS received Sea Grant support for a comprehensive literature search concerning potential biological effects of sand and gravel mining in the New York Harbor. The award supplements his present research program funded by the New York Office of General Services.

ROBERT RICHMOND, MSRC graduate student, received a travel grant from the Smithsonian Tropical Research Institute for field work in Panama.

Dr. J. R. SCHUBEL and C. R. JONES received a Sea Grant award for phase two of their research project to assess the pressures on New York's coastal zone from physical alterations. They also received additional support from the Long Island Regional Planning Board for their study of surficial sediments distribution in Great South Bay.

Dr. HENRY BOKUNIEWICZ will examine the characteristics of groundwater flow across the floor of Great South Bay under a grant from the Long Island Regional Planning Board.

Dr. J. L. McHUGH and JAY GINTER, 1974 MSRC graduate, were recipients of a first place award in the fifth annual Technical Publications Competition for their publication titled *Fisheries* (MESA NY Bight Atlas Monograph #16). The competition was sponsored by the Puget Sound Chapter of the Society for Technical Communication, an organization composed of the writers and illustrators of newsletters, brochures and technical manuals. *Fisheries* will be automatically entered by the STC in its international competition, which will be held in Los Angeles in the spring.

Dr. WAYNE E. ESAIAS was granted continued support from the Brookhaven National Laboratory for his work on phytoplankton ecology in the New York Bight.

SEMINAR SCHEDULE

Feb

19 Behavior of Fish Larvae in Response to Light--a Mechanism for Vertical Migration
P. M. J. WOODHEAD, MSRC

26 Uses of the Electron Microscope in Marine Biology
K. GOLD, Osborn Laboratory

Mar

5 An Overview of the Fans Project in Great South Bay
J. BAIER, Suffolk County Dept. of Environmental Conservation

12 Growth of Herbivorous Zooplankton in Relation to Phytoplankton Concentrations, Temperature and Body Size
J. VIDAL, Brookhaven National Lab.

19 Oxygen Depletion in the New York Bight
J. J. WALSH, Brookhaven National Lab.

Apr

2 Longshore Variations of Nutrients and Chlorophyll-*a* on the Long Island Shelf
T. E. WHITLEDGE, Brookhaven National Lab.

9 Circulation and Characteristics of Georges Bank Water
T. S. HOPKINS, Brookhaven National Lab.

16 Strategies and Light-shade Adaption in Marine Phytoplankton
P. G. FALKOWSKI, Brookhaven National Lab.

All seminars are held in Building F, Rm. 163 at 3 pm (unless otherwise noted), on the South Campus of the University.

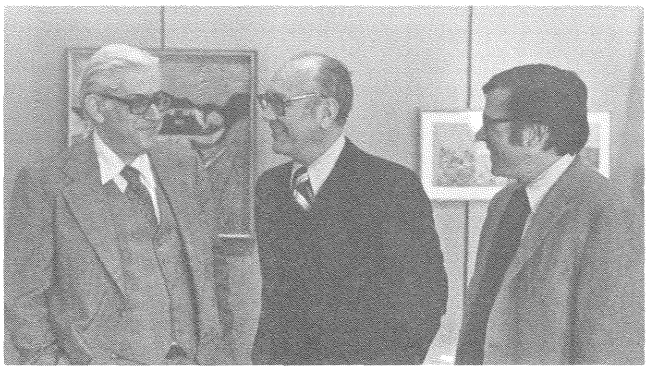
BOWMAN REPRESENTS U.S. IN TALKS WITH NEW ZEALAND

In November, a group of U.S. scientists which included Professor M. J. BOWMAN (MSRC) met with New Zealand scientists in Auckland, New Zealand, to discuss collaboration between the two countries in the marine sciences. The nine-man American team (seven delegates and two observers from the U.S. National Science Foundation) met with New Zealanders in seminar and workshop sessions at the University of Auckland, visited marine facilities in the Auckland area, and had discussions with Government officials in Wellington. The New Zealand group included scientists from academia, the Department of Scientific and Industrial Research, the Ministry of Agriculture and Fisheries, and the Navy at talks in Auckland Nov. 13-17.

MSRC STUDENT PENELLO SPENDS SEMESTER AT CORNELL

WAYNE PENELLO, MSRC graduate student, is spending the spring semester at Cornell in preparation for doctoral research at MSRC. While at Cornell, Mr. Penello will be supervised by Dr. J. H. Gillespie, Professor and Chairman of the Department of Microbiology within the College of Veterinary Medicine. Mr. Penello will take courses in pathogenic microbiology, veterinary virology, advanced animal virology techniques and diseases of aquatic animals and will participate in a research project concerned with isolating viruses from the species of hard clam common to Long Island's coastal waters, *Mercenaria mercenaria*.

Mr. Penello was a Jessie Smith Noyes Fellow for the past year while he worked on his master's research into the mobilization of metals by eelgrass, a rooted aquatic plant. Professor B. H. BRINKHUIS served as advisor.



Dr. Sidney Gelber, Academic Vice President (left), and Dr. J. R. Schubel, Director of MSRC (right), welcome Dr. D. W. Pritchard to Stony Brook as Professor and MSRC's Associate Director for Research. He previously founded the Chesapeake Bay Institute and served as its director for 30 years.

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