CORRELATION OF COASTAL WATER TURBIDITY AND CIRCULATION WITH ERTS-1 AND SKYLAB IMAGERY

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May 28, 1974
Report on Significant Results
NASA ERTS-1 Contract NASS-21837
Un 362 SR 9654

Prepared for
GODDARD SPACE FLIGHT CENTER
GREENBELT, MD 20771

Significant Results

Circulation patterns were observed by ERTS-1 during different parts of the tidal cycle, using suspended sediment as a natural tracer. The current direction in the imagery agreed well with predicted and measured currents throughout Delaware Bay. During flood tide the suspended sediment as seen from ERTS-1 also correlated with the depth profile at the mouth of the bay.

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. Several varieties of boundaries or fronts have been seen. Those near the mouth of the bay are associated with the tidal intrustion of shelf water. Fronts in the interior of the bay on the Delaware side appear to he associated with velocity shears induced by differences in bottom topography. In several ERTS-1 and Skylab-EREP frames, acid waste disposal plumes have been detected about 40 miles off Delaware's Atlantic coast.

Under atmospheric conditions encoutered along the East Coast of the United States, MSS band 5 seemed to give the best representation of sediment load in the upper one meter of the water column. Band 4 was masked by haze-like noise, while band 6 did not penetrate sufficiently into the water column. Microdensitometer traces across the band 5 imagery produce a relative irradiance curve which correlates with Secchi depth and suspended sediment concentration. A more meaningful correlation between radiance and sediment concentration can be obtained by combining the data in all four bands using computer techniques. Such a method promises to yield not only a mathematically expressible relationship between concentration and radiance but also, by identification of typical spectral signatures, allows identification of sediment and certain pollutants. If this method is refined by using a greater number of bands, it may even be capable of distinguishing between different sediment types.

As expected, Slylab imagery contains better spectral and spatial resolution than that from ERTS-1. Based on high-contrast targets, such as pier clusters and street patterns, the ERTS-1 MSS seems to have a resolution of 70 to 100 meters. On the other hand, the regular eighteen-day cycle of ERTS-1 permits observation of important man-made and natural changes, and facilitiates collection of ground truth.