REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
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LEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION. REPORT DATE (DD-MM-YYYY) 2. REPORT TYPE 26-09-2007 Conference Proceedings		3. DATES COVERED (From - To)		
4. TITLE AND SUBTITLE		0	5a. COM	NTRACT NUMBER
Shallow Water Environmental Profiler in Trawl-resistant Real-time			5b. GRANT NUMBER 5c. PROGRAM ELEMENT NUMBER	
Configuration (SEPTR) Used for Frontal Dynamics Research				
		0602435N		
		06024331		
		Jeffrey W. Book, Michel Rixen, Alessandro Carta, Mark S. Hulbert, Andrew J. Quaid, Emanuel Coelho, Vittorio Grandi, Lavinio Gualdesi 56		5d. PROJECT NUMBER
5e. TASK NUMBER				
5f. WORK UNIT NUMBER				
55500000000000000000000000000000000000				
			73-6648-07-5	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)			8. PERFORMING ORGANIZATION REPORT NUMBER	
Naval Research Laboratory				
Oceanography Division				NRL/PP/7330-06-7037
Stennis Space Center, MS 39529-5004				
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)
Office of Naval Research				ONR
800 N. Quincy St. Arlington, VA 22217-5660				11. SPONSOR/MONITOR'S REPORT
Anington, VA 22217-3000				NUMBER(S)
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12. DISTRIBUTION/AVAILABILITY STATEMENT				
Approved for public release, distribution is unlimited.				
	- 20	n_7	71 *	110067
13. SUPPLEMENTARY NOTES 20071119067				
14. ABSTRACT				
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fished coastal frontal zone.				
15. SUBJECT TERMS				
Fronts, Adriatic Sea, Instruments and Techniques				
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16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF 18	8. NUMBER	19a. NAM	ME OF RESPONSIBLE PERSON
a. REPORT b. ABSTRACT c. TH	ADOTDAOT	OF	Jeffrey l	
Unclassified Unclassified Unc	lassified UL	PAGES 1	19b. TEL	EPHONE NUMBER (Include area code)

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228-688-5251

38th CLESM Congress in Istanbel, Turkey Apr 9-13, 2000 in Istanbel, Turkey

SHALLOW WATER ENVIRONMENTAL PROFILER IN TRAWL-RESISTANT REAL-TIME CONFIGURATION (SEPTR) USED FOR FRONTAL DYNAMICS RESEARCH

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Abstract

During both a winter and summer period of 2006, SEPTR moorings were used for real-time monitoring of velocity, temperature, salinity, waves, and optics in a dynamic frontal zone of the central Adriatic Sea. From the trawl-resistant barnacle like shaped SEPTR housings, velocities were measured acoustically. Other water column parameters were measured four times a day through a CTD profiler that was released to the surface and winched back into the protective mooring housing. Thus all variables of dynamic significance were monitored synoptically across a heavily fished coastal frontal zone.

Keywords : Fronts, Adriatic Sea, Instruments And Techniques.

A Cooperative Agreement was established between the NATO Undersea Research Centre (NURC) and the U.S. Naval Research Laboratory (NRL) to establish the feasibility of carrying out real-time environmental assessments over longer time periods in shallow seas where commercial fishing is often intense. The work under this agreement built upon NRL/NURC past success of improving trawl-resistant bottom mounts for Acoustic Doppler Current Profilers (ADCP) [1] and NURC work on prototype systems for bottom-mounted profiling systems [2]. The result was five production units of Shallow water Environmental Profiler in Trawlresistant Real-time configuration moorings (SEPTRs) that were tested and used during the winter and summer experiments of the Dynamics of the Adriatic in Real-Time (DART) international collaborative project. The moorings were used to study the frontal dynamics of the Western Adriatic Current (WAC) in the Gulf of Manfredonia area of the Adriatic Sea. Throughout three cruises, the moorings measured profiles of velocity, temperature, salinity, chlorophyll concentration, and backscattering at two wavelengths. The velocity profiles were acoustically measured every 15 minutes while other parameters were measured every six hours during CTD casts taken by a profiler that was released in the water column and winched back into the protective mooring housing after the brief measurement period. During these casts, an option was sometimes used to pause near the surface and also measure the surface wave spectrum and significant wave height. When at the surface, the profilers attempted to send all data back to a land-station via the Global-Star satellite system. During the summer cruises of DART, three SEPTRs deployed across the WAC demonstrated the importance of synoptically measuring both the thermohaline and velocity structure to gain understanding of frontal dynamics.

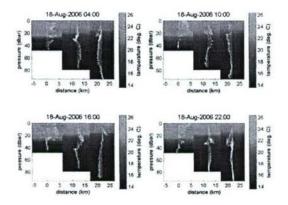


Fig. 1. Temperature and velocity measurements for 18-August 2006 from three SEPTRs deployed across the WAC. White arrows indicate 6-hour averages of ADCP measured velocities where upward is flow into the page, downward is flow out of the page, and horizontal is along-section flow. Shading indicates the profiler measured temperatures.

Figure 1 shows an example of SEPTR measured dynamic variables for a particular day. The profilers measured a relatively simple, but strong and consistent offshore rise in thermocline depth during this time. However, the measured velocities reveal multi-level structures with significant time dependence (tidal and inertial) and an interesting upper-layer flow at the inshore mooring directed along the section towards the oscillating WAC flow seen further offshore. Further analysis will be done using these direct measurements to understand the relative importance of geostrophic, advective, and other forces in determining the WAC frontal structure.

Acknowledgments

This work was supported by the Office of Naval Research as part of the research program "Dynamics of the Adriatic in Real-Time" under Program Element 0602435N.

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