



ACOUSTIC METHODS FOR WATER MASS DELINEATION IN COASTAL MARINE ECOSYSTEMS

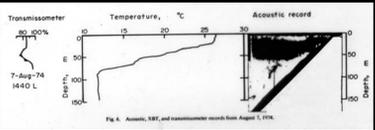
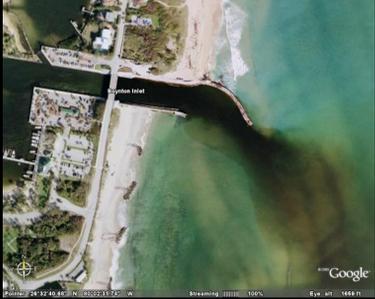


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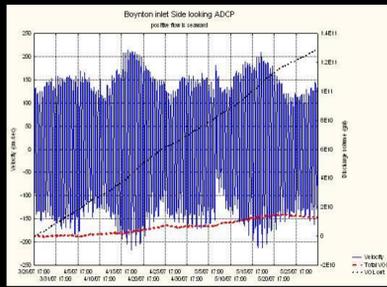
United States Department of Commerce
National Oceanic and Atmospheric Administration
Office of Ocean and Atmospheric Research
Atlantic Oceanographic and Meteorological Laboratory
Ocean Chemistry Division

SEPTEMBER 2007 48-HOUR STUDY				JUNE 2007 48-HOUR STUDY				kg		
NET outflowing nutrient (kg)										
	1	2	3	4	1	2	3	4	Average	StDev
NO ₃ -N	588.8	588.1	536.1	134.1	203.5	116.1	162.2	21.8	282.0	229.0
NO ₂ -N	1014.4	2165.1	1016.7	719.8	1419.9	1038.1	1778.8	693.5	1576.4	789.5
PO ₄ -P	187.1	153.8	81.8	16.6	288.7	186.3	168.8	18.8	203.7	192.3
NH ₄ ⁺ -N	784.7	818.9	377.8	92.8	208.4	71.8	38.8	48.6	264.6	264.2

Satellite Observations of Plumes
Exiting inlets in South Florida

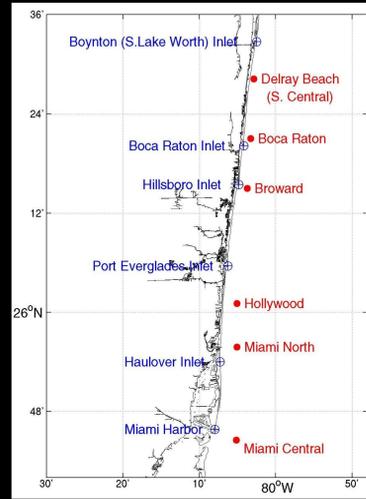


Acoustic visualization of plume exiting the Port of Miami on an out-going tide. Plume remains in the upper 50 meters of the water column and extends more than 2 kilometers out of the Port entrance.

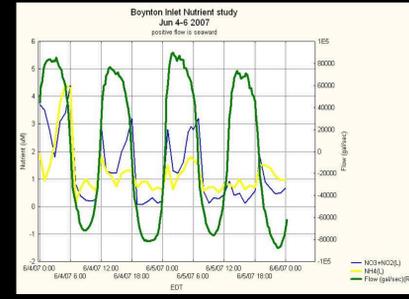


Inlet Flow Measurements obtained from a side-looking Acoustic Doppler Current Profiler. From these data an average seaward net flow of 180 million gallons per day is derived

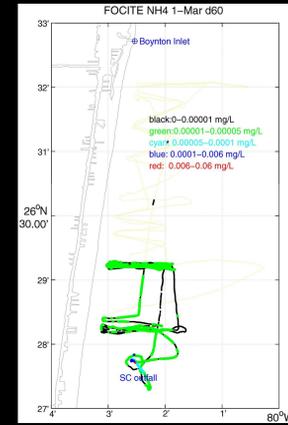
FACE AREA OF INTEREST
Inlets and treated-wastewater outfalls in SE Florida



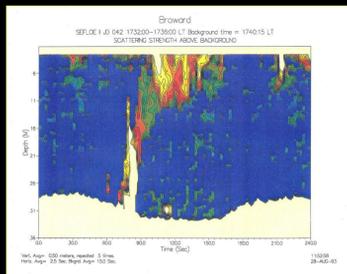
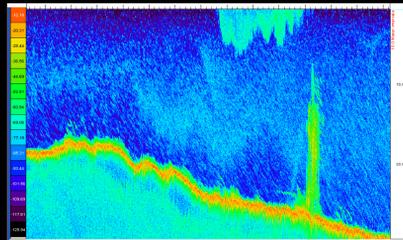
INLET STUDIES
Boynton Inlet Nutrient and Flow Measurements
28-hour Intensive, June 4-6, 2007



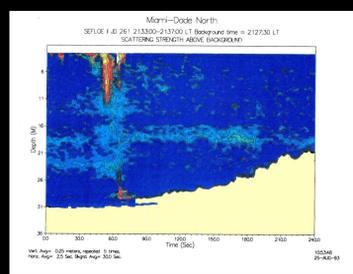
CHEMICAL OCEANOGRAPHIC MEASUREMENTS
High frequency underway Ammonium (NH₄⁺) measurements during the FOCITE cruise, February 24, 2007



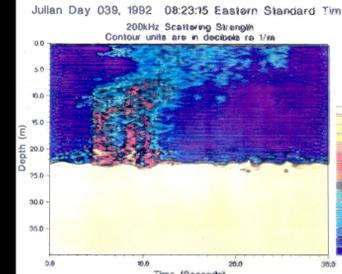
OCEAN ACOUSTICS
Acoustic Image of Delray Outfall Plume, February 2007



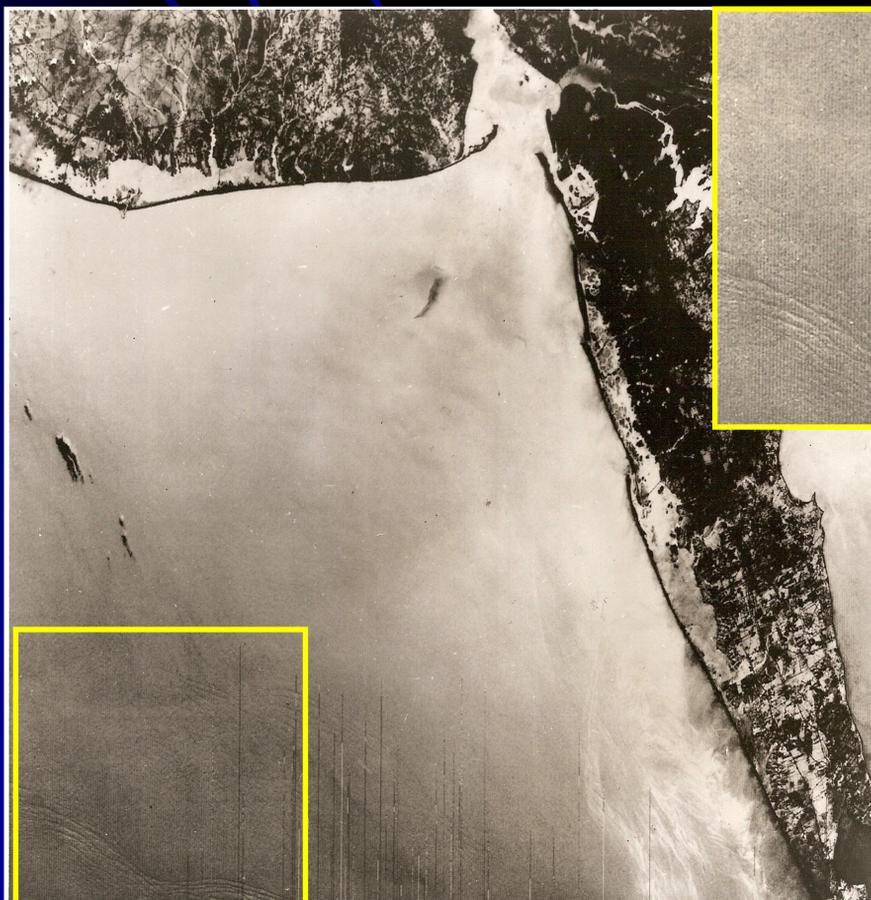
Acoustic visualization of rising wastewater effluent plume. Acoustic visualization reveals that the plume rises to the ocean's surface and is largely initially contained within the ten meters of the water column adjacent to the ocean's surface.



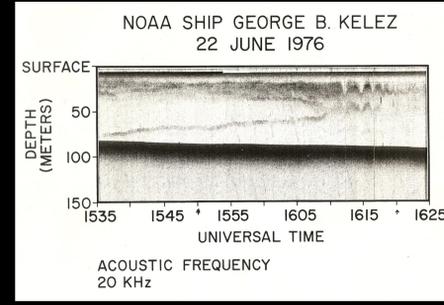
Acoustic visualization of wastewater effluent plume showing "de-training" effect, wherein sections of the rising plume are retained as horizontal fixed-depth horizons.



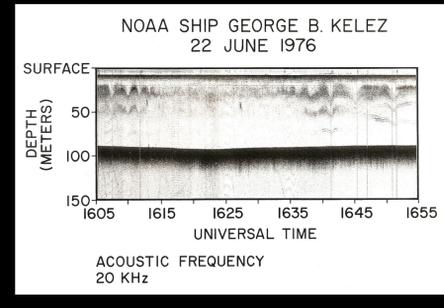
Acoustic visualization of multiple rising plumes showing effects of current shear and near surface disposition of combined plume.



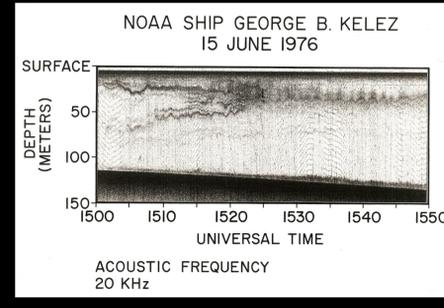
A satellite image of the Hudson-Raritan river plume. Inset shows internal wave packets approaching and impinging on plume boundary.



Acoustic visualization of the seaward edge of the Hudson-Raritan river plume (approximately 90 km from river entrance.) Note packet of internal waves about to impinge on the plume.



A subsequent Acoustic visualization showing the Hudson-Raritan river plume being deformed by the impinging internal wave packet.



A third Acoustic visualization of the Hudson Raritan plume shows the interim of the plume with horizons capable of generating backscatter. The nature of the content of the layers is not known at this time. Also visible is a bottom boundary layer of what is conjectured to be re-suspended particulate matter.