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E73-11147

CR-135735

TITLE: APPLICATION OF ECOLOGICAL, GEOLOGICAL AND OCEANOGRAPHIC
ERTS-1 IMAGERY TO DELAWARE'S COASTAL RESOURCES PLANNING

SUBTASK: MONITORING WATER PROPERTIES AND MOVEMENTS: TURBIDITY, COLOR,
BOUNDARIES, CIRCULATION, POLLUTION DISPERSION

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CONTRACT: NAS5-21837
UN362
SR9654

FUNDING: \$27,820 (UNIVERSITY OF DELAWARE)
\$26,279 (BENDIX SUBCONTRACT)

E73-11147) APPLICATION OF ECOLOGICAL,
GEOLOGICAL AND OCEANOGRAPHIC ERTS-1
IMAGERY TO DELAWARE'S COASTAL RESOURCES
PLANNING: MONITORING WATER PROPERTIES
(Delaware Univ.) 3 p HC \$3.00 CSCL 08J

N73-33301

Unclas
63/13 01147

RESULTS

WATER PROPERTIES AND COASTAL DYNAMICS

1. The following water properties have been identified and studied synoptically over Delaware Bay and the continental shelf:
 - a. Suspended Sediment (Turbidity) Concentration and Patterns
 - b. Current Circulation Patterns
 - c. Water Mass Boundaries
 - d. Waste Disposal Plumes
2. Photographs and digital tapes from eight successful ERTS-1 overpasses and nine major aircraft overflights are being correlated with ground truth data measured during twelve boat helicopter transects, including:
 - a. Secchi depth
 - b. Suspended sediment concentration and size
 - c. Alpha obtained with transmissometer
 - d. Temperature
 - e. Salinity
 - f. Current velocity
 - g. Water color
3. Grey tone (microdensitometer trace) of ERTS-1 imagery correlates well with a Secchi disk and water sample analysis of sediment concentration.
4. Circulation patterns observed by ERTS-1, using suspended sediment as a natural tracer, agree well with predicted and measured currents throughout Delaware Bay. ERTS-1 imagery is being used to extend and verify a predictive model for oil slick movement in Delaware Bay.
5. Convergent shear boundaries between different water masses have been observed from ERTS-1, with foam lines containing high concentrations of lead, mercury and other toxic substances.
6. Acid disposal plumes have been monitored 36 miles off Delaware's Atlantic coast. Since the acid changes from greenish to brownish upon exposure to seawater, the ratio of the signal in the green band to that in the red band may give an indication of when the acid was dumped. Thus the temporal change is being used to supplement the spectral signature of the plume.

7. Under atmospheric conditions encountered along the East Coast of the United States MSS band 5 seems to give the best representation of sediment load in the upper one meter of the water column. Band 4 is masked by haze-like noise, while band 6 does not penetrate sufficiently into the water column.
8. In the ERTS-1 imagery the sediment patterns are delineated by only three to four neighboring shades of grey. The digital tapes permit better grey scale discrimination of suspended matter.
9. Negative transparencies of the ERTS-1 images give better contrast whenever the suspended sediment tones fall within the first few steps of the grey scale. Considerable improvement in contrast can be obtained by more careful development of film and prints.
10. Color density slicing helps delineate the suspended sediment patterns more clearly and differentiate turbidity levels.
11. Sediment pattern enhancements obtained by additive color viewing of the four ERTS-1 MSS band transparencies did not noticeably improve the contrast shown above that seen in the best band, i.e., MSS band 5. However, digital multispectral enhancement techniques are providing improved thematic maps.
12. Five papers and articles have been published based on ERTS-1 results on coastal dynamics and water properties. Three more papers were prepared on coastal vegetation and land use.