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EVALUATION OF ERTS DATA

FOR

CERTAIN OCEANOGRAPHIC USES

A Bimonthly Report #11/#12

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Principal Investigator

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Reporting Period: January - April 1974
ERTS Proposal: #106
GSFC MMC: C309

A. WORK SUMMARY DURING PERIOD

1. Significant Result - Lake Michigan "Whitings"

More data have been acquired on the significant result reported during the last period. According to Lake Michigan records, the pH levels have been steadily increasing as the lake becomes more eutrophic. Numerous upwellings during the summer of 1973, beginning with the late July event, appear to be triggering a chemical precipitation of calcium carbonate. The upwelling provides abundant carbon-dioxide into the surface water and results in massive blooms of phytoplankton. As the CO_2 is utilized by these microscopic plants the pH is increased (acidity decreases) and $CaCO_3$ no longer is able to remain in solution (it is supersaturated). The precipitation takes place where the phytoplankton are living--------near depths of 10 meters. Therefore, the whiting observed by ERTS is only seen in the green band, as red cannot penetrate but a few meters. With these whitings, secchi disc readings lower in in July from 10-15 meters to 3-5 meters and green, milky water is observed by research vessels. It appears that whitings have been becoming more frequent since the middle 60's but until ERTS the extent had never been realized.

Calcium levels are too low, presently, for a similar precipitate in Lakes Huron or Superior. However, whitings have been seen by ERTS in Lakes Erie and Ontario where the calcium ion and pH levels are more like those found in Lake Michigan.

2. Circulation Atlas

Work continues on our circulation atlas for selected portions of the four lower lakes and Lake St. Clair. This study will make up the bulk of

the final report.

3. Study Period

The period August 1972 through December 1973 has been chosen for the Atlas. This enables us to work with two fall and early winter periods, deemed necessary by the much higher cloud coverage during that portion of the year. Data obtained during the first half of 1974 will be held in reserve in case a particular phenomenon is noted, but no further work is expected from this data set as far as the final report is concerned.

B. EXPECTED ACCOMPLISHMENTS DURING NEXT PERIOD

Final report will be delivered during September 1974.

C. PROBLEMS

NONE

D. PUBLICATION STATUS

1. ERTS-1 Observes an Oil Slick? Remote Sensing of Environment, 3(1), 1974.
2. Remote Sensing of Algal Blooms by Aircraft and Satellite in Lake Erie and Utah Lake, Remote Sensing of Environment, 3(2), 1974. (in press).
3. Extensive Summar Upwelling on Lake Michigan during 1973 Observed by NOAA-2 and ERTS-1 Satellites, Proceedings of 9th Int'l. Sympos. on Remote Sensing of Environment, Univ. of Michigan, April 1974 (in press).

4. New Sensor on NOAA-2 Satellite Monitors the 1972-73 Great Lakes Ice Season, Remote Sensing and Water Resources Management, Proceedings #17, Amer. Water Resources Assoc., 1973.

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