Dec. 1971 "Report on MODE-0 Progress to Date"
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REPORT ON MODE-0 PROGRESS TO DATE

MODE-0 is made up of two major types of activities, namely 1) preliminary field observations in the MODE area to aid the specific design of the MODE-I experiment, and 2) the preliminary testing and evaluation of new instruments and techniques which are to be used in MODE-I. The activities of the second type are not necessarily conducted in the MODE area.

The following activities of the first type are now in progress or have been completed. The WHOI buoy group has set Array #1, consisting of 7 moorings and 19 current meters (see attached figure). Wilton Sturges from URI has set 3 moorings, each with one current meter at 4000 meters depth. Array #1 will be recovered on February 1, 1972. Richard Scarlet of MIT has completed two cruises of two weeks each making density measurements in the MODE area aboard the R/V TRIDENT using a variety of instruments. Various questions concerning the proper instrumentation and strategy for density sampling should now be able to be resolved based on his data. The data taken by Scarlet is also being used to test the data reduction systems at both MIT and AOML/NOAA, to ensure that the large quantity of density data to be obtained in MODE-I can be processed quickly and accurately. Also, the observations he made were taken near the Array I current meters, which will allow a comparison of the actual shear measured by the current meters with the geostrophic shear determined from the density field. Scarlet also made bottom topographic sections in the MODE area. Donald Hansen of AOML/NOAA is arranging to have further bottom topography work done in the area in 1972 by both NOAA and NASA ships.

Further activities of the first type are planned. Array #1 was set in an area of fairly smooth bottom topography. In March, 1972 Array #2 is scheduled to be set in an area where the bottom topography is considerably rougher. A comparison of these observations with those of Array #1 will allow us to make an estimate of the influence of bottom topography on the motions in the area. Also, in January 1972, two site moorings will be deployed in the MODE area. These will be maintained at least through the MODE-I experiment.

The following activities of the second type have been carried out. Thomas Sanford of WHOI completed a 12 day cruise aboard the Atlantis II making vertical profiles of horizontal velocity with his new electric field profiler. Previous comparisons with other techniques have demonstrated the reliability of his measurement technique. The purpose of his November cruise was to test a new digital recording system, and some new instrument components. The tests were conducted at site J near

a WHOI current meter mooring, so that a direct comparison could be made
with current meter data. The other purpose of this experiment was to
gather a time series by making repeated drops with the Sanford profiler
at one place. A two day time series consisting of eighteen profiles was
obtained and is now being analyzed.

Another new instrument tested in MODE-0 is the air dropped transport
and surface current probe developed by W.S. Richardson at Nova University.
Previous tests of this instrument were conducted in areas where the water
depth was 1000 meters or less. In November and December Richardson con-
ducted successful air drops and data recovery from probes in 4500-4800
meters depth. Working to these depths involved major modifications to the
clocks in the probes, and Richardson wants to test a larger run of the new
clocks before starting long overwater sections to the MODE area. At
various times during 1972 Richardson will conduct tests in the MODE area,
especially in conjunction with instrument tests and observations by other
investigators.

Another instrument test planned for MODE-0 is the horizontally towed STD of
Eli Katz at WHOI. It was originally planned that Katz would conduct his
work on the TRIDENT cruises, but due to logistic difficulties this was not
possible, and therefore his testing will take place in February aboard the
R/V CHAIN. It is hoped that a successful test of his method will conclusively
demonstrate its ability to resolve the shortest horizontal scales over which
geostrophic balance obtains, and result in the funding of his project for
MODE-I.

Two west coast participants in MODE-I have been making instrument tests
in the Pacific as part of MODE-0. Munk and Snodgrass at the Institute of
Geophysics and Planetary Physics, University of California, San Diego have
been testing a new deployment configuration for the Snodgrass capsule, in
which the capsule is moored approximately one kilometer above the ocean floor,
instead of ten meters off the bottom. Their tests have been successful and
deployment is on schedule. Charles Cox from Scripps Institution has been
testing electrodes for his new instrument for measuring the electric field
on the ocean floor. The instrument itself is as yet untested. At present
he is trying to determine the level of instrumental noise and the effects
of turbulence.

The major instruments to be used in MODE-I which have not yet undergone any
testing at sea are the new model long range SOFAR floats being developed
by Voorhis and Webb at WHOI and Rossby at Yale, the bottom pressure gauge
being developed by Baker at Harvard, and the thermal array being developed by
Wunsch and Dahlen at MIT. All of these instruments are scheduled for field
tests in 1972. Also the inverted echo sounder developed by Rossby at Yale
is soon to be tested.

In summary, the progress to date has been satisfactory. Preliminary oberservations in the MODE area have begun. Some new instruments have been tested at sea, and others will be in the near future. We anticipate that much of the instrument testing to be done in 1972 will actually be carried out in the MODE area, so that we will not only be able to evaluate the instruments but also get some feeling for the typical conditions in the MODE area itself.

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