MONITORING PHYSICAL AND CHEMICAL PARAMETERS OF DELAWARE BAY WATERS WITH AN ERTS-1 DATA COLLECTION PLATFORM

C. A. Wethe, A. S. Hanby, V. Klemas
College of Marine Studies
University of Delaware
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Monitoring Physical and Chemical Parameters of Delaware Bay Waters with an ERTS-1 Data Collection Platform.

C. A. Wethe, A. S. Hanby, V. Klemas
Univ. of Del., College of Marine Studies, Lewes, Del.

The purpose of this study is to determine the feasibility of deploying a multiparameter probe to operate in conjunction with an ERTS-DCP so that long oceanographic stations could be operated continuously in Delaware Bay and on the Continental Shelf. The initial phase of the study involved determining the frequency of routine maintenance necessary to keep each probe operating accurately. In addition it was necessary to learn the data output characteristics of a malfunctioning probe. During this phase, the system was operated from a readily accessible site so that the instrumentation could be closely monitored and any malfunctions quickly corrected.

The difference between a maintenance problem and a malfunction in the probe soon became evident. The dissolved oxygen probe, to date, has proved to have a relatively short operating life. To operate accurately, it must be serviced on a weekly basis. However, even with this maintenance the probe itself becomes inoperative after less than one month's operation. A maintenance problem exhibits itself as an extremely low or even negative reading while a failure can only be noted when the probe does not recover after servicing. Fortunately the other probes have been more reliable.

The recording thermistor has functioned without problems for six months and requires only monthly cleaning. The compensating thermistor used in conjunction with the salinity and dissolve oxygen readout did experience one failure but this was not attributed to lack of maintenance.

The pH probe has also operated with a minimum of maintenance although here again we have had one probe failure. With the thermistors and pH probe a failure exhibits itself as a zero or negative readout. If these probes were left unattended for a long period of time the need for cleaning would probably appear as a probe failure.

The depth indicator (used as a tide gauge) has operated without a problem from the maintenance standpoint. We have experienced some difficulty in amplifying its output for transmission to the satellite, however. This sensor evidently is picking up an AC voltage through the water from the conductivity probe. An oscilliscope trace indicates a high frequency AC signal. This AC signal adversely affects the amplification of the depth readout so that the values obtained from satellite messages are in error. NASA Wallops is currently cooperating in correcting this problem.

The Conductivity/Salinity probe has functioned without problems throughout the study. The salinity readout was affected by the failure of the compensating thermistor; but since both conductivity and salinity readouts were monitored, the cause of the failure was quickly determined.

The turbidity sensor has required frequent cleaning to maintain it in proper operating condition. Initially it became fouled with floating debris after less than one week's operation. Operating time improved to almost two weeks when the sensor was repositioned to prevent algae and other debris from becoming trapped between the sensor and the probe. However with the warming of the water, the quantity of organizing growing on the probe has increased markedly again reducing the operating time of the sensor. So far no solution has been found for this fouling problem; therefore, this sensor must be cleaned weekly.

The second phase of the study is currently in operation. Water

sampling is being carried out in conjunction with the recording of on-site probe outputs and the reduction of output data obtained from the satellite. This phase will continue for at least three months in order to evaluate the accuracy and responsiveness of the problem. The present location of the instruments is ideal for this type of evaluation since large fluctuations in salinity, temperature, suspended sediment and dissolved oxygen are observed over a tidal cycle.

Significant Results:

Evaluation of the probe performances during the initial phase indicates that the dissolved oxygen sensor available as part of the package is not sufficiently reliable for long term operation. The turbidity probe requires frequent visits to the site to maintain it in proper operating condition. The cost of these visits would have to be weighed against the information obtained. The Conductivity/Salinity, Temperature, pH and Depth indicators have worked extremely well over the course of the study. Monthly cleanings would maintain all these probes in top operating condition. Currently the accuracy of each measurement returned via satellite is being compared to the accuracy of the probe reading and water samples analyzed in the laboratory.