

APPENDIX C-a

Wake Trial Time Series *M/V Chinook*

M/V Chinook

The AMD 385 *Chinook*, and sister ship *Snohomish*, are catamaran passenger ferries designed by Advanced Multihull Designs of Sydney Australia and built by Dakota Creek Industries of Anacortes, WA. *Chinook* was brought into service by WSF in 1998.

Chinook-class POFF Characteristics*

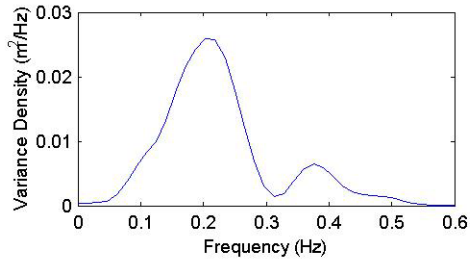
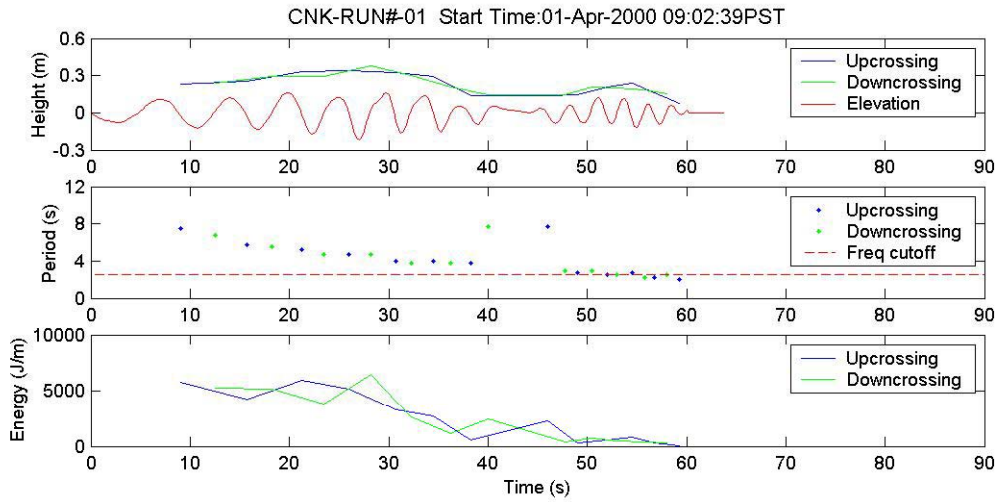
Vessel Type	Catamaran
Length (m)	43.6
Vessel beam (m)	12.0
Maximum Operating Speed (knots)	38
Number of Passengers	350
Crew	5
Year built	1998

*Source:

http://www.wsdot.wa.gov/ferries/your_wsf/corporate_communications/index.cfm?fuseaction=1999_wsf_today&print=yes

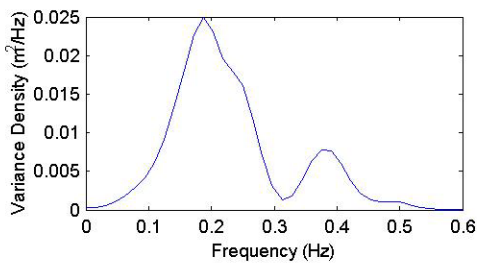
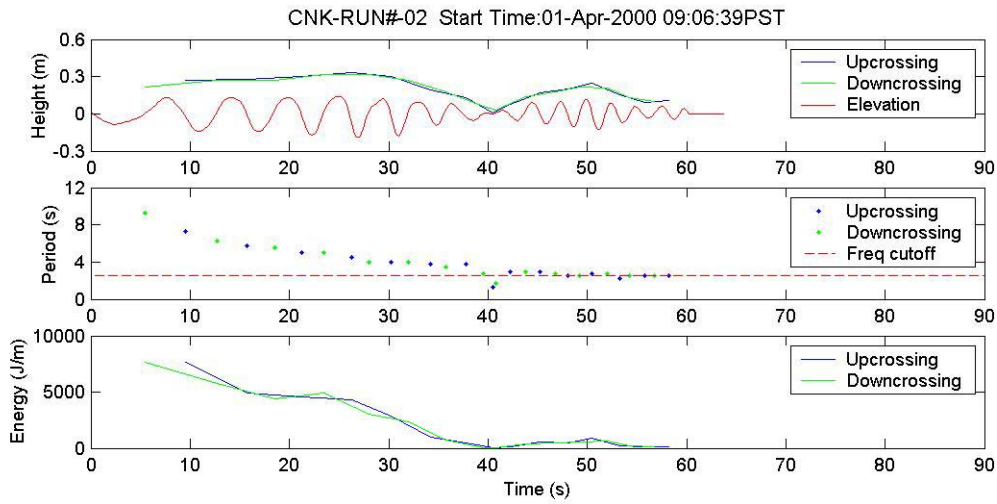
WSF tested *Chinook* by conducting various wake trials at a number of different locations on Puget Sound, including Port Madison. Only limited trial data for this vessel were available to this study. Trial data for *Chinook* acquired on April 1, 2000 are available to the present study. The *Chinook* trials were conducted to test the effects of interceptors on the wake height and energy density (Stumbo, pers comm., 2004). The results have been published in several related papers (Stumbo et al., 1998; Stumbo et al., 1999; Stumbo et al., 2000). Stumbo et al. (2000) report that a significant reduction of wake energy was achieved in deep water by optimizing trim with interceptors.

Time series from the April 2000 trials were analyzed by Pacific International Engineering as part of this study and are presented below.



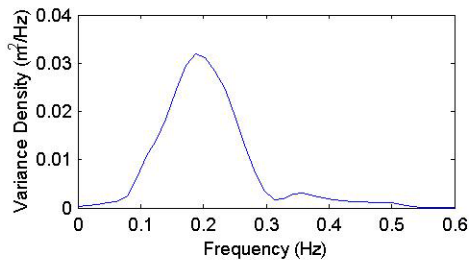
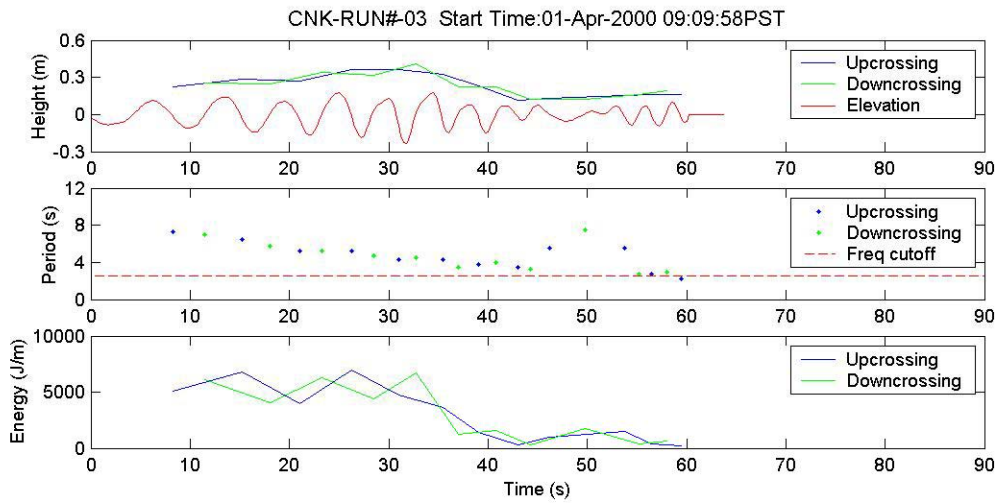
Burst Summary
 Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.34	4.75
0.33	5.25
0.33	4.00
0.29	4.00
0.26	5.75
0.24	2.75



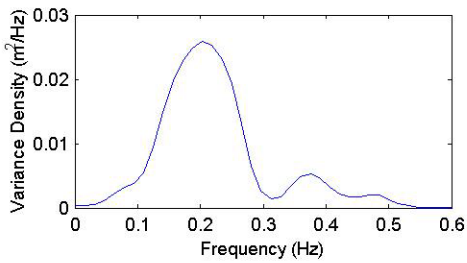
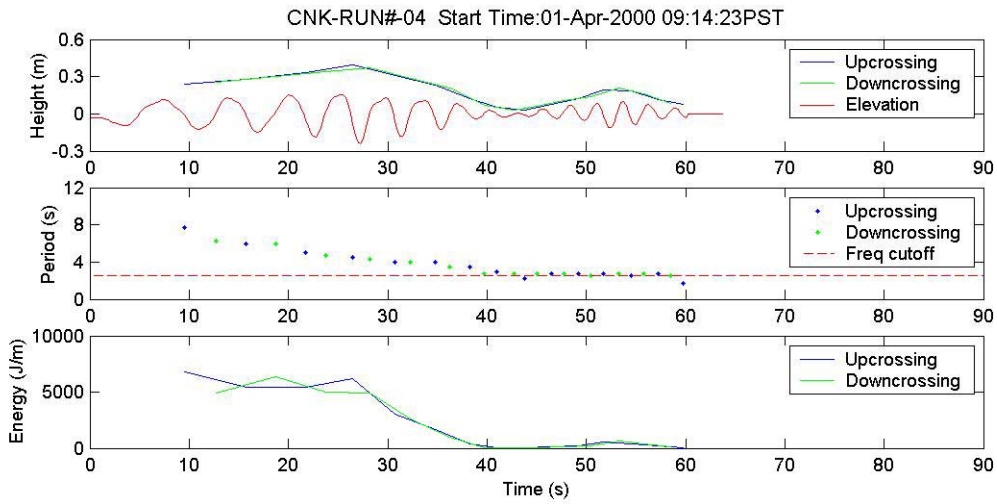
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.33	4.50
0.30	5.00
0.30	4.00
0.28	5.75
0.27	7.25
0.24	2.75



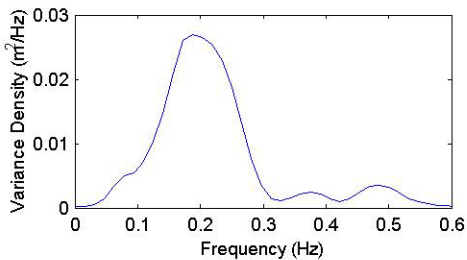
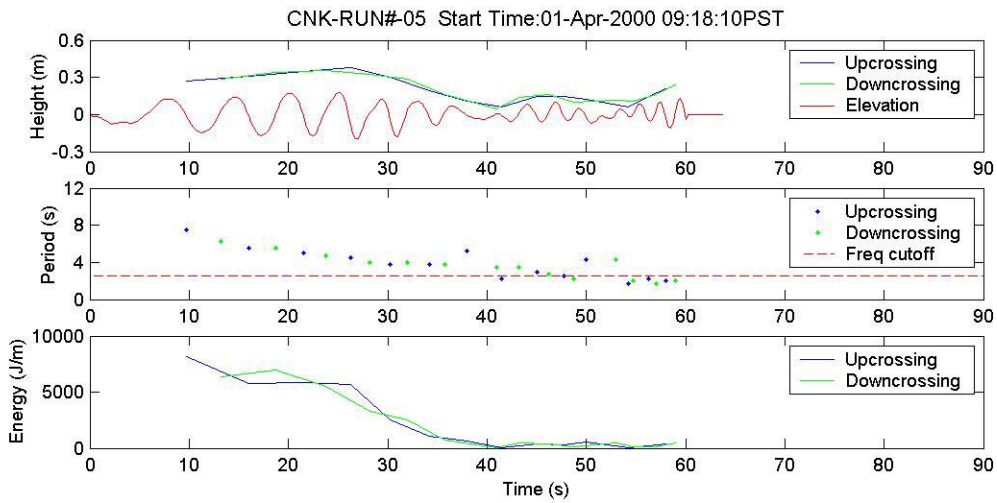
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.37	4.25
0.36	5.25
0.32	4.25
0.29	6.50
0.27	5.25
0.23	3.75



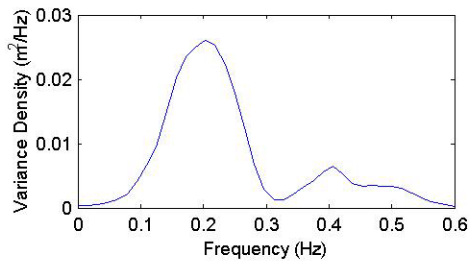
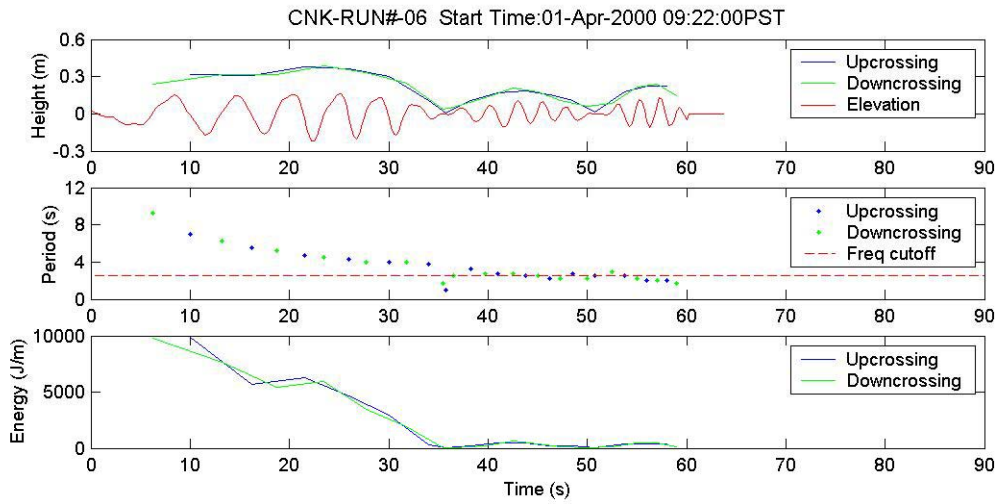
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.40	4.50
0.33	5.00
0.31	4.00
0.28	6.00
0.24	7.75
0.23	4.00



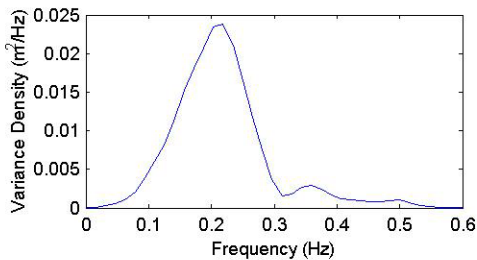
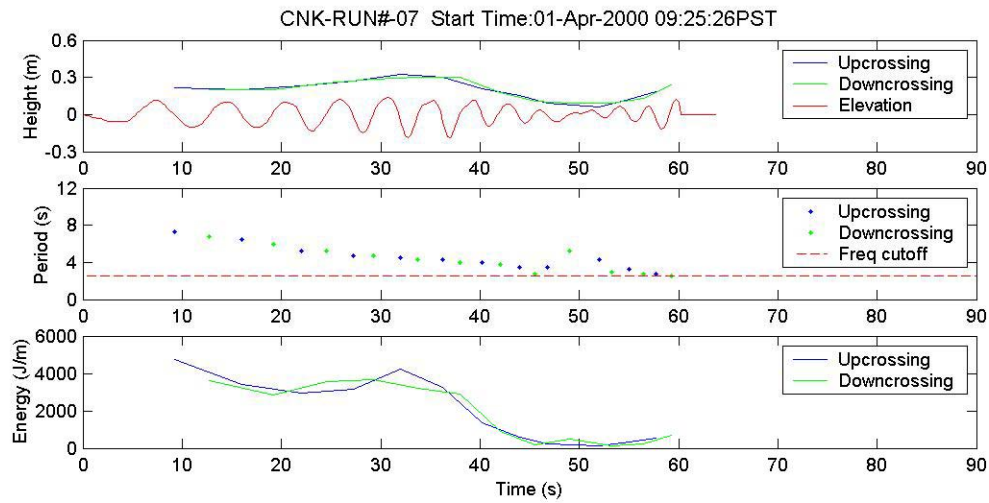
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.38	4.50
0.35	5.00
0.31	5.50
0.30	3.75
0.27	7.50
0.21	2.00



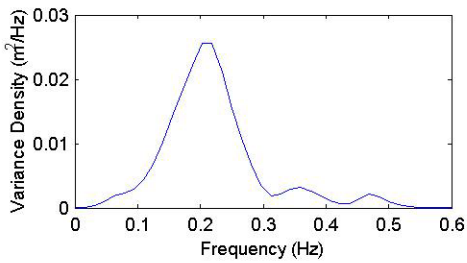
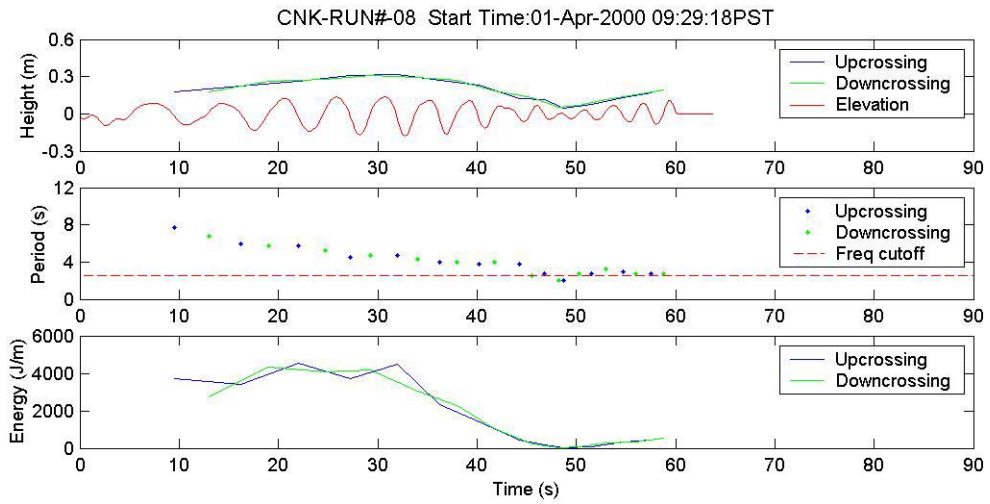
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.38	4.75
0.36	4.25
0.32	7.00
0.31	5.50
0.31	4.00
0.22	2.00



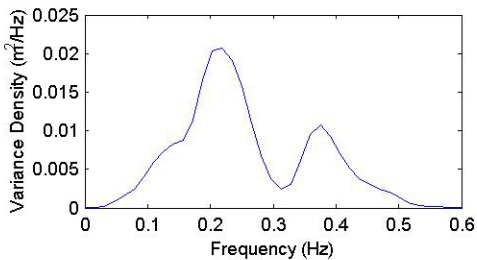
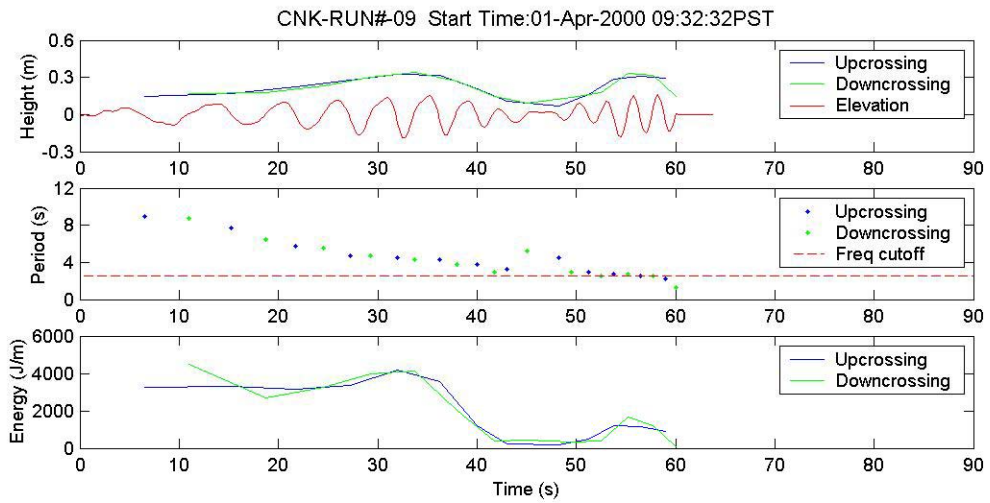
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.33	4.50
0.30	4.25
0.27	4.75
0.23	5.25
0.22	7.25
0.21	4.00



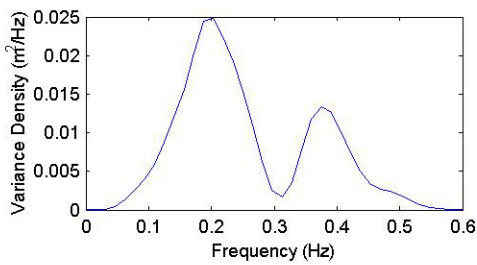
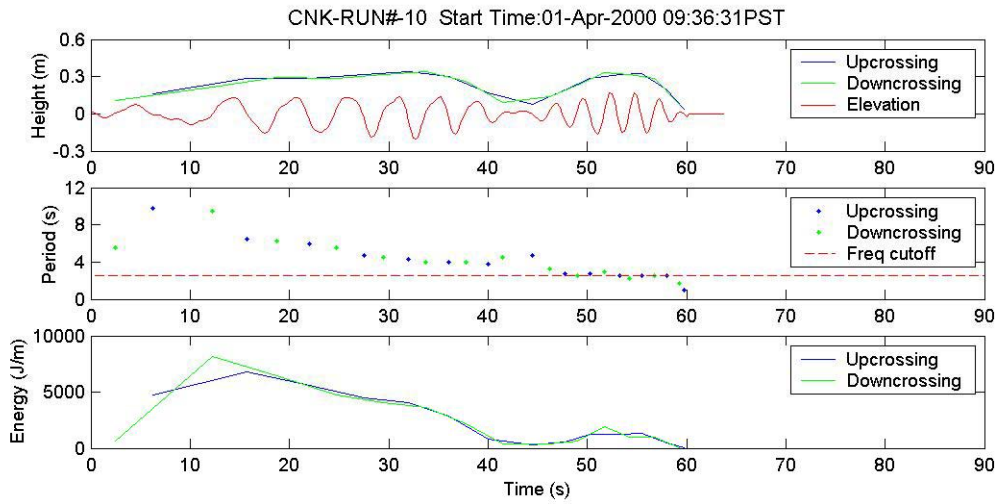
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.32	4.75
0.31	4.50
0.27	4.00
0.26	5.75
0.23	3.75
0.22	6.00



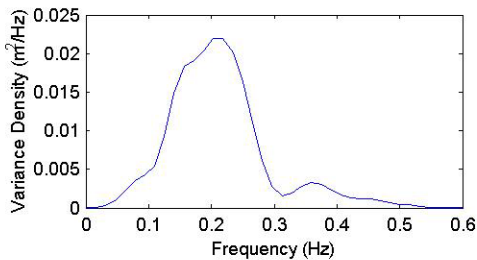
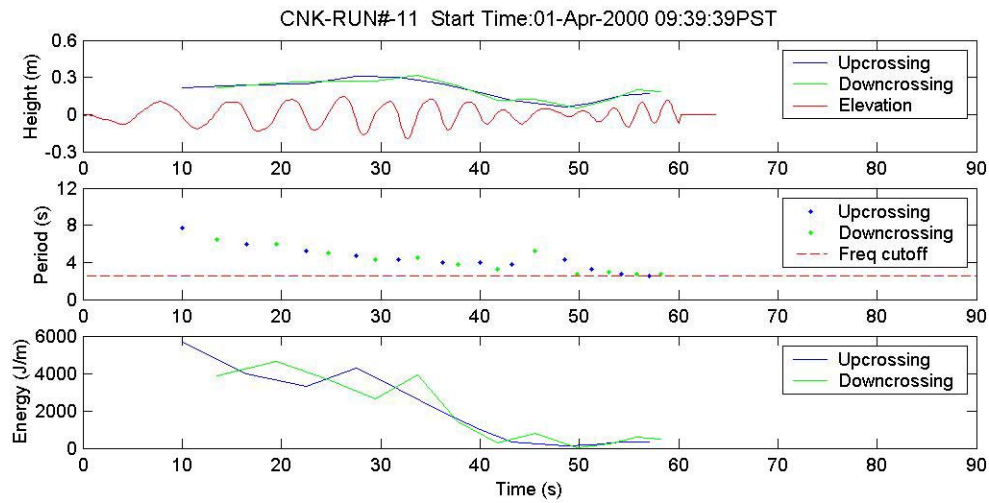
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.33	4.50
0.32	4.25
0.31	2.50
0.30	2.25
0.29	2.75
0.28	4.75



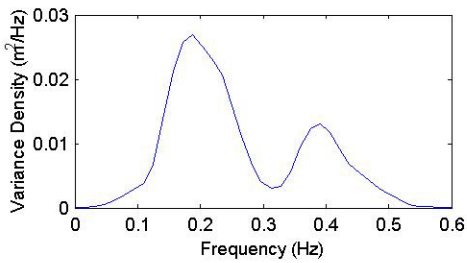
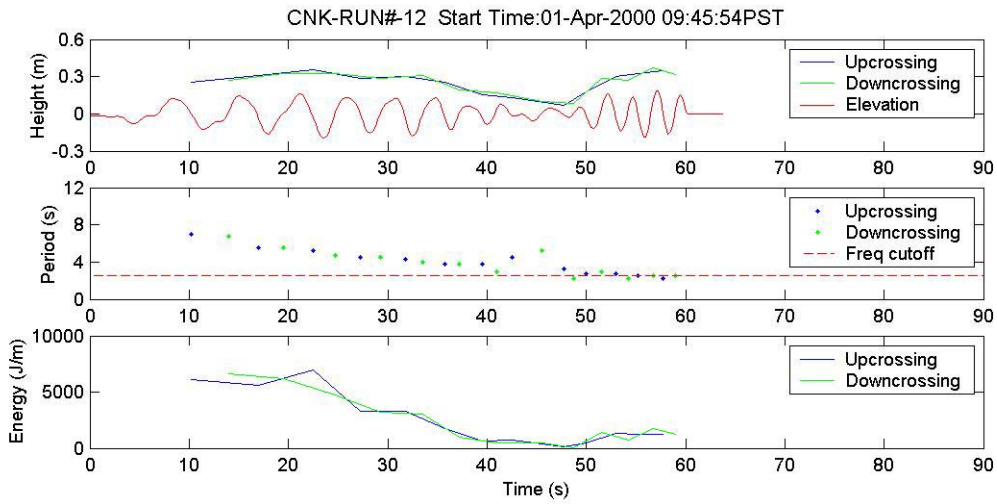
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.34	4.25
0.33	2.50
0.32	4.75
0.32	2.50
0.30	4.00
0.29	6.50



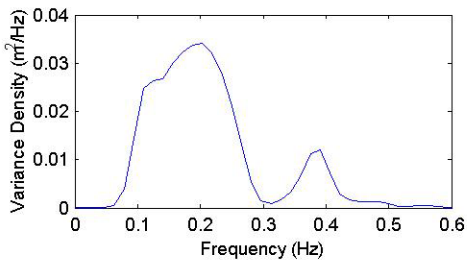
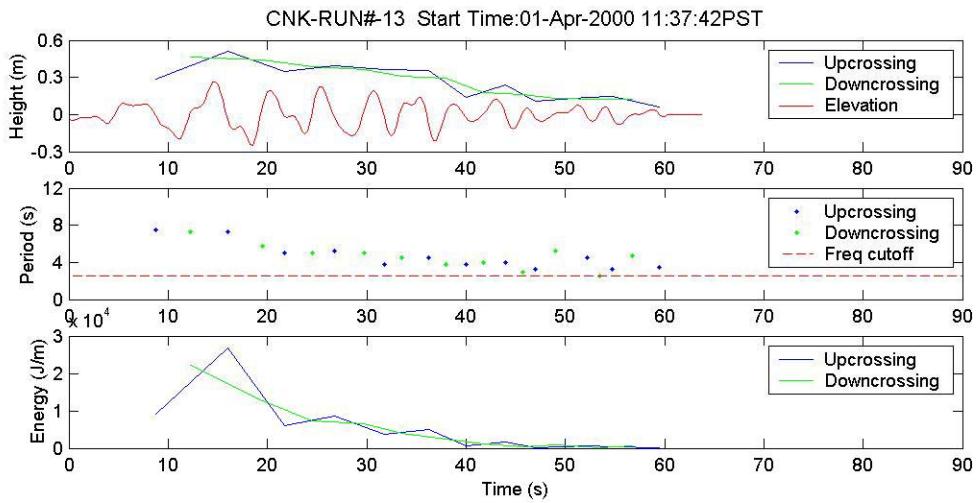
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.31	4.75
0.30	4.25
0.25	4.00
0.25	5.25
0.24	6.00
0.22	7.75



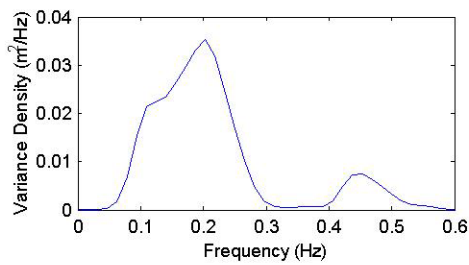
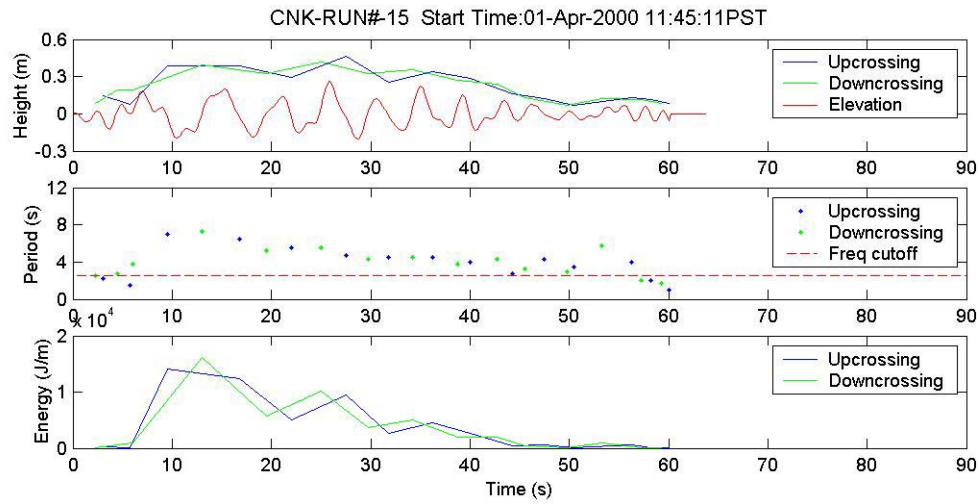
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.36	5.25
0.35	2.25
0.32	2.50
0.31	5.50
0.30	4.25
0.30	2.75



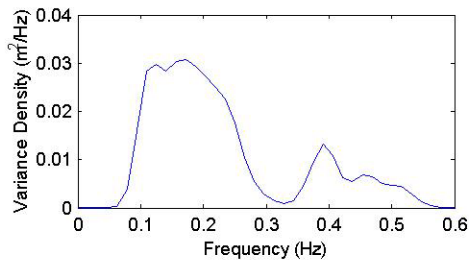
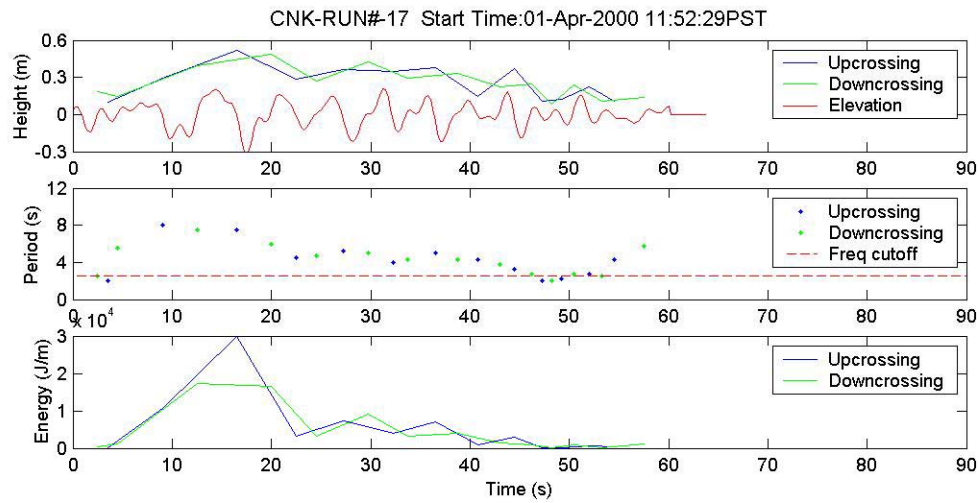
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.51	7.25
0.40	5.25
0.36	3.75
0.35	4.50
0.35	5.00
0.29	7.50



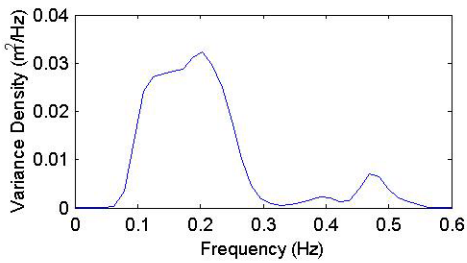
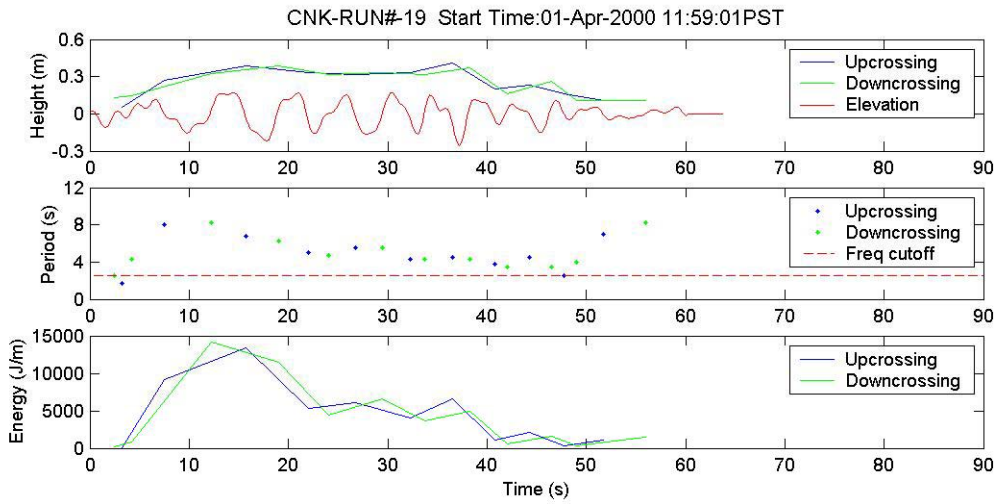
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.46	4.75
0.39	6.50
0.38	7.00
0.34	4.50
0.29	5.50
0.29	4.00



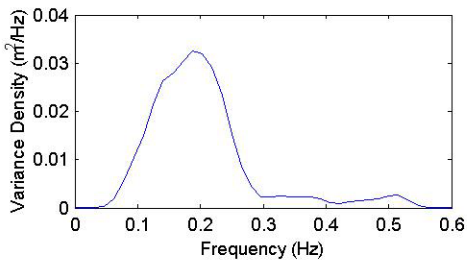
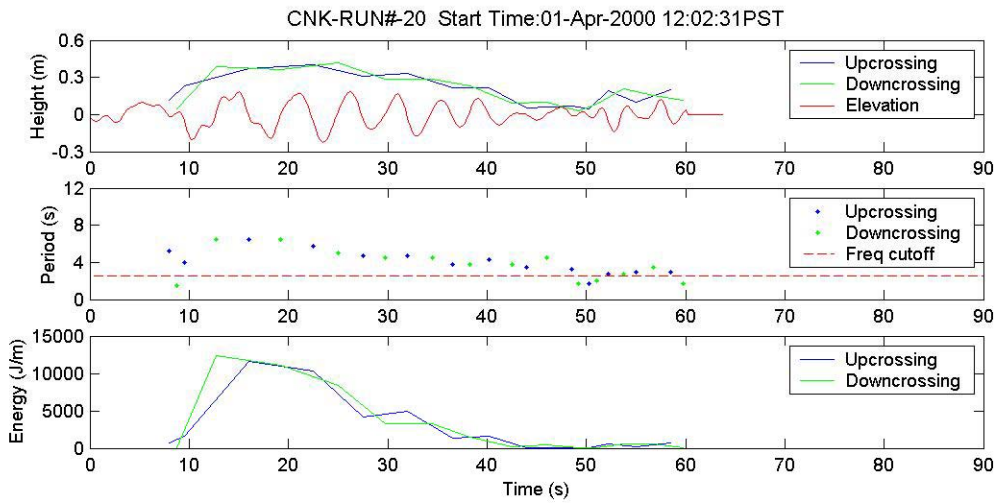
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.52	7.50
0.38	5.00
0.38	3.25
0.37	5.25
0.35	4.00
0.29	8.00



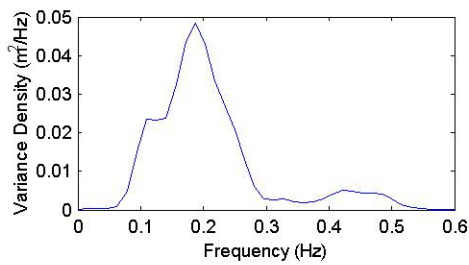
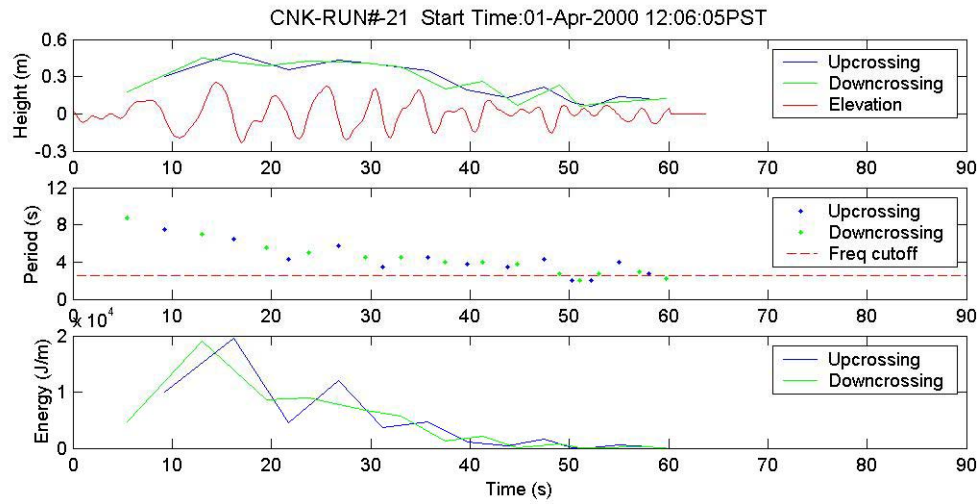
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.41	4.50
0.39	6.75
0.34	4.25
0.33	5.00
0.32	5.50
0.27	8.00



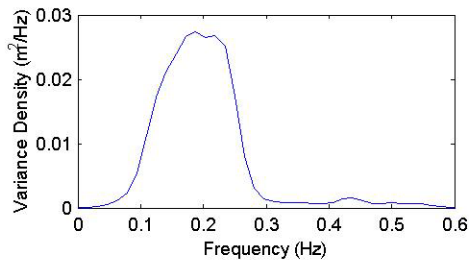
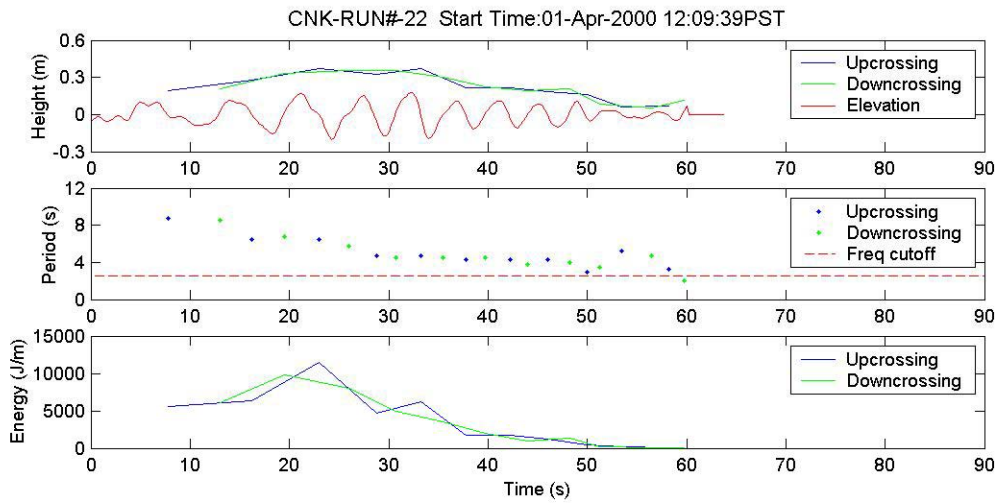
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.40	5.75
0.38	6.50
0.34	4.75
0.31	4.75
0.23	4.00
0.22	3.75



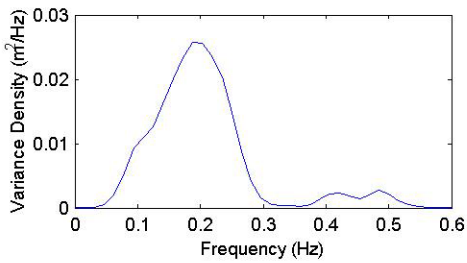
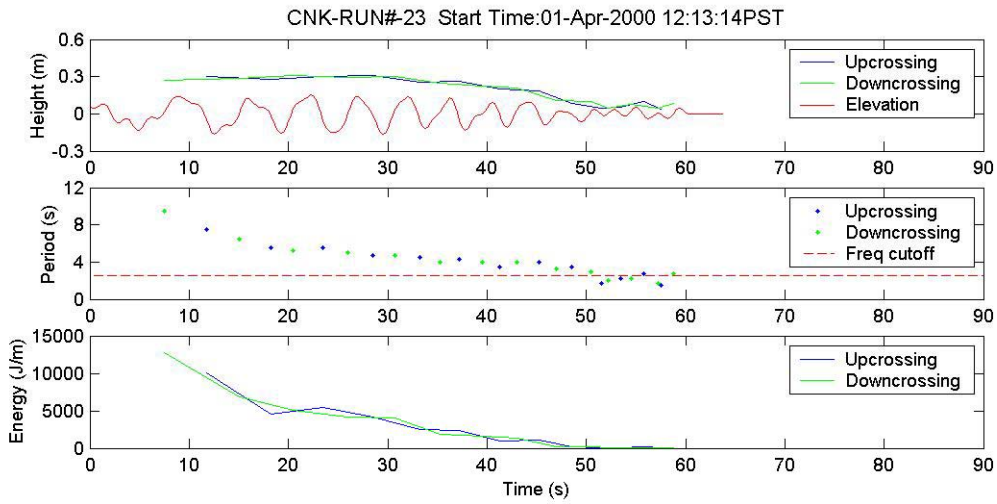
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.48	6.50
0.43	5.75
0.40	3.50
0.36	4.25
0.35	4.50
0.30	7.50



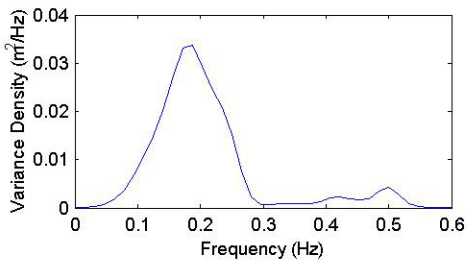
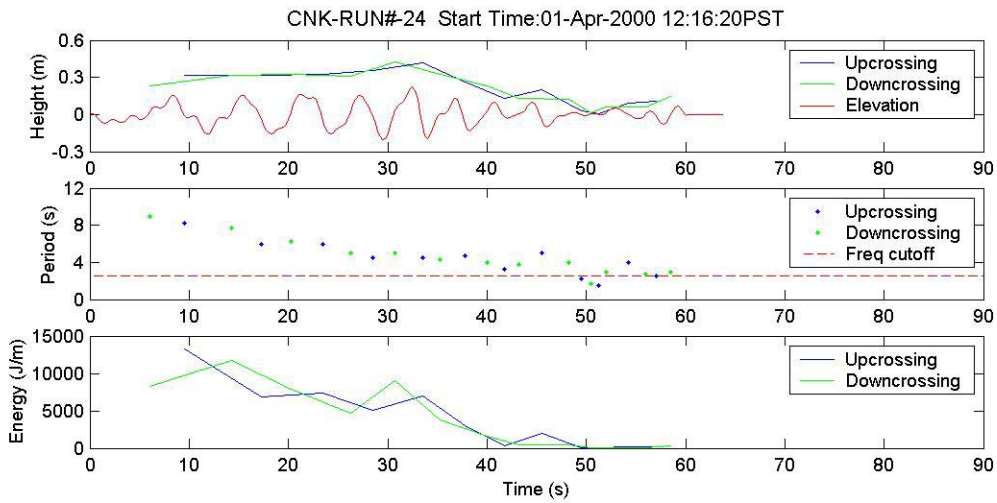
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.38	4.75
0.37	6.50
0.32	4.75
0.28	6.50
0.22	4.25
0.22	4.25



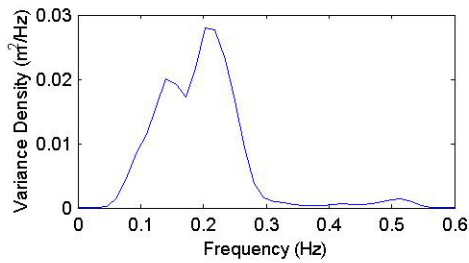
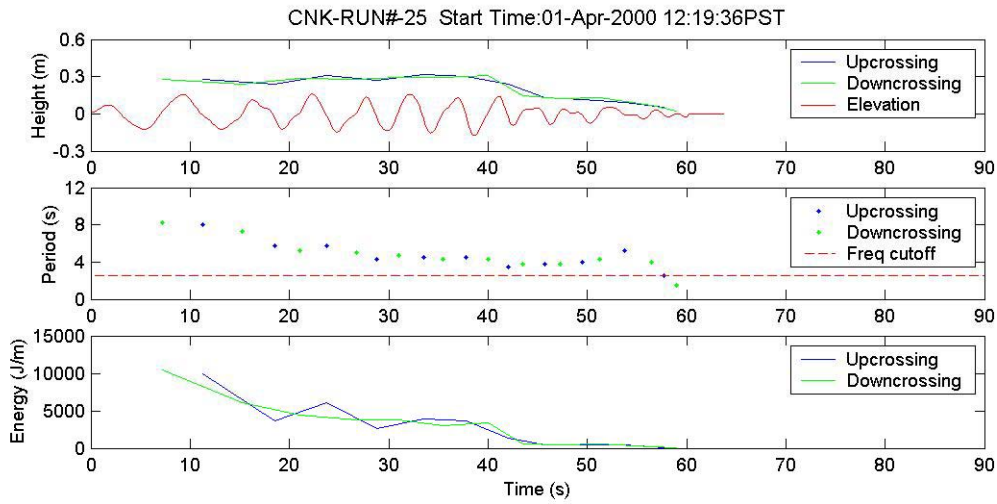
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.31	4.75
0.30	5.50
0.30	7.50
0.28	5.50
0.26	4.25
0.25	4.50



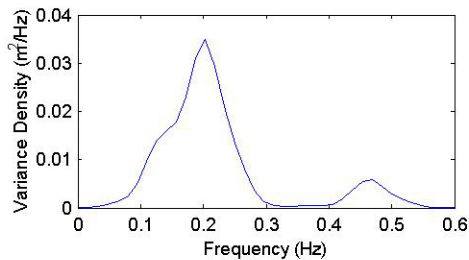
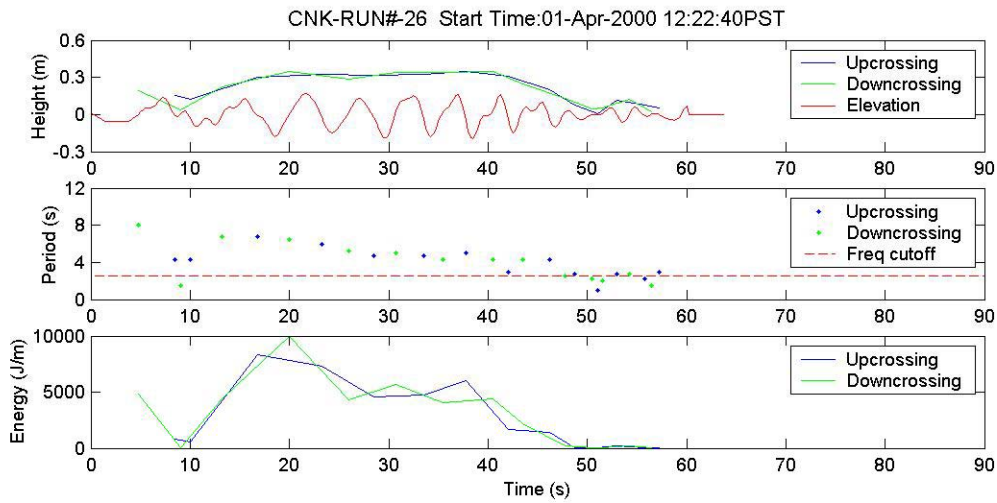
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.42	4.50
0.36	4.50
0.32	6.00
0.32	8.25
0.31	6.00
0.26	4.75



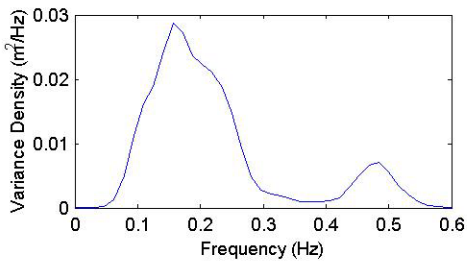
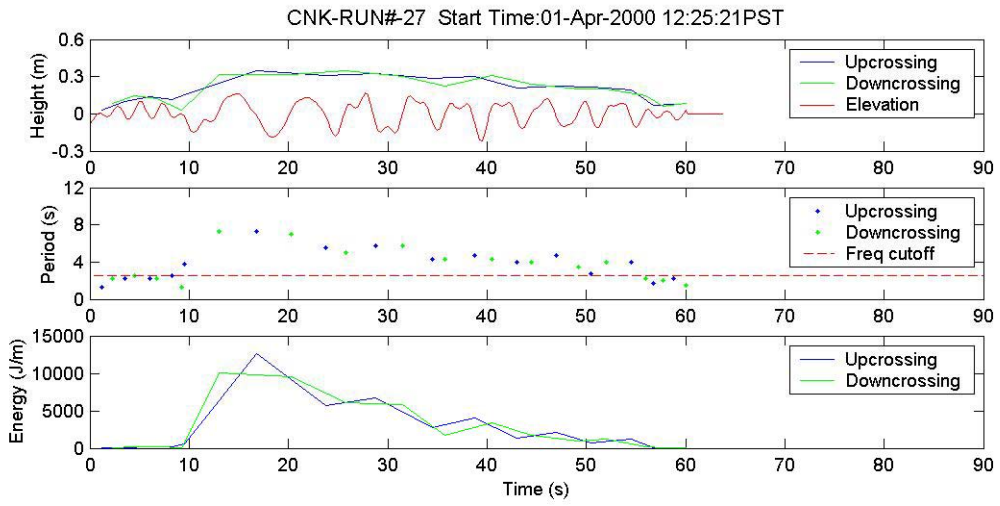
Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.32	4.50
0.31	5.75
0.30	4.50
0.28	8.00
0.27	4.25
0.24	3.50



Burst Summary
Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec)
0.35	5.00
0.33	4.75
0.32	6.00
0.32	4.75
0.31	3.00
0.30	6.75



Burst Summary

Zero-Crossing Statistics of the Highest 6 Waves:

H (m)	T (sec):
0.35	7.25
0.32	5.75
0.31	5.50
0.30	4.75
0.28	4.25
0.22	4.75

APPENDIX C-b

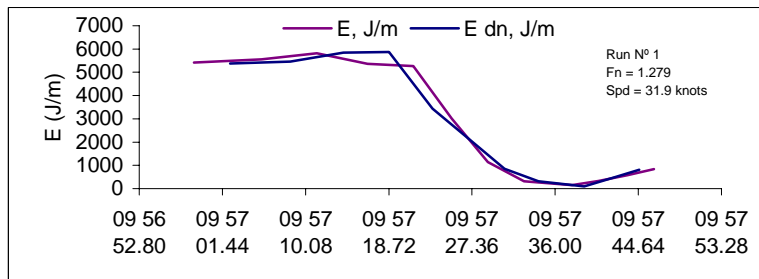
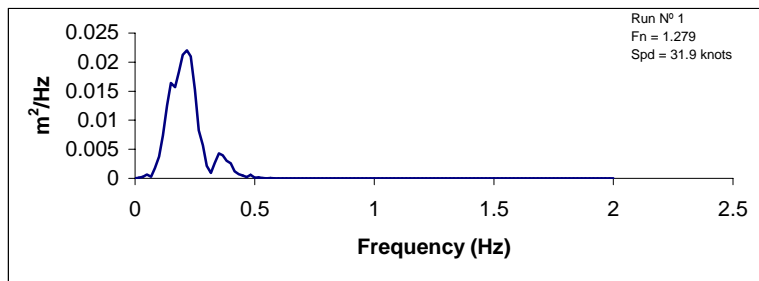
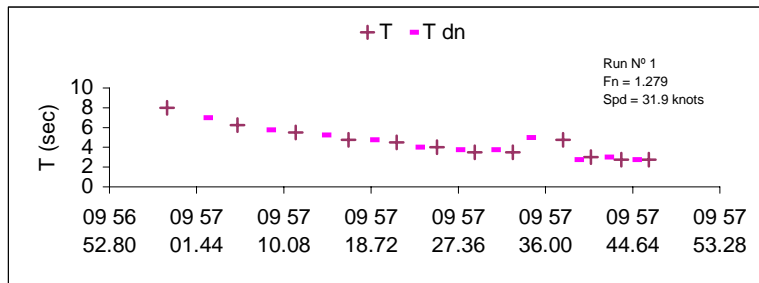
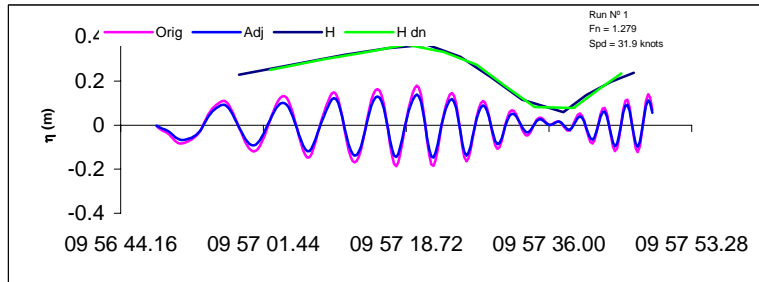
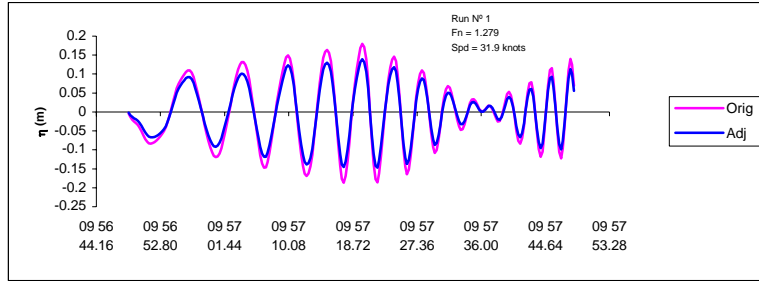
Wake Trial Time Series *M/V Snohomish*

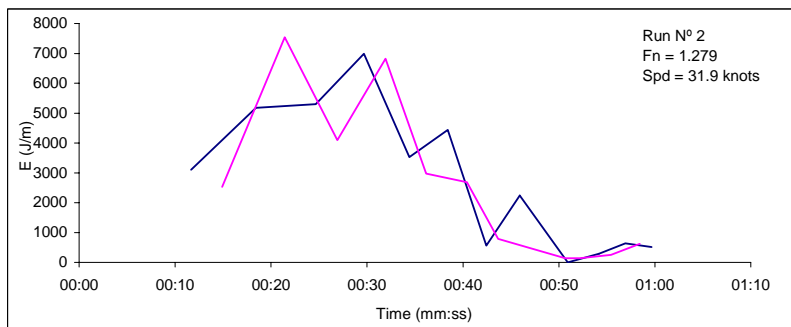
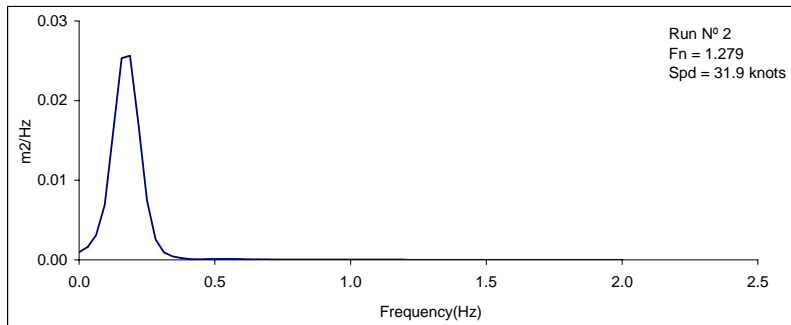
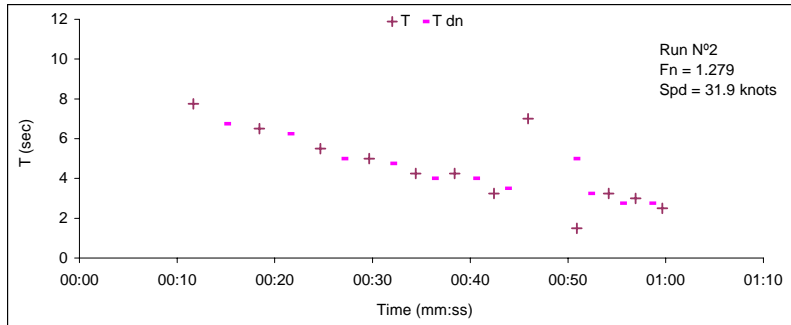
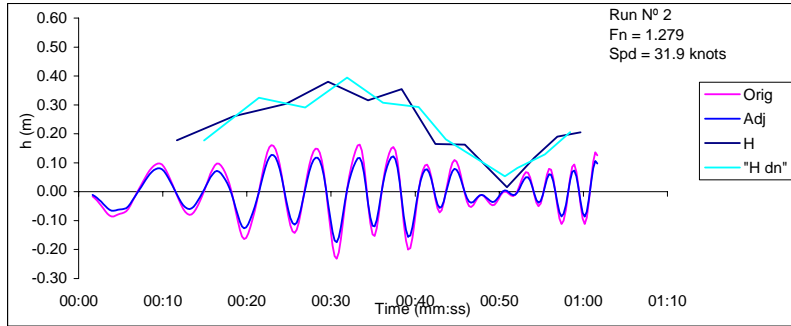
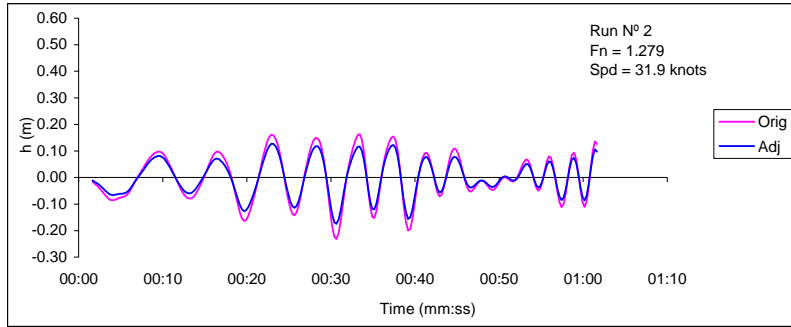
M/V Snohomish

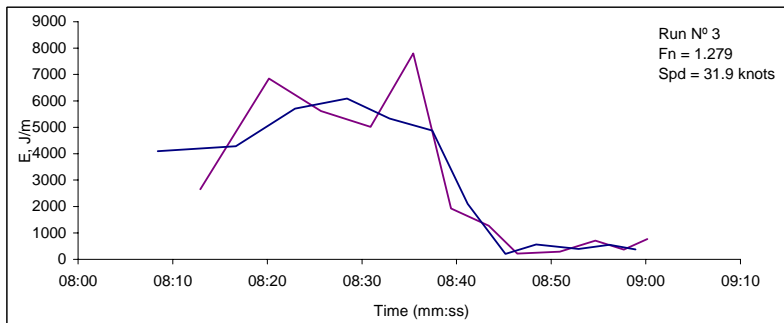
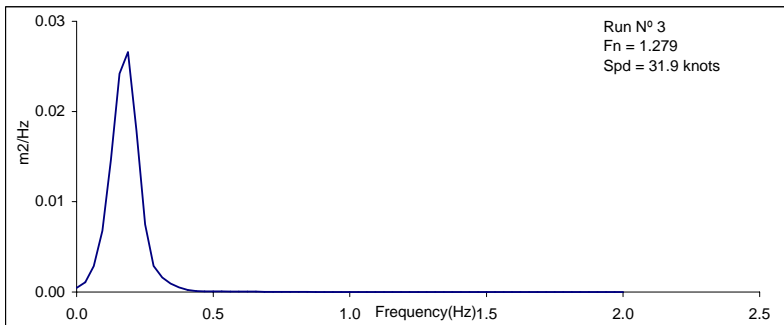
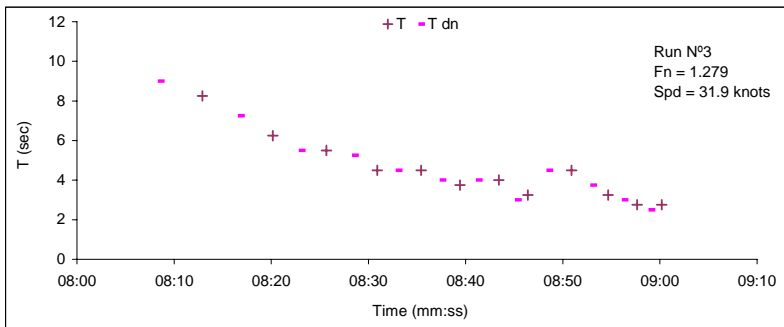
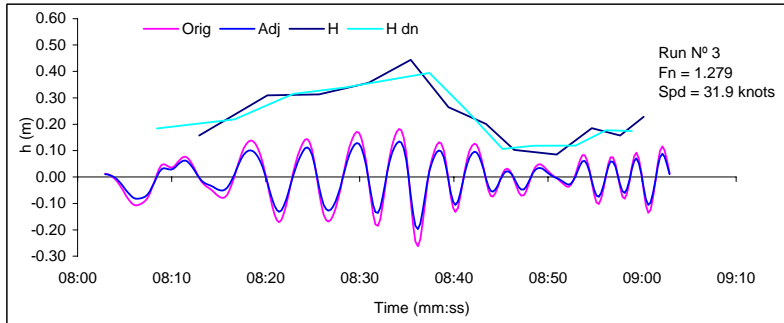
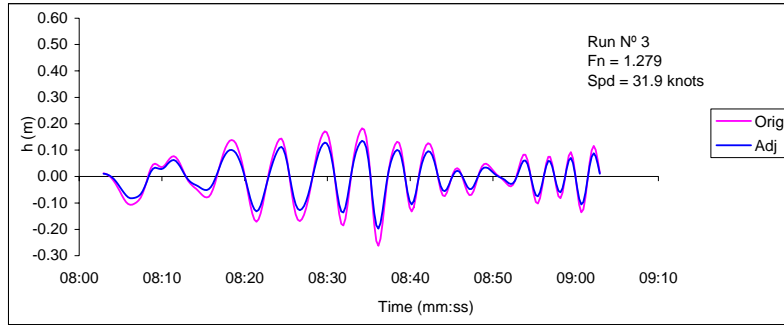
The AMD 385 *Snohomish* is a sister ship to the *Chinook*. Both are 196 tonne, 350-passenger ferries designed by Advanced Multihull Designs of Sydney Australia and built by Dakota Creek Industries of Anacortes, WA. The *Snohomish* was brought into service by WSF in early 2000.

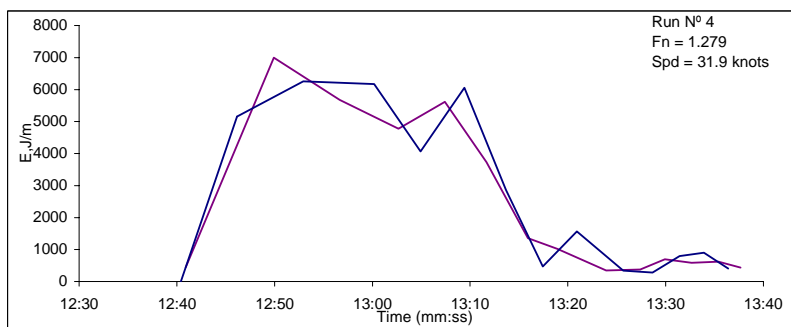
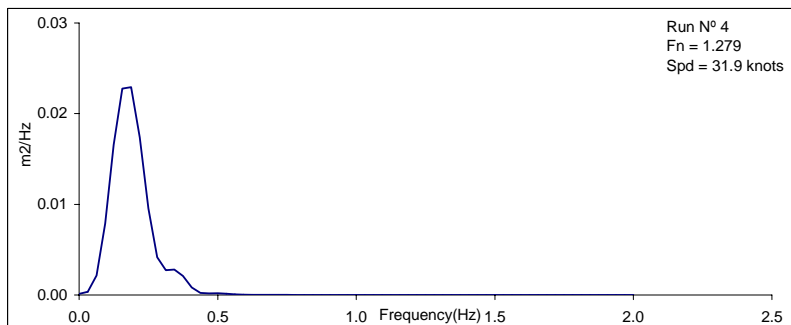
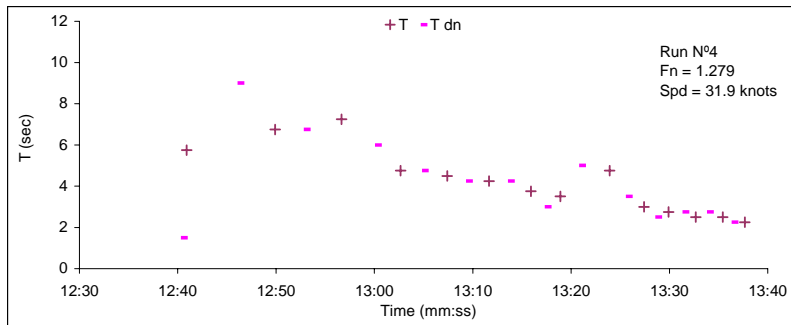
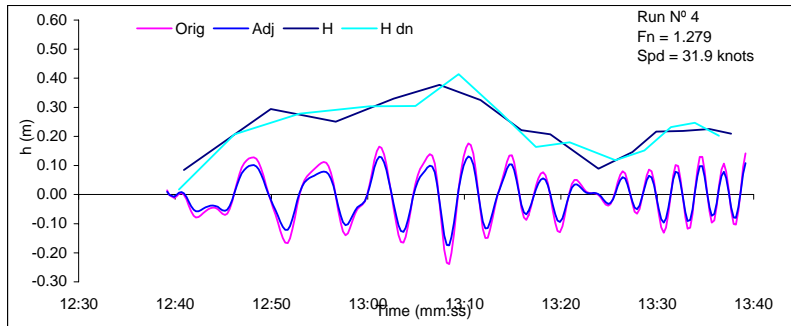
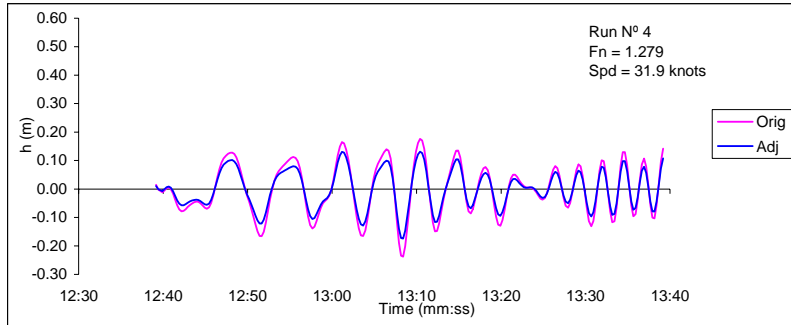
WSF tested *Snohomish* by conducting various wake trials at a number of different locations on Puget Sound, including Port Madison. Only limited trial data for this vessel were available to this study.

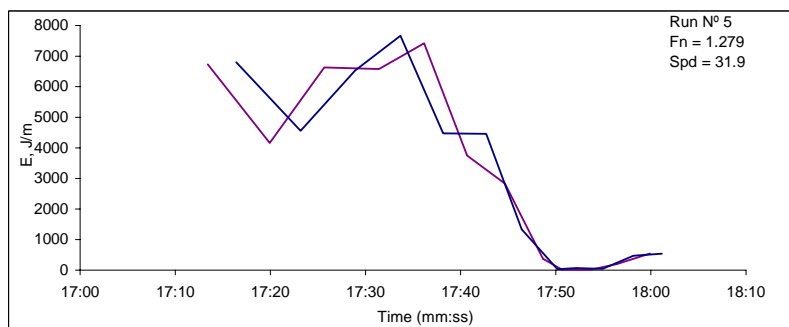
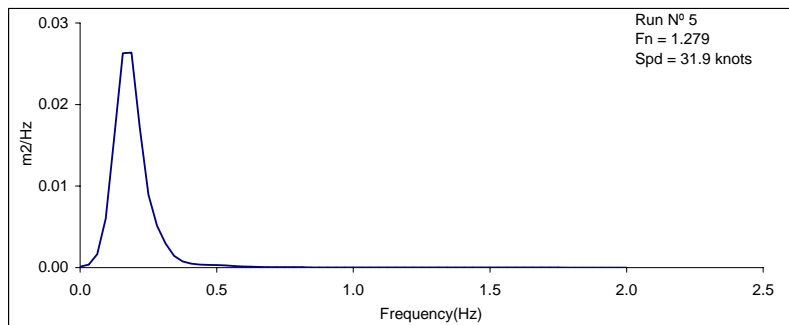
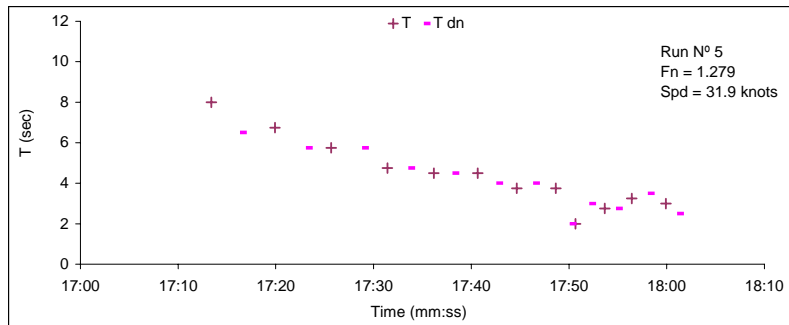
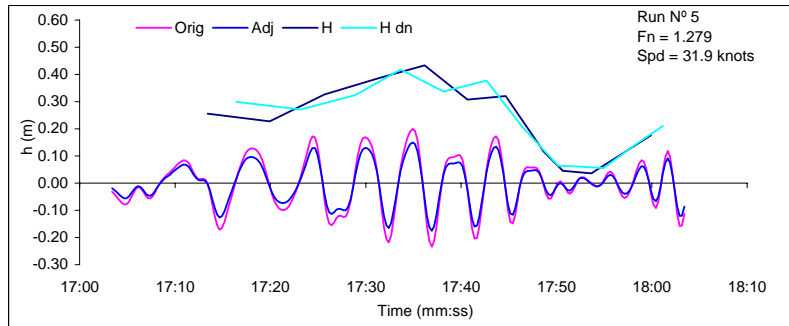
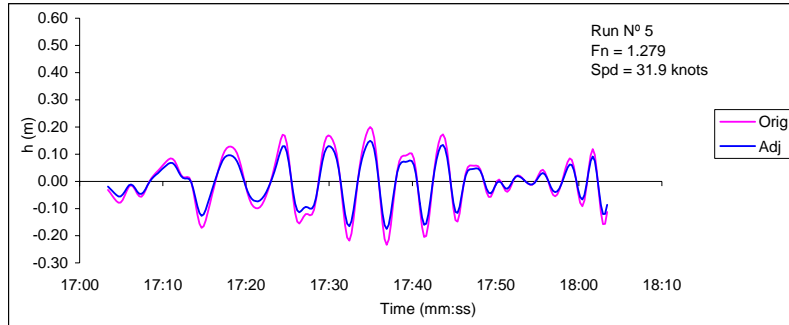
Trial data for *Snohomish* acquired on February 27, 2000 are available to the present study. Time series from the trials were analyzed by Pacific International Engineering as part of this study and are presented below.

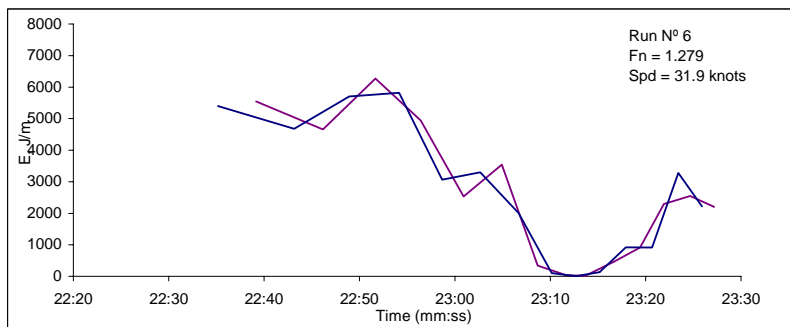
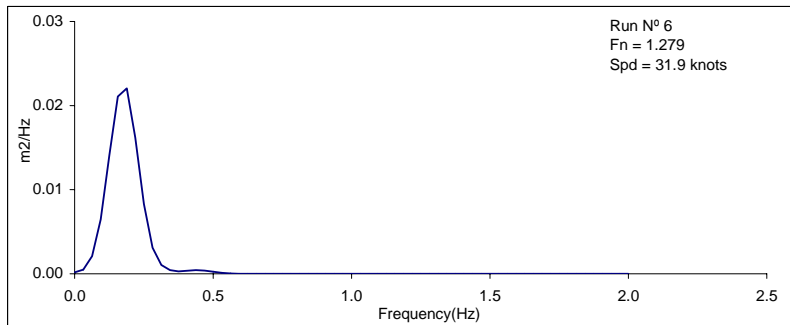
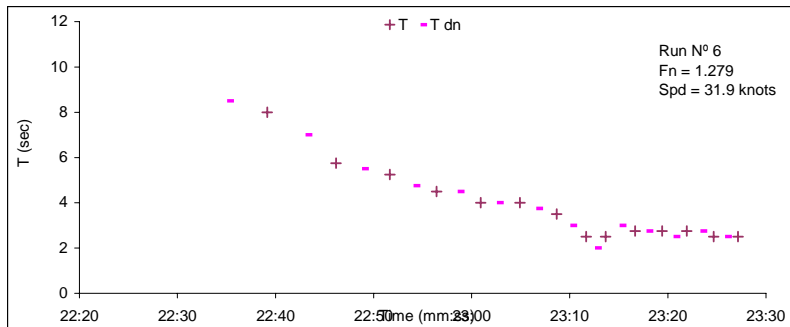
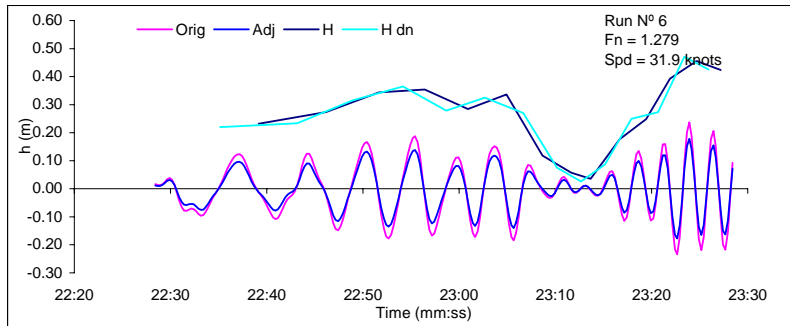
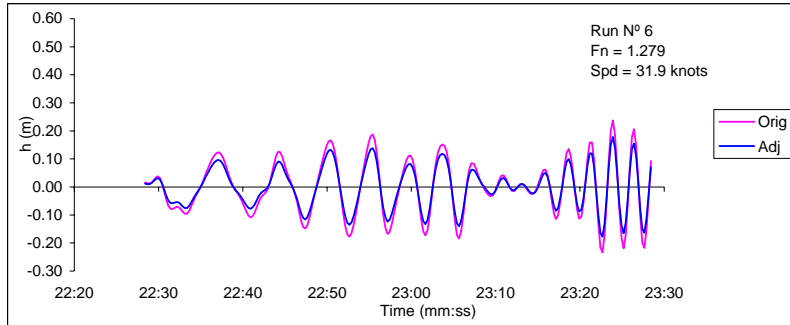


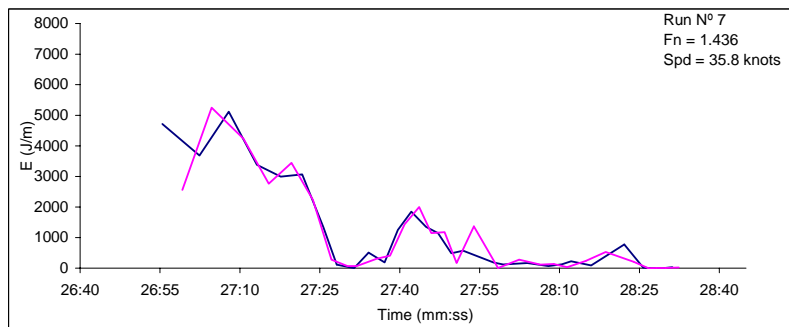
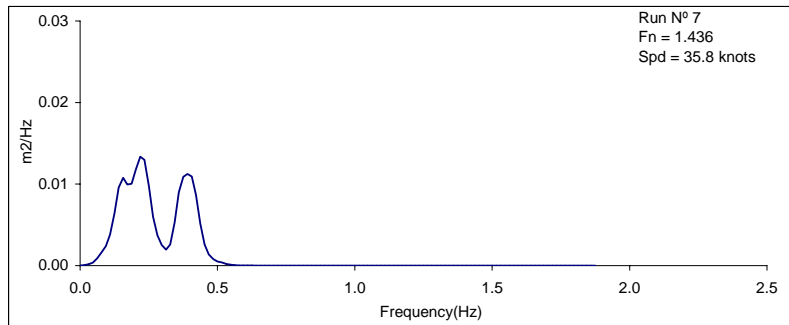
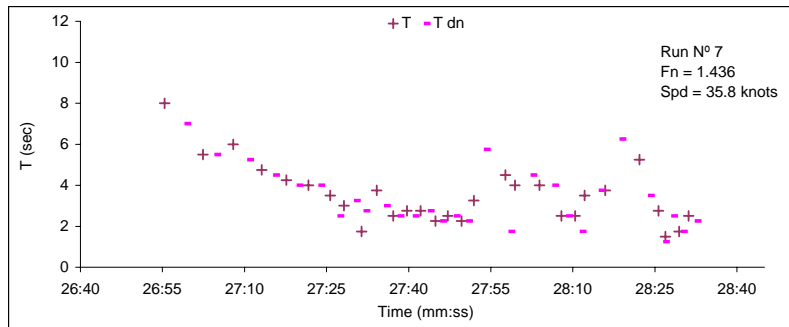
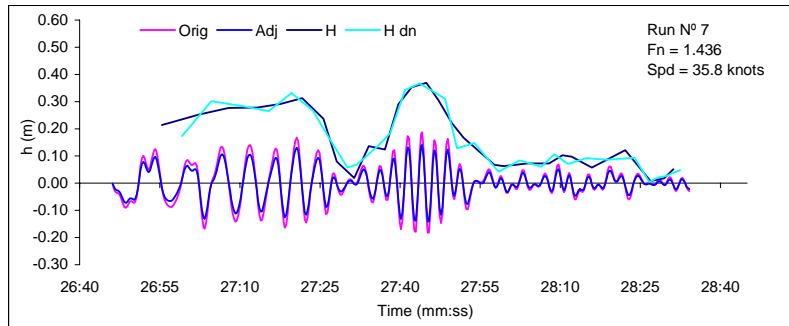
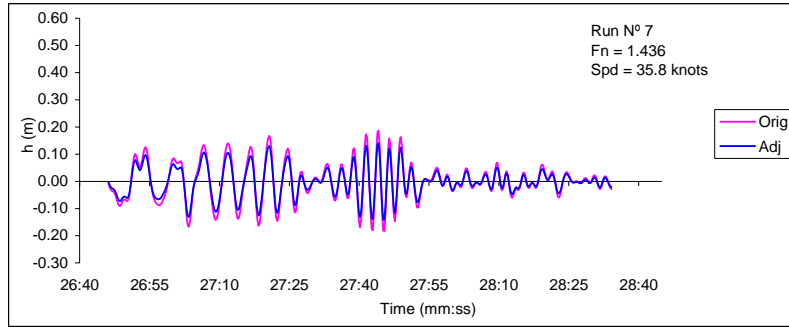


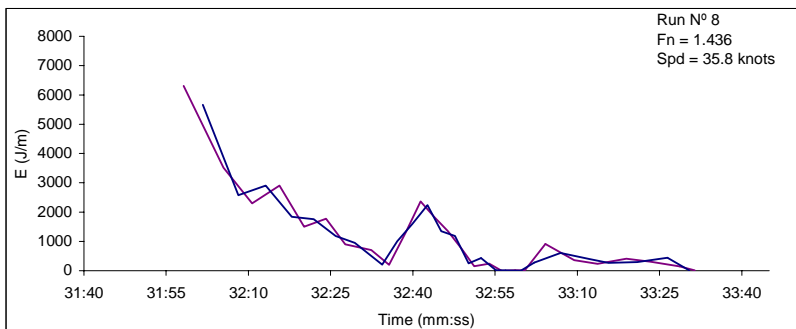
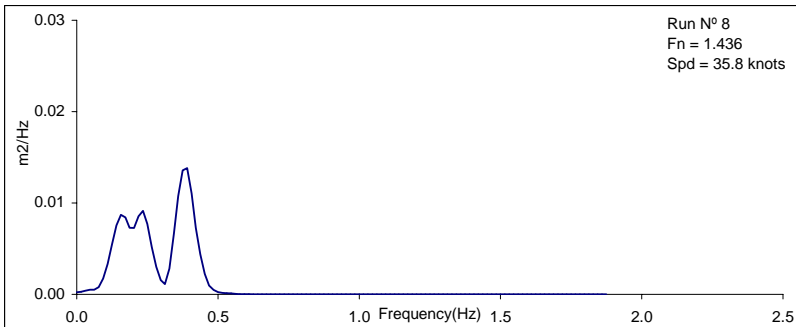
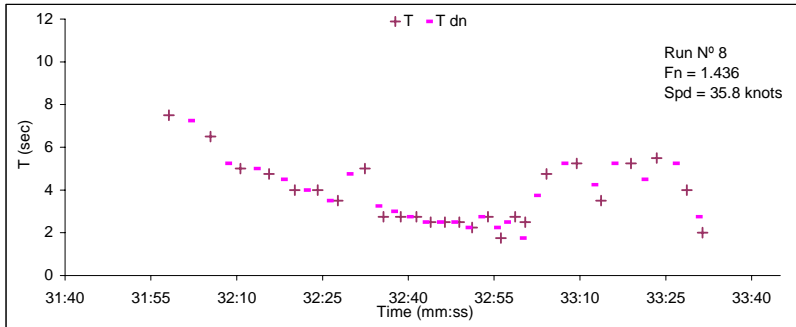
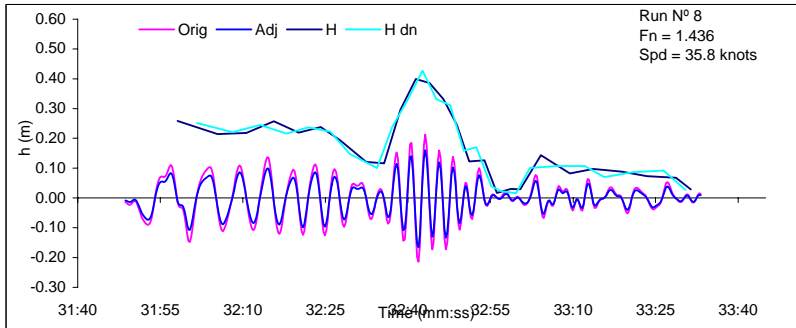
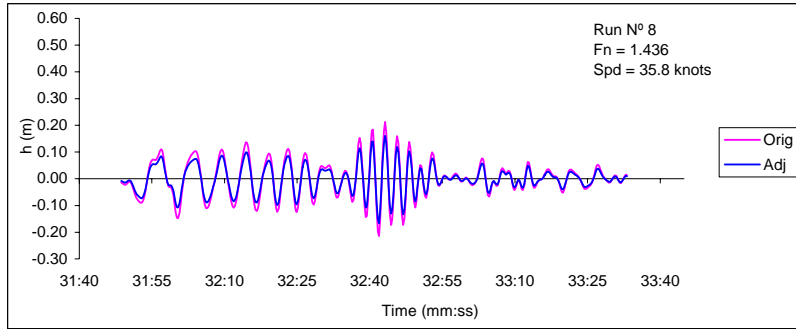


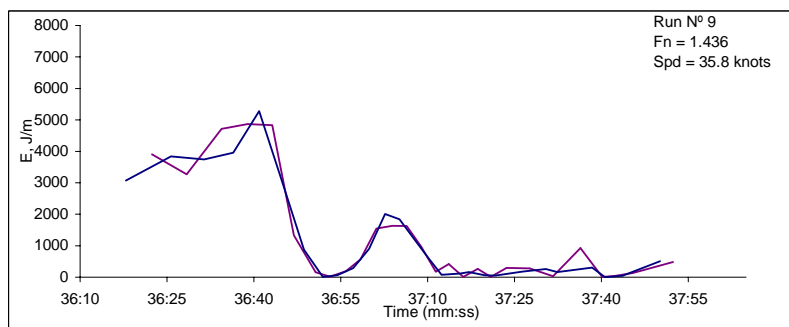
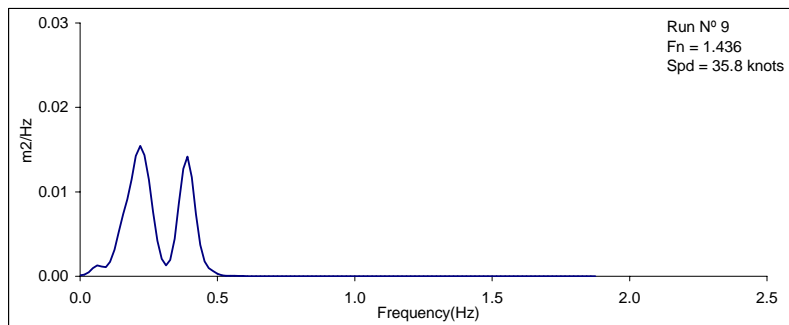
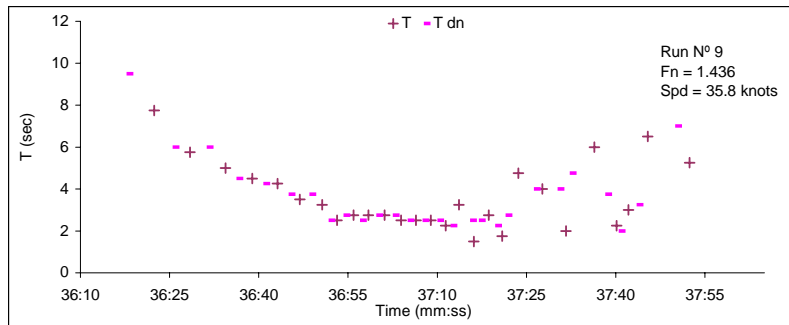
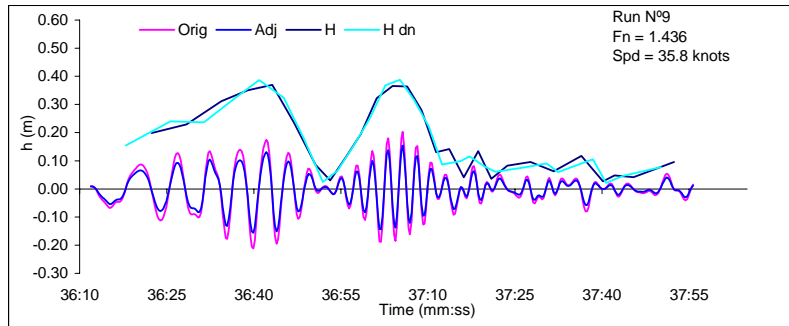
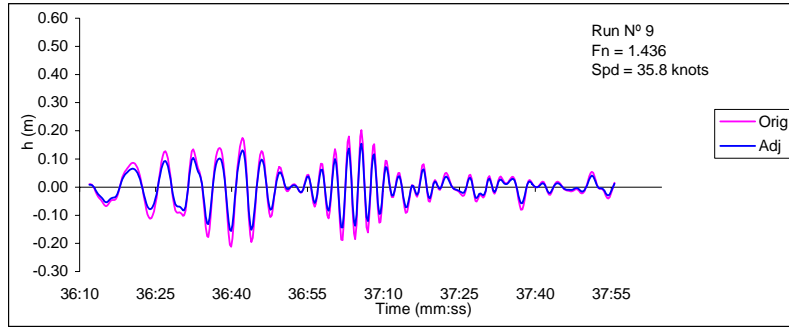


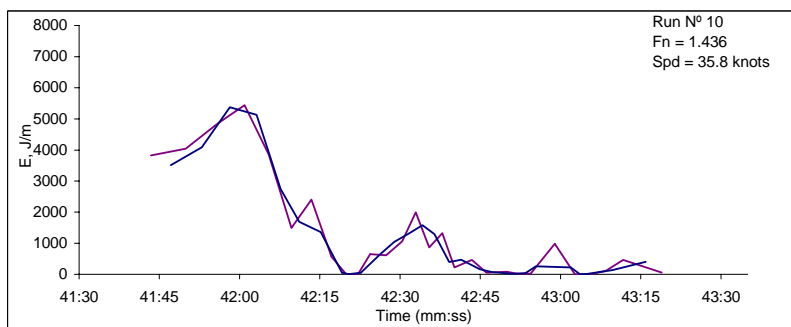
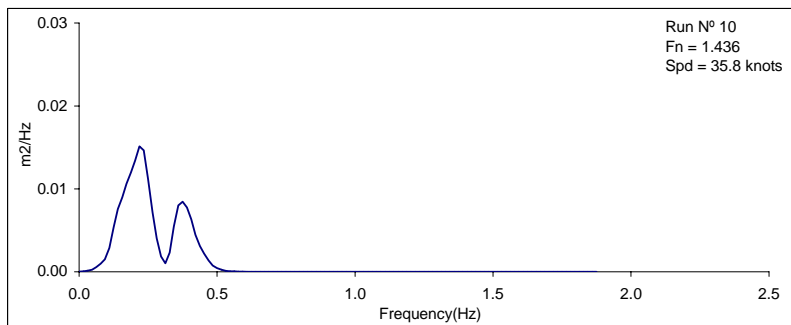
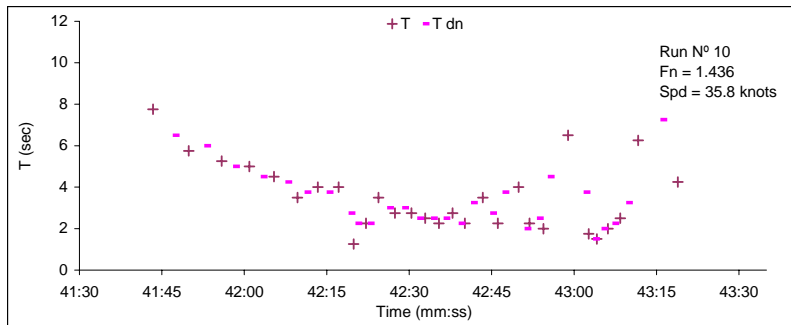
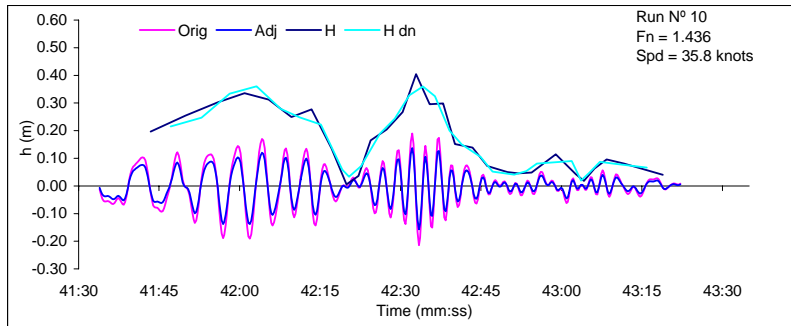
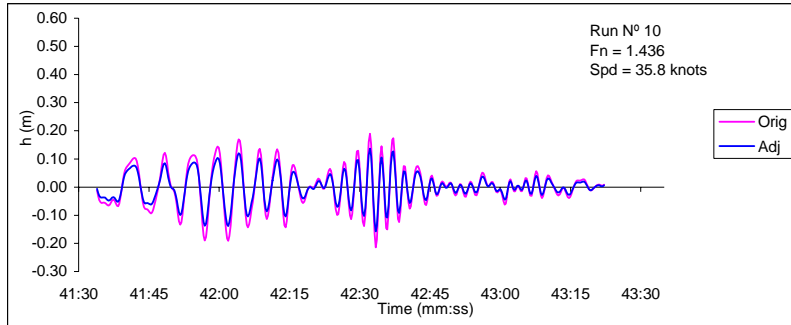


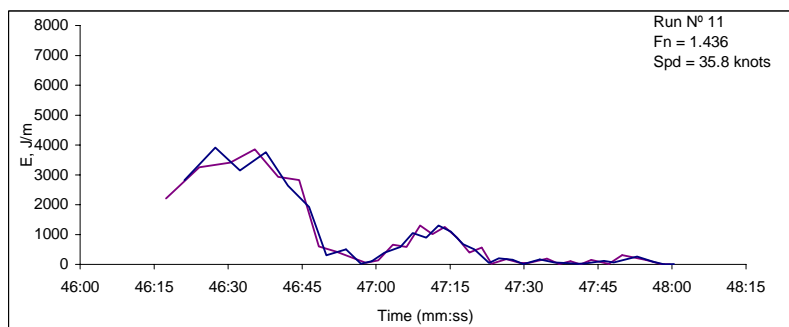
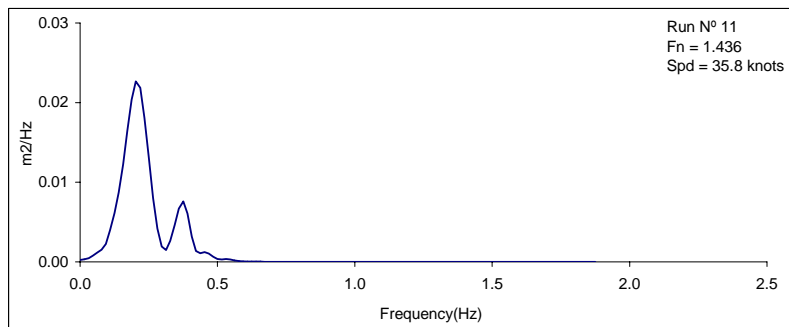
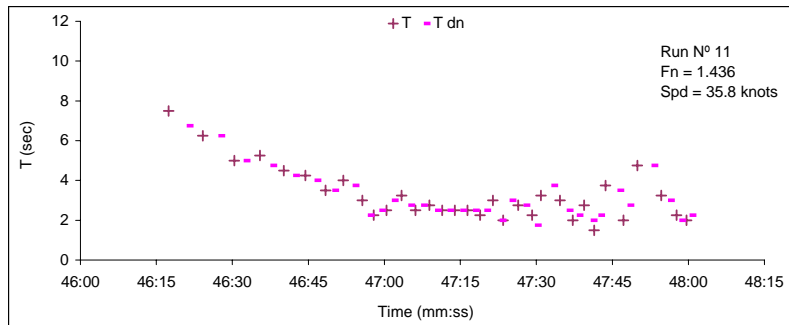
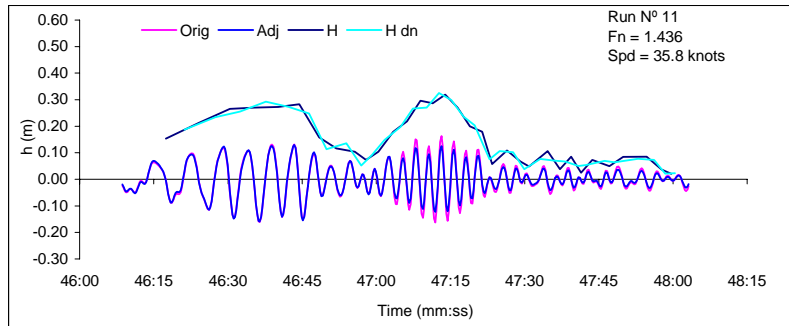
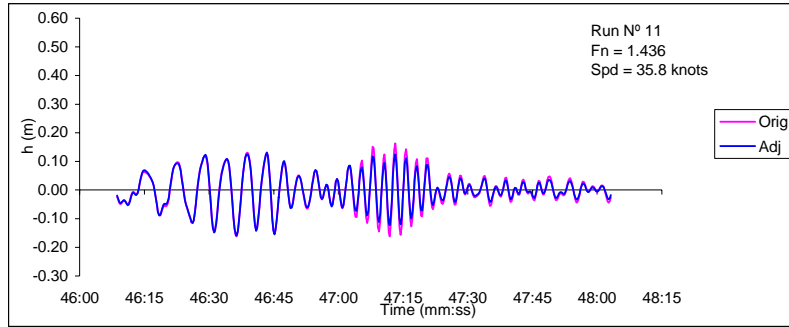


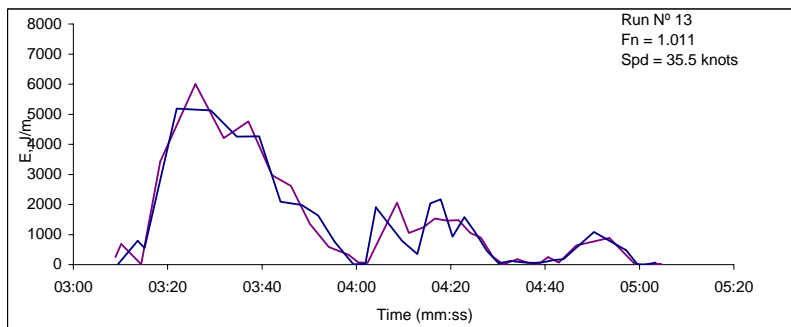
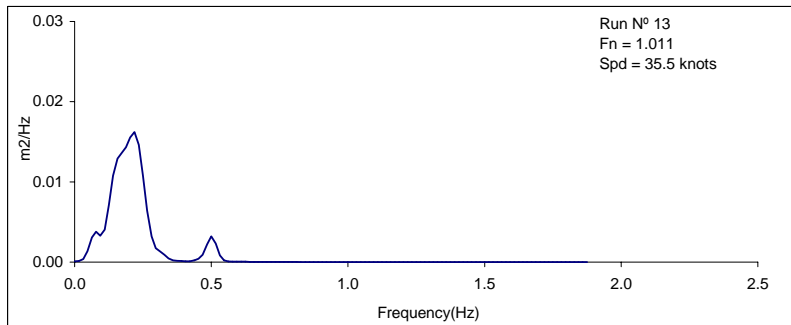
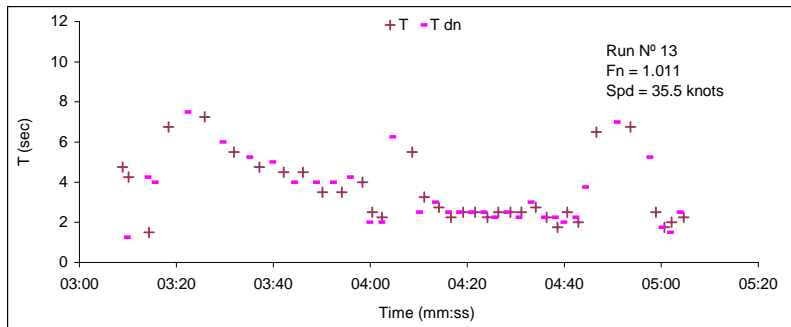
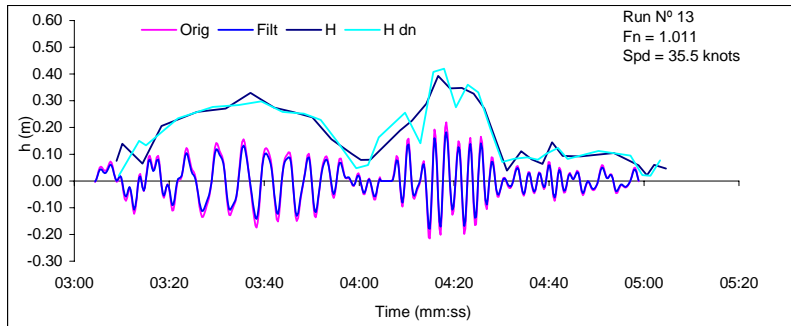
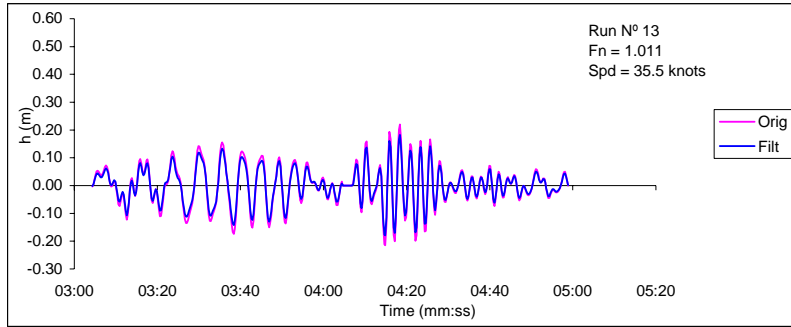


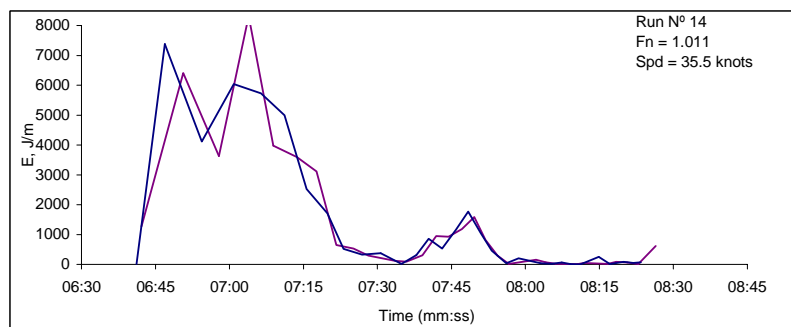
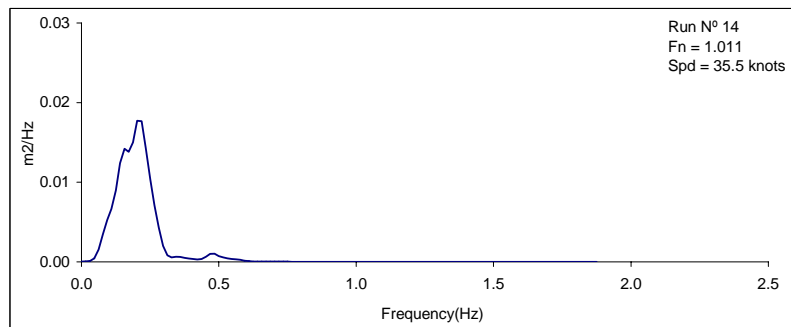
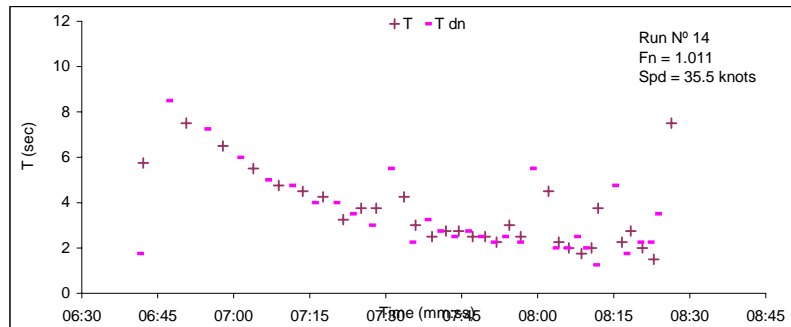
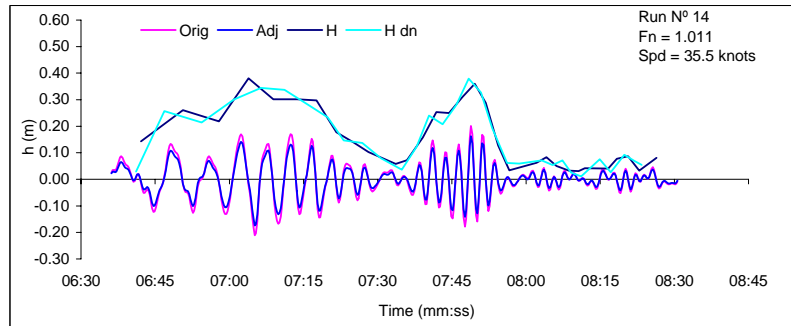
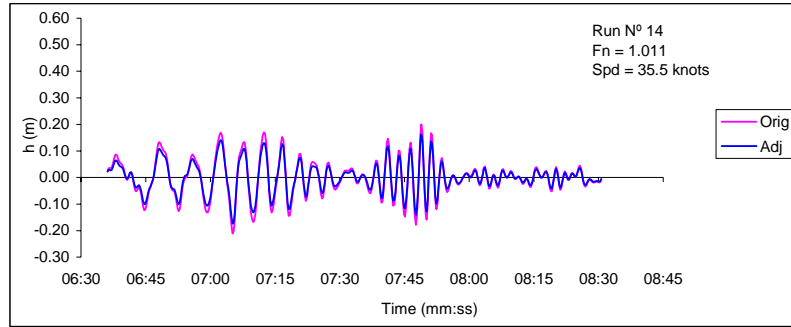


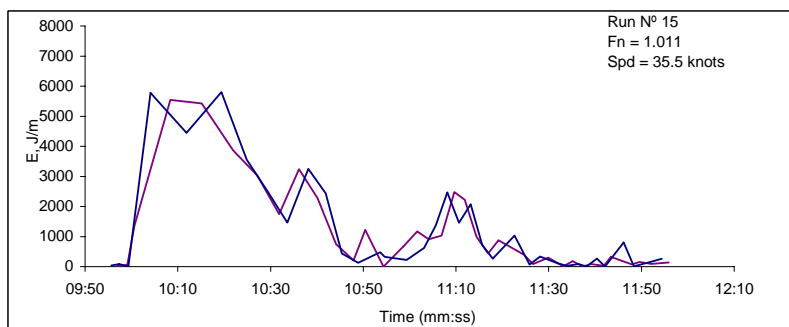
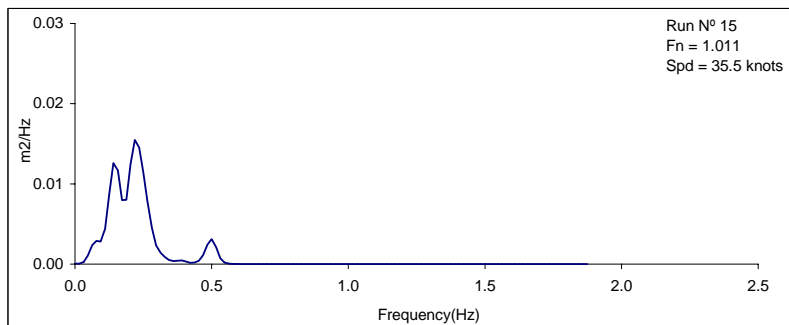
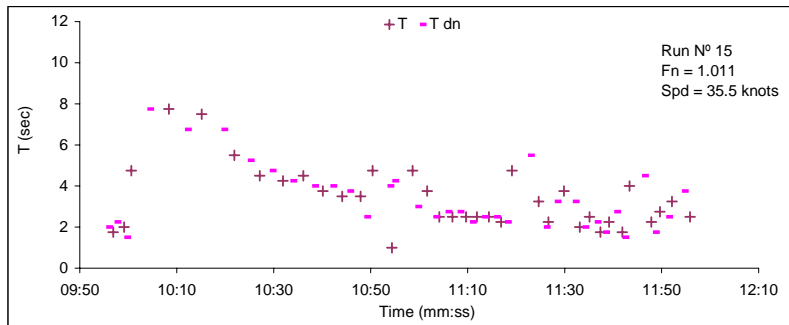
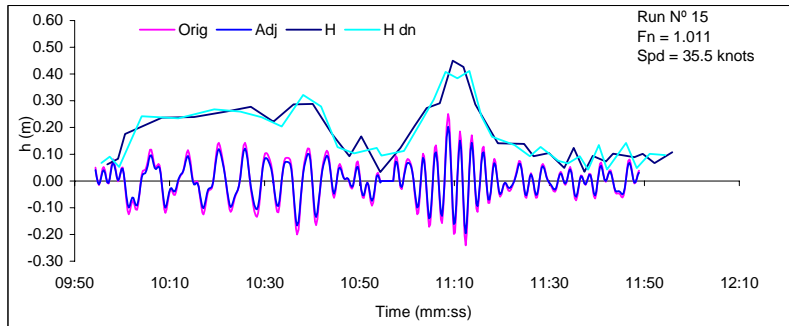
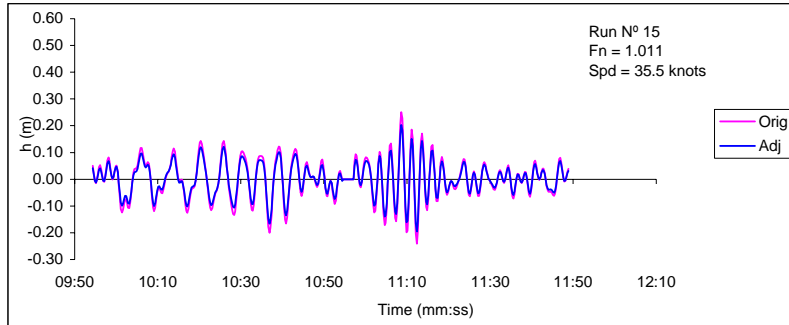


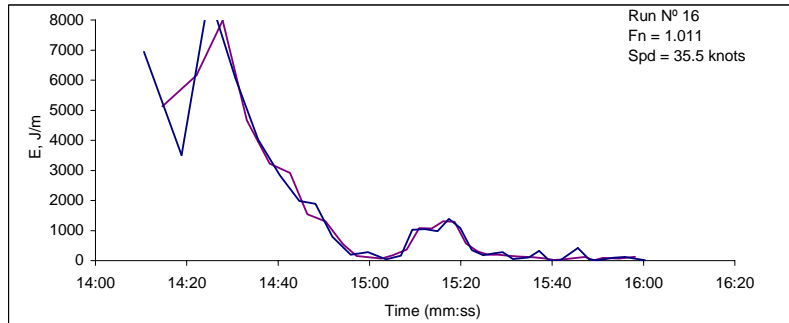
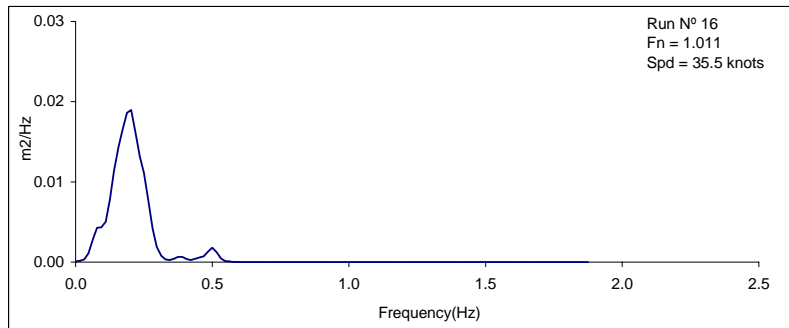
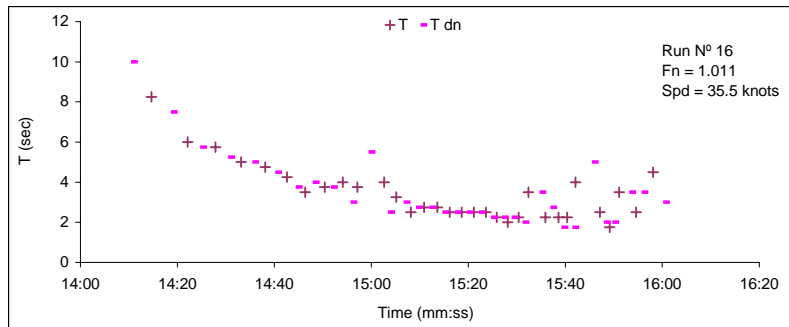
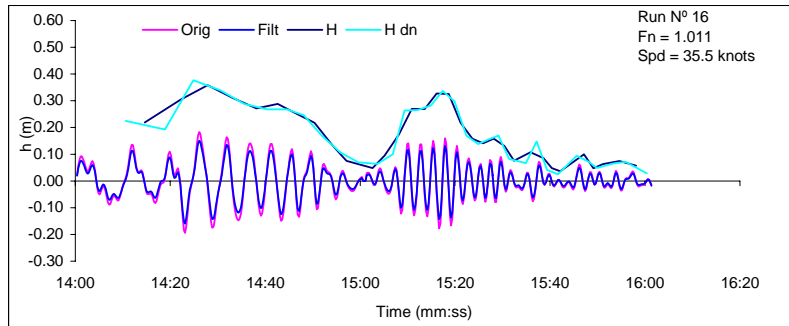
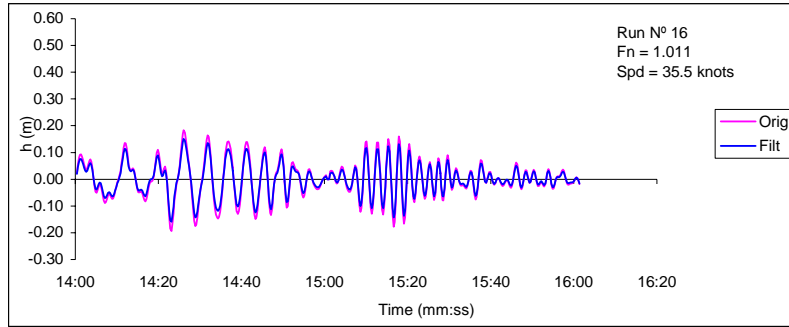


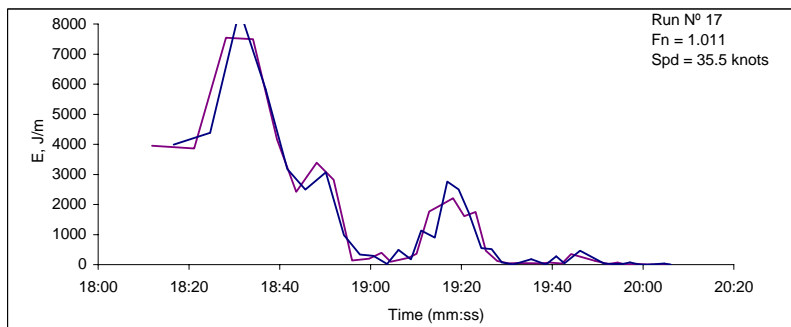
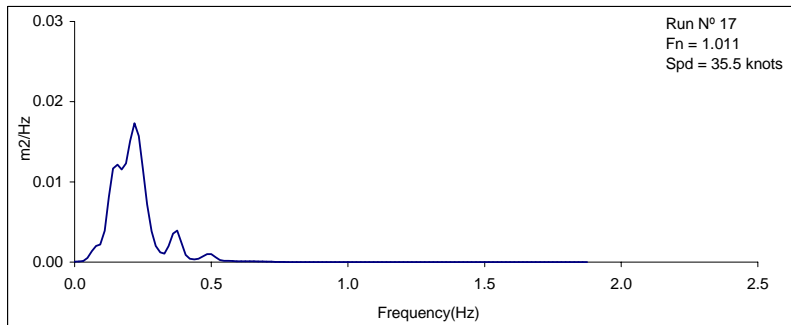
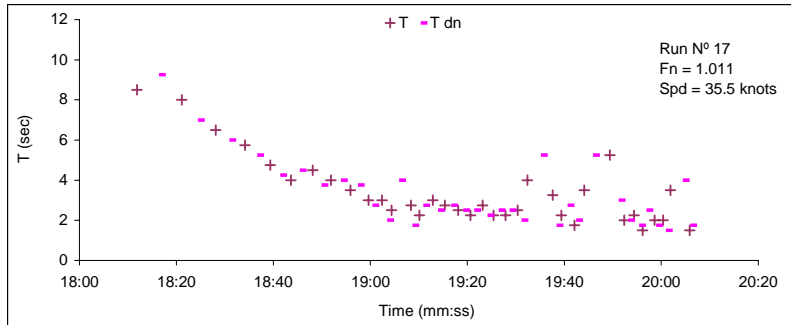
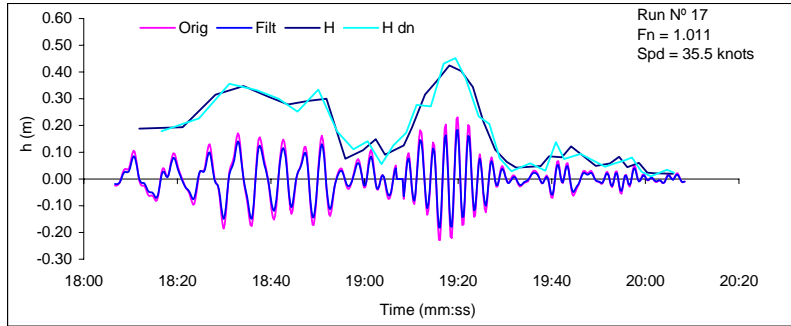
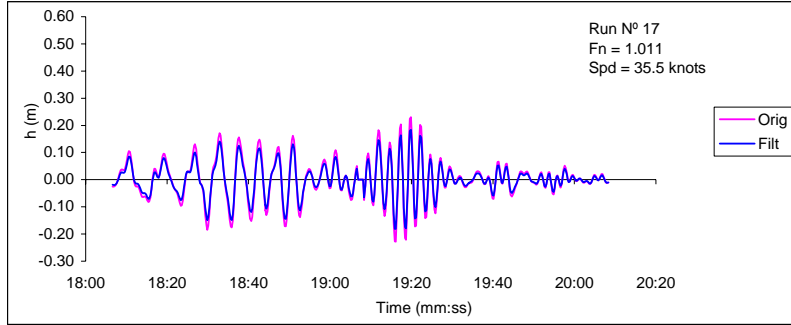


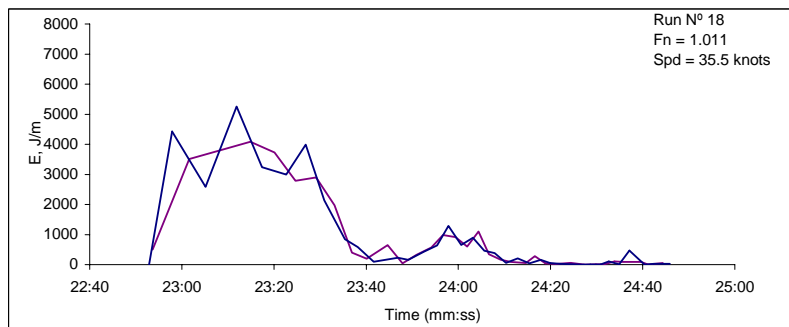
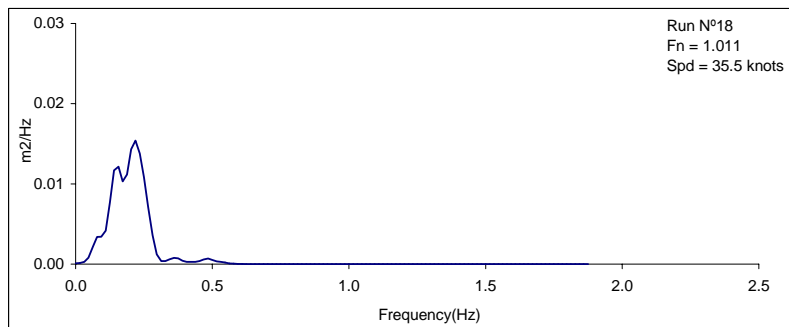
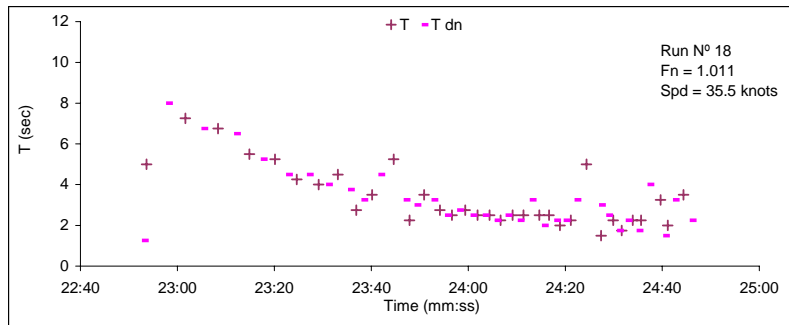
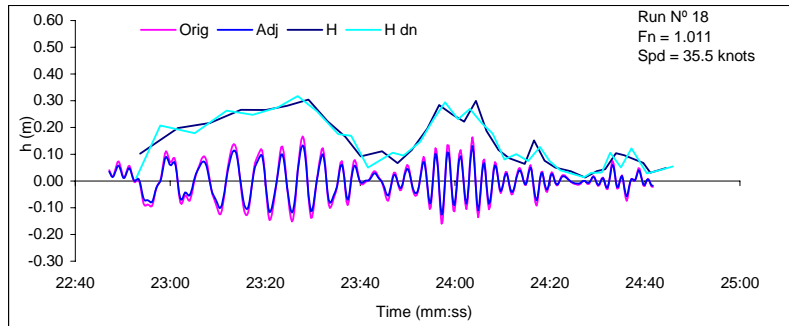
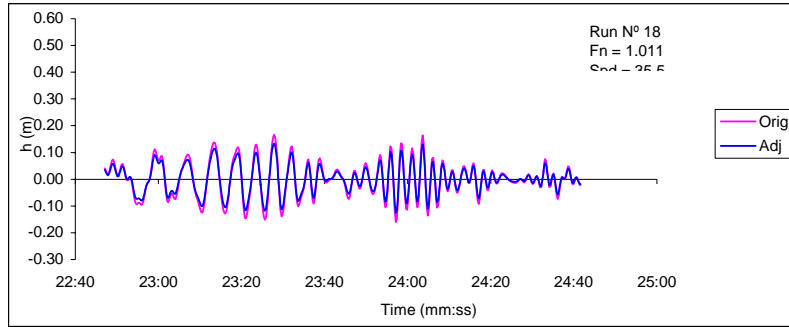


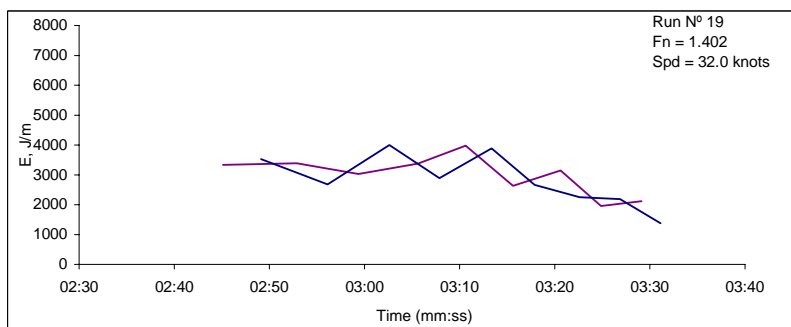
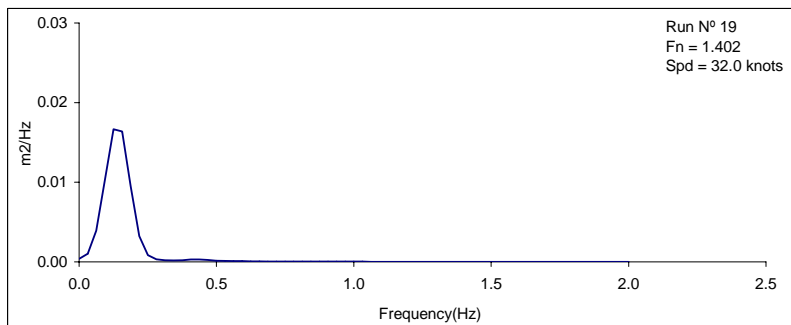
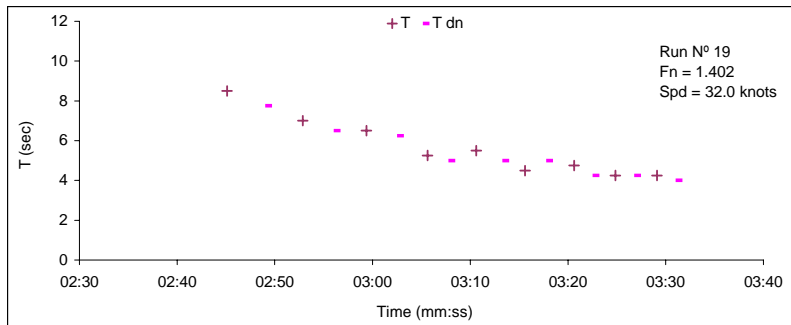
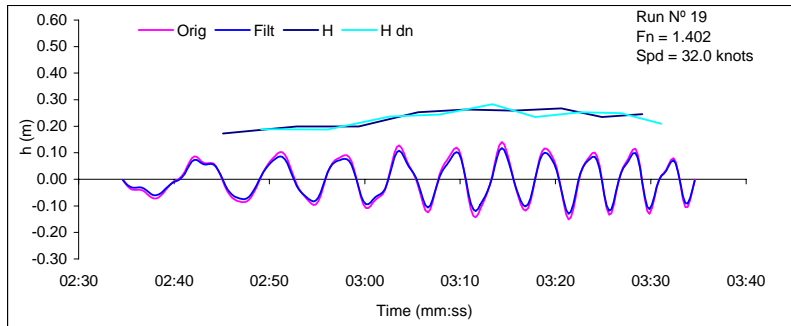
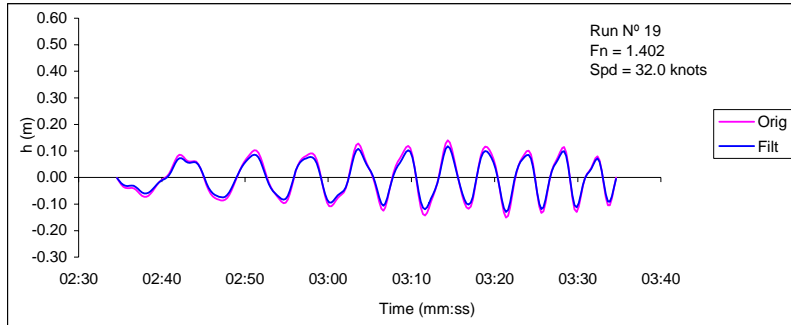


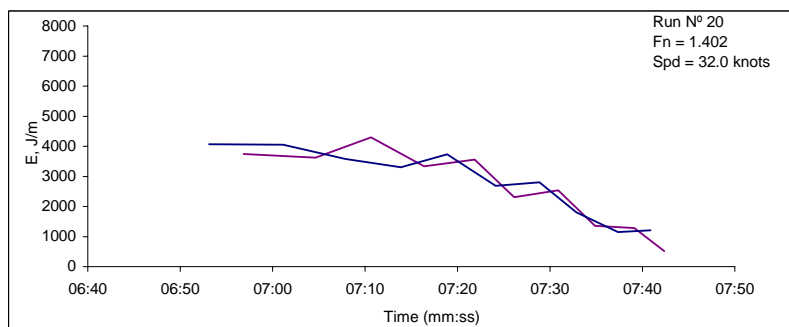
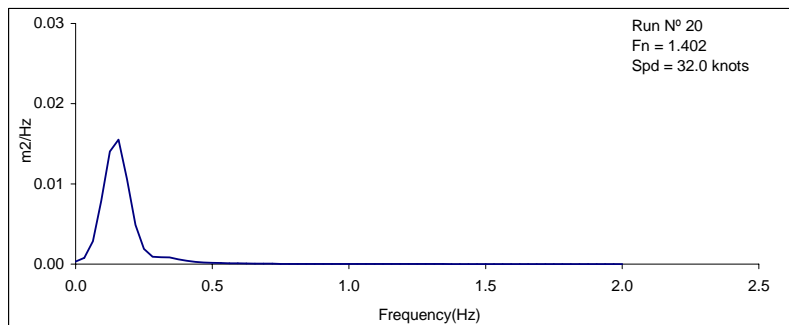
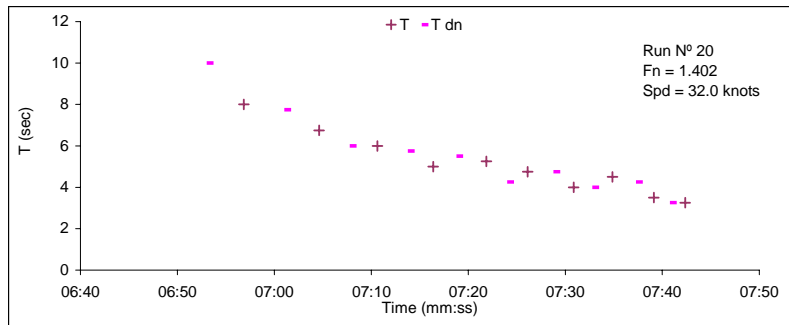
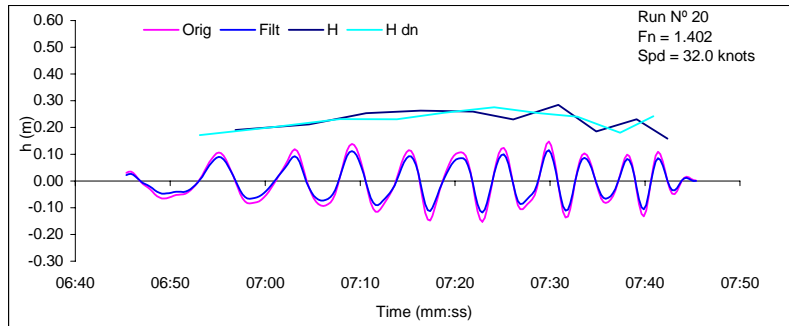
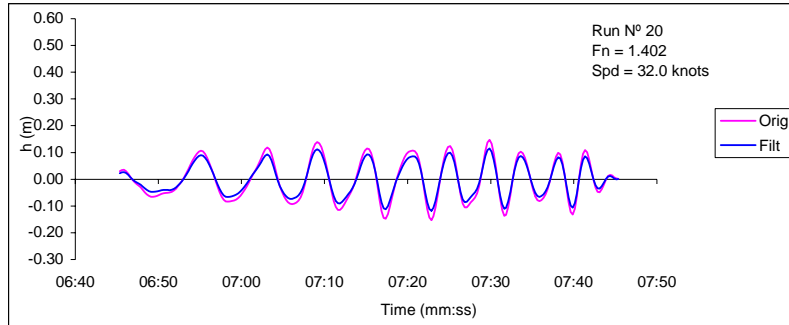


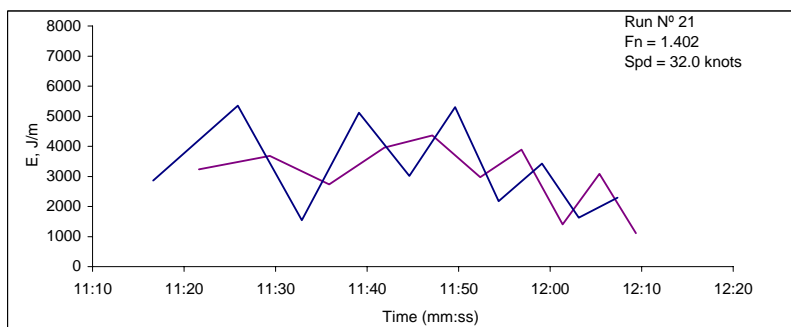
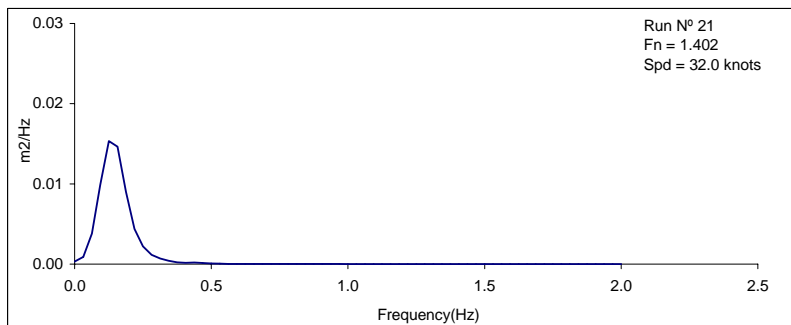
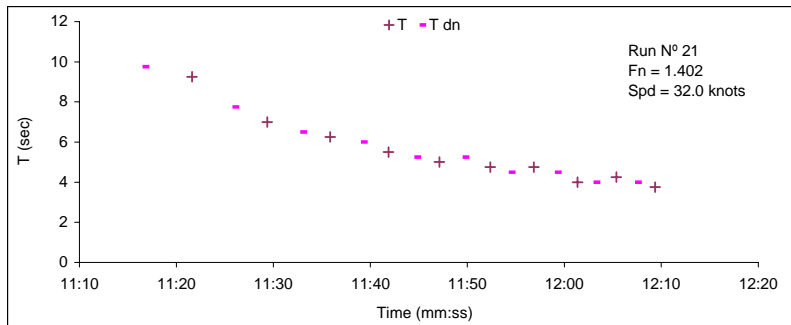
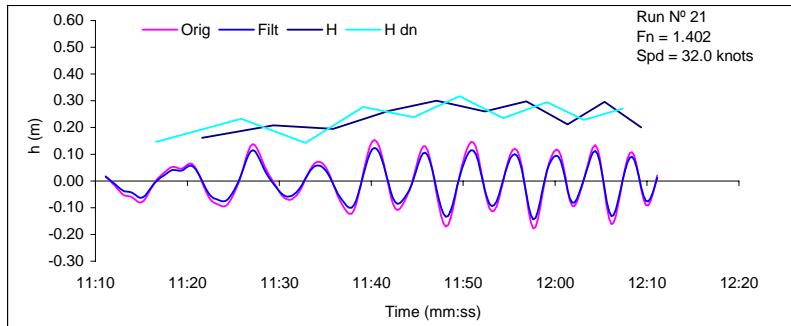
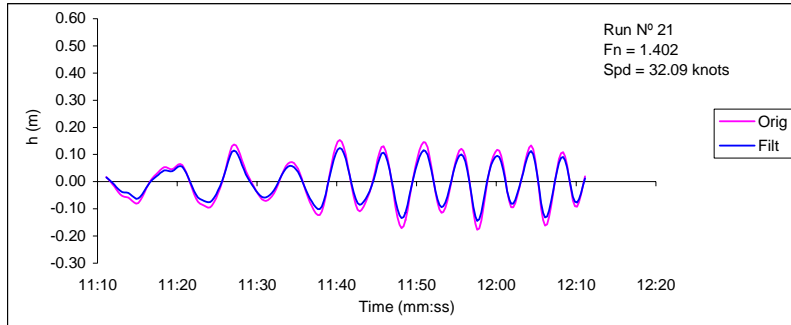


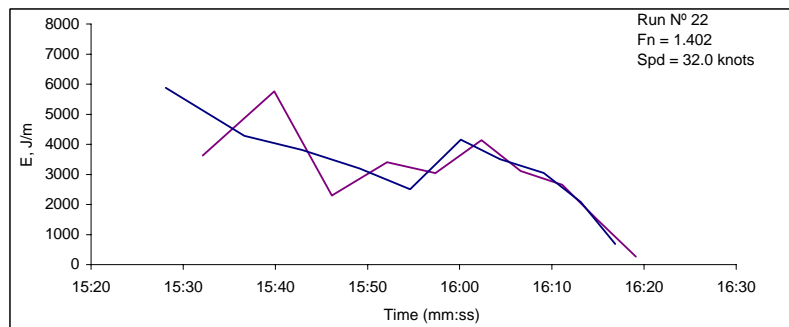
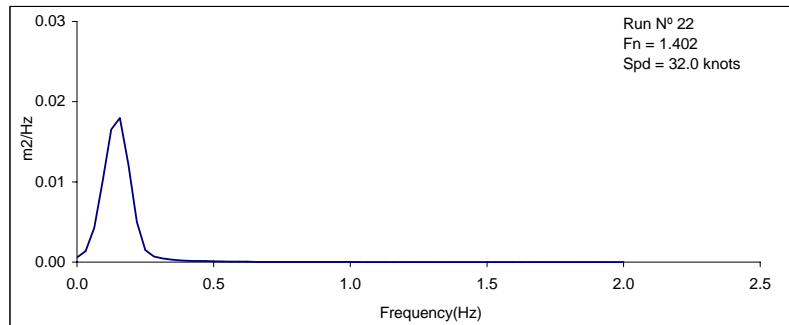
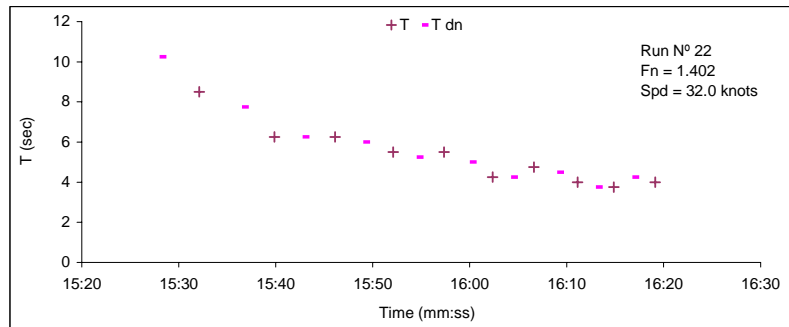
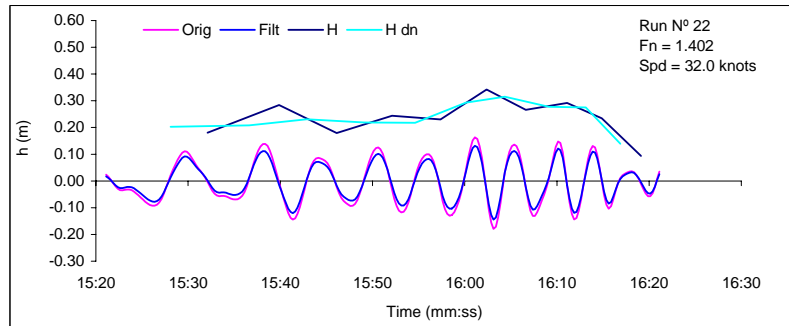
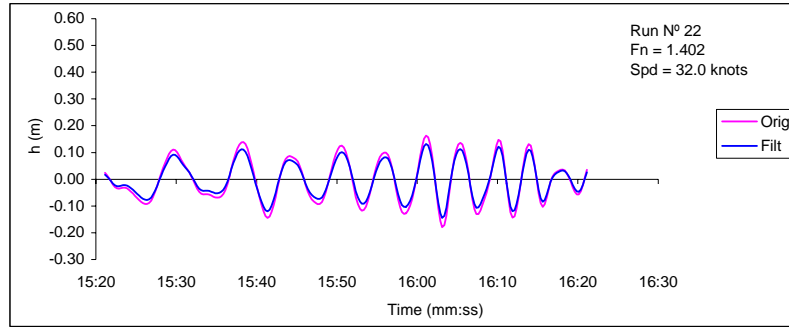


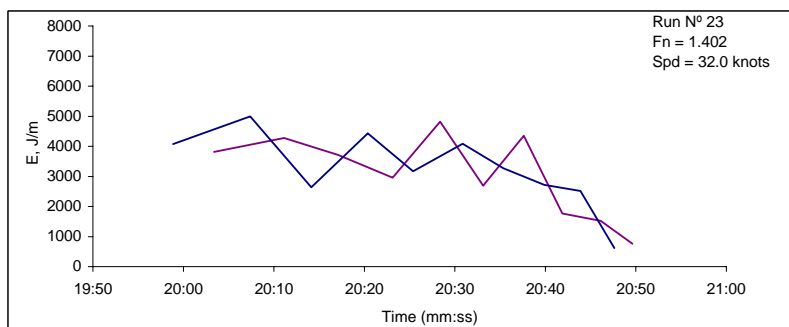
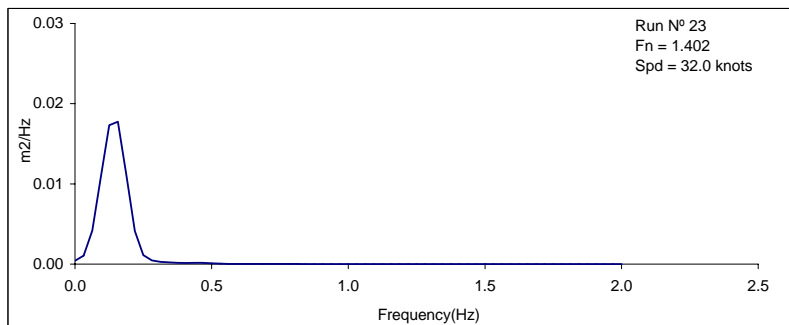
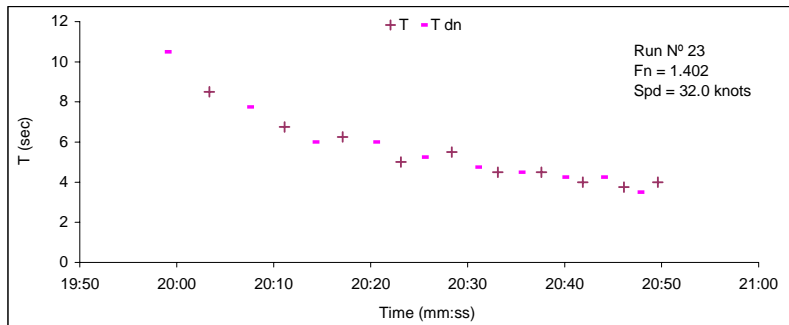
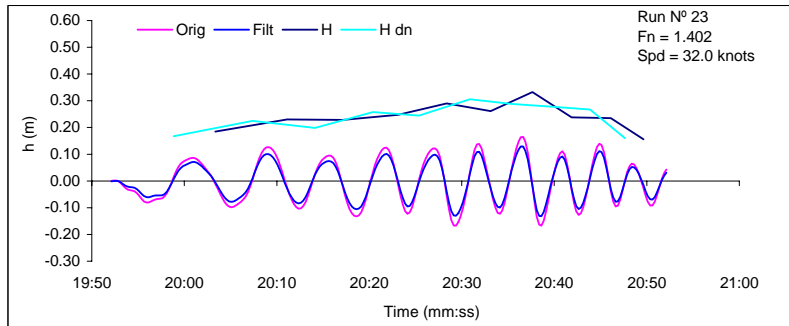
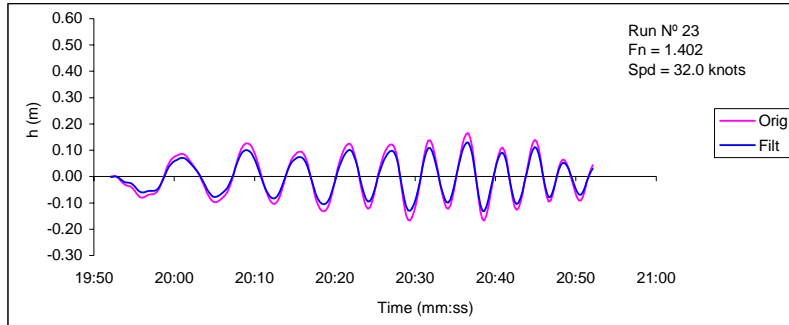


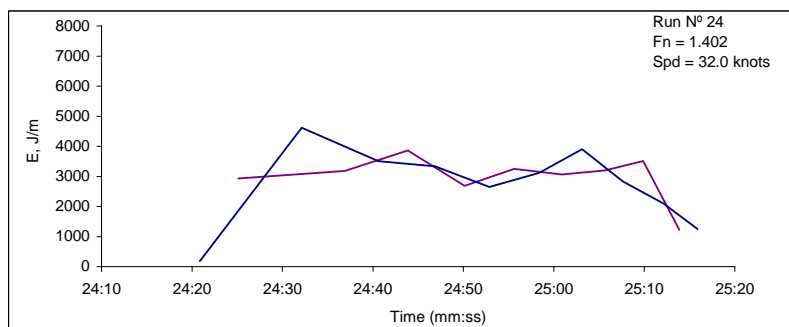
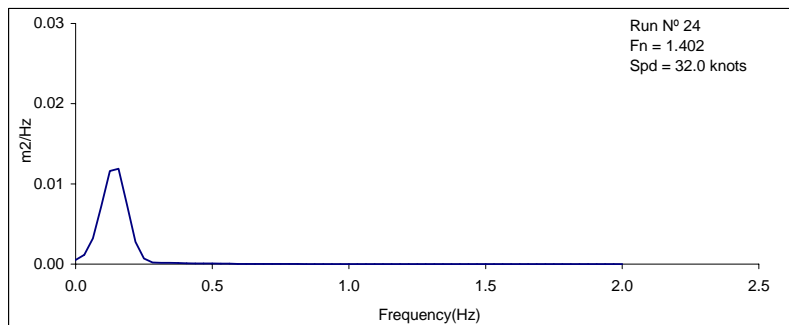
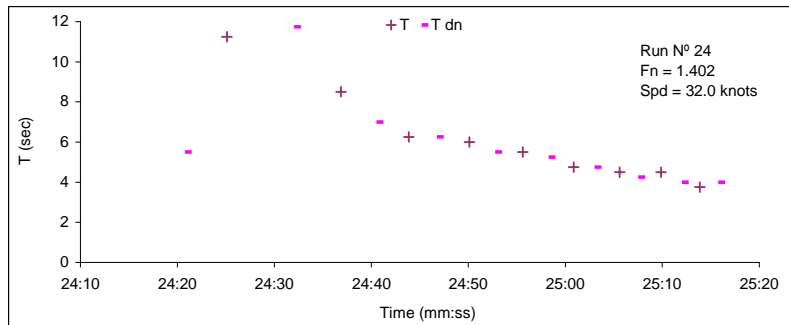
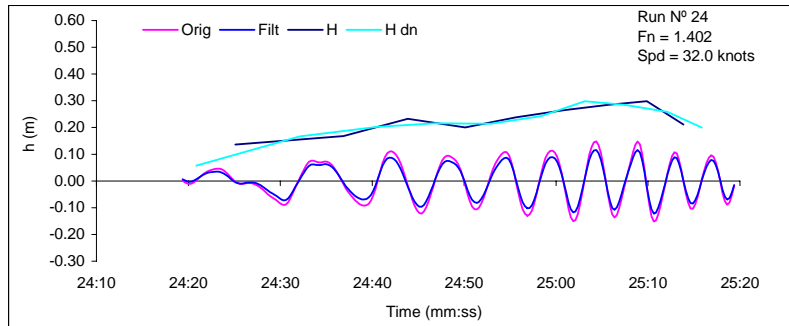
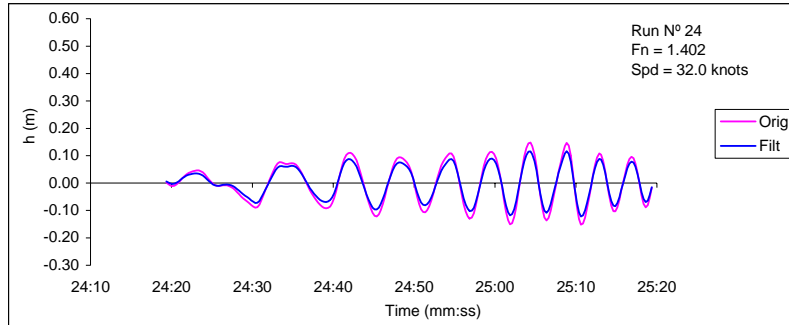


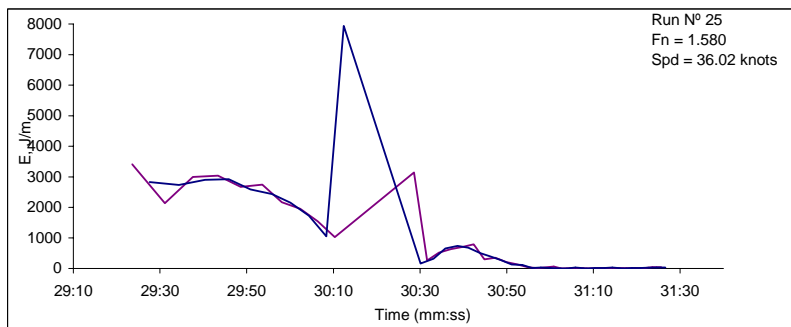
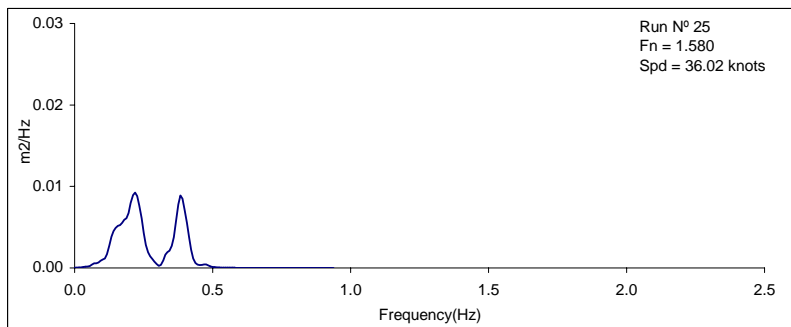
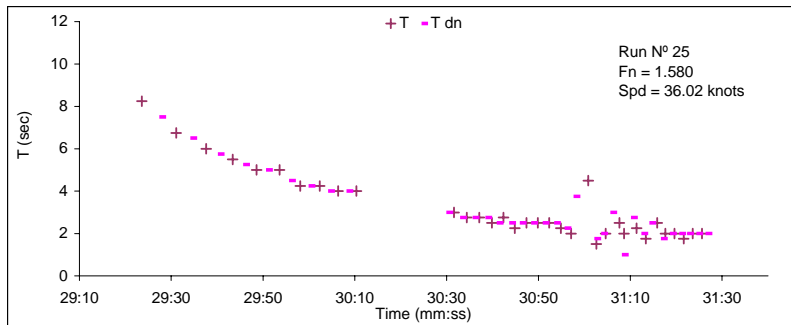
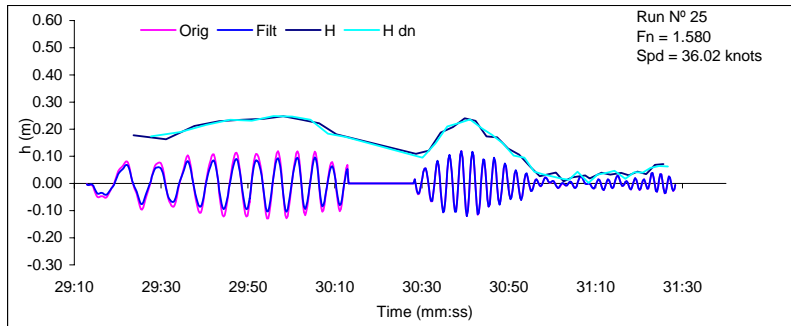
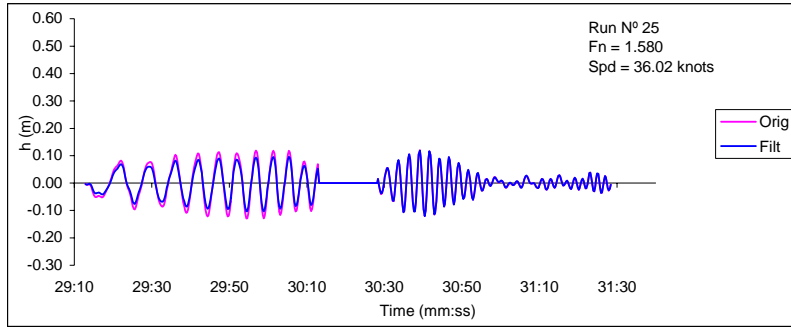


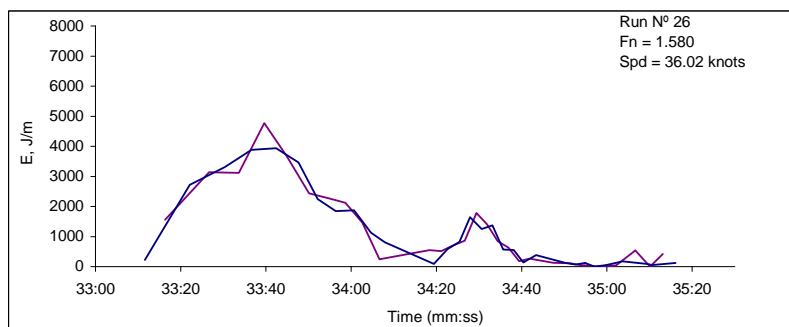
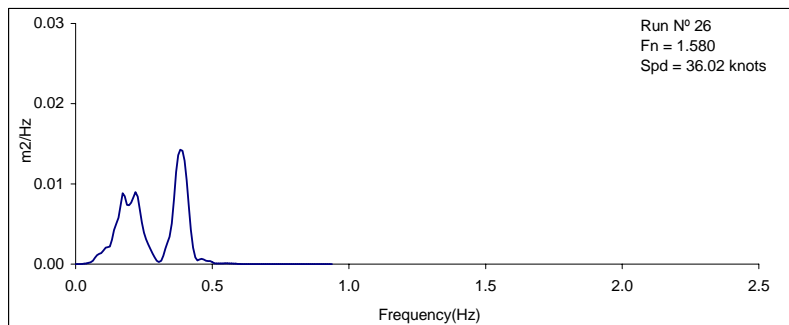
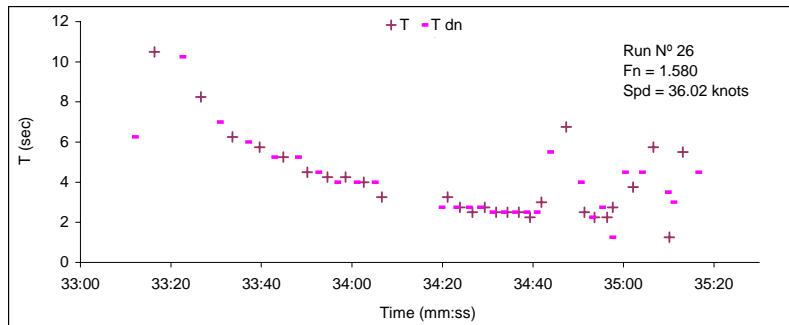
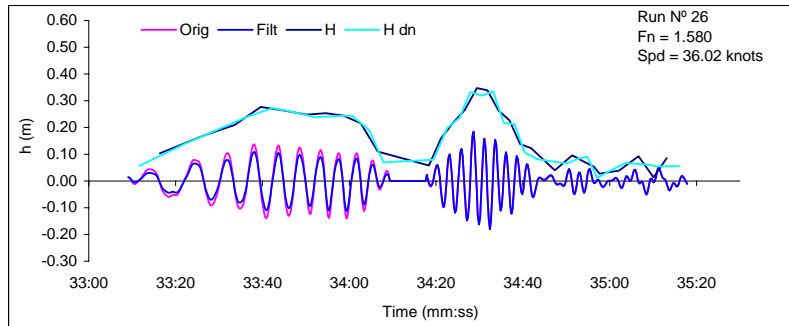
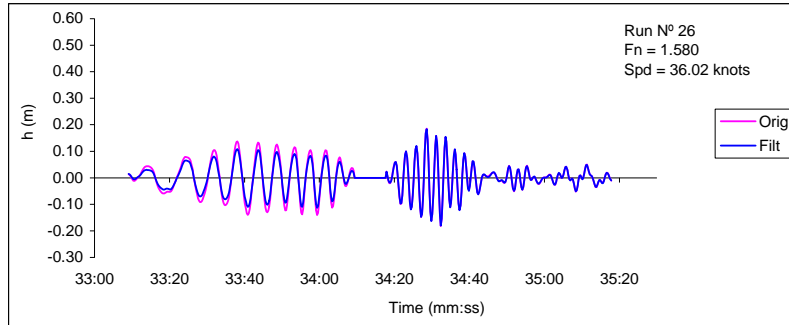


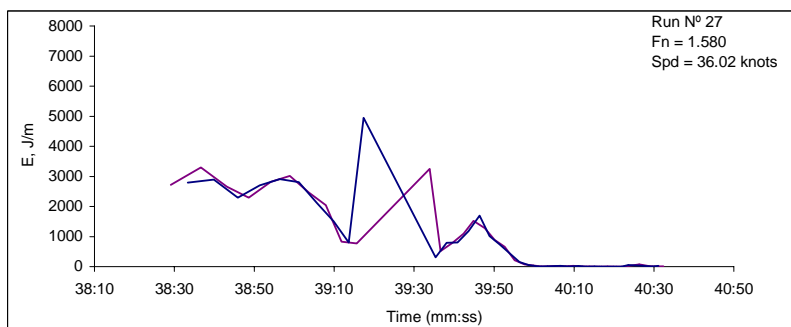
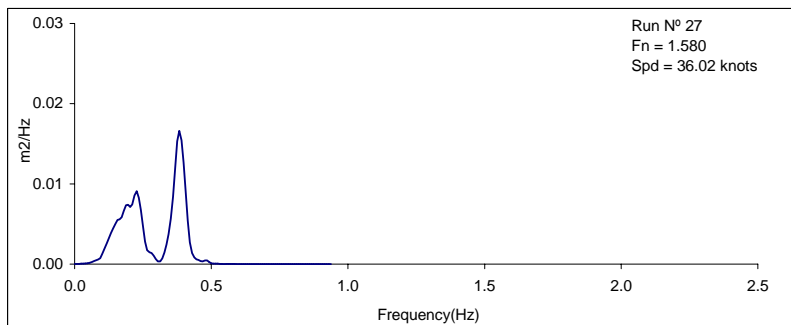
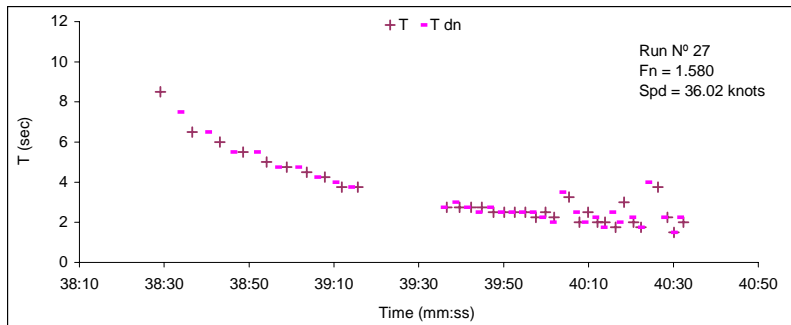
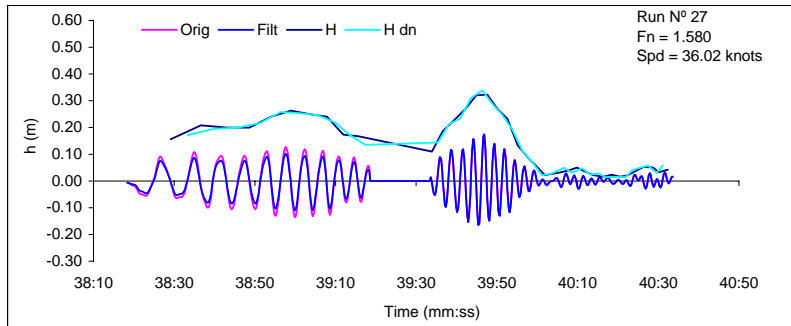
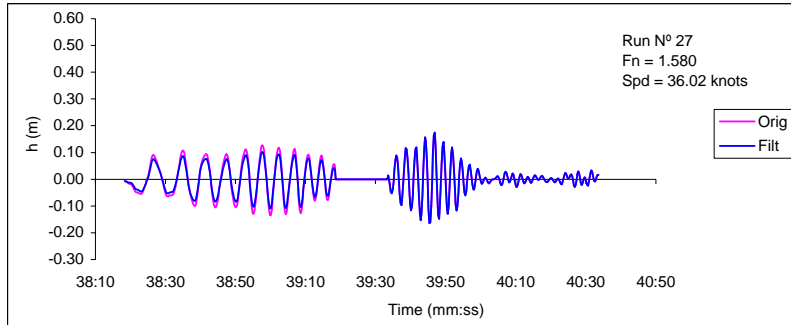


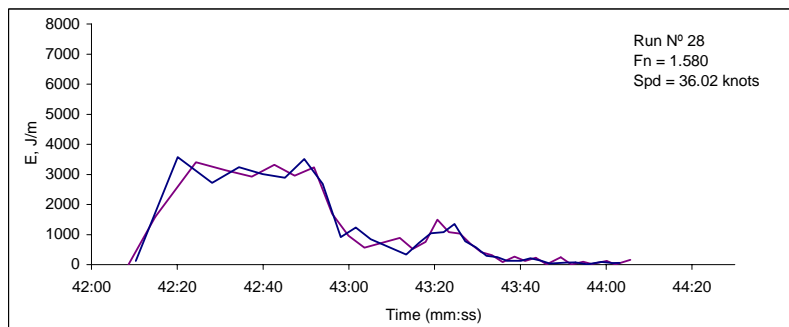
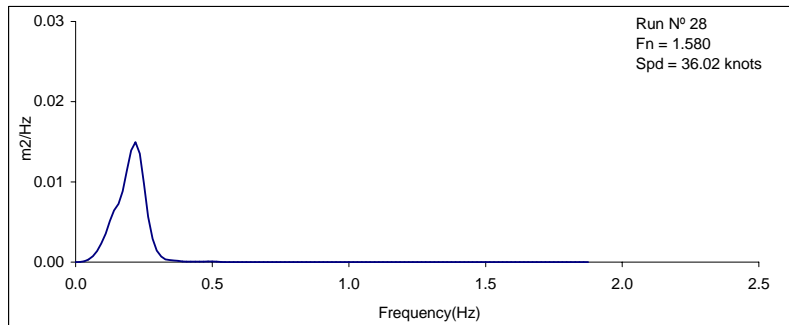
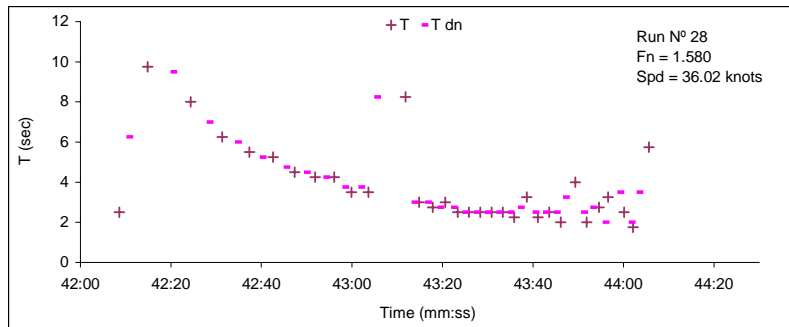
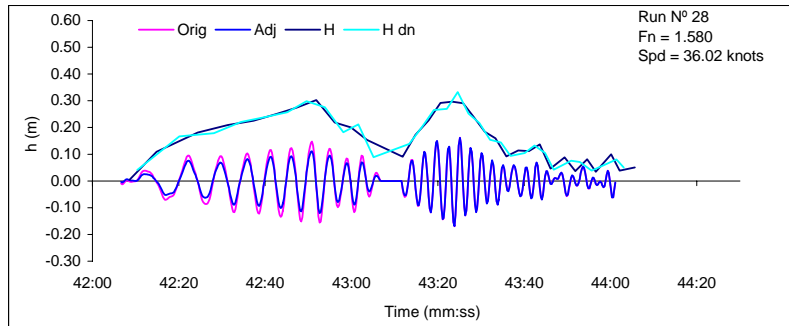
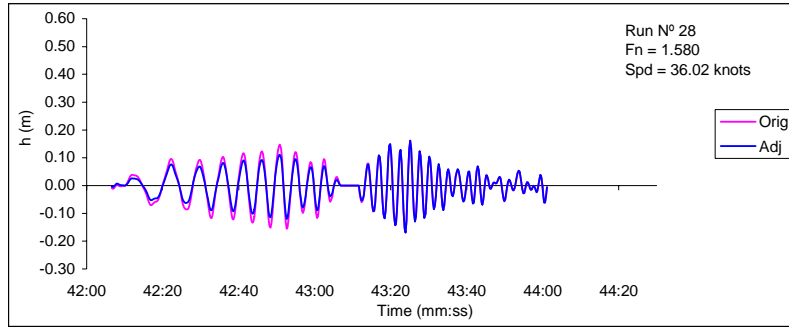


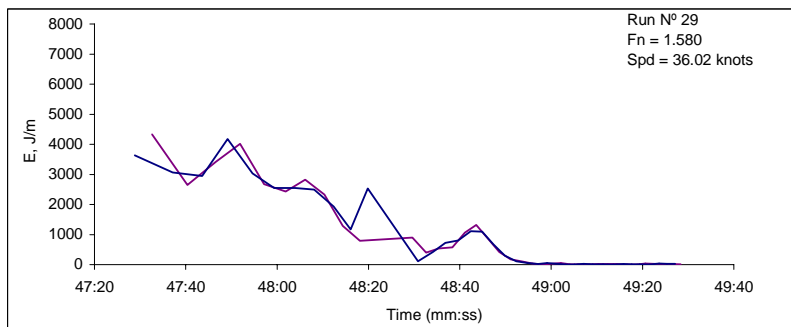
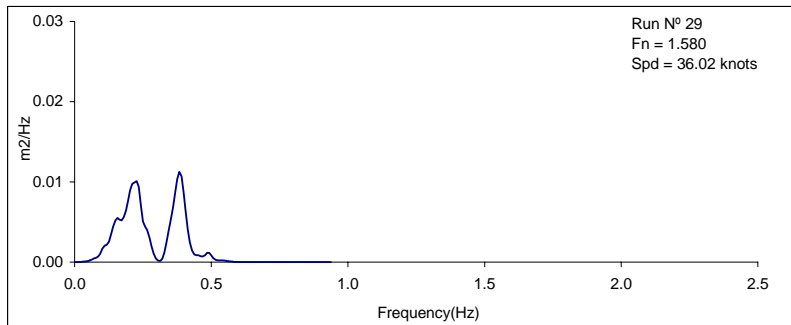
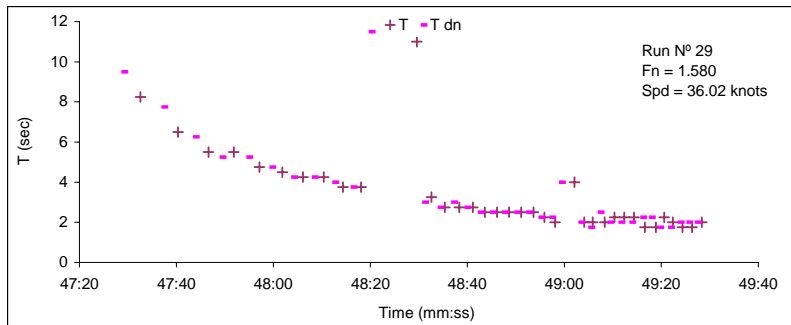
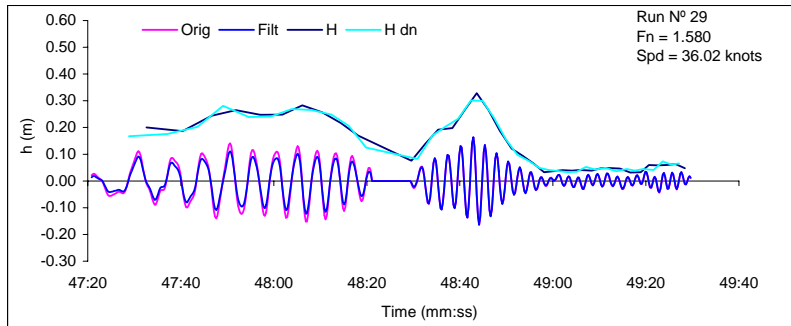
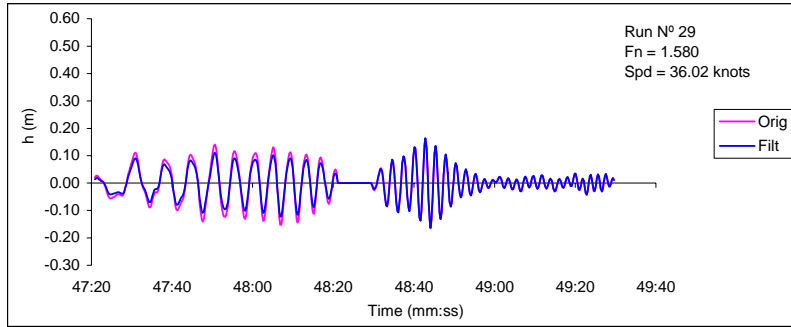


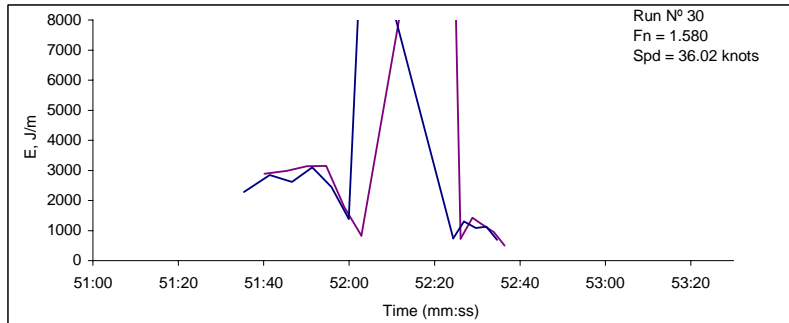
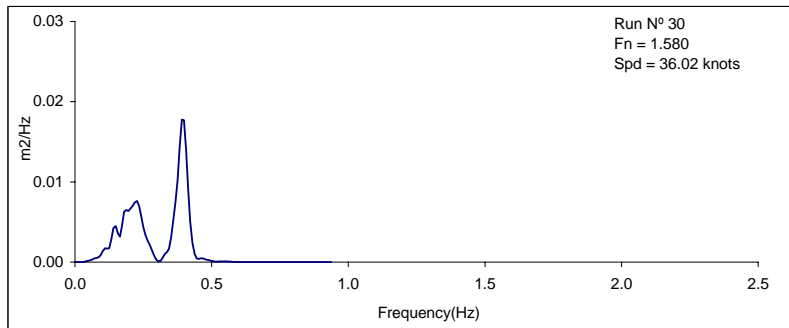
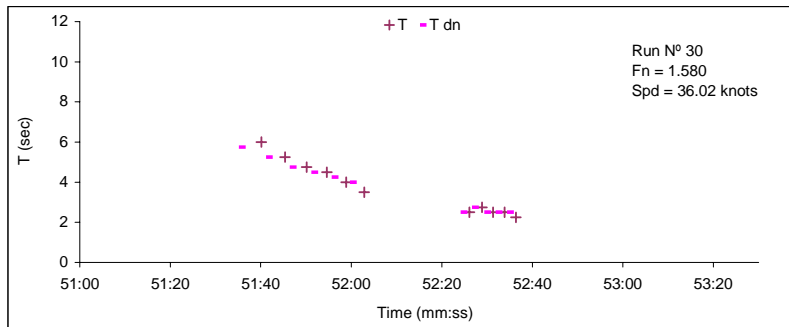
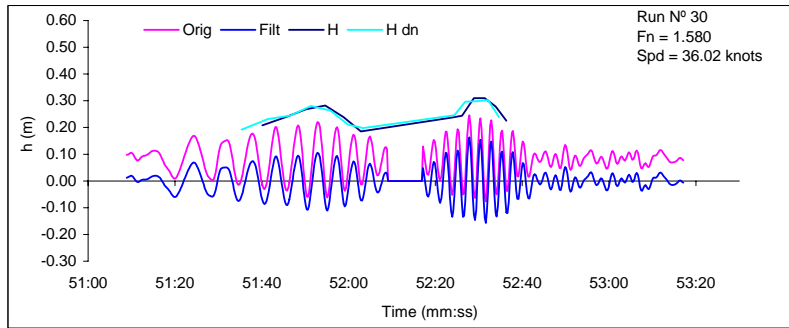
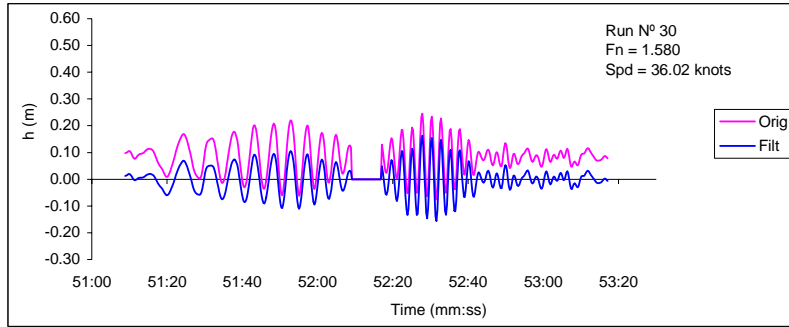












APPENDIX C-c

Wake Trial Time Series *M/V Bravest*

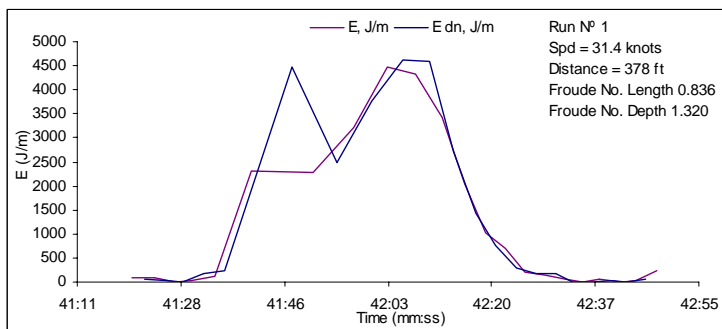
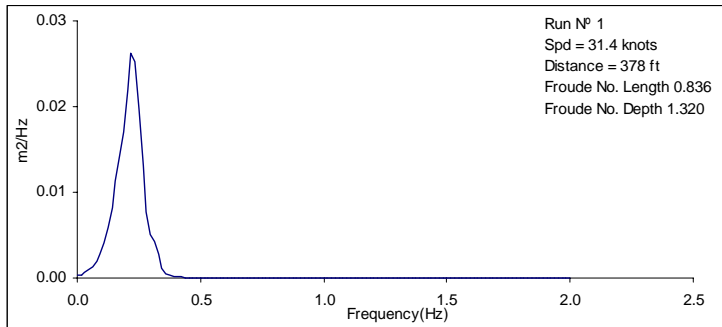
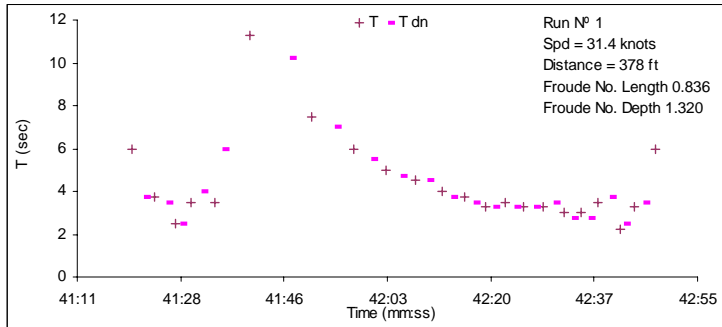
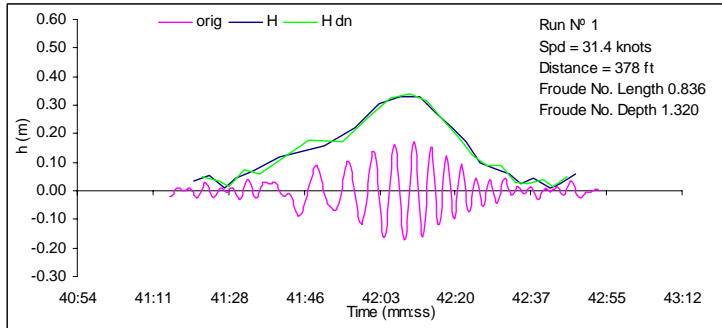
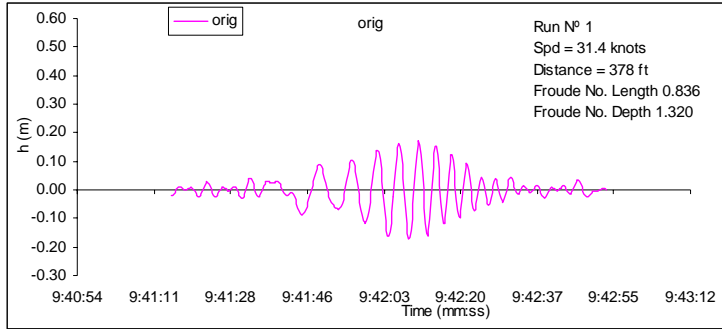
M/V Bravest

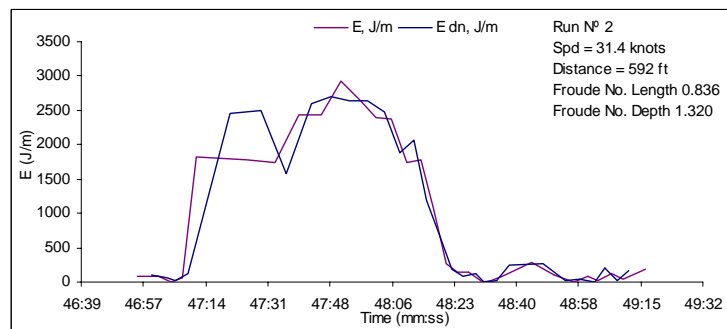
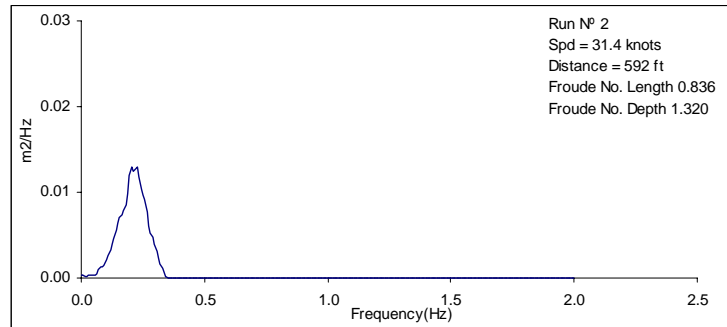
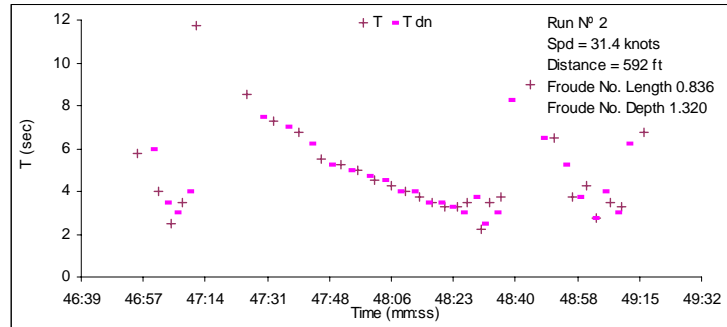
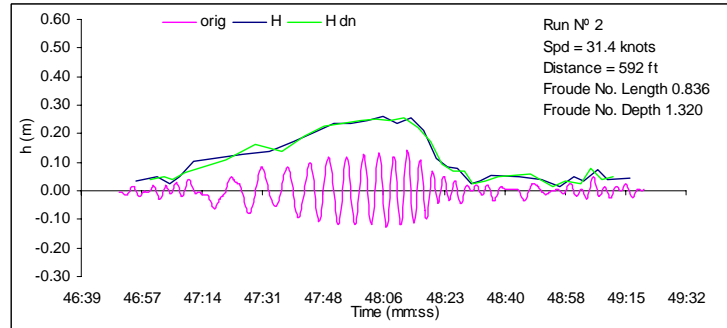
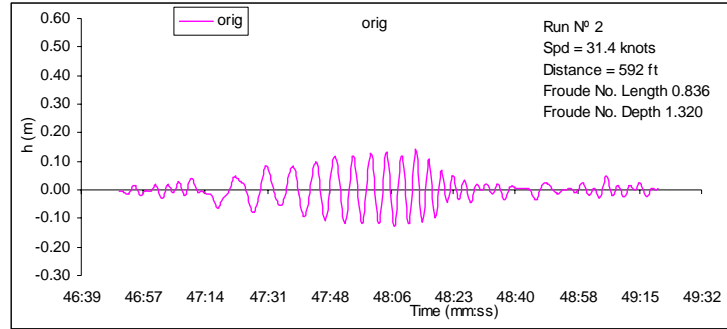
M/V Bravest is a 38 meter, 140 tonne, 350-passenger aluminum catamaran, with a 10 meter beam, designed by Nigel Gee Associates of Southampton England. *Bravest* was built by Derecktor Shipyards in their Mamaroneck NY yard, and placed in service in 1997 with NY Fast Ferries.

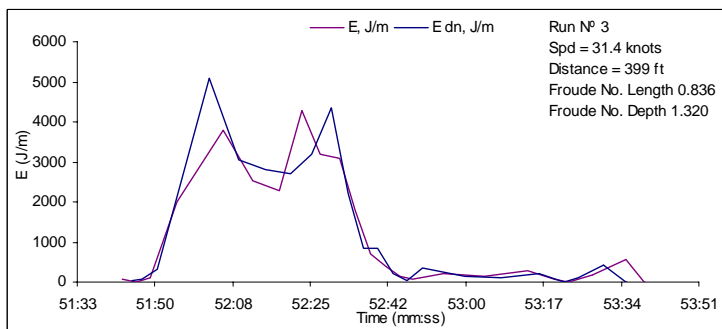
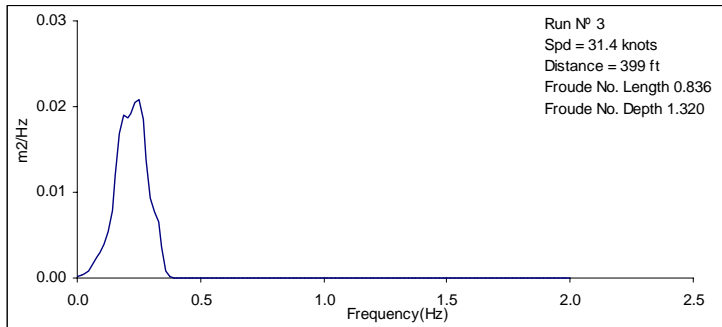
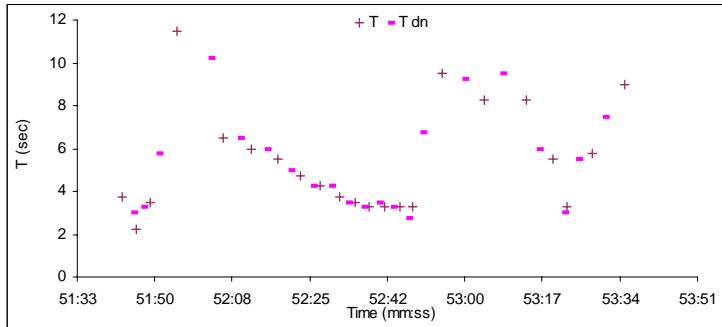
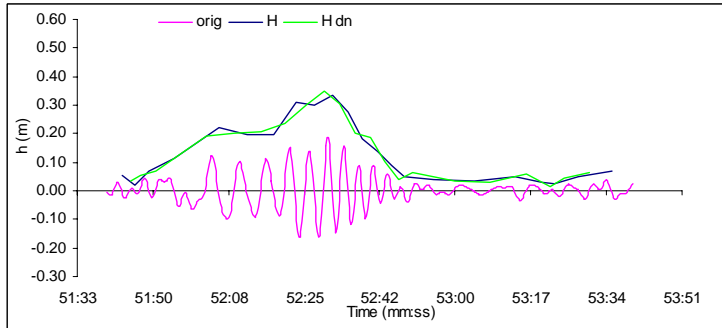
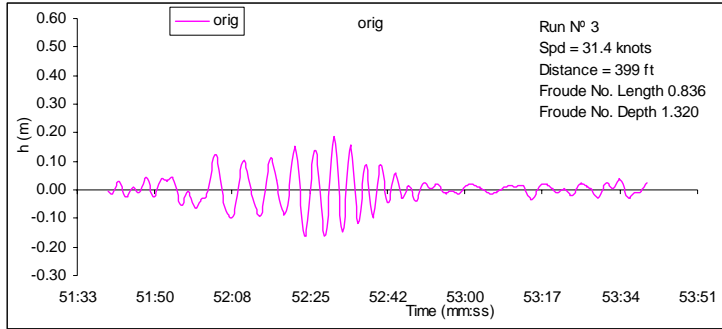
WSF conducted trials on February 23, 1998 on Long Island Sound to determine the wake wash signature of the vessel.

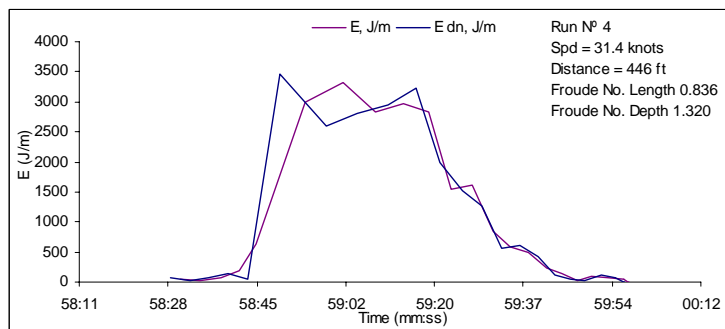
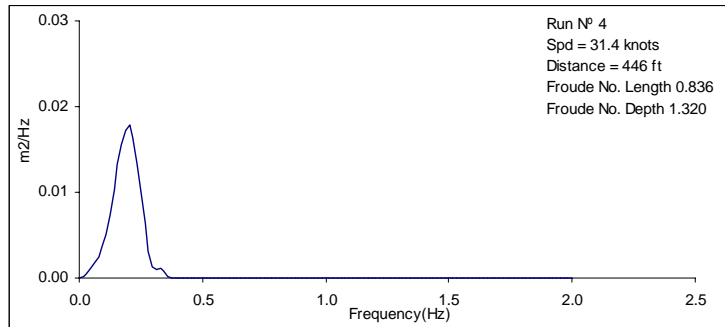
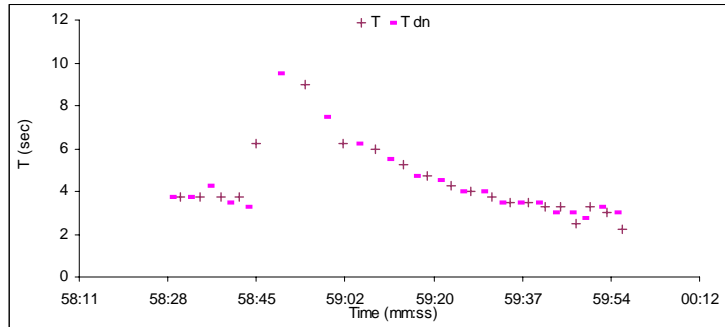
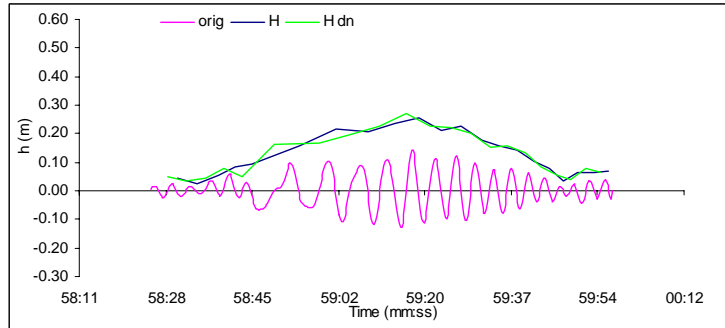
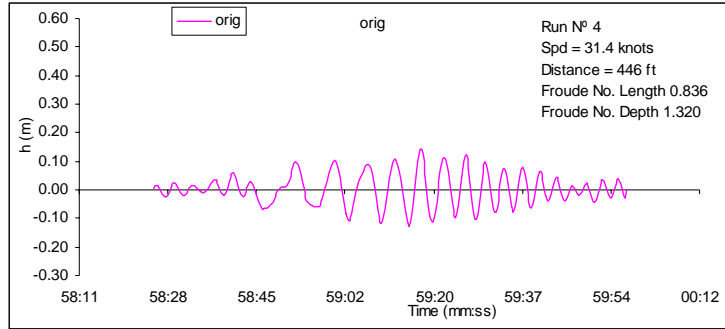
Wash measurement runs were conducted at 22, 27, and maximum (31.5 knots) with the vessel ballasted to simulate the fully loaded condition. All data that was consistent and repeatable was analyzed.

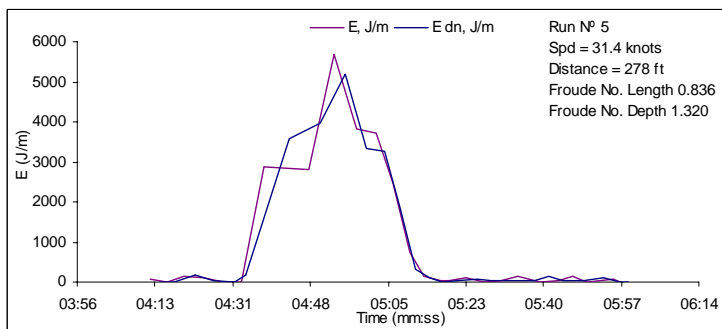
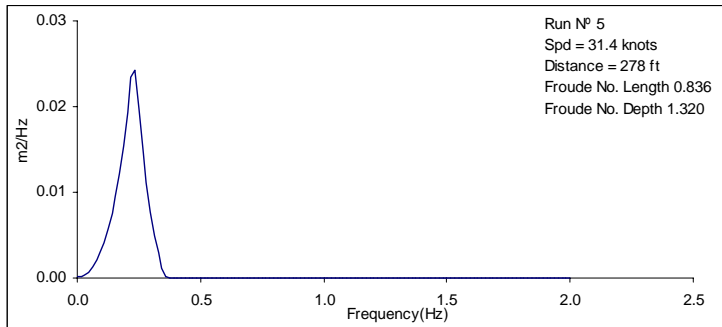
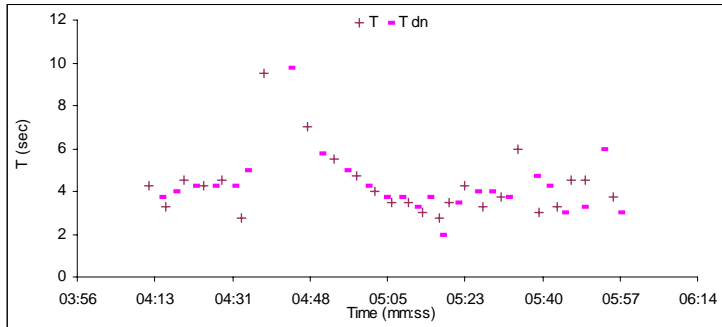
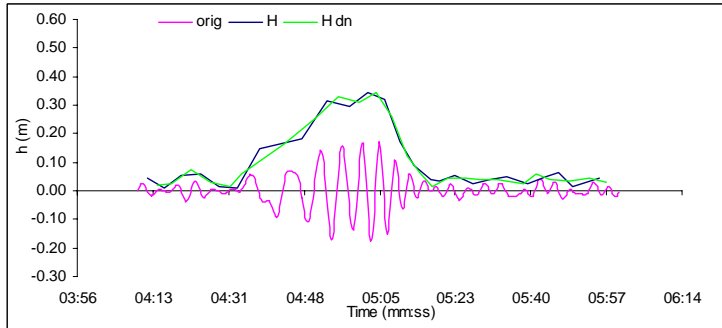
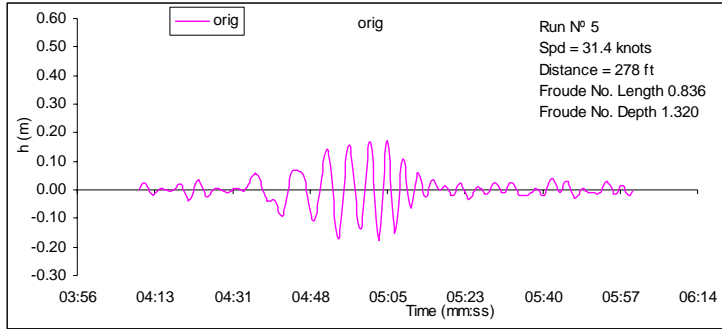
The time series presented below represent the analysis of the measured time series conducted by Pacific International Engineering as part of the present study.

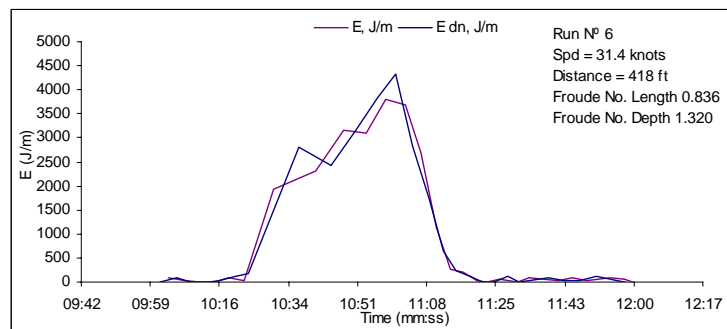
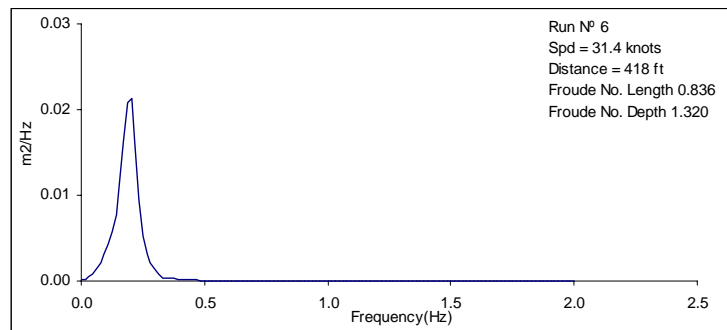
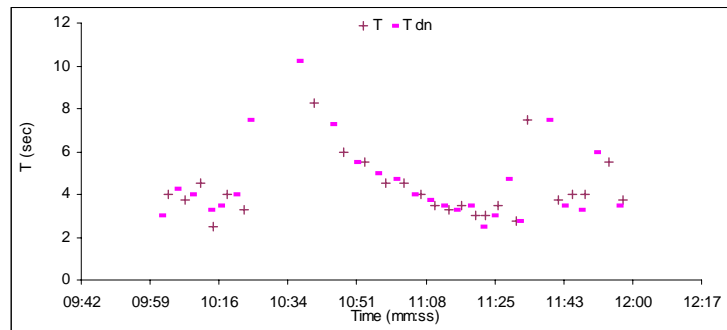
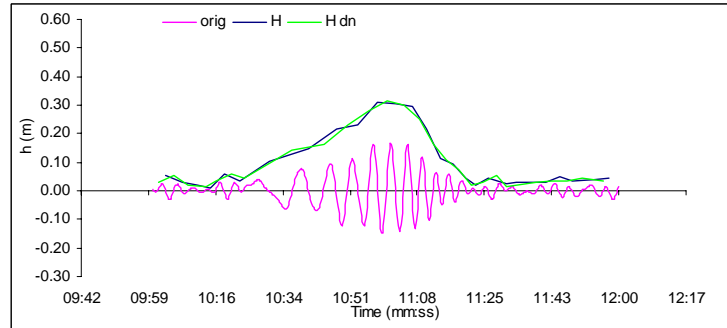
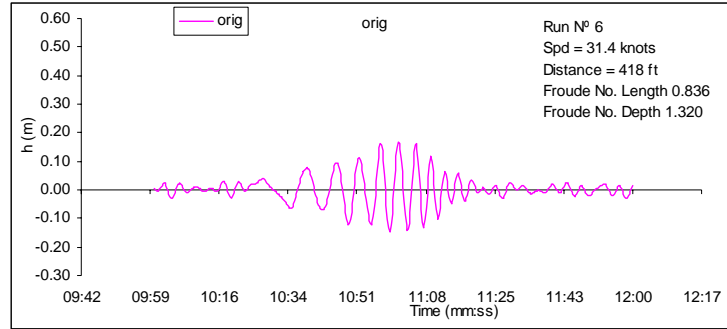


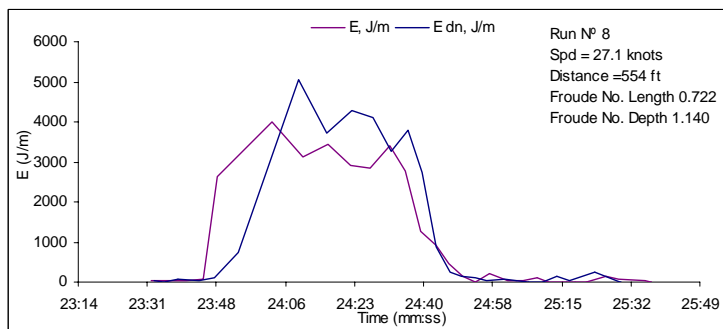
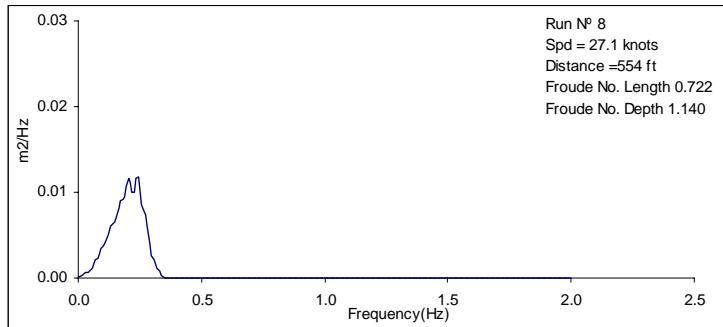
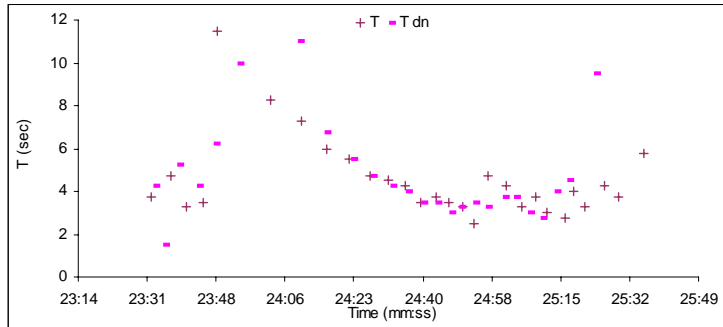
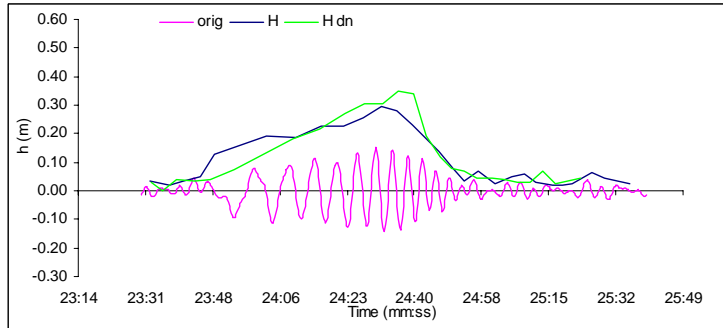
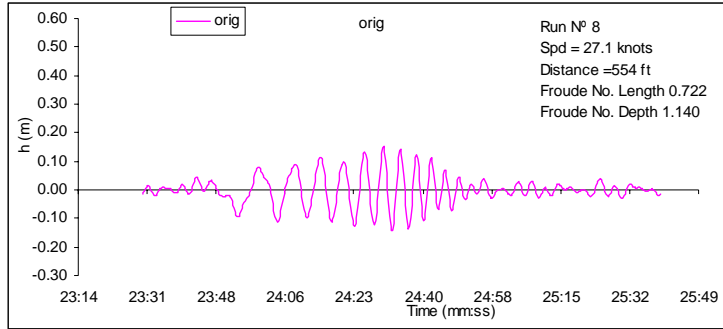


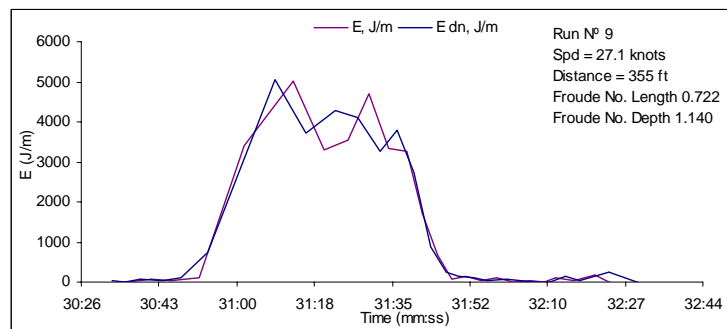
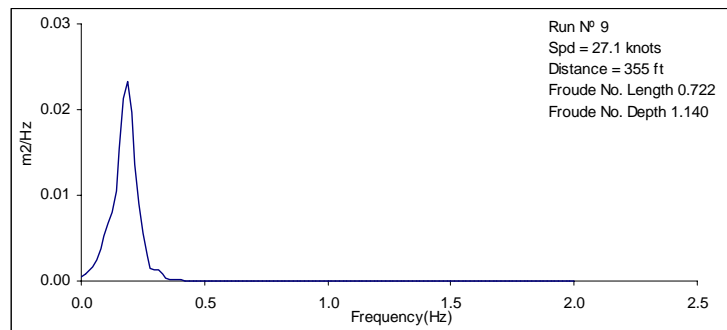
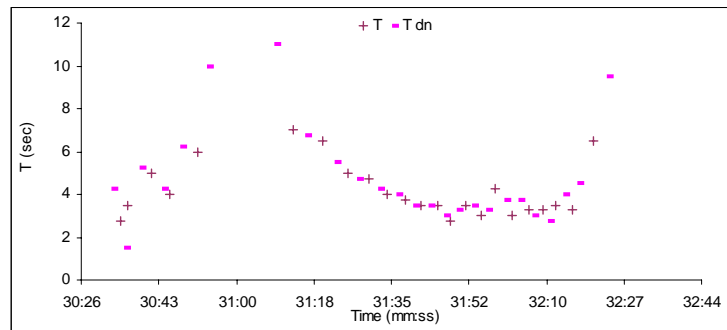
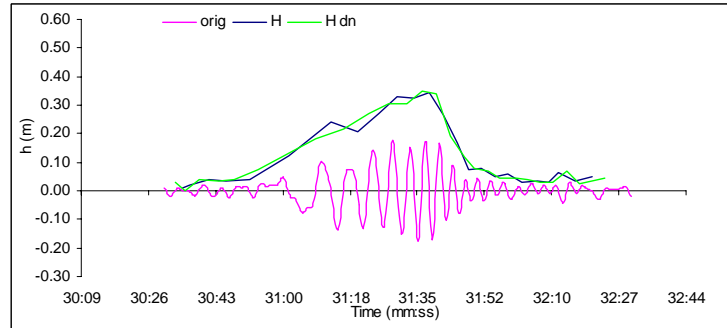
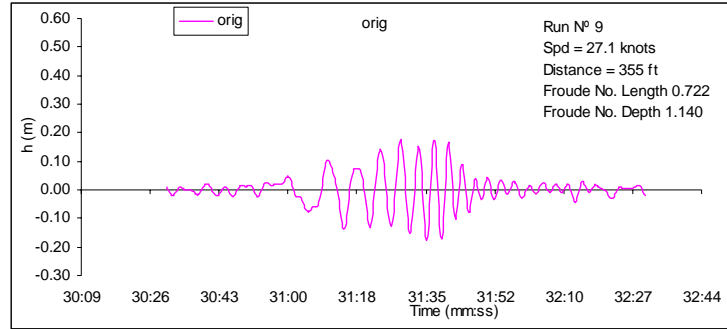


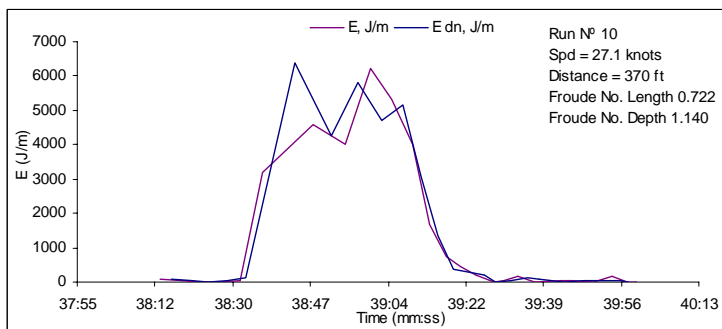
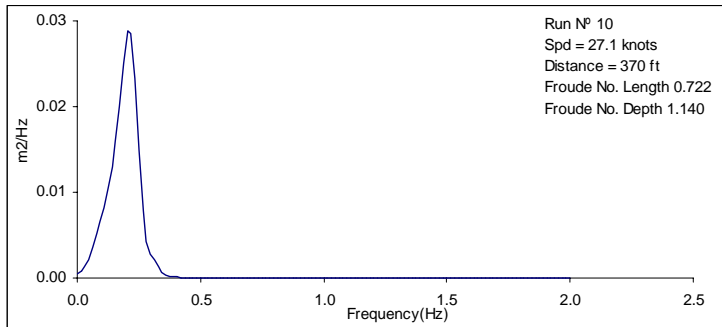
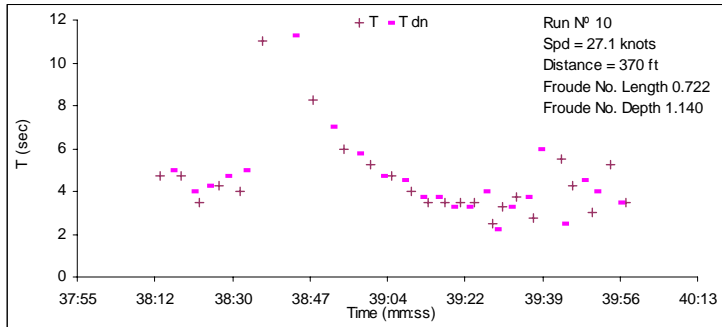
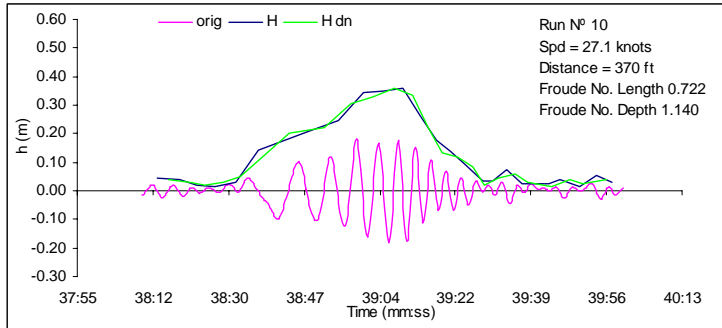
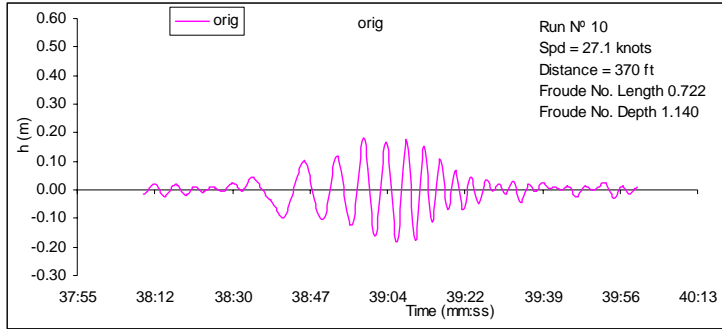


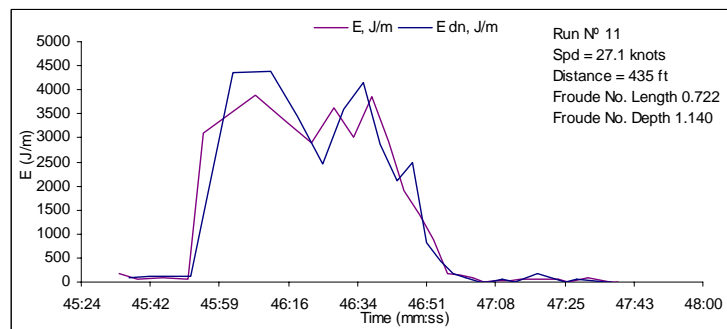
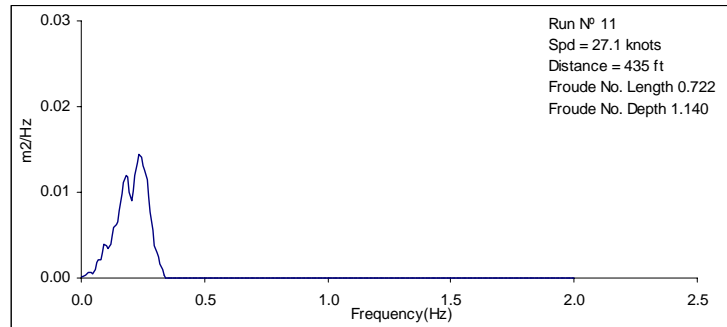
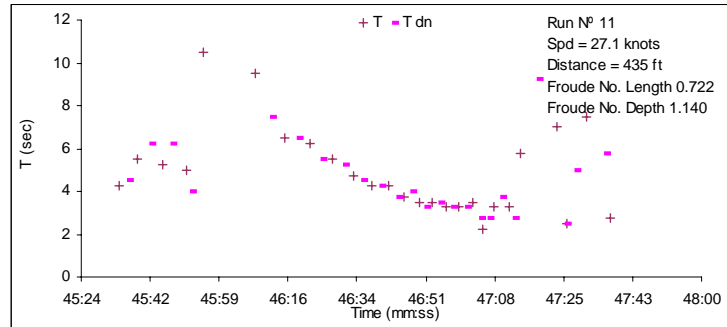
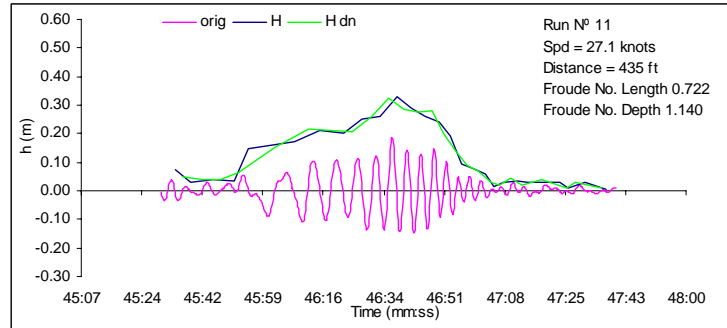
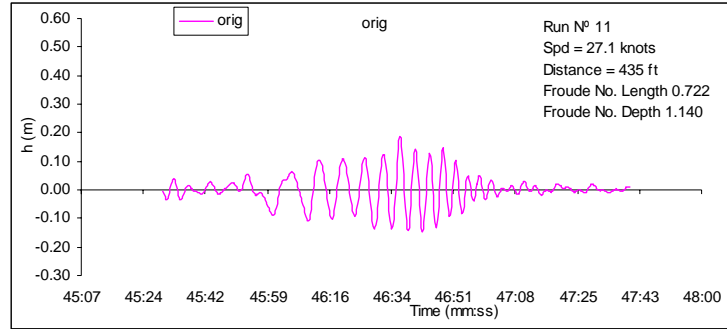


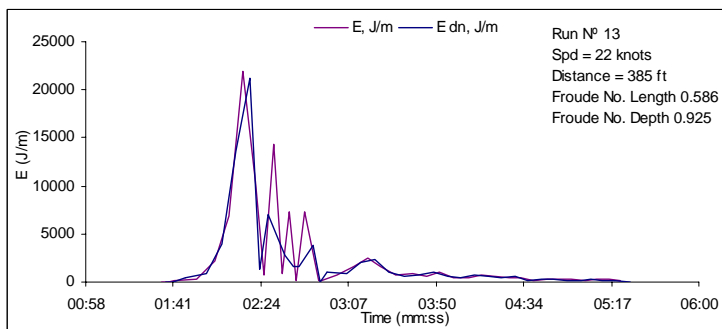
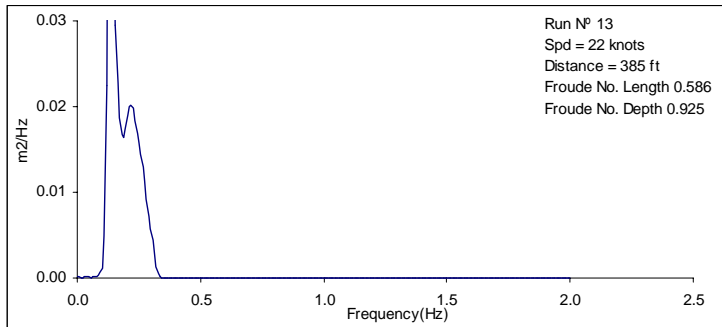
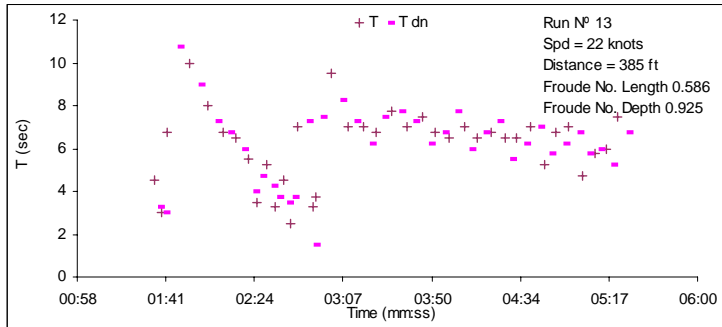
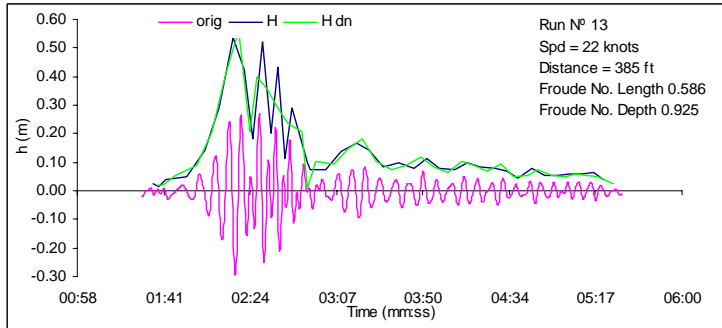
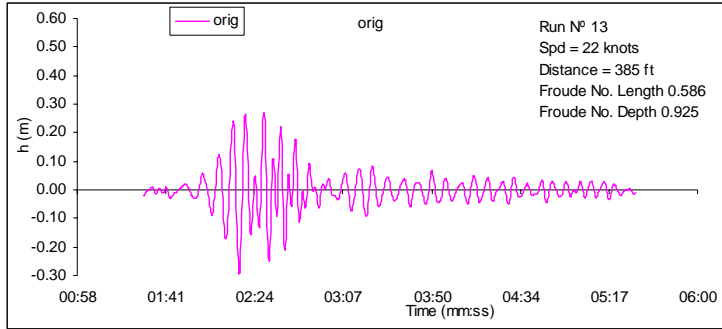


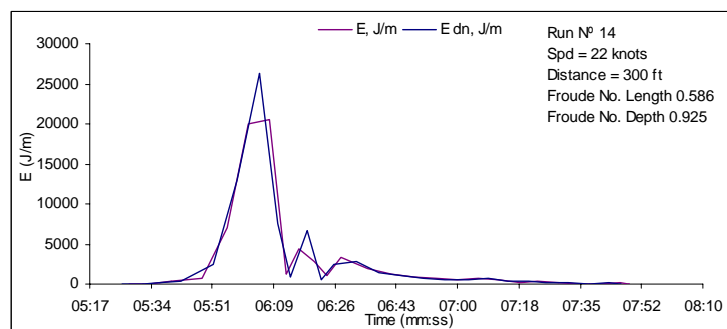
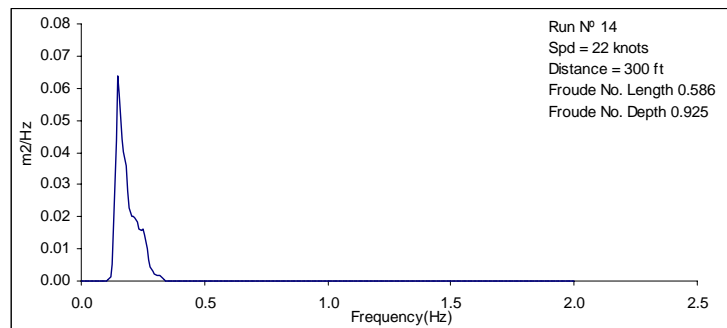
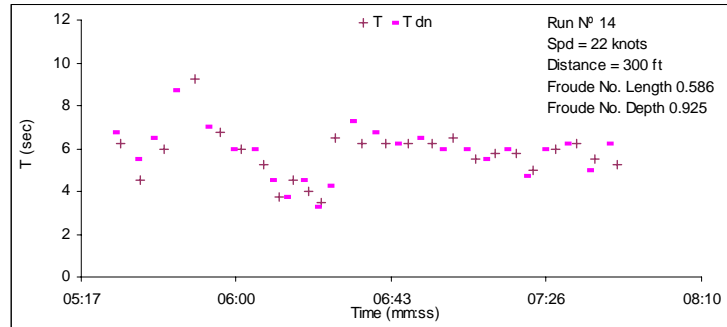
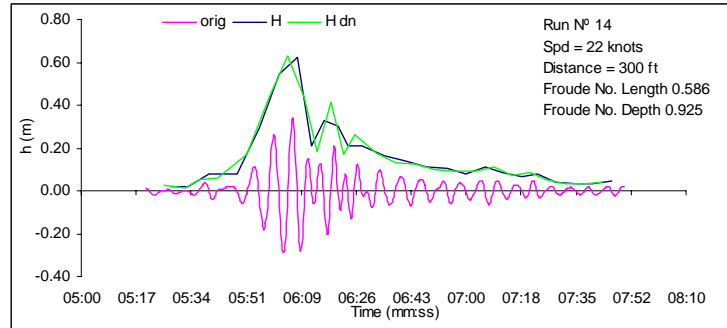
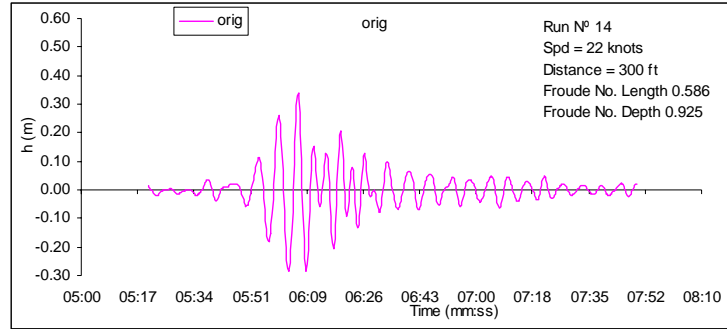


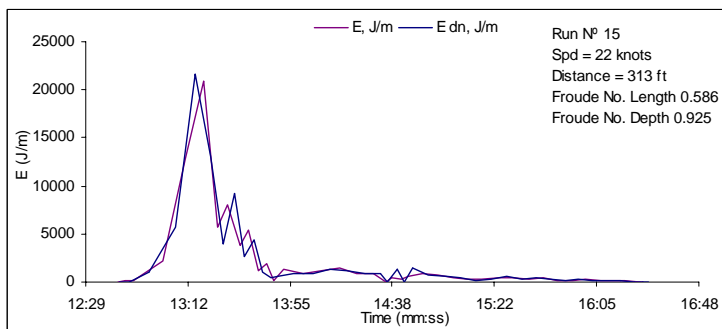
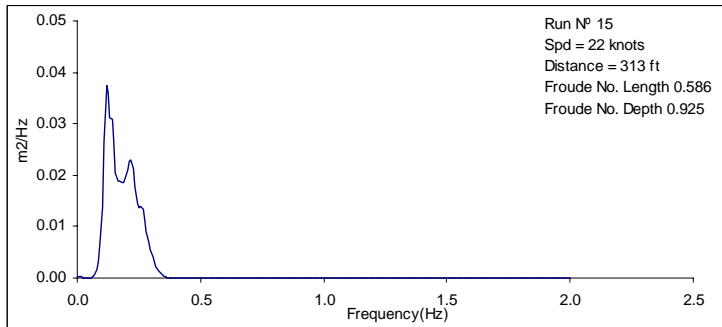
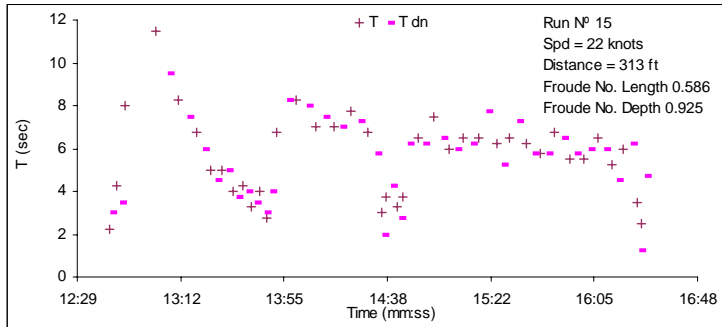
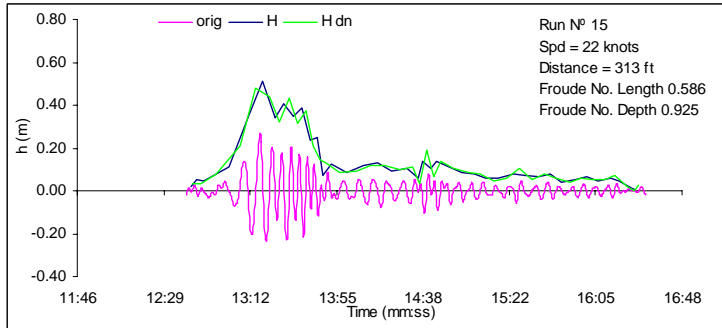
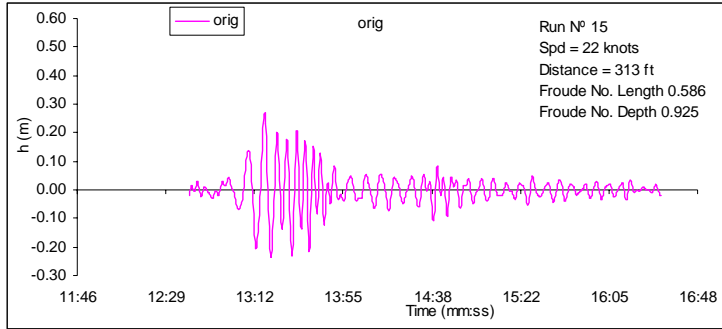


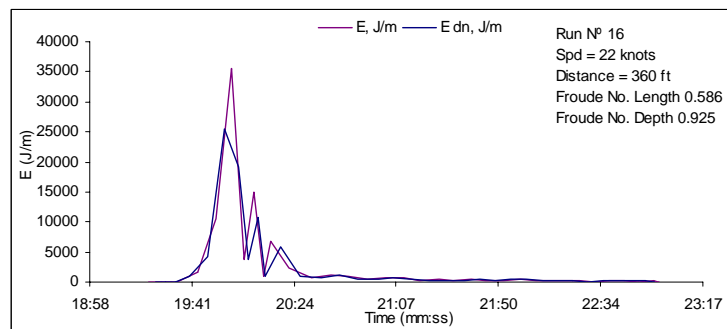
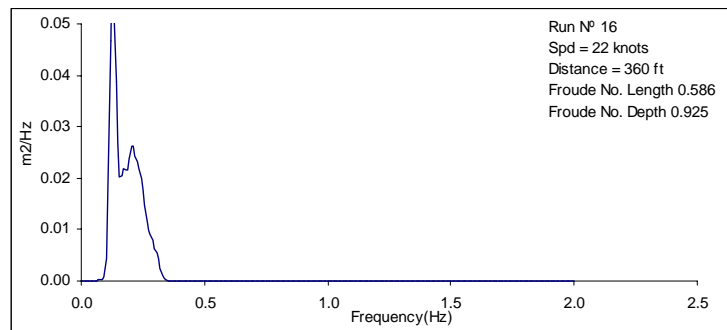
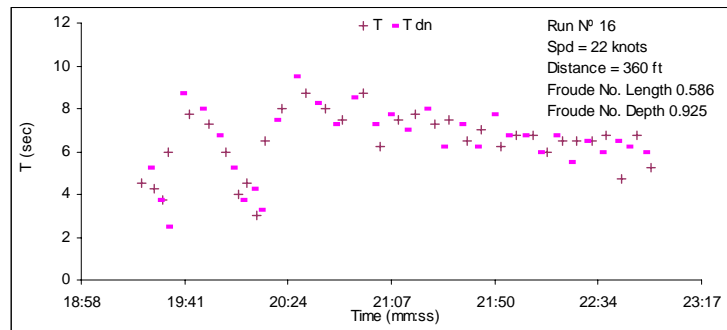
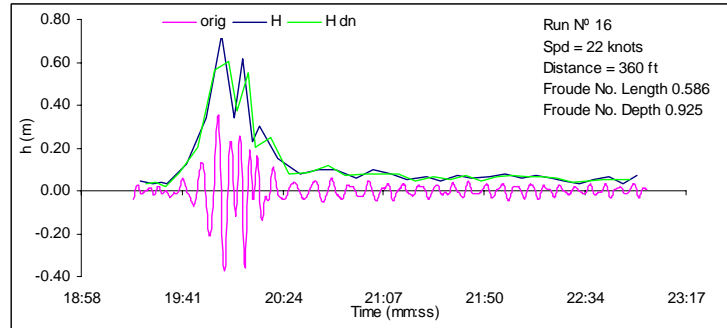
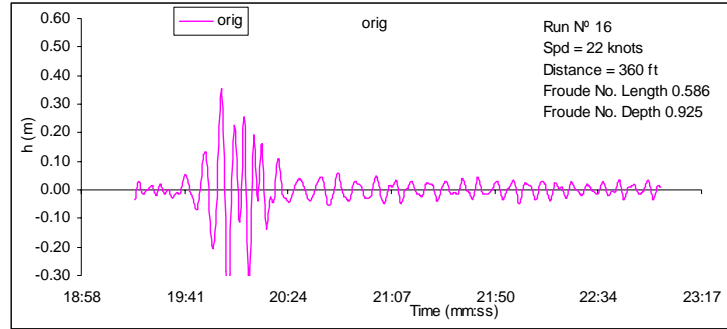


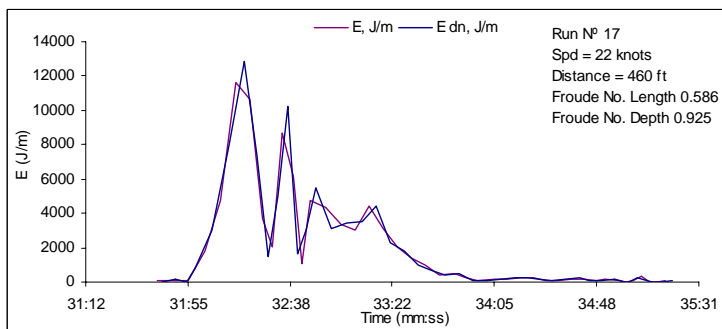
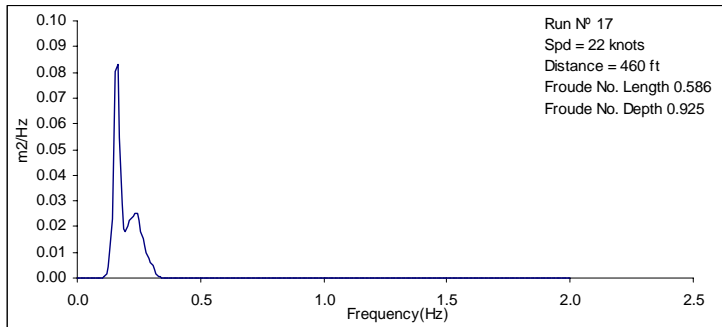
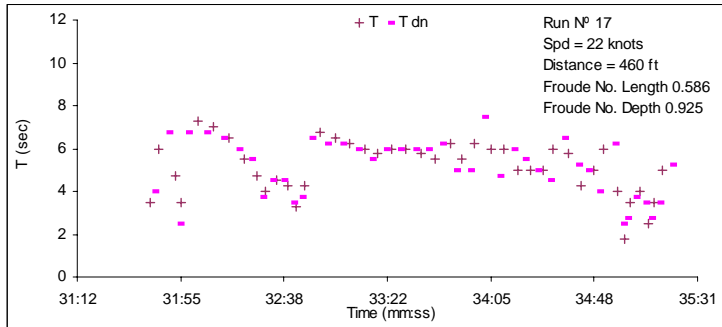
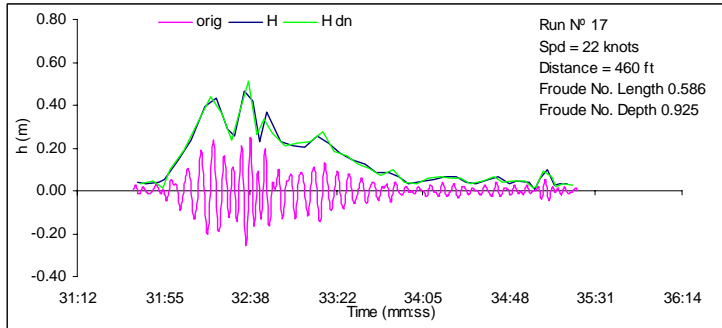
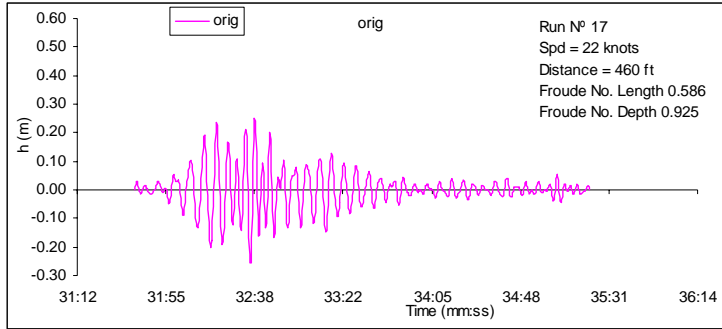


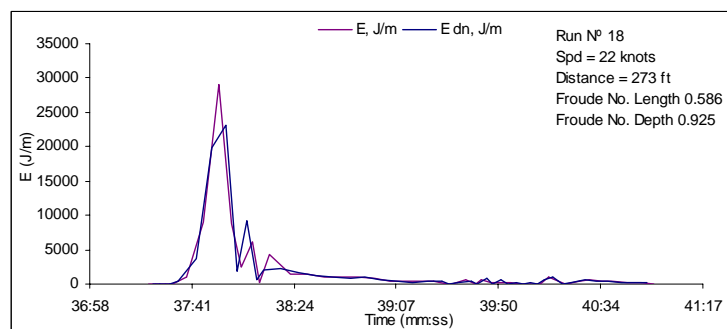
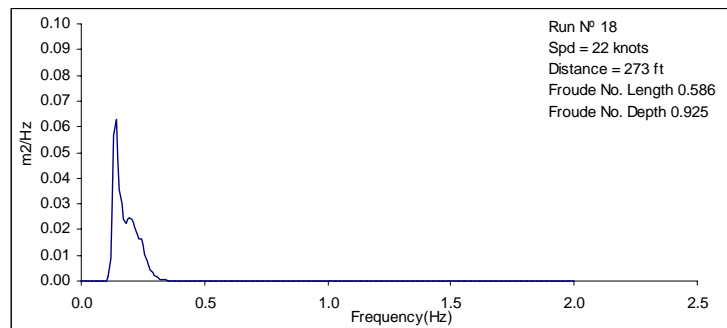
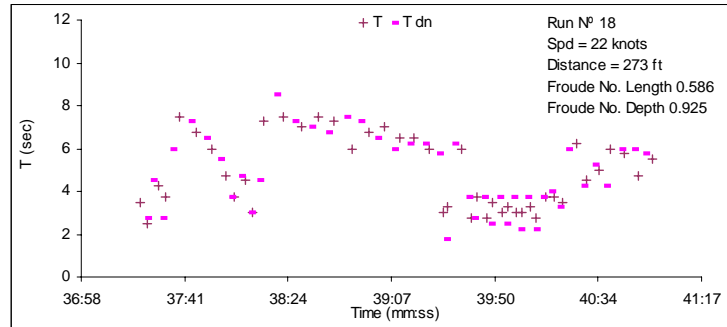
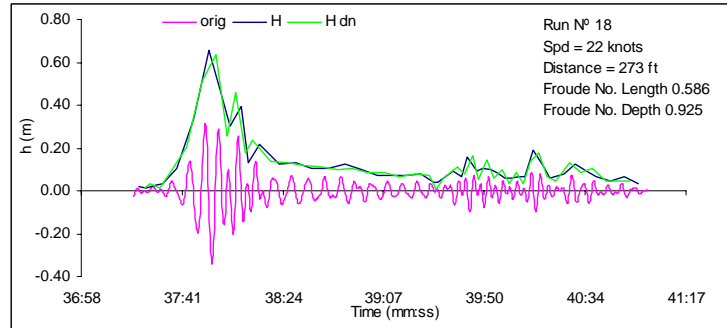
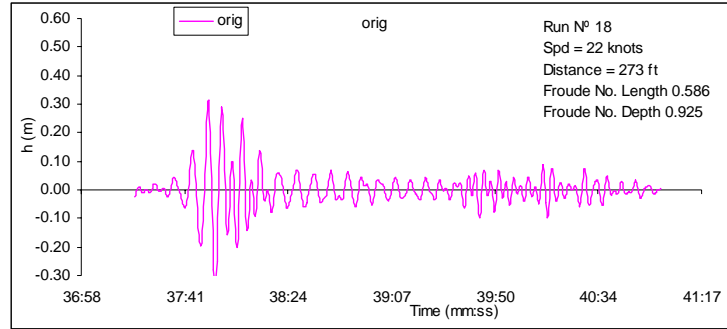


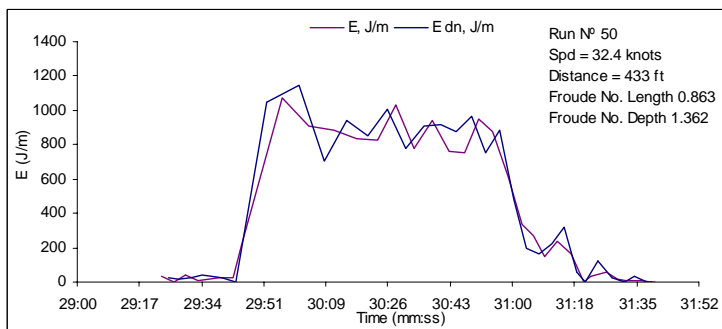
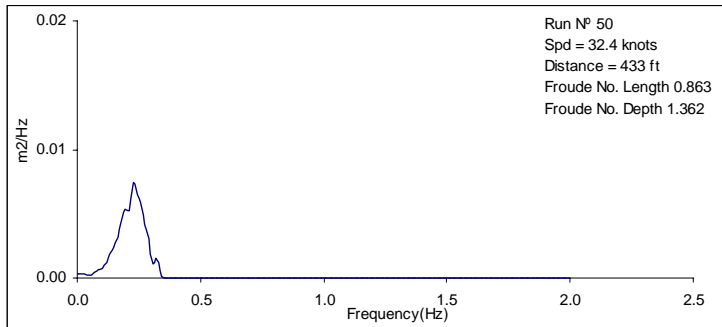
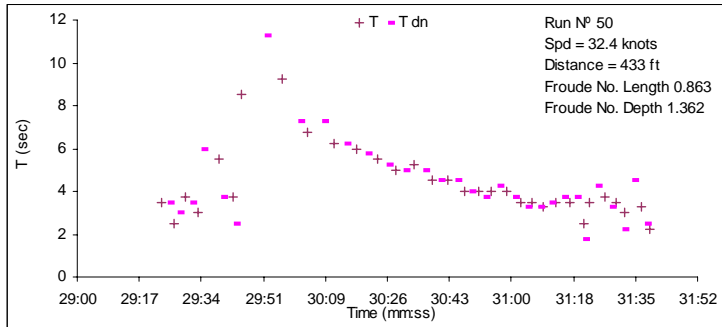
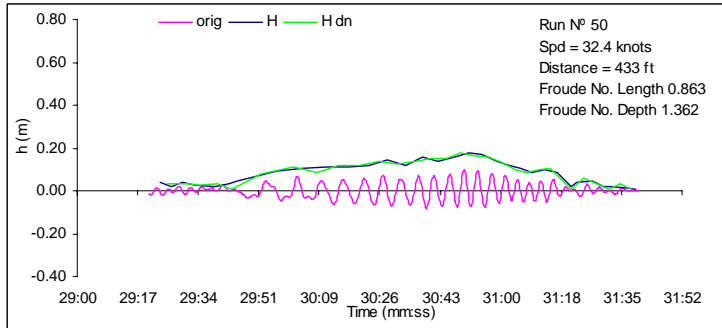
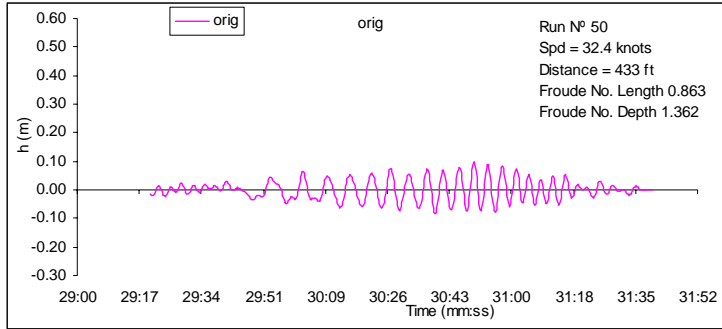


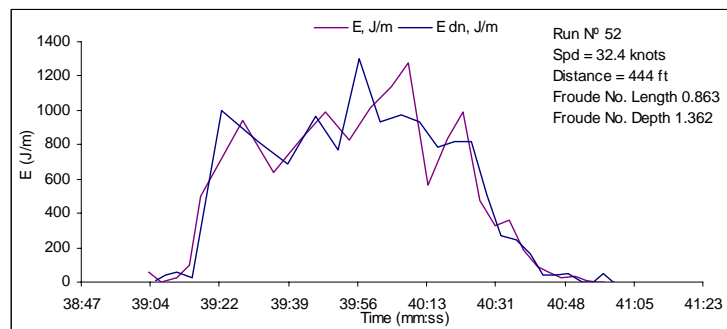
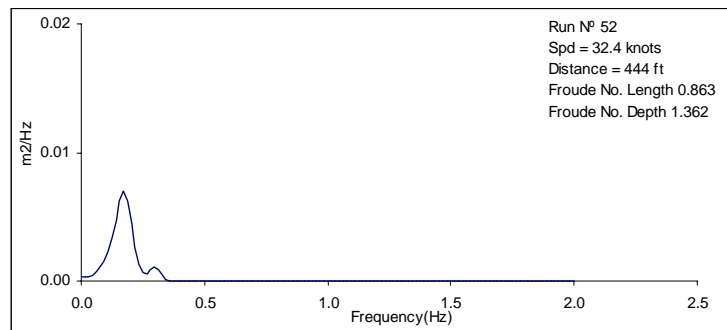
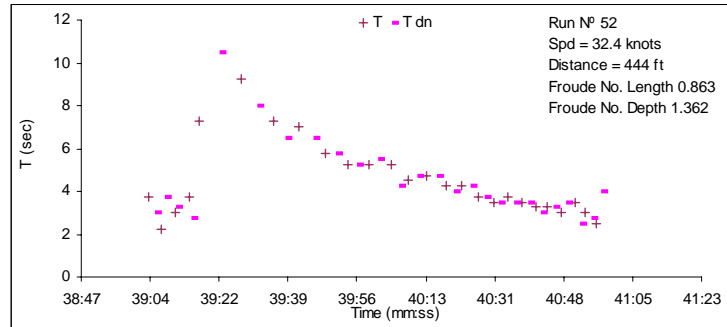
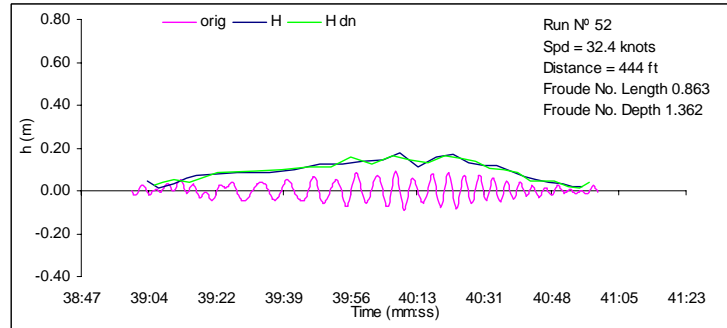
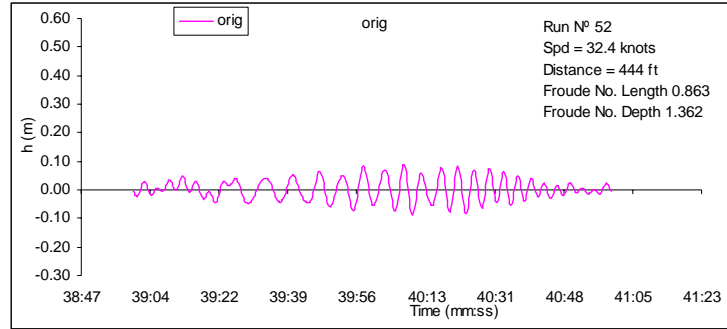


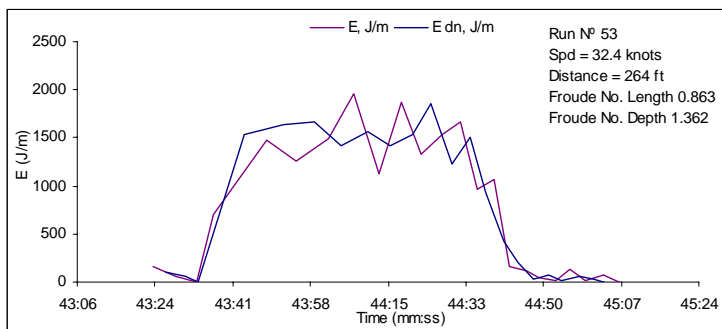
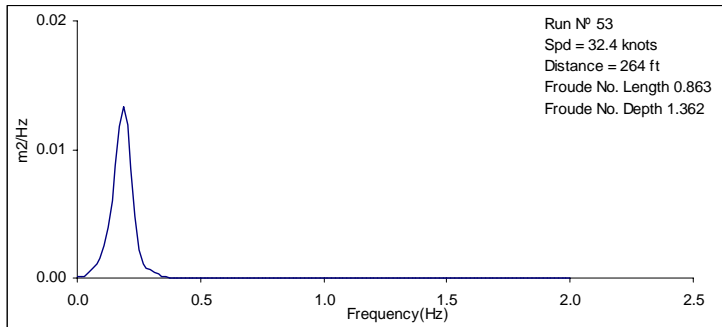
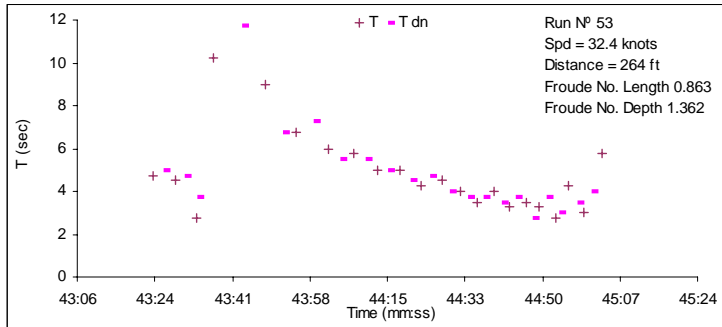
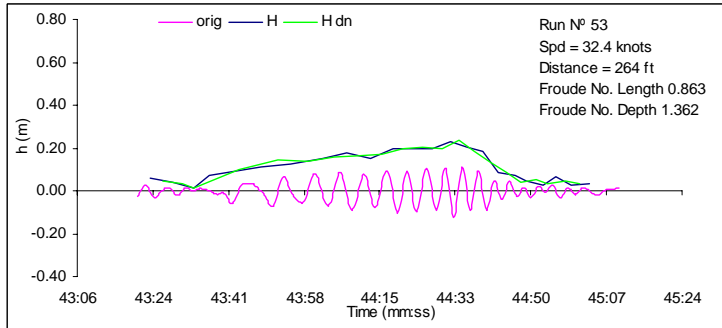
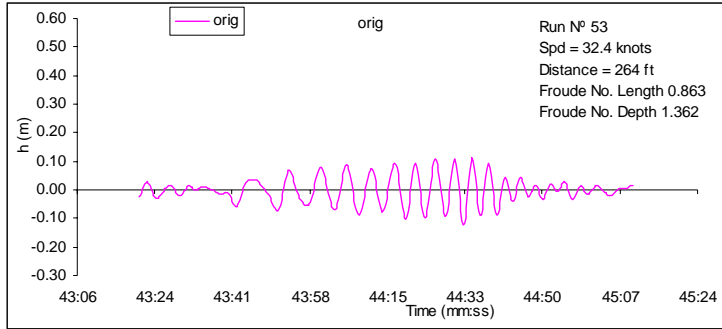


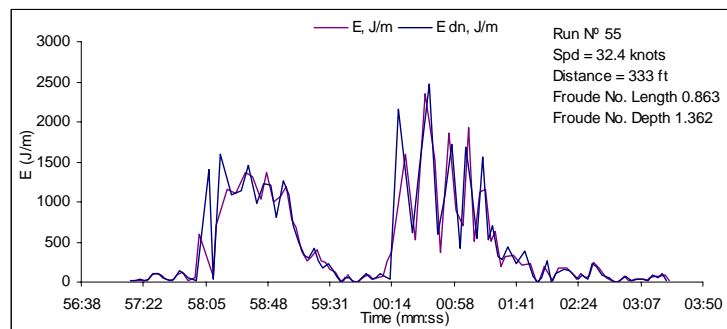
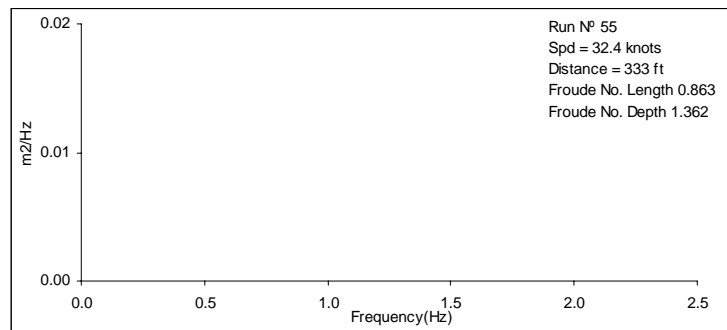
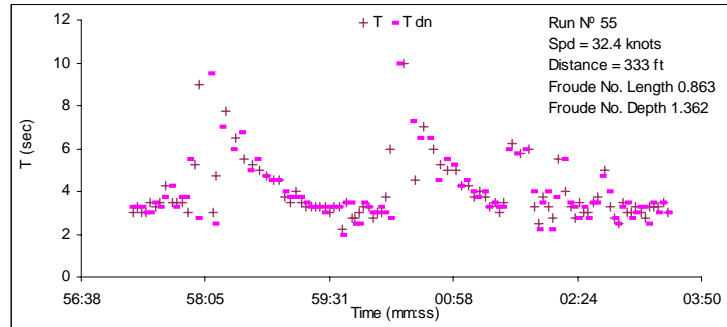
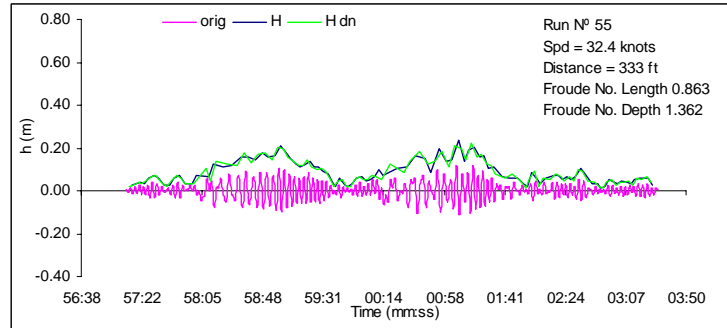
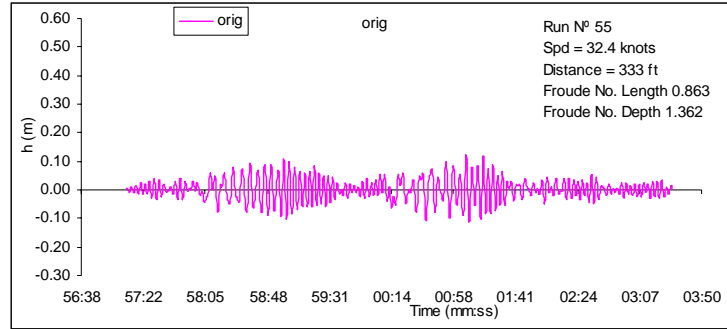












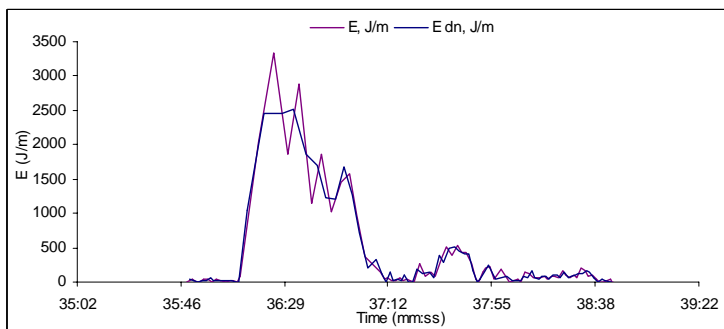
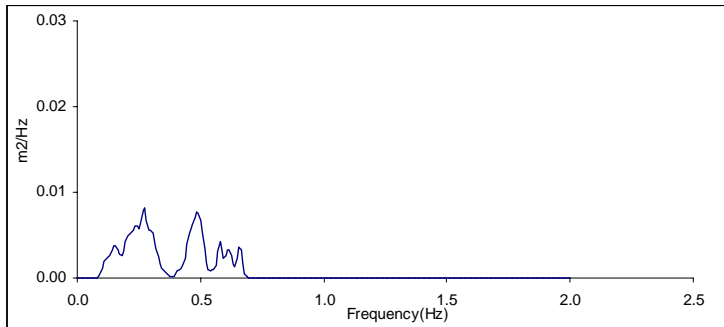
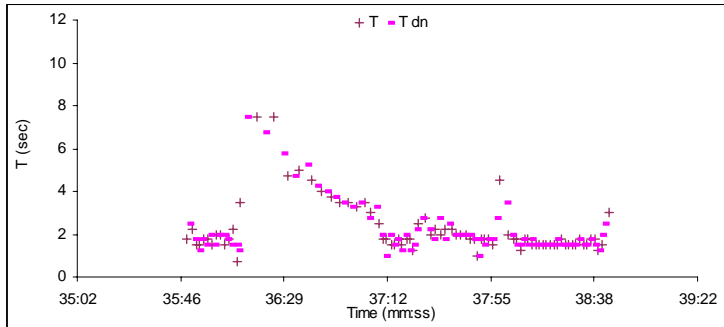
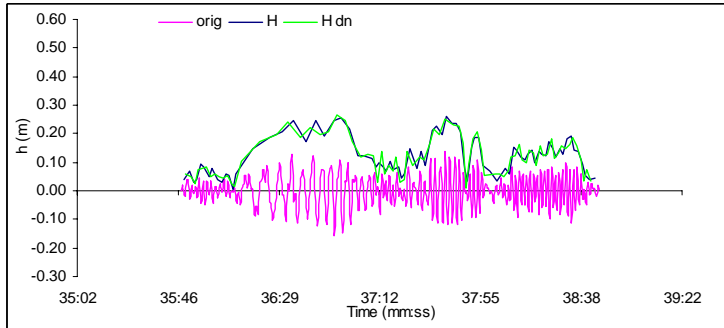
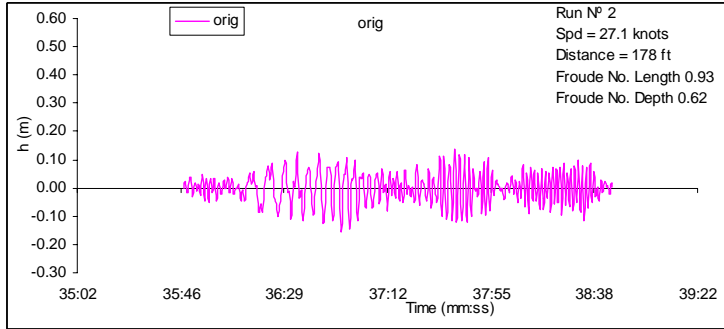
APPENDIX C-d

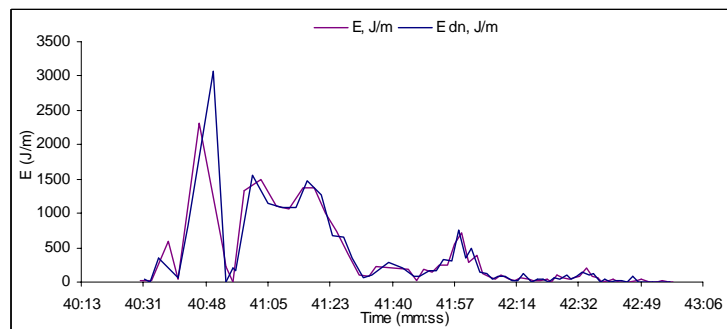
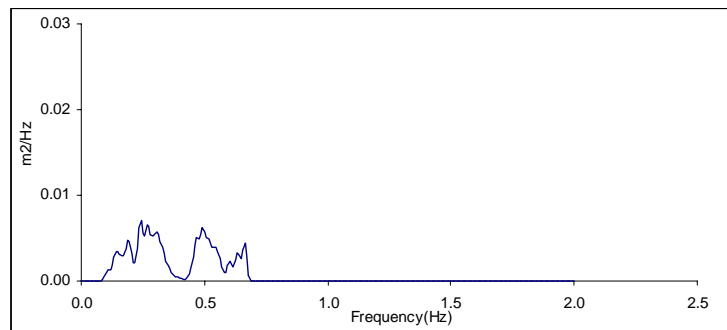
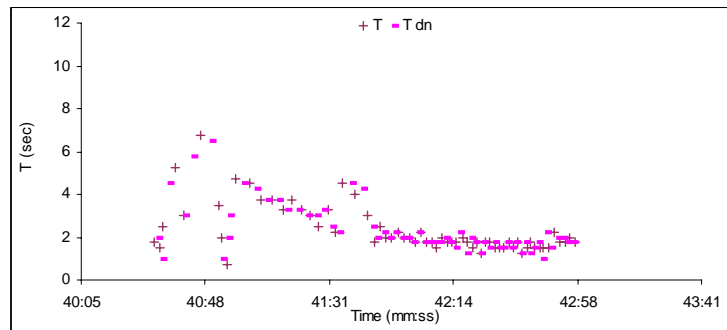
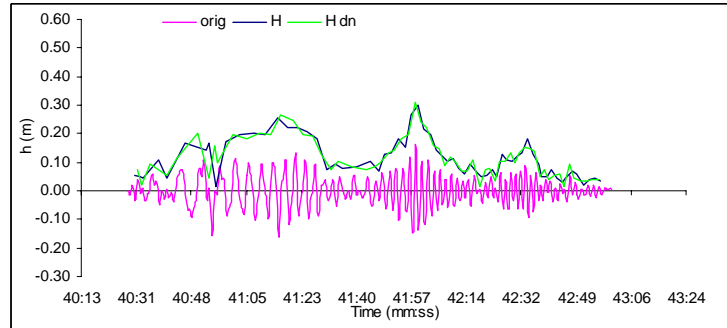
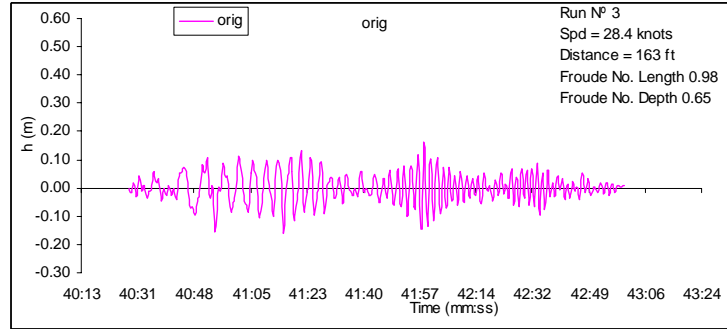
Wake Trial Time Series *M/V St. Nicholas*

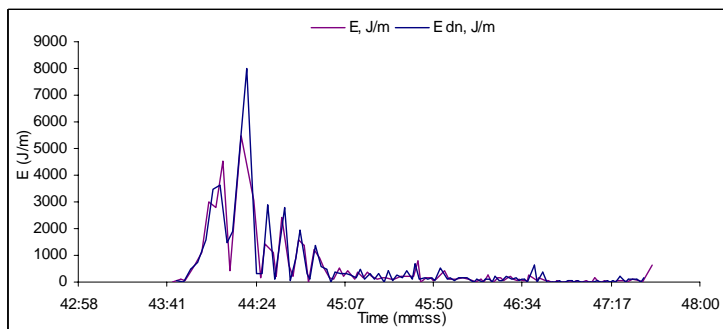
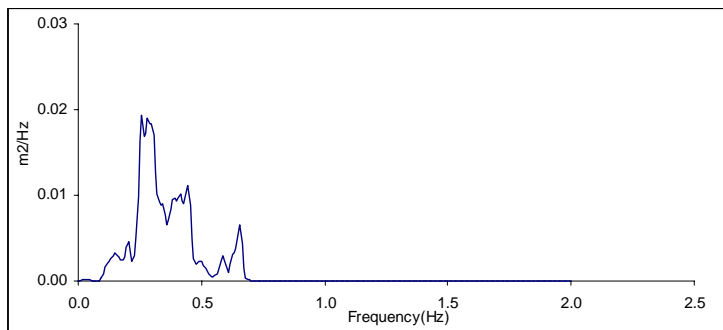
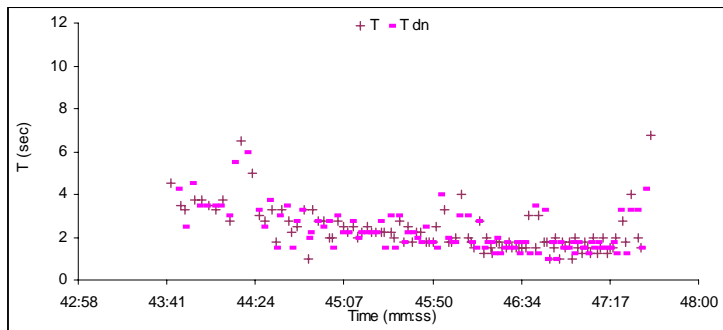
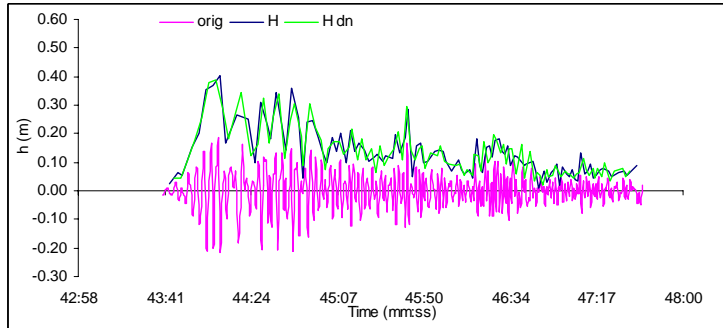
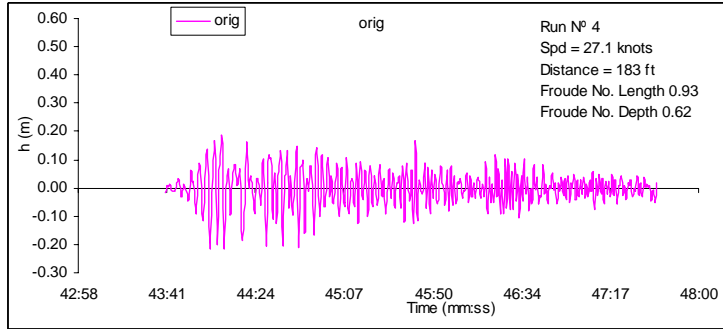
St. Nicholas is a 25 meter, 57 tonne, 149-passenger aluminum catamaran, service speed 28 knots, designed and built by Allen Marine of Sitka, Alaska. She is one of a series of several sister ship catamaran hulls built for New York Waterways between 1996 and 2002. *St. Nicholas* has operated as a whale watch tour ship, as well as a ferry, in Alaska and Puget Sound.

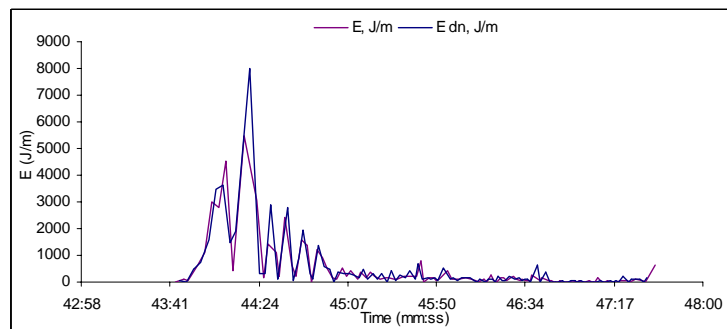
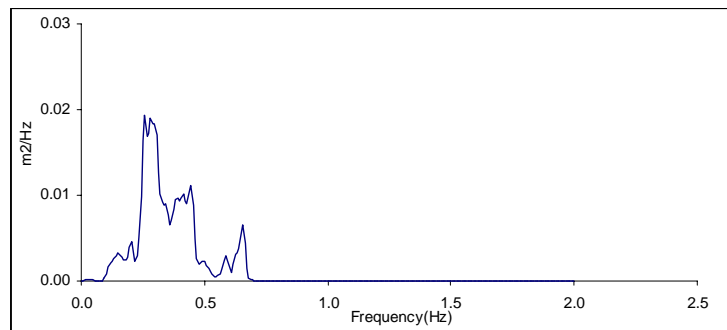
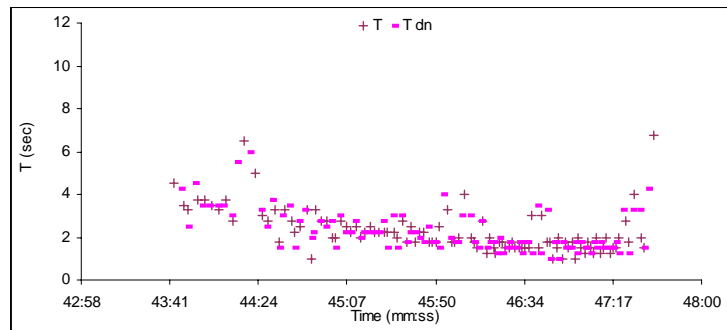
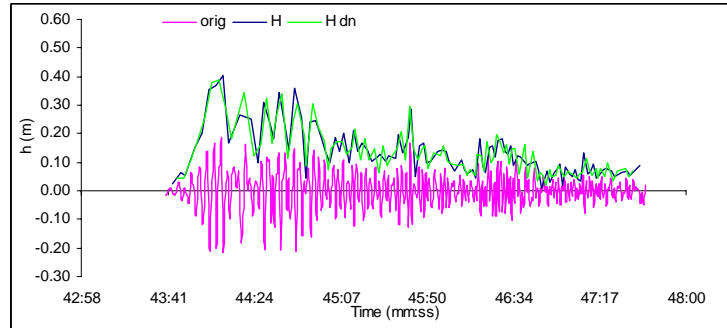
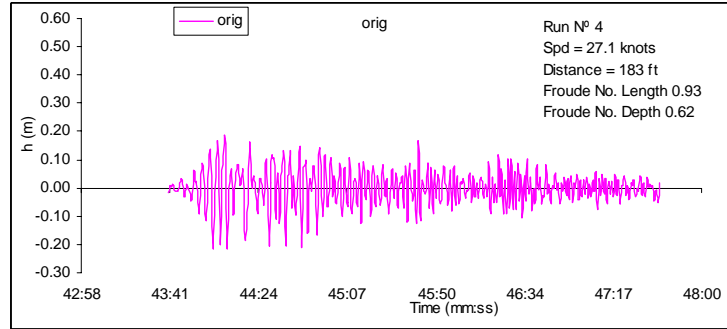
Fox and Associates conducted trials of *St. Nicholas* on March 16, 2000 in Port Madison, Puget Sound. Six runs at each nominal speed were recorded at 12, 16, 20, 24 and 28 knots with the vessel in the fully loaded condition. All data that was consistent and repeatable was analyzed. Each run's data was normalized to a distance off centerline of travel of 300 meters and the data for each speed was averaged. Plots were then developed of wash height vs. speed, wash period vs. speed and wash energy density vs. speed. From this data and analysis, it was shown that, with ST. NICHOLAS at maximum service speed, wash height is 16.1 cm (peak to trough) at 27.7 knots. The wash energy density at 27.7 knots is 1603 joules/meter. ST. NICHOLAS was tested in a loaded condition with a combination of passengers and excess fuel that, according to Mosquito Fleet, simulates the configuration of the vessel with a normal full load of fuel, water and passengers. The vessel was tested at a displacement of 67.6 long tons.

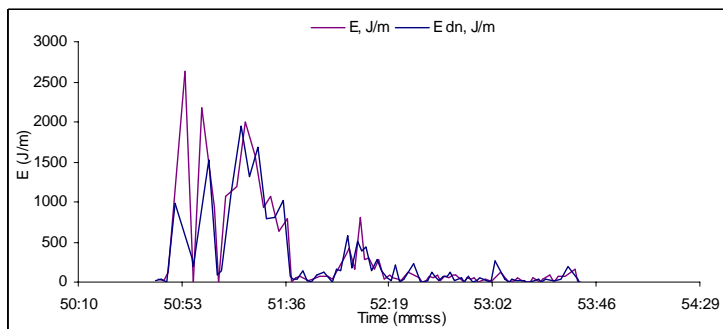
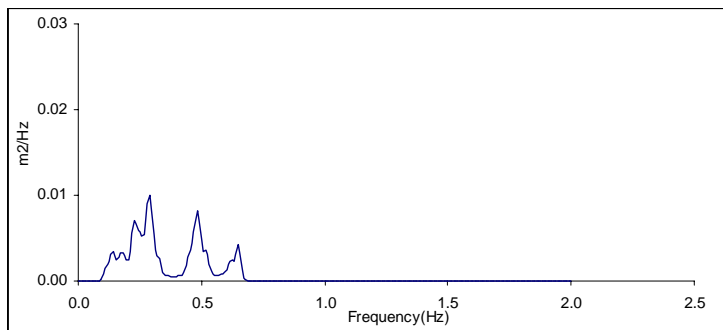
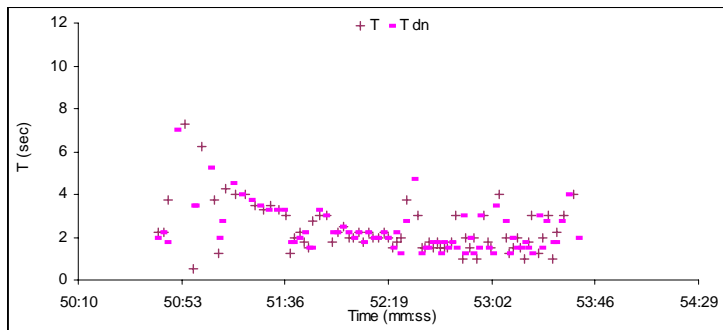
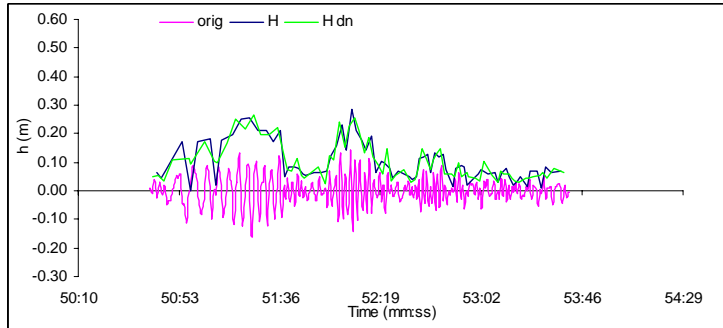
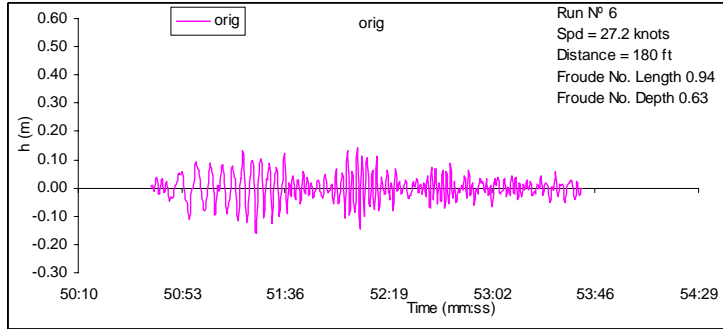
The time series presented below represent the analysis of the measured time series conducted by Pacific International Engineering as part of the present study.

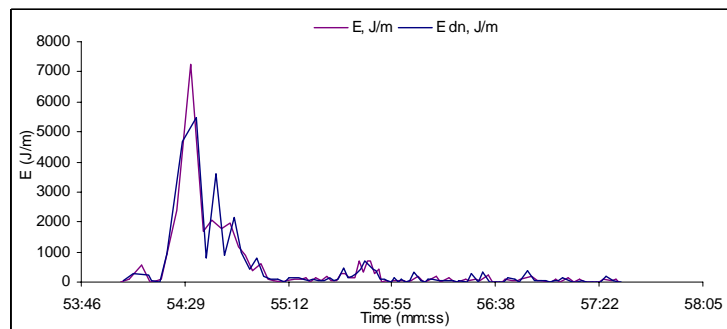
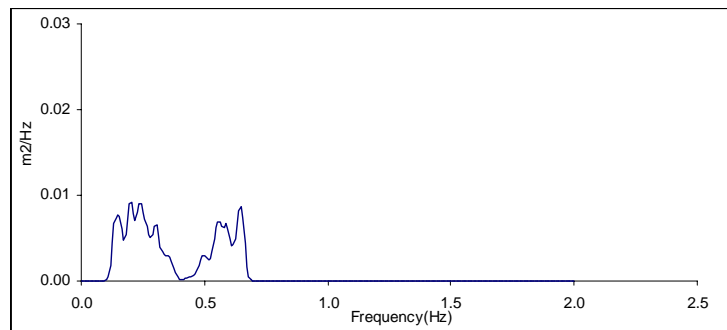
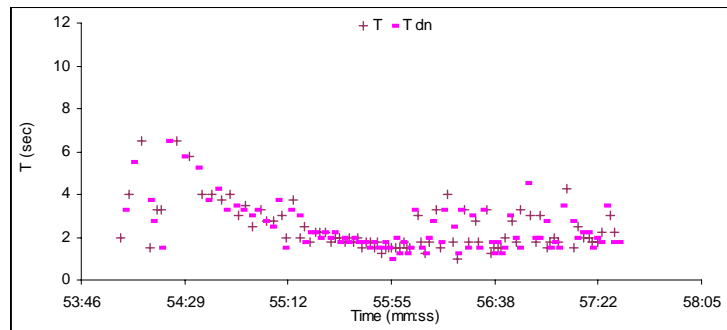
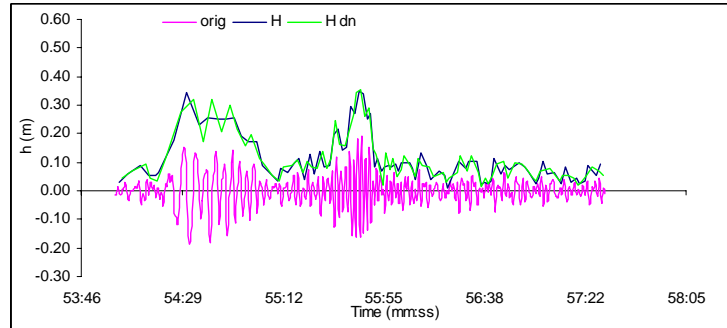
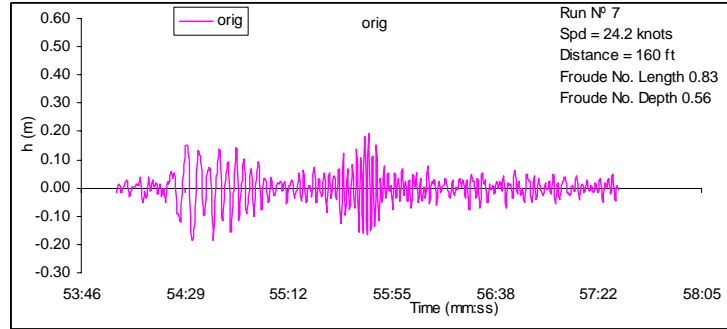


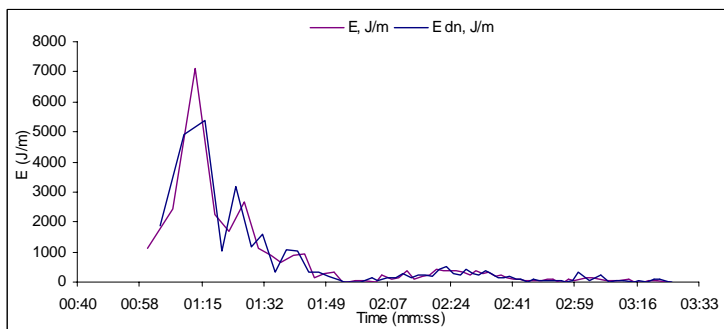
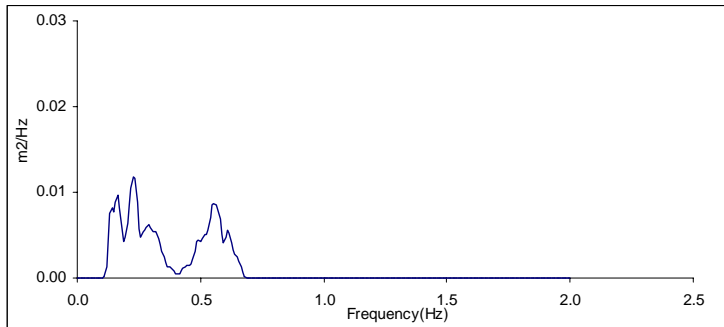
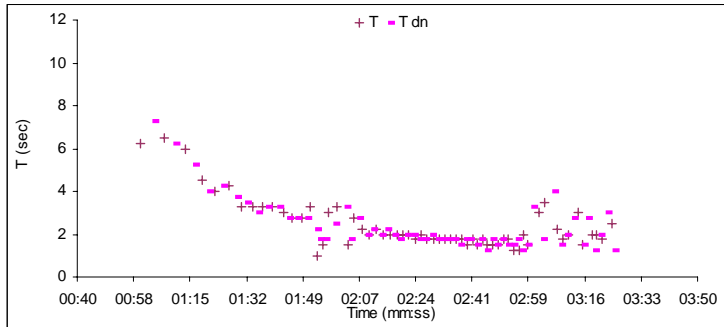
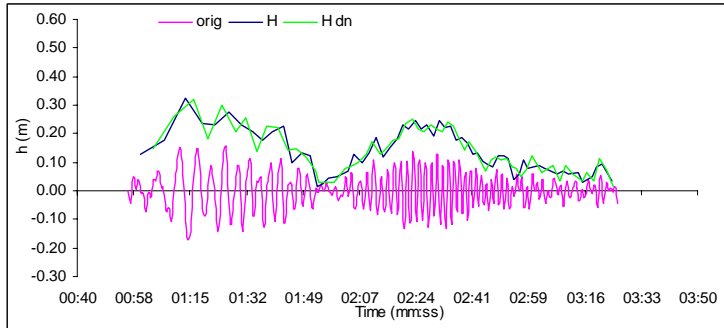
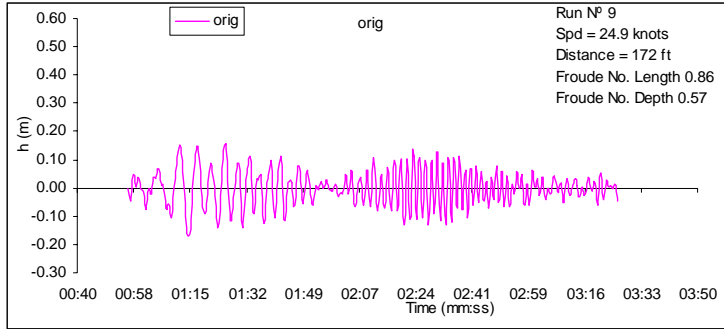


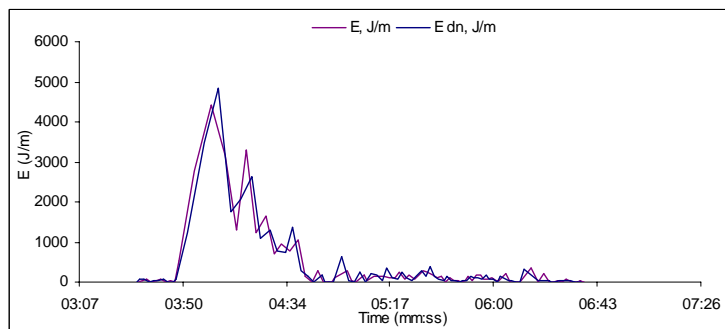
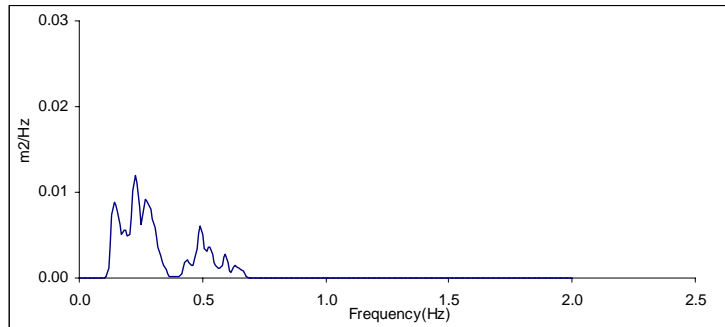
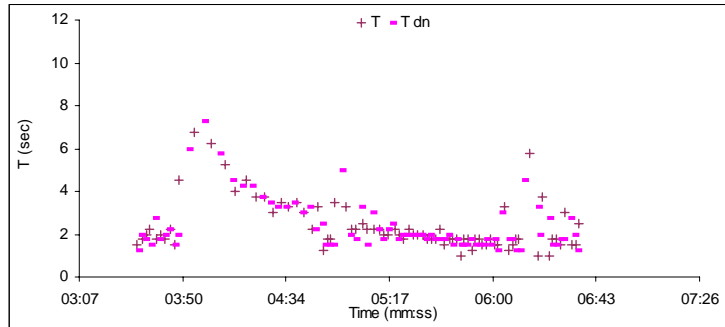
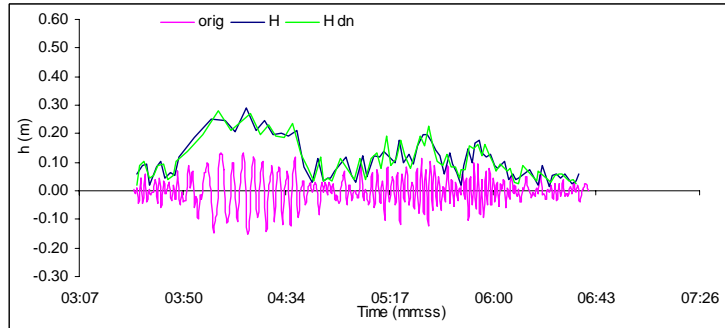
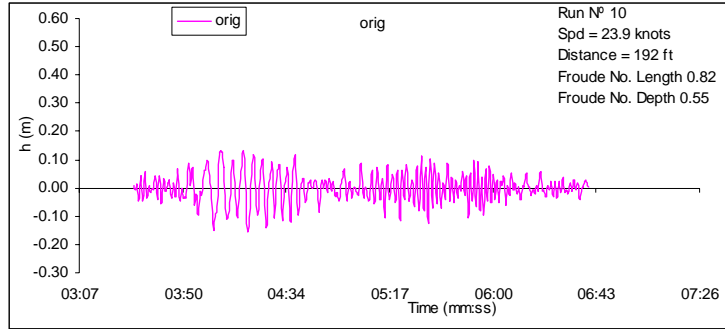


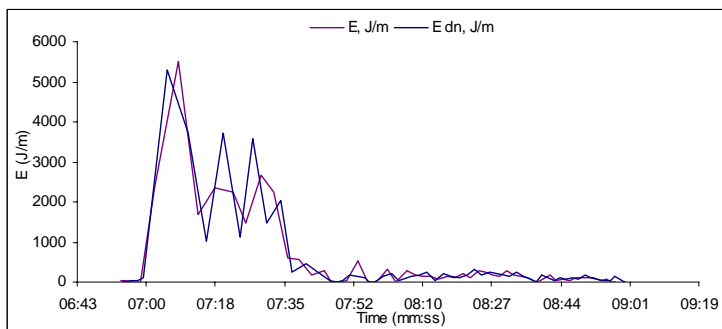
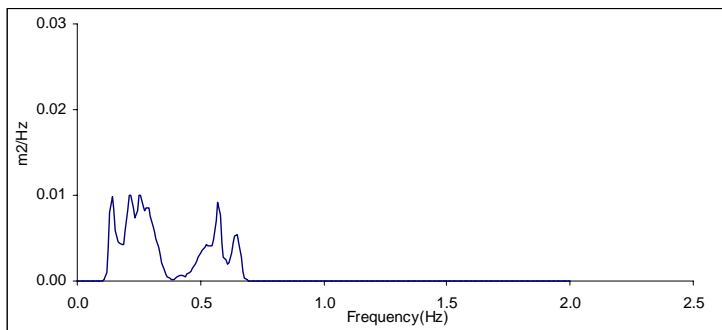
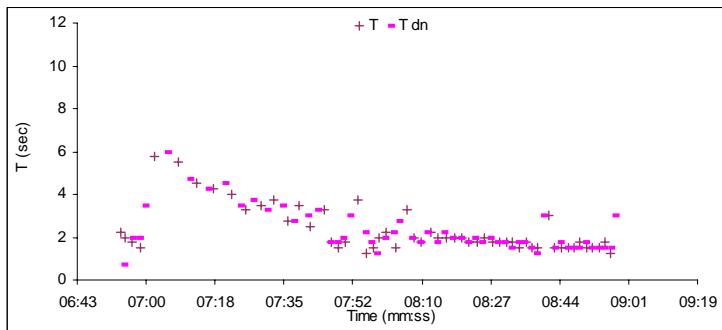
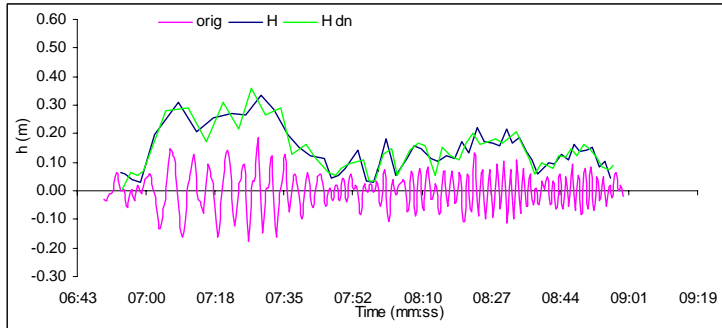
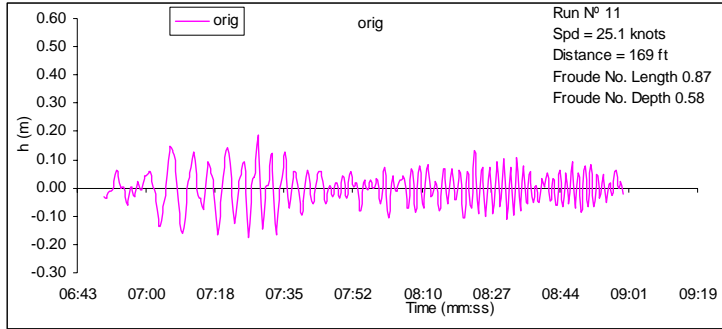


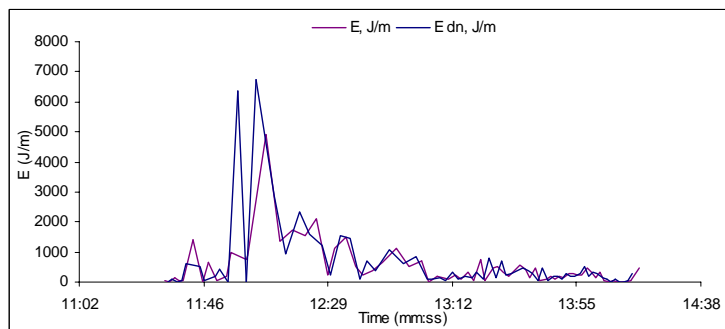
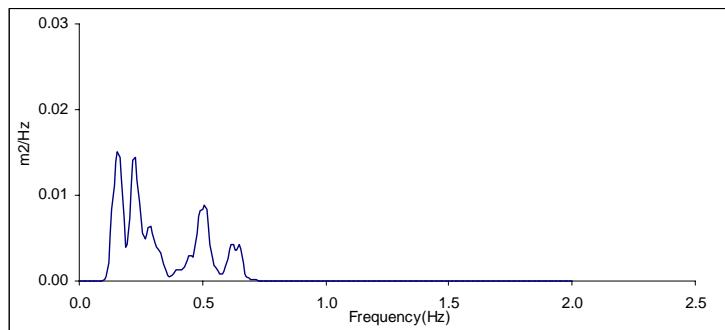
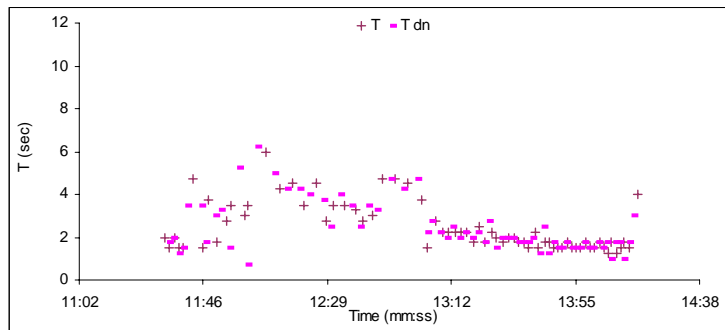
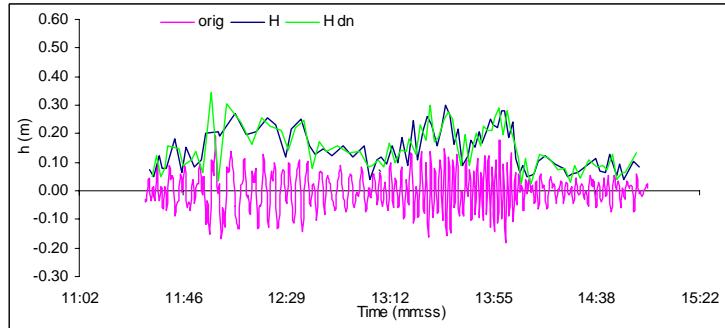
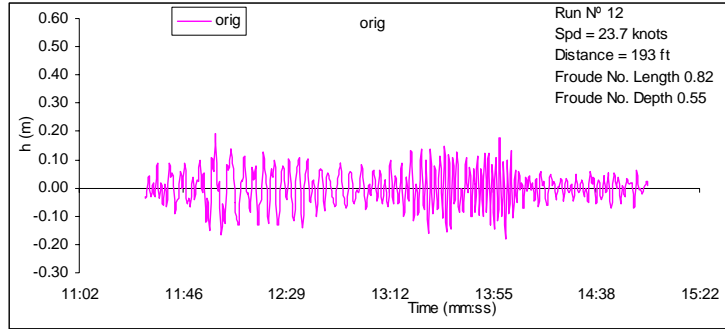


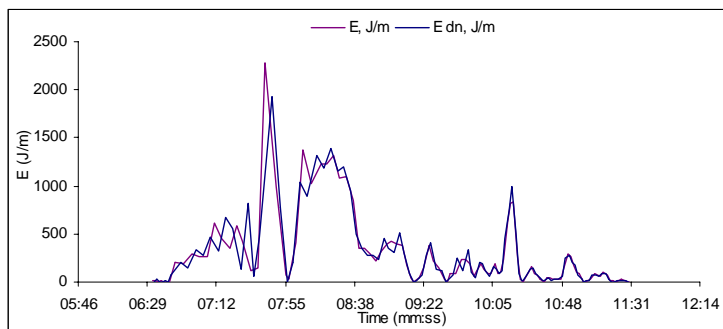
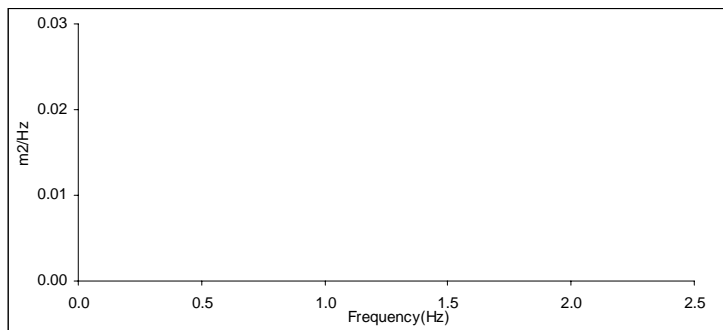
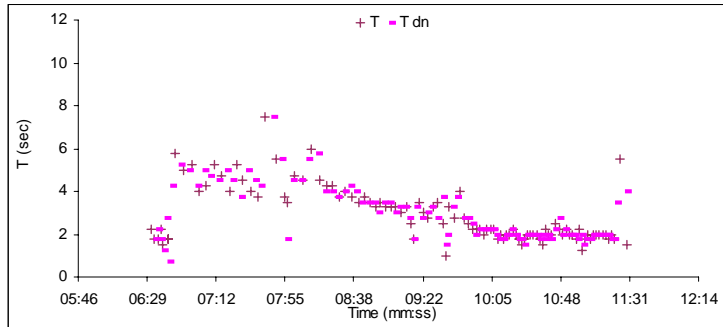
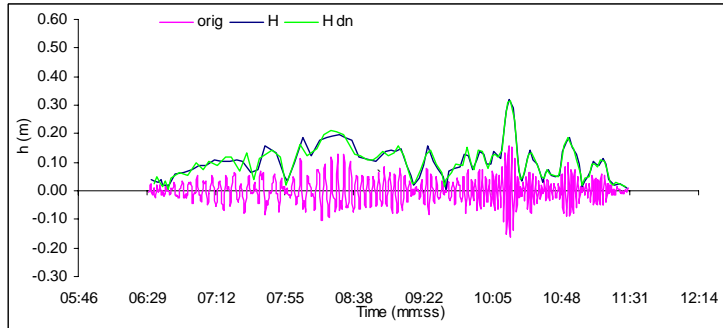
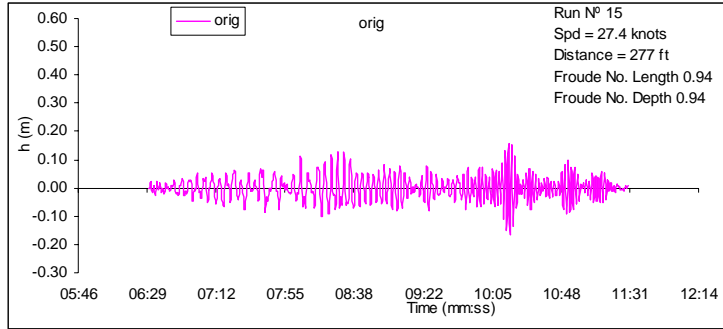


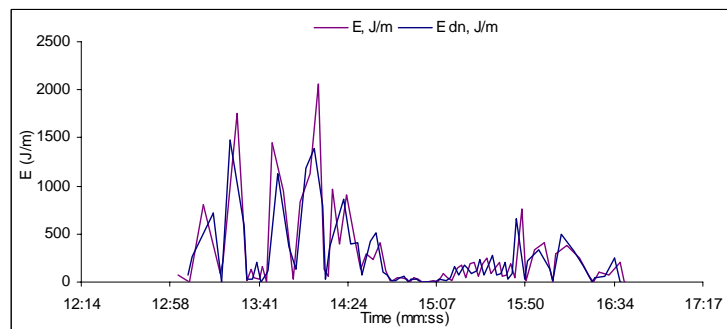
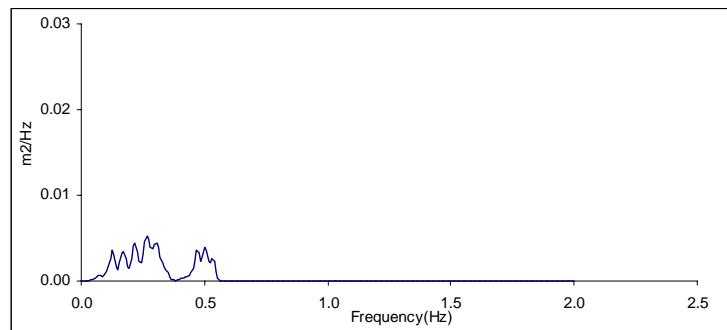
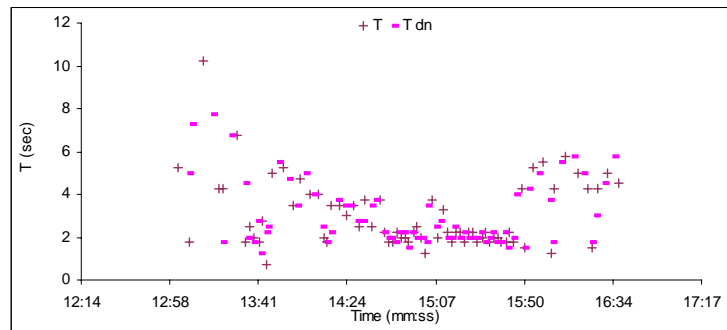
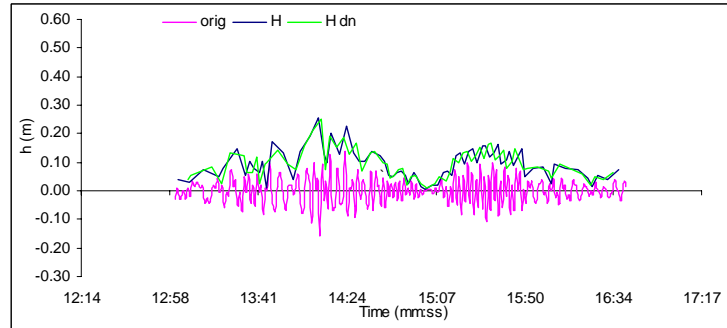
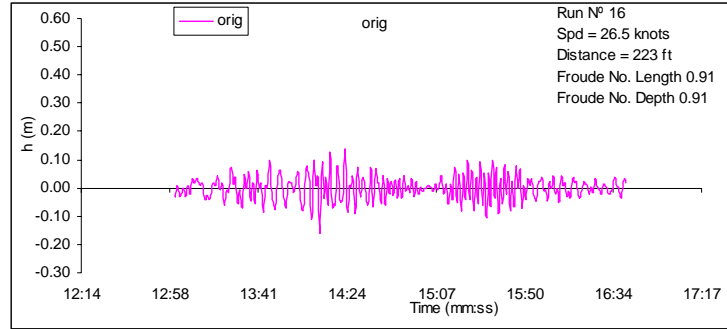


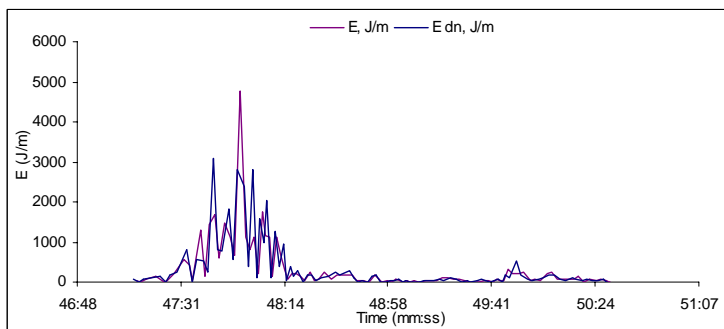
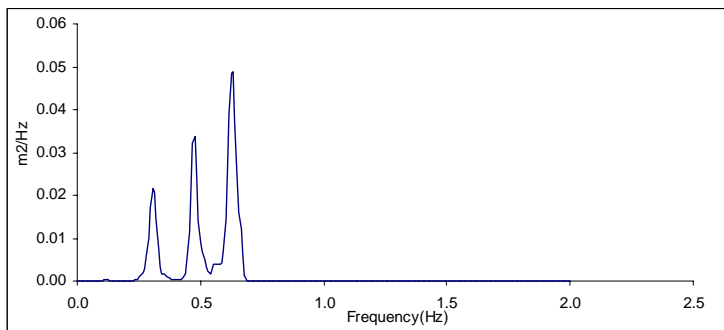
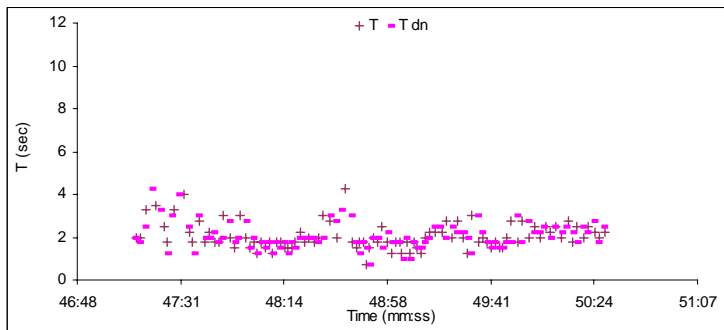
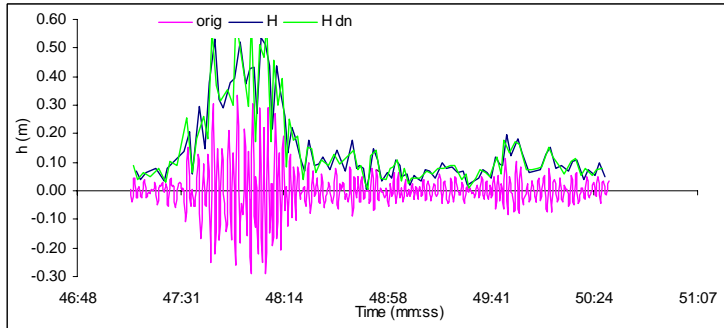
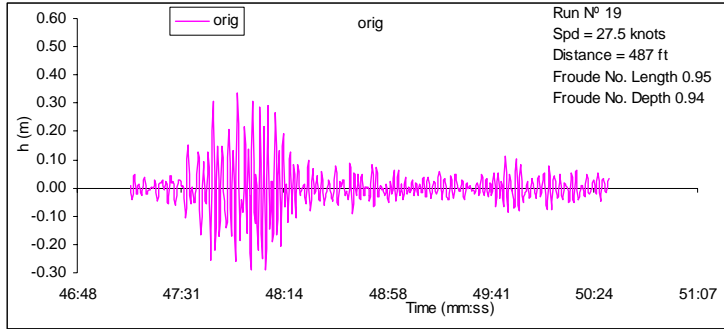


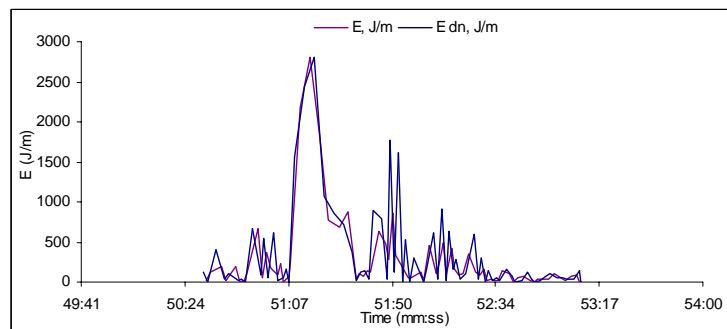
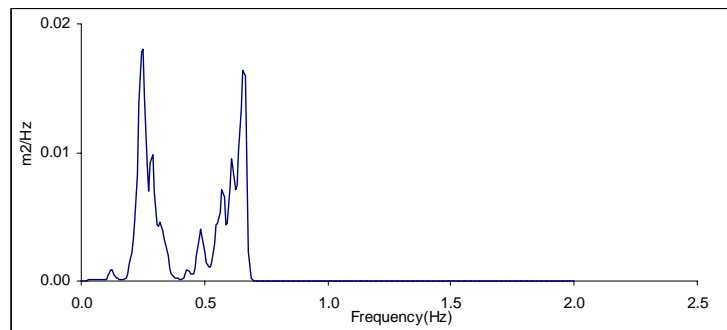
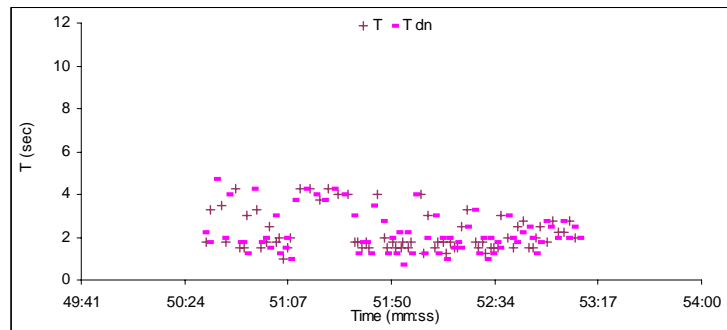
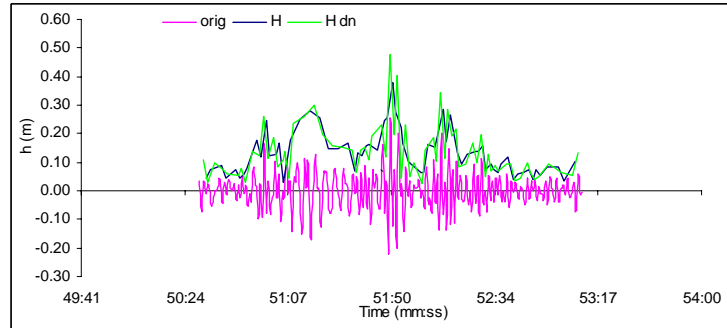
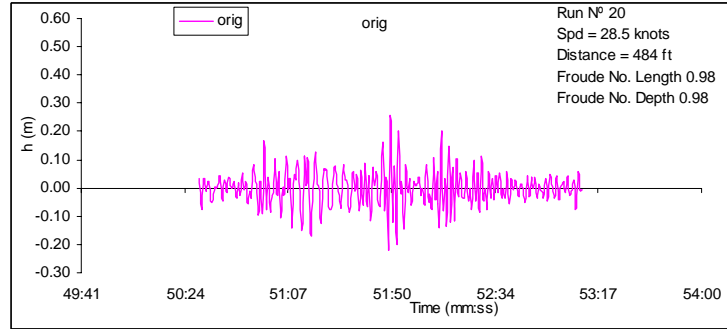


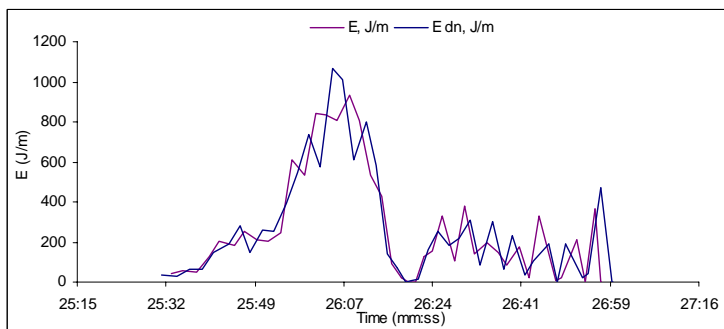
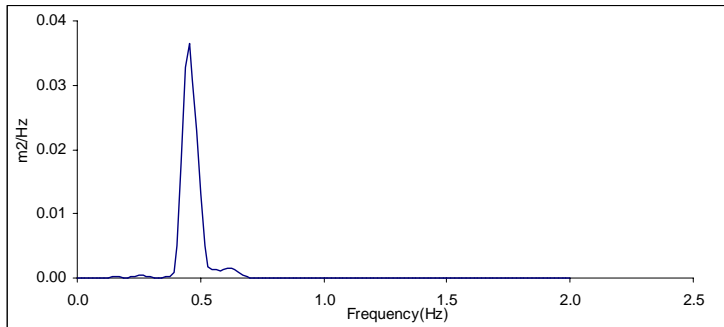
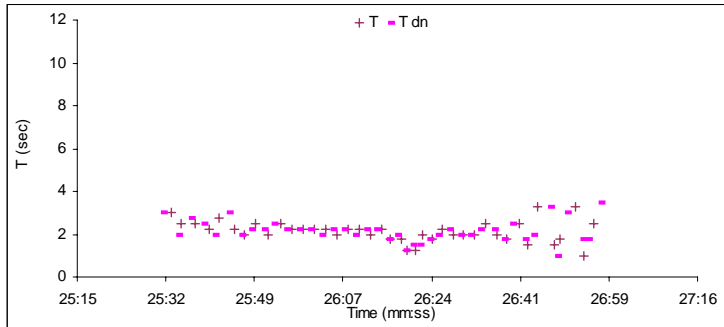
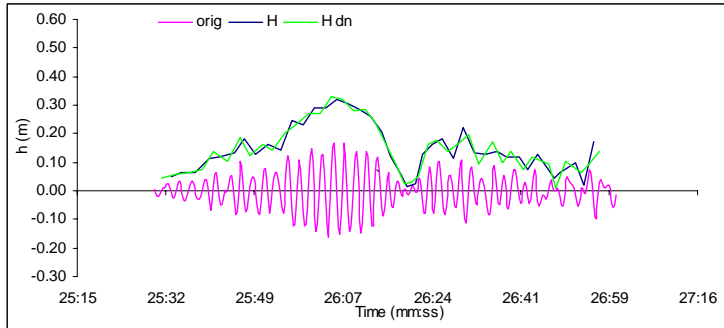
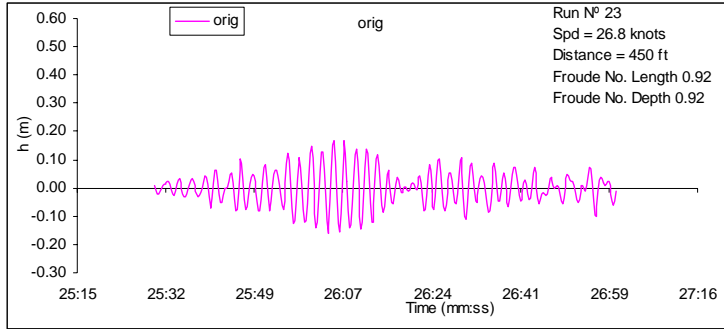


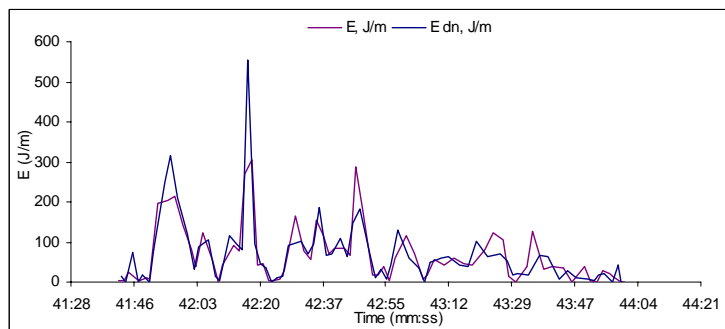
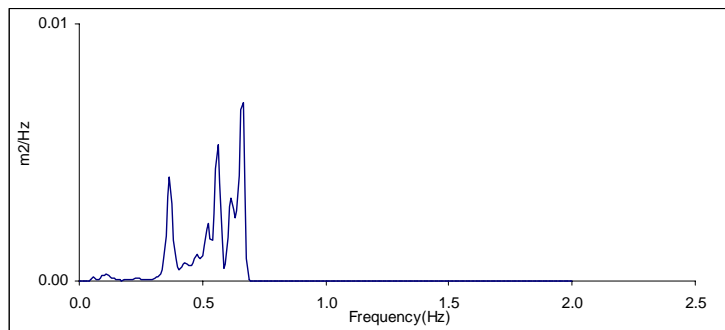
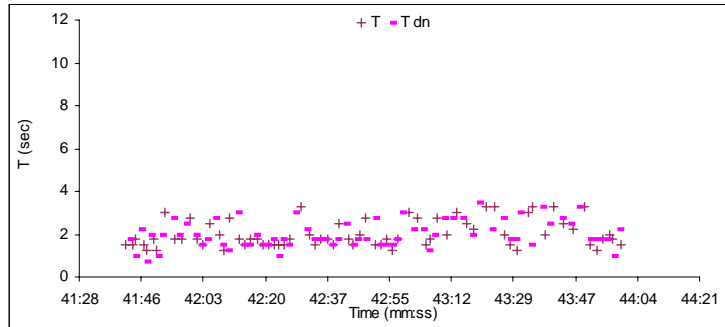
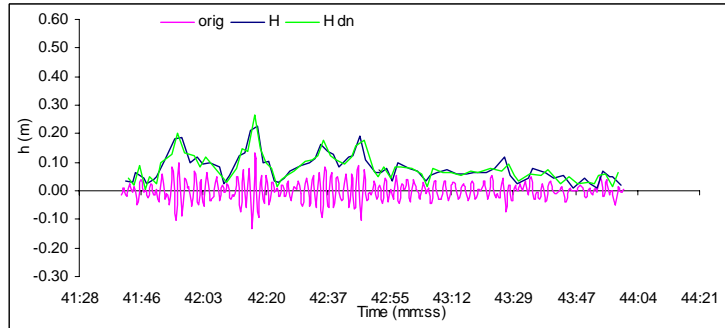
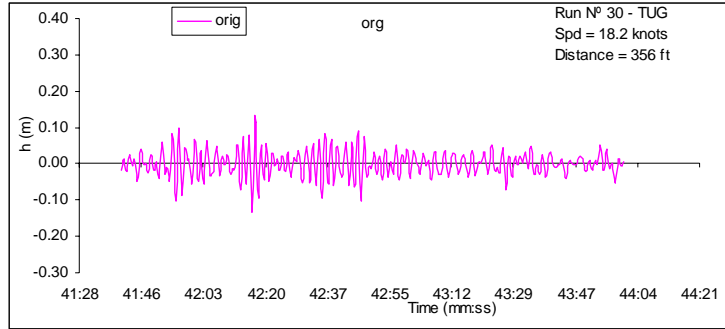


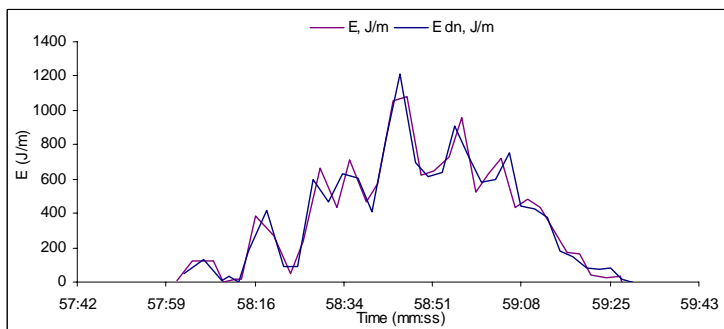
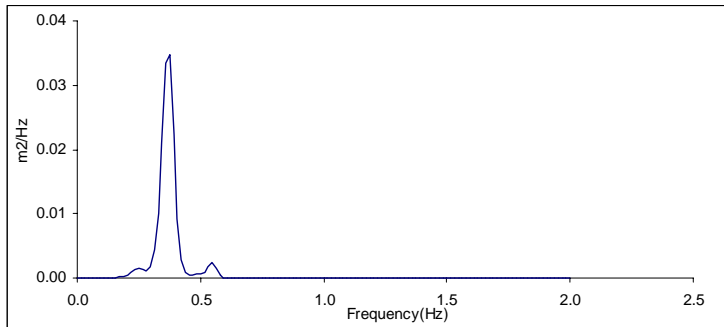
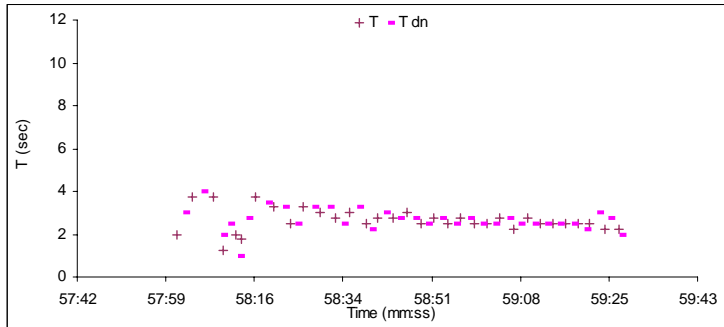
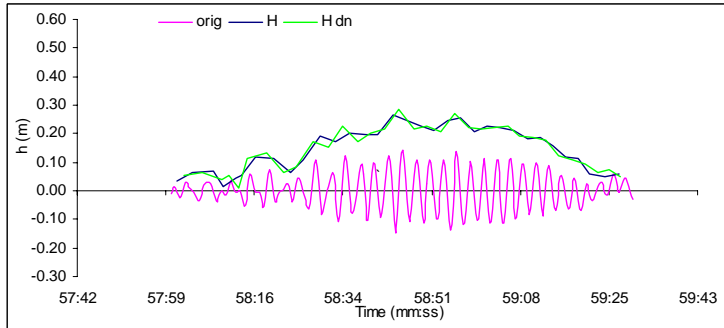
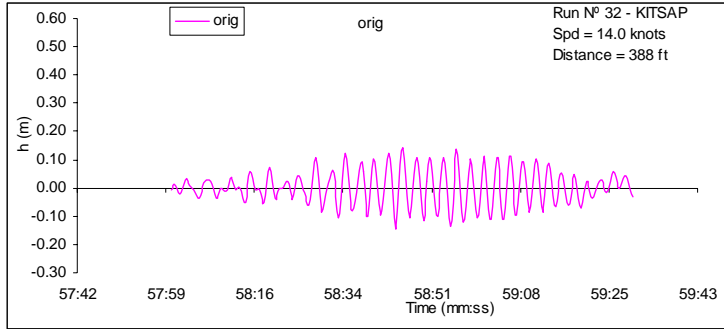


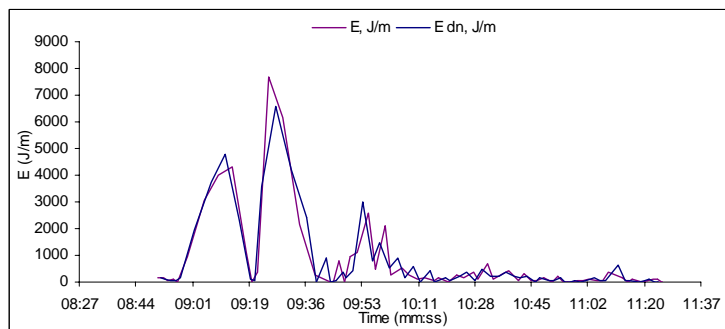
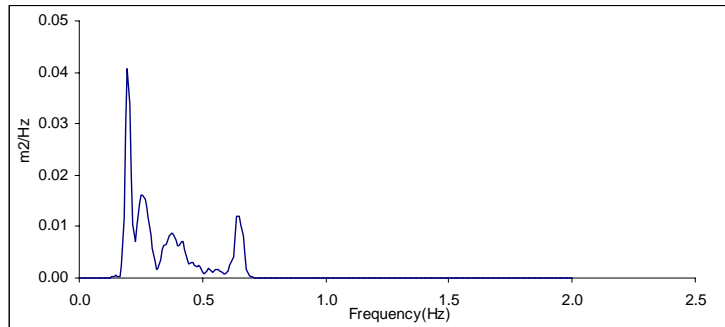
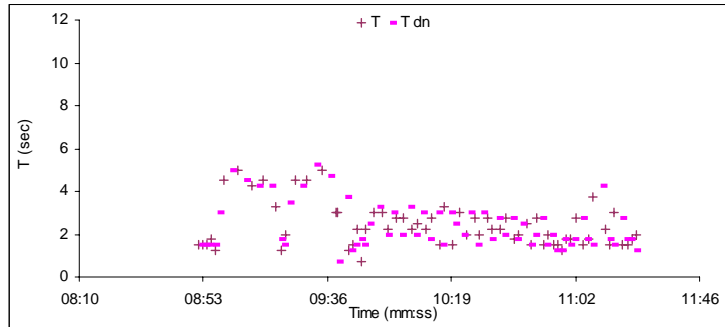
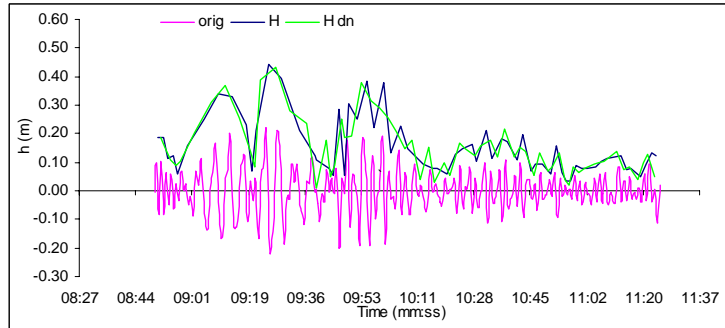
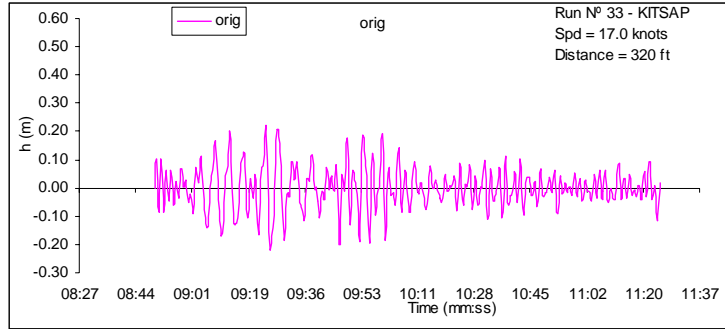


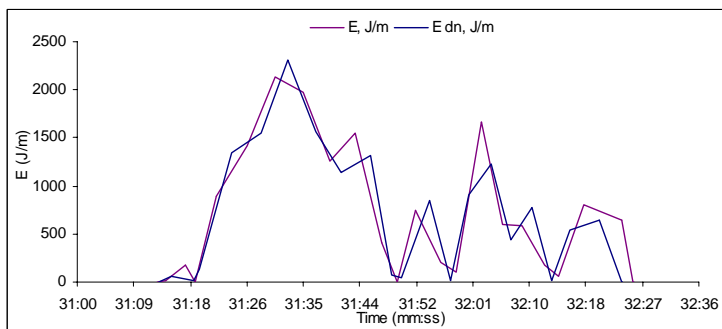
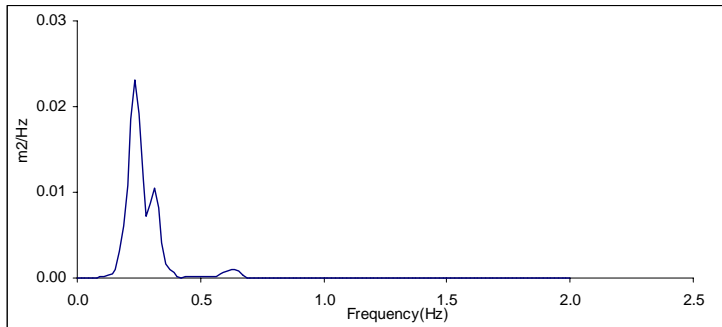
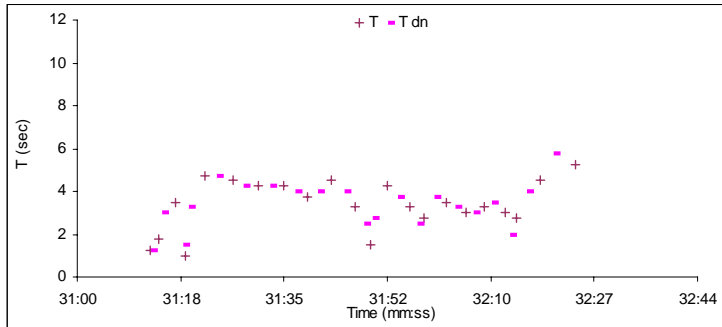
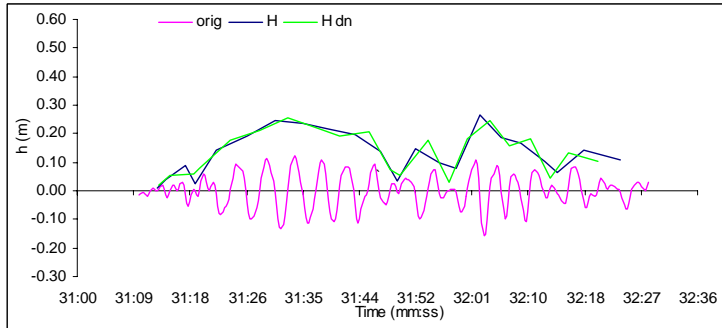
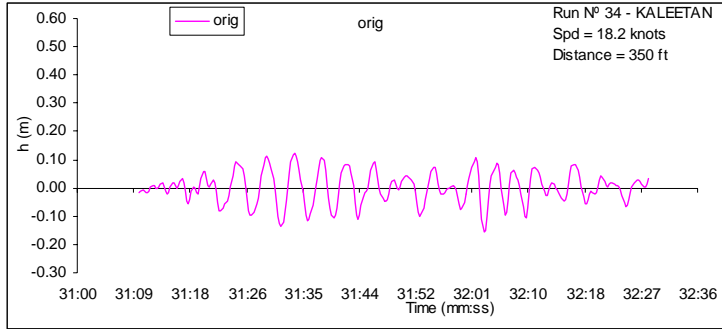


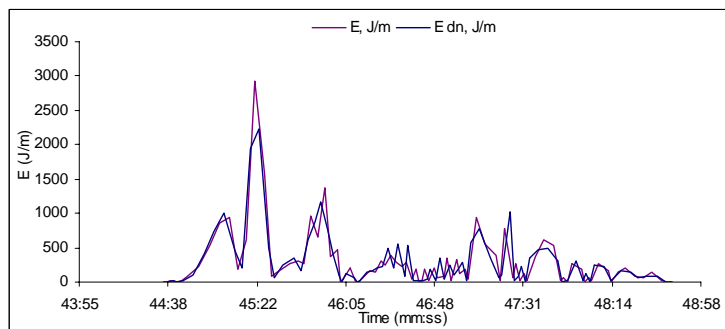
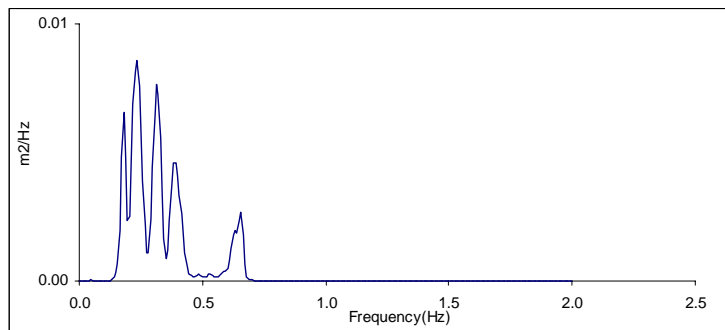
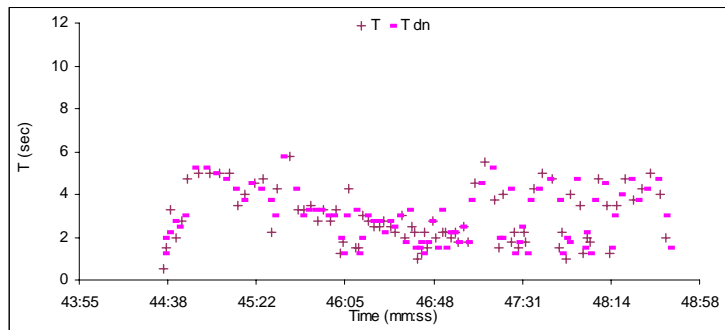
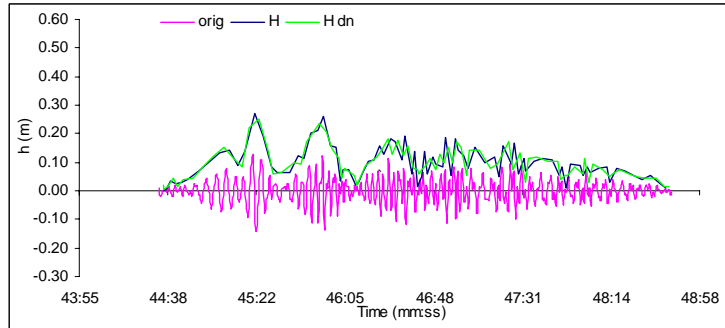
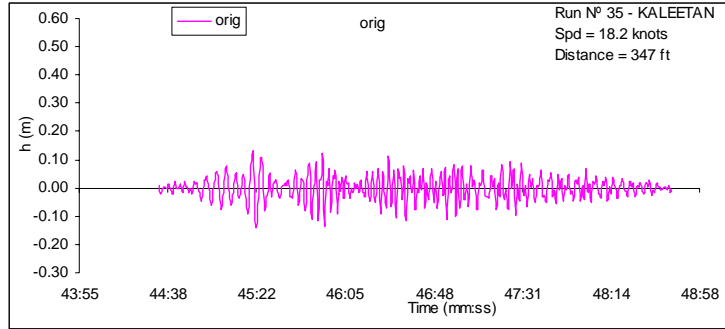


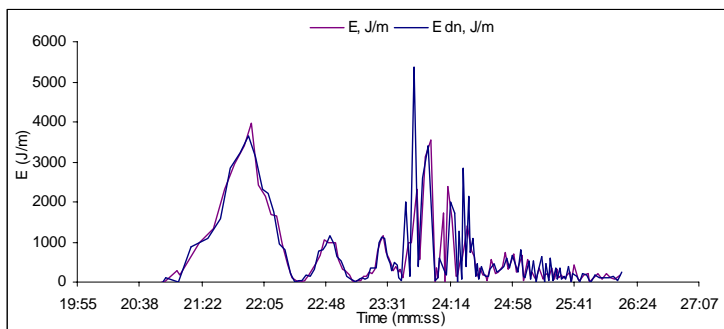
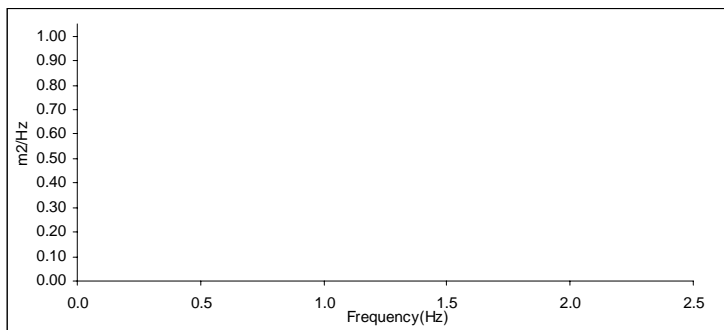
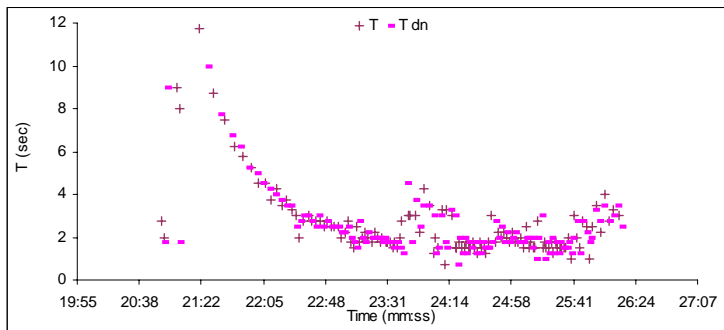
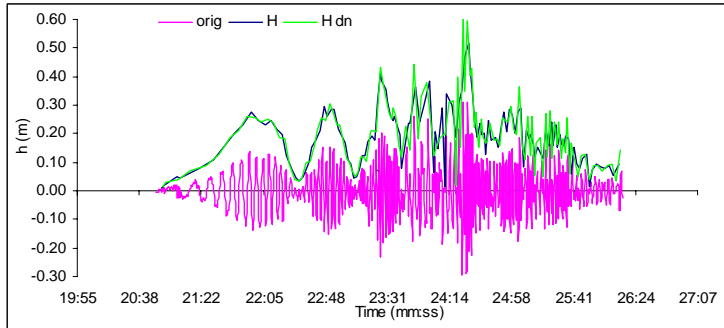
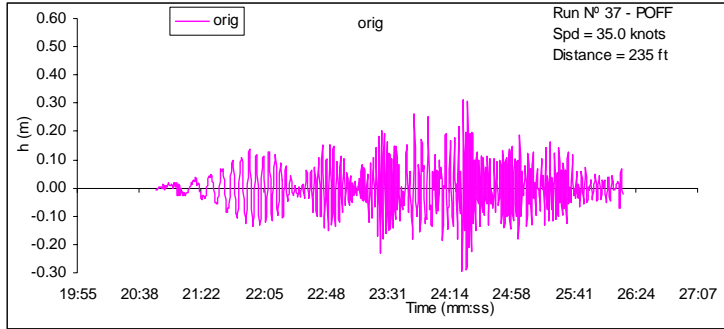












APPENDIX C-e

Wake Trial Time Series *M/V St. Nicholas*

M/V St. Nicholas

Fox and Associates conducted a second set of trials of *St. Nicholas* on November 16, 2001 in Port Madison, Puget Sound to test the sensitivity of the wakes to displacement and trim.

From the ST NICHOLAS Lightship Report by Coastwise Engineering:

Freeboard at forepeak stem	89.0 in.
Freeboard at stern (Sta. 5)	64.19 in.
Displacement (tonnes)	47.29 tonnes
Trim (+ degrees down by the stern)	+0.45 deg.

From the 3/16/2000 ST NICHOLAS Wake Wash Test by Fox Associates:

Freeboard at forepeak stem	79.75 in.
Freeboard at stern (Sta. 5)	59.5 in.
Displacement (tonnes)	67.63 tonnes
Trim (+ degrees down by the stern)	+0.17 deg. New calculation

Average sinkage: 6.97 in.
Displacement change: 20.34 tonnes

TPI = 20.34/6.97 = 2.918 tonnes/inch immersion

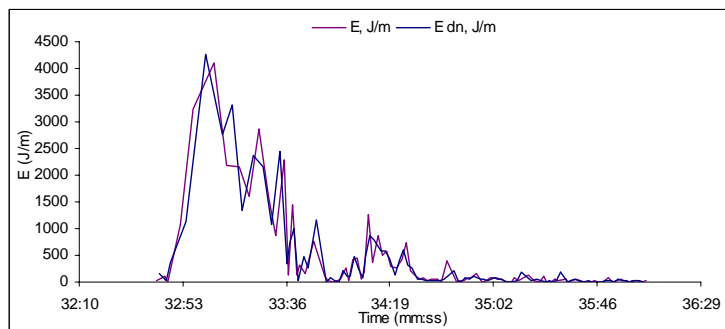
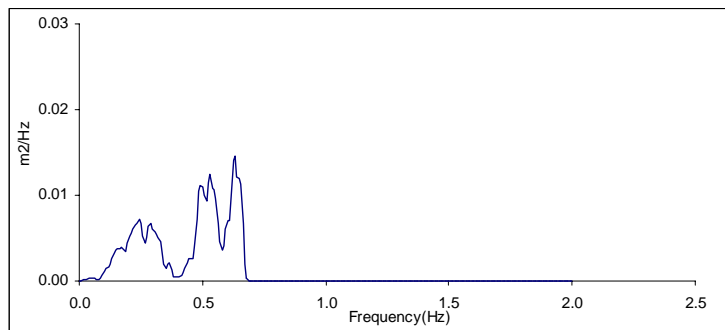
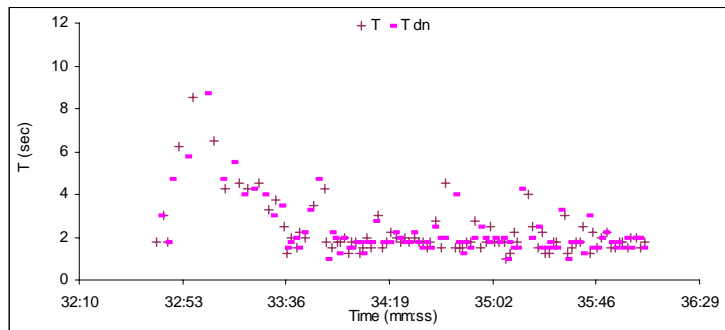
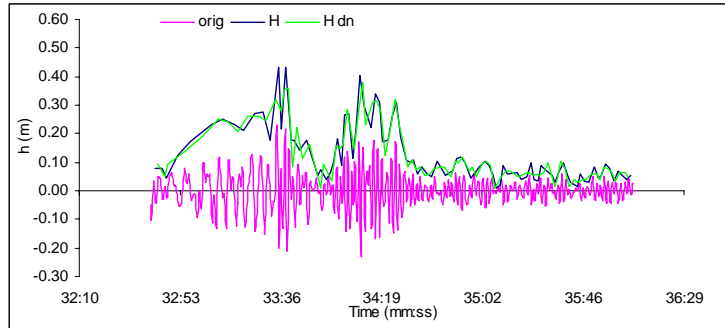
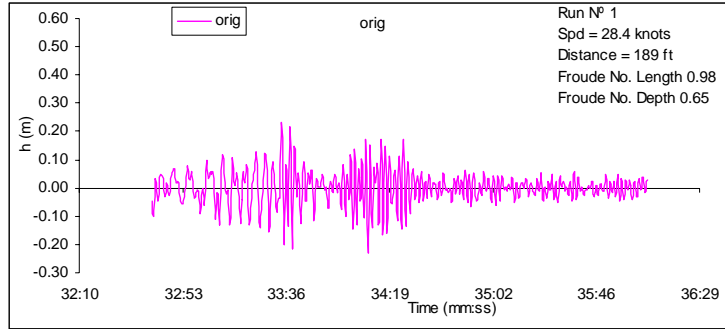
From the 11/16/2001 ST NICHOLAS Wake Wash Test by Fox Associates:

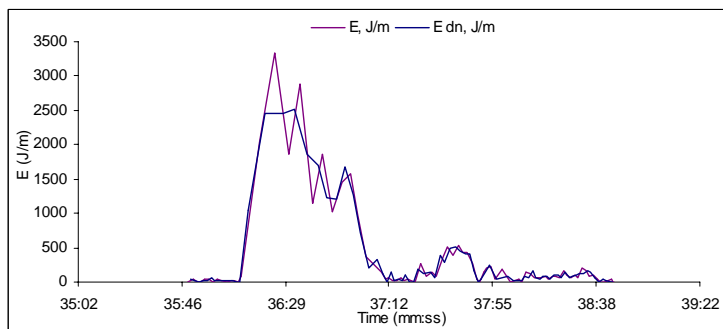
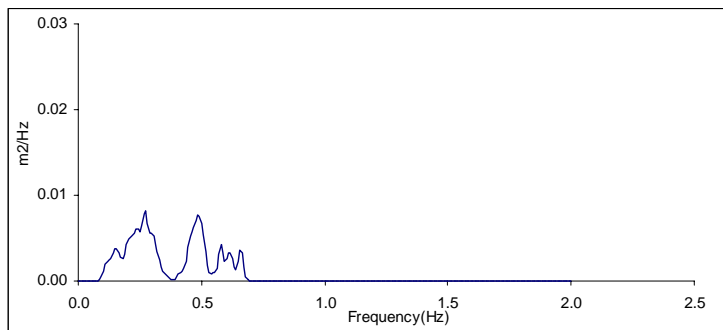
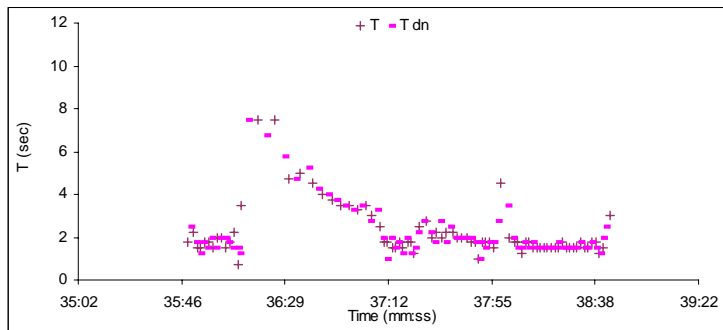
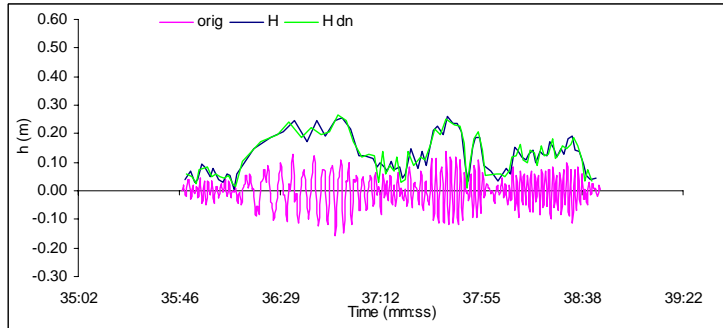
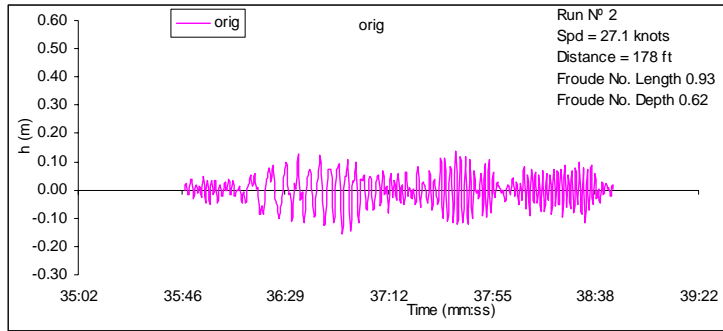
Freeboard at forepeak stem	86.8125 in.
Freeboard at stern (Sta. 5)	60.75 in.
Displacement (tonnes)	55.5 tonnes
Trim (+ degrees down by the stern)	+0.37 deg.

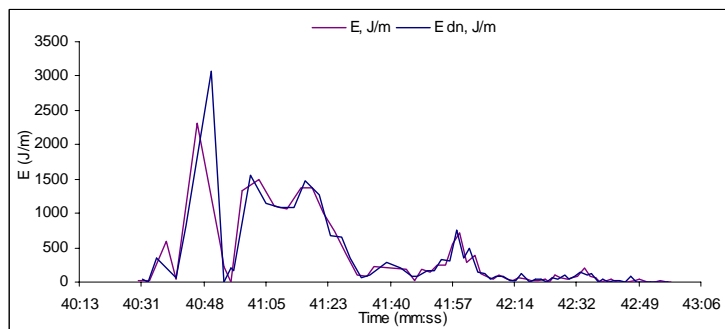
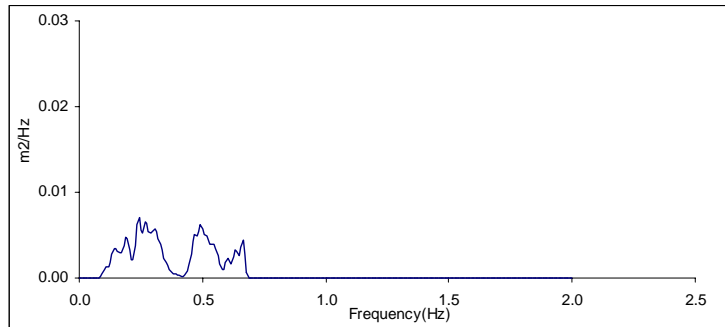
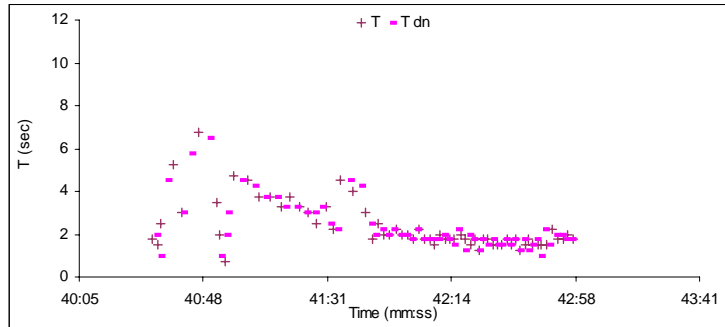
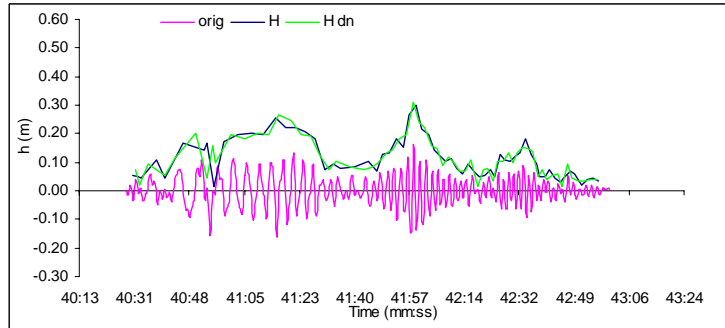
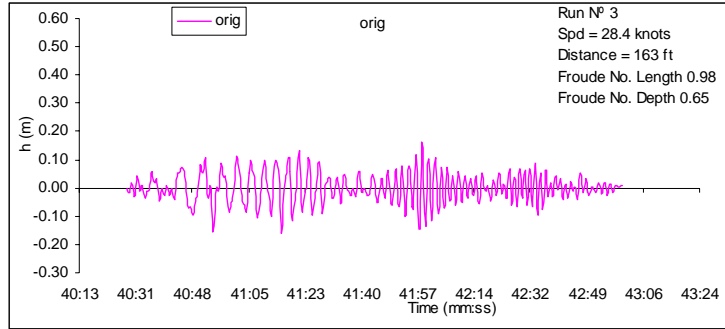
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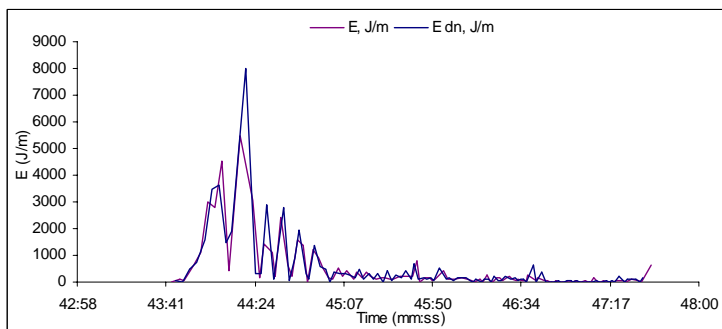
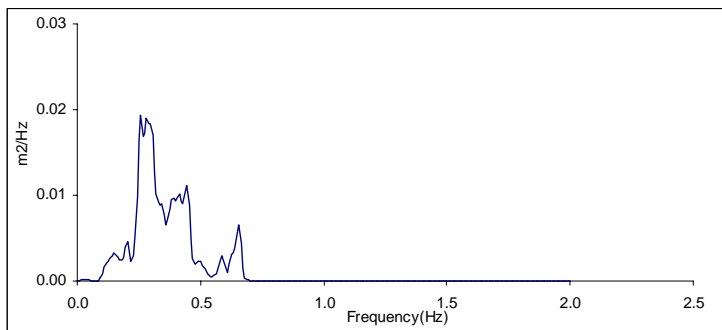
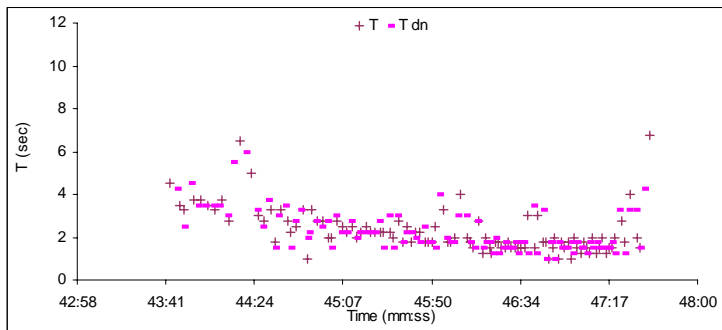
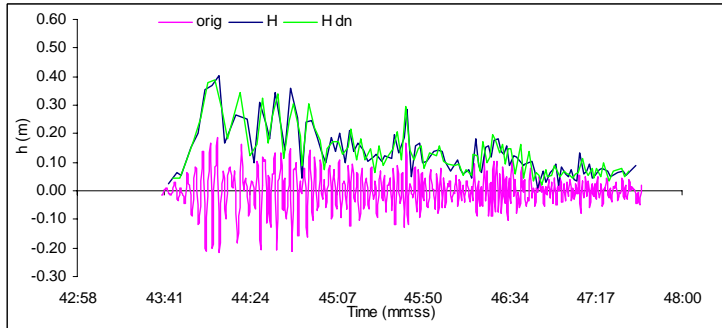
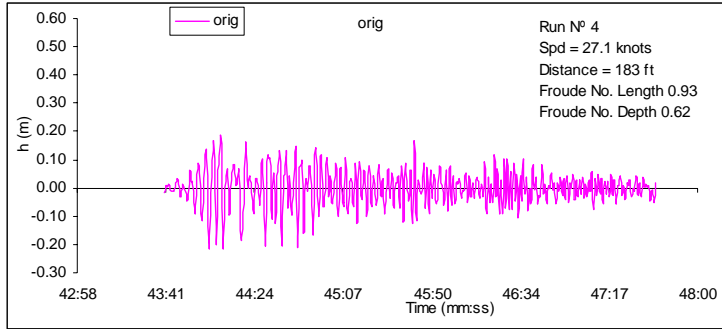
Fuel: 1200 gals. (capacity 2000 gals)
Pax + crew: 74

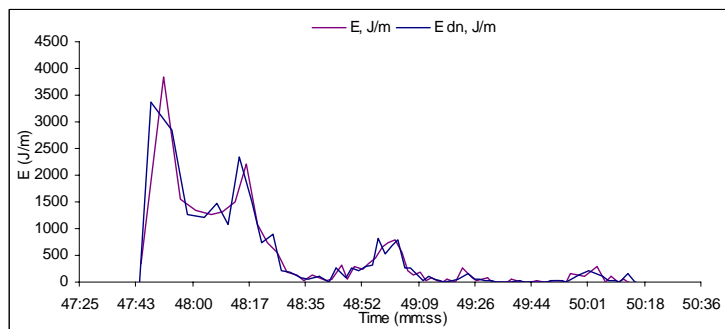
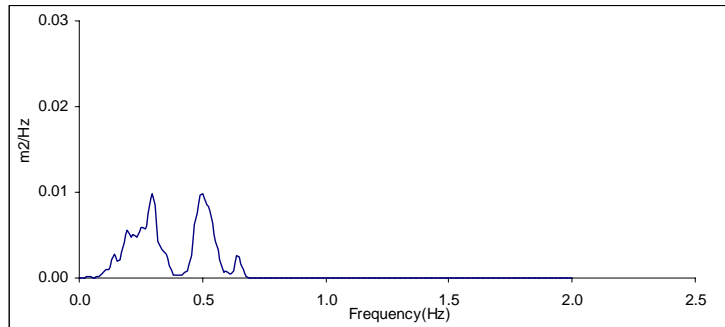
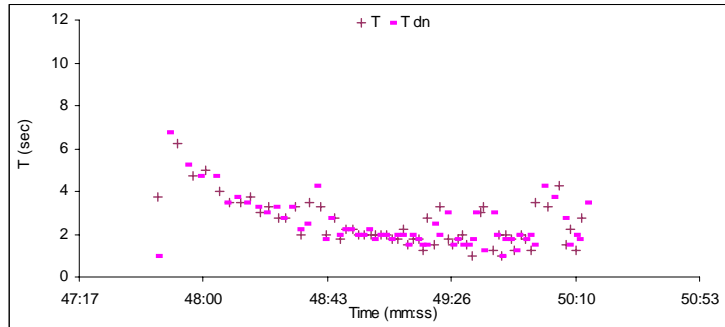
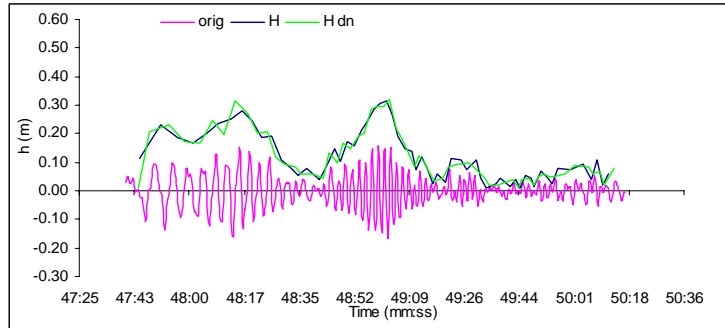
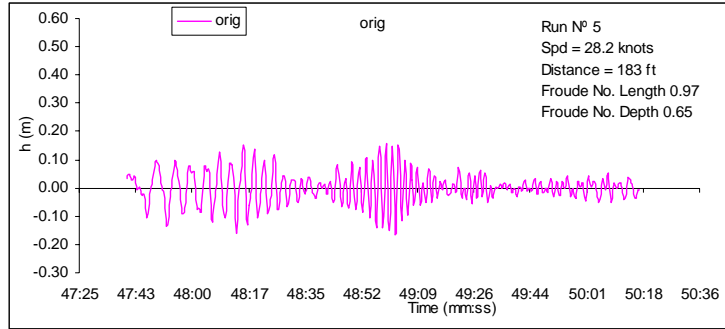
The time series presented below represent the analysis of the measured time series conducted by Pacific International Engineering as part of the present study.

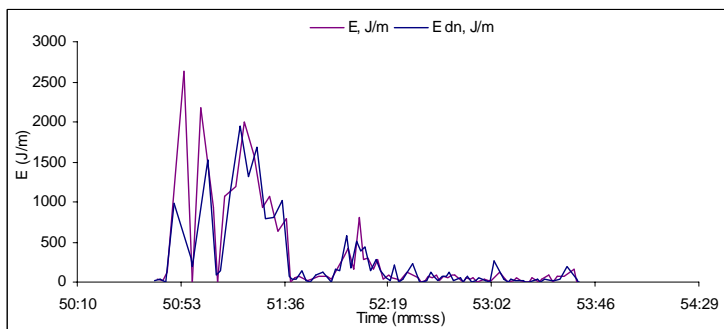
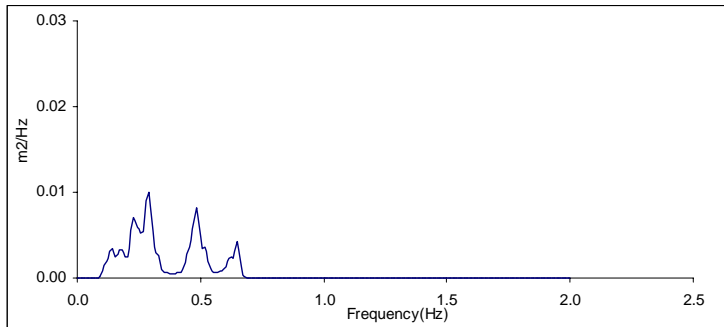
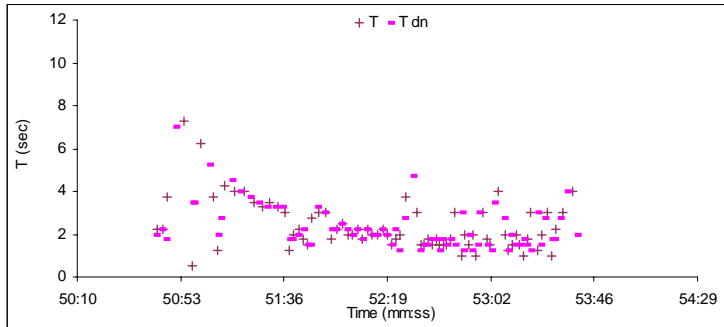
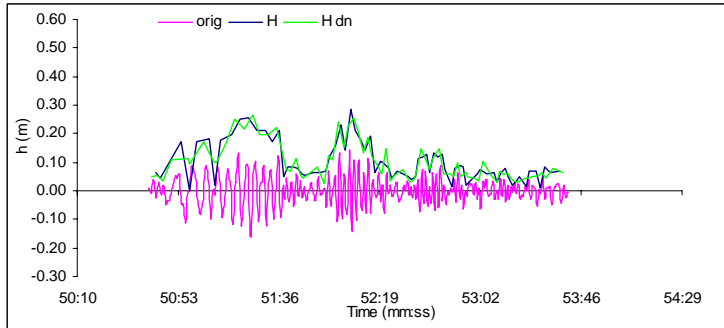
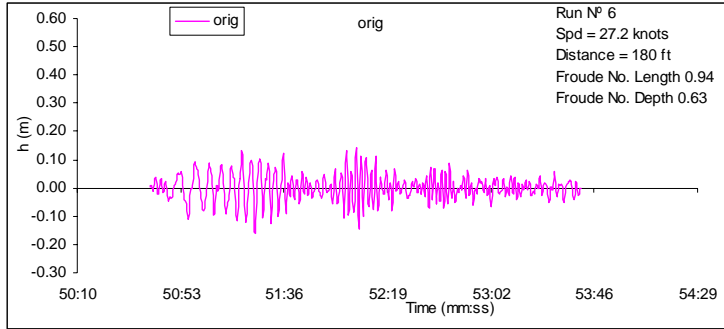


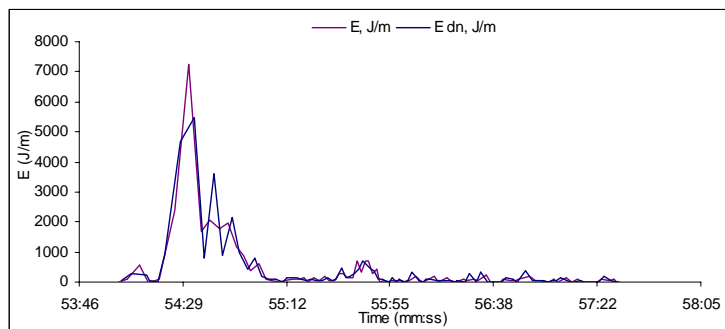
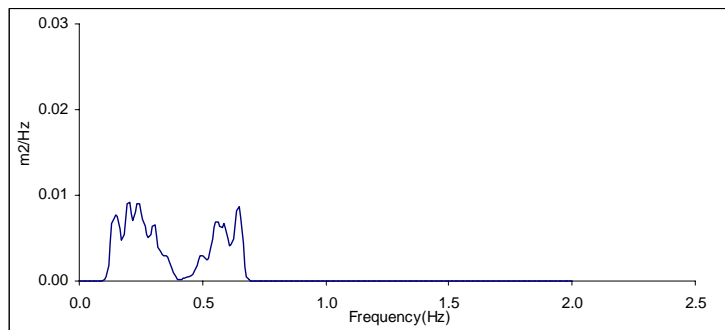
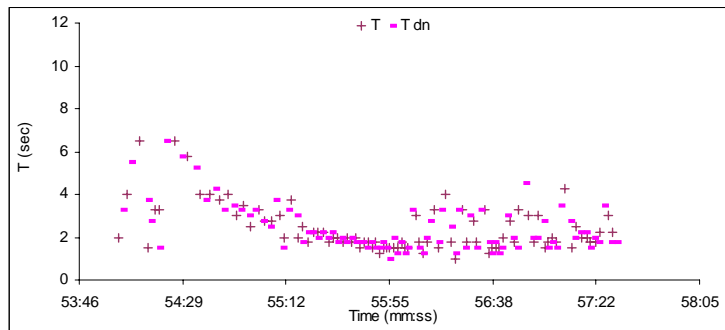
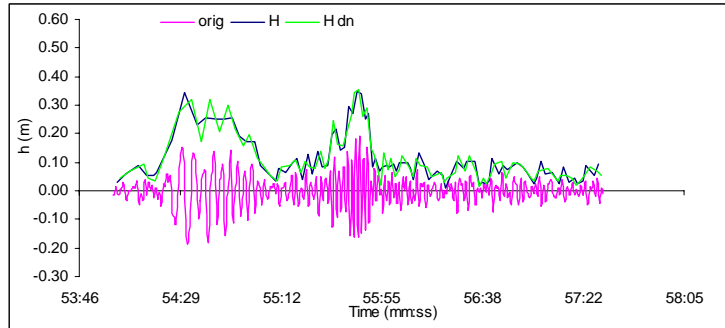
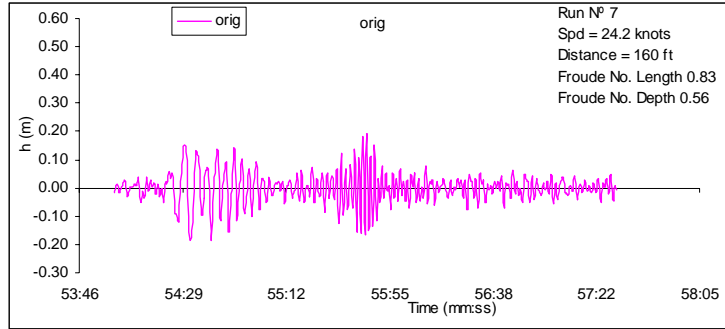


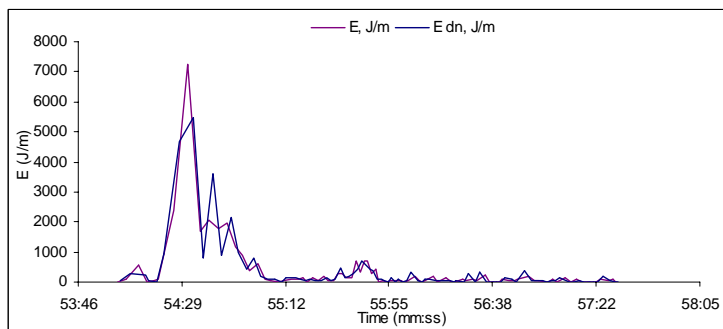
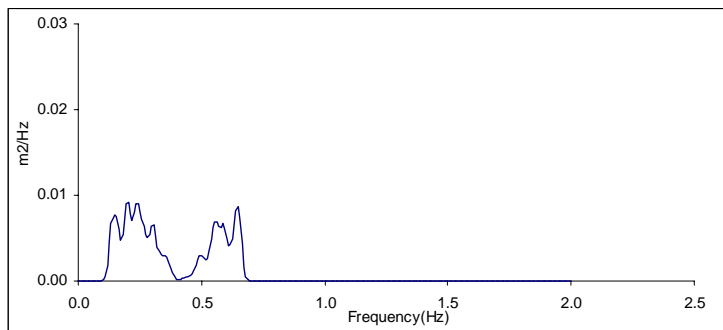
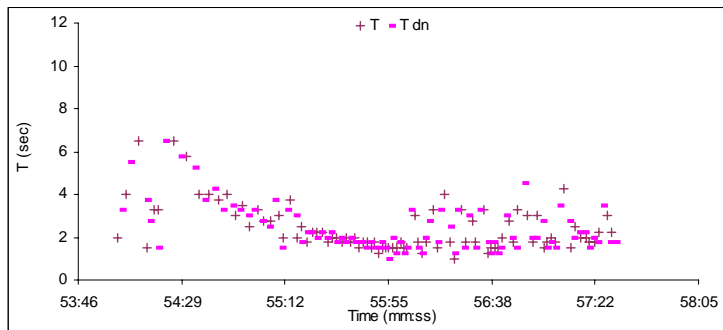
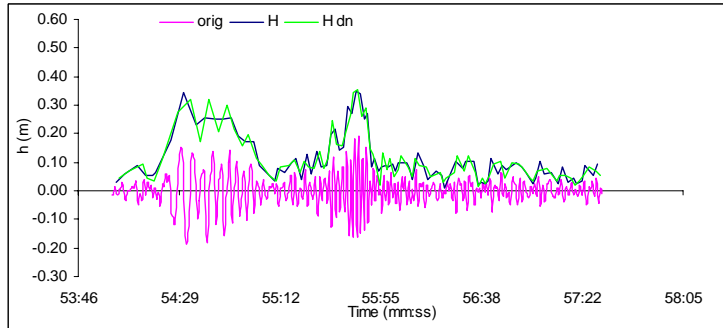
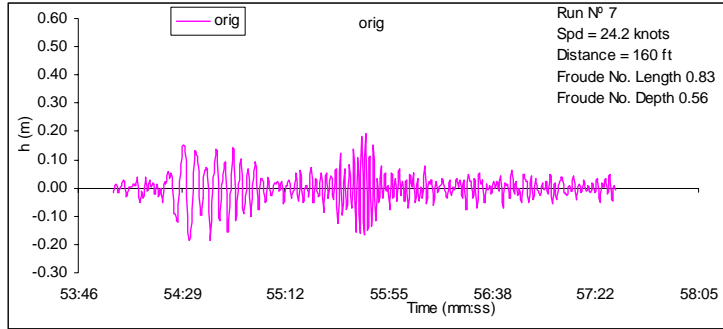


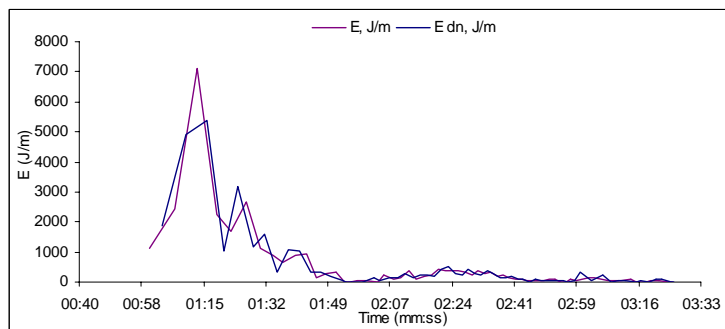
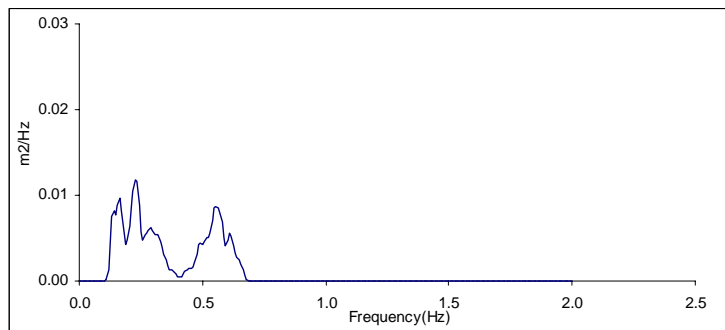
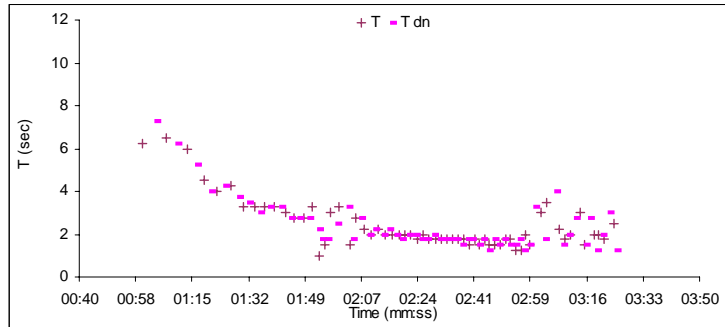
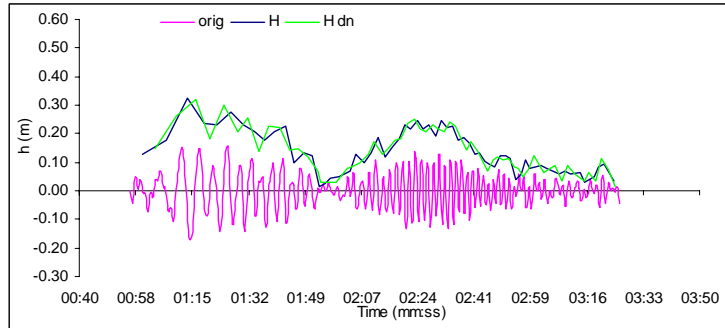
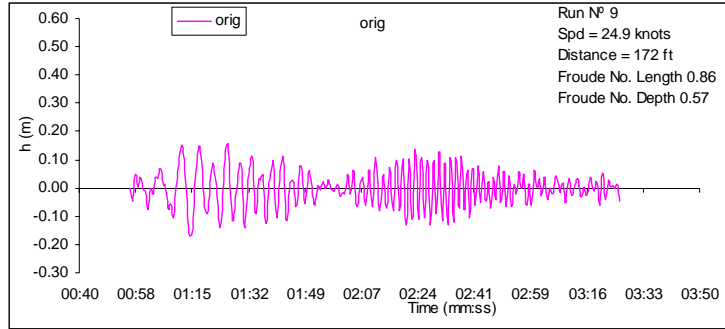


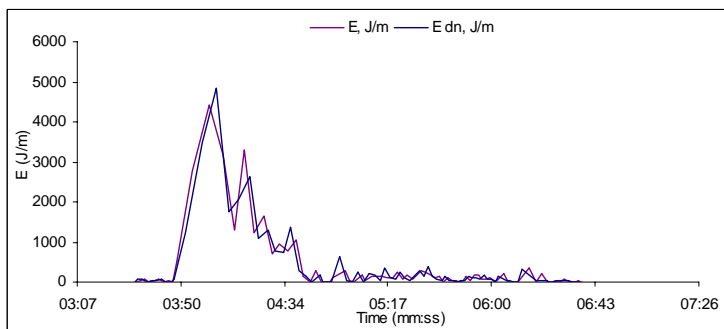
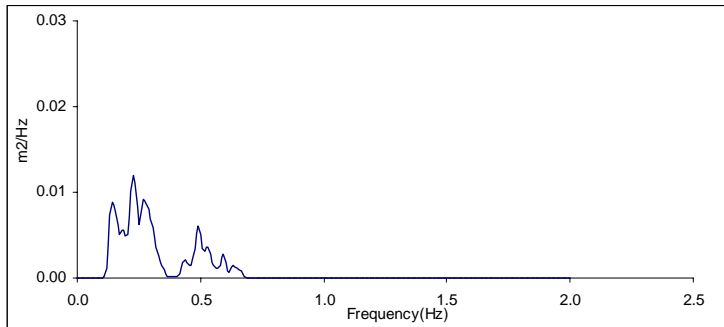
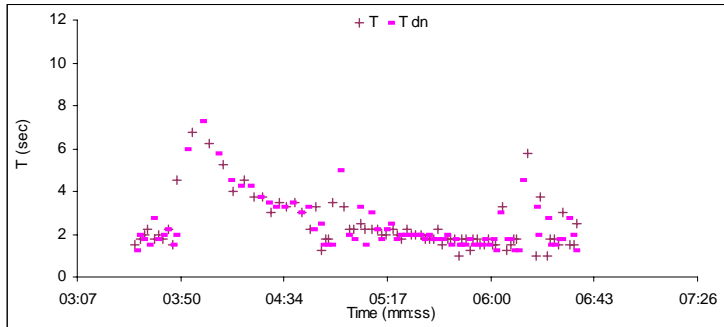
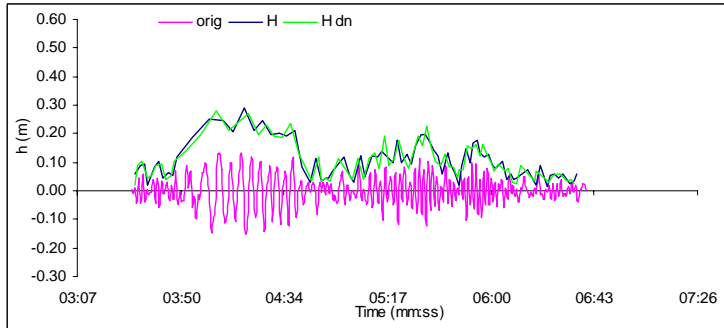
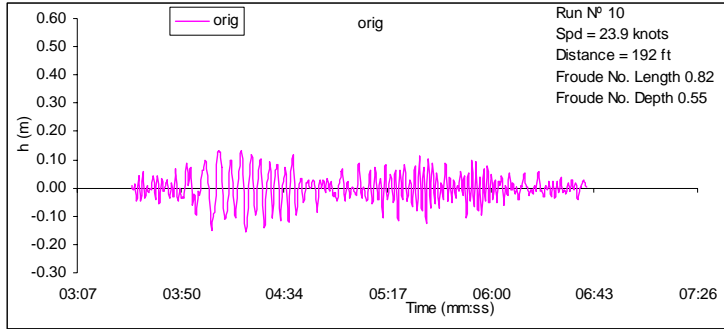


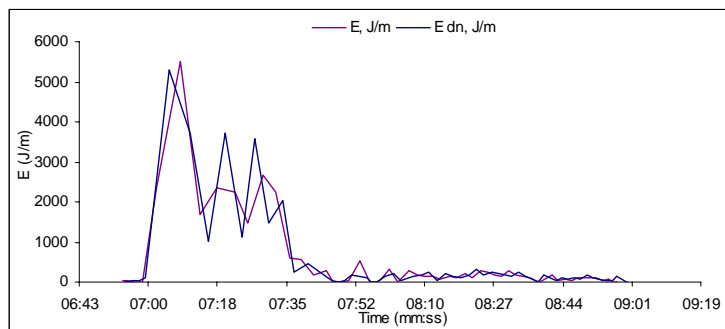
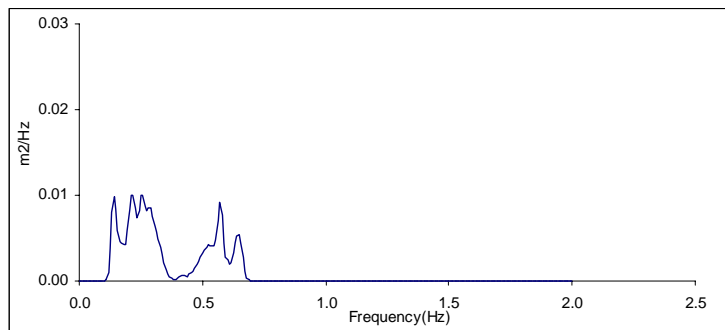
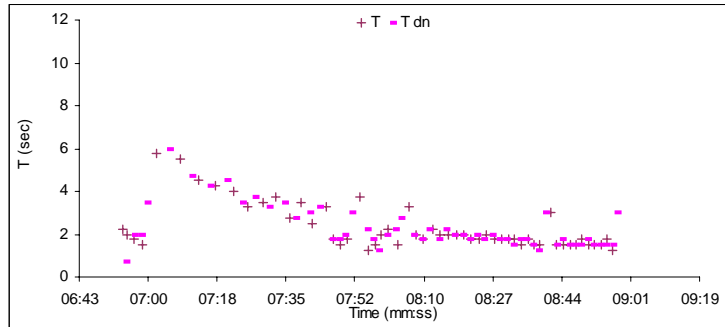
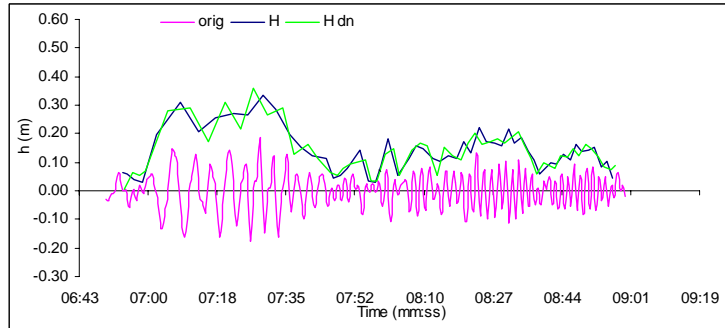
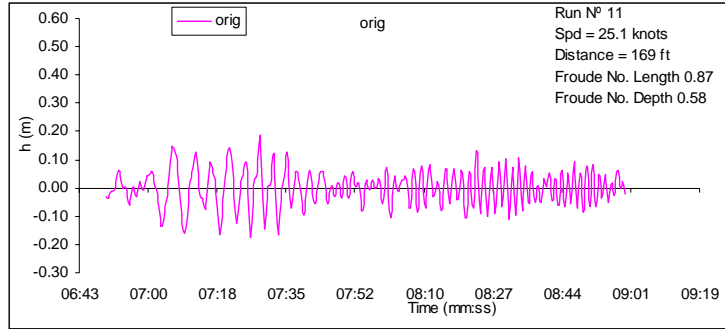


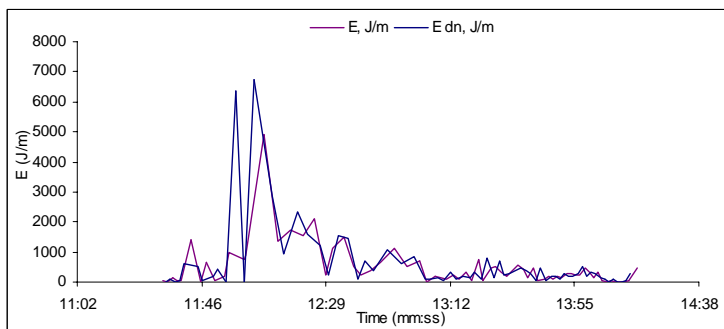
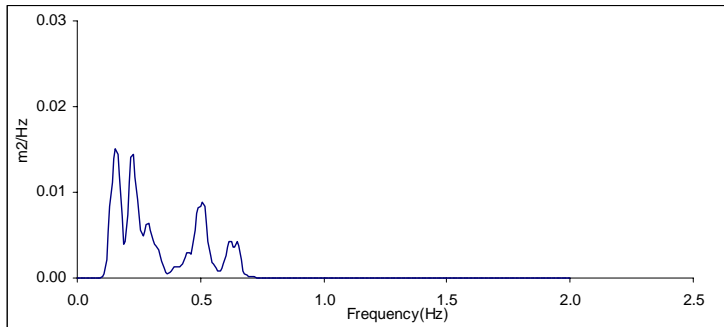
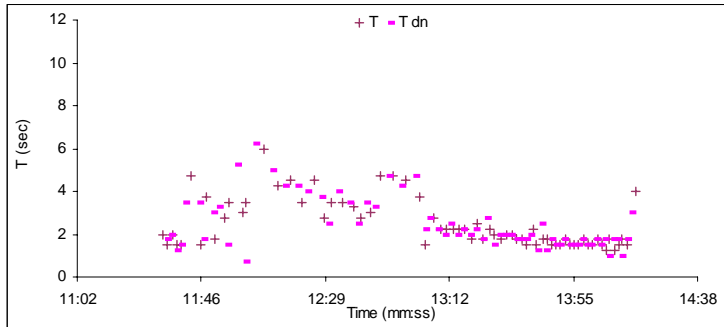
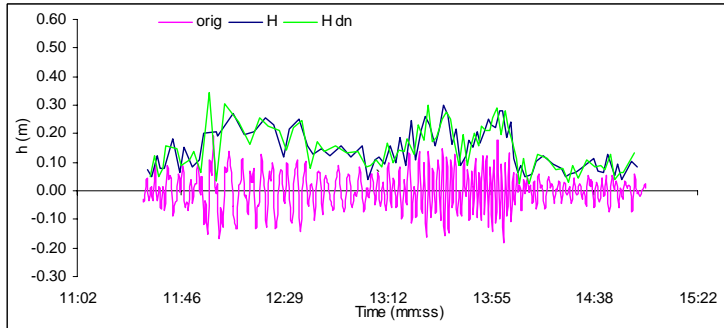
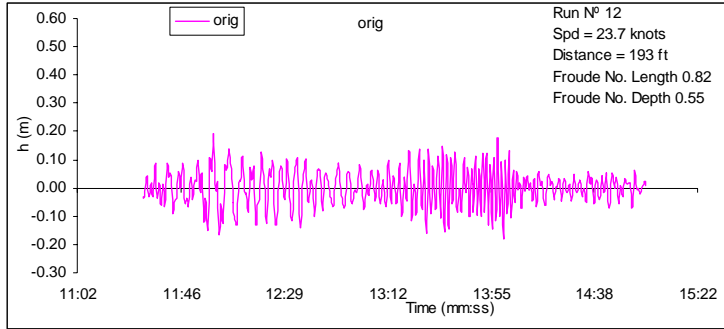


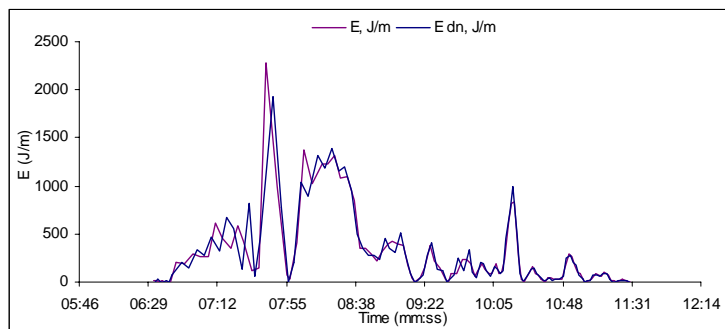
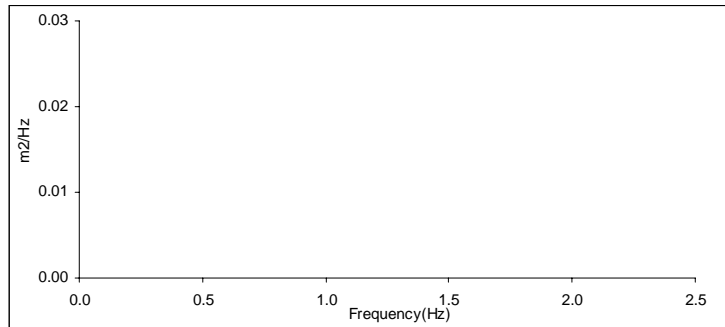
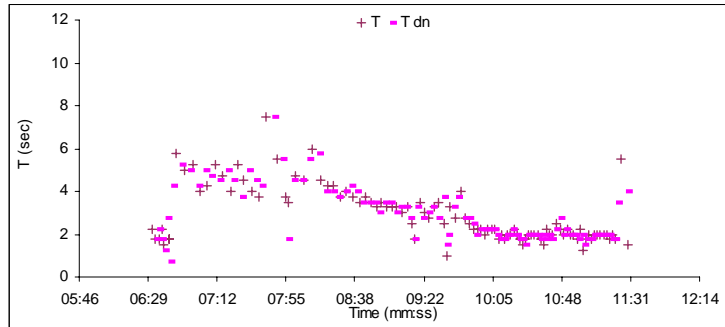
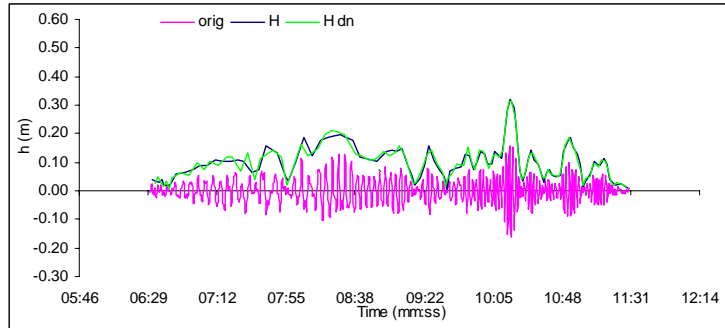
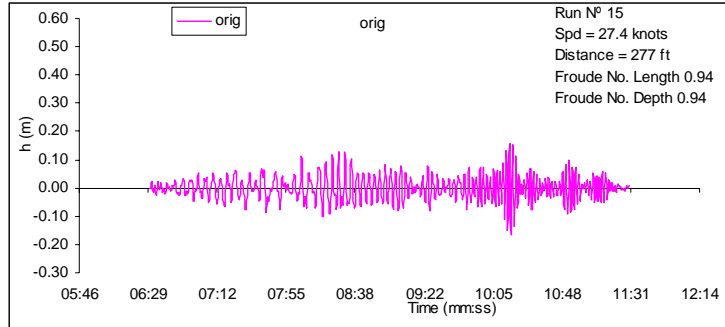


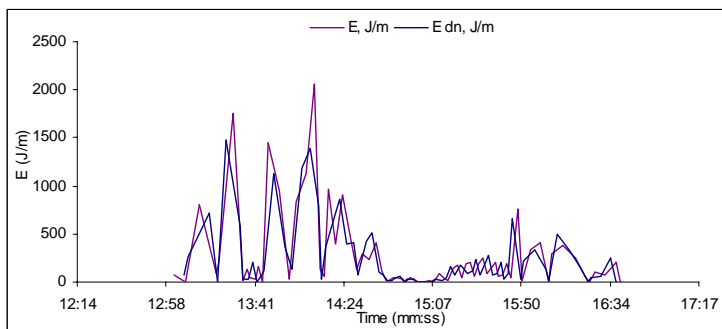
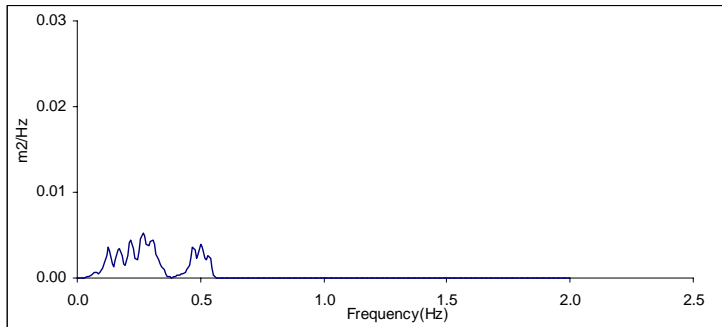
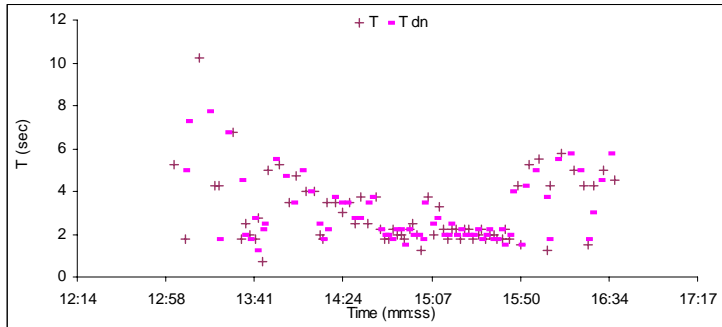
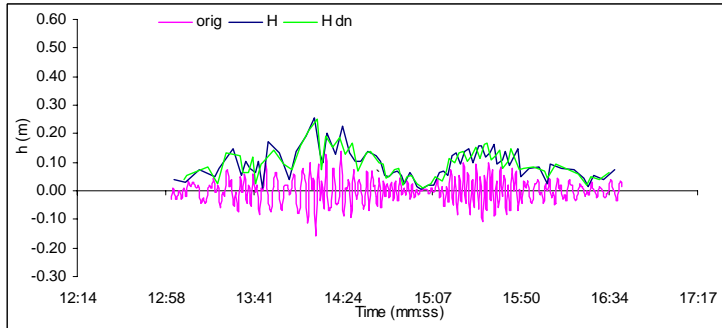
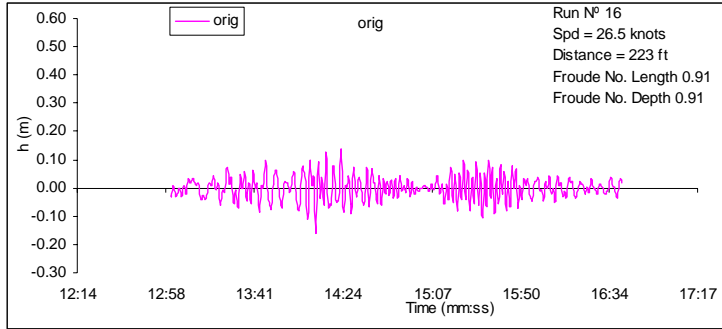


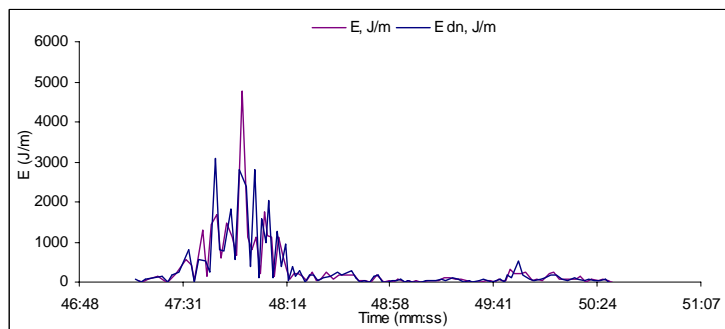
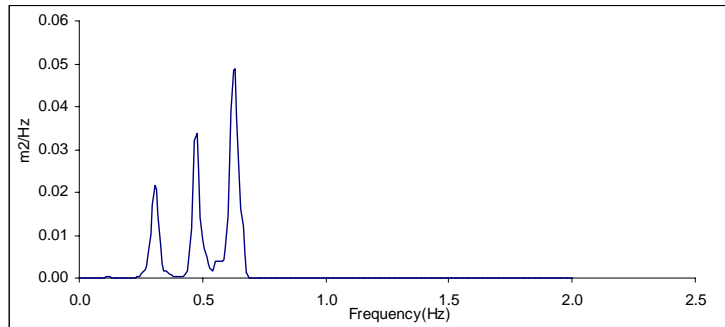
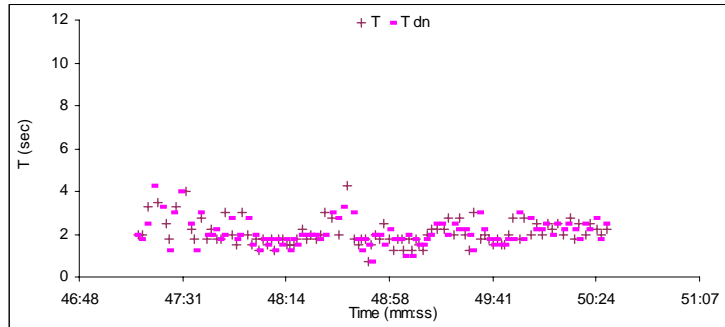
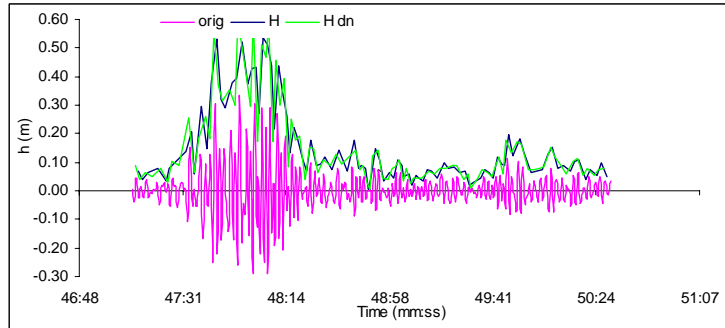
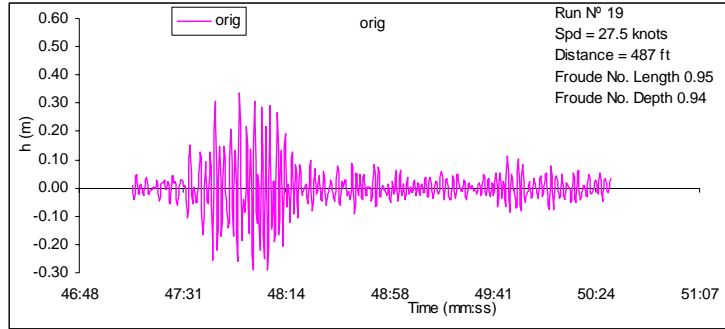


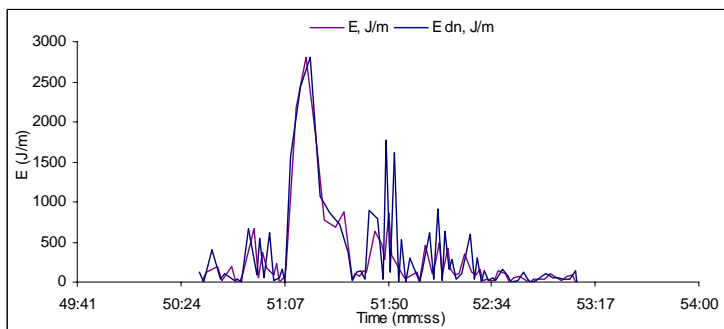
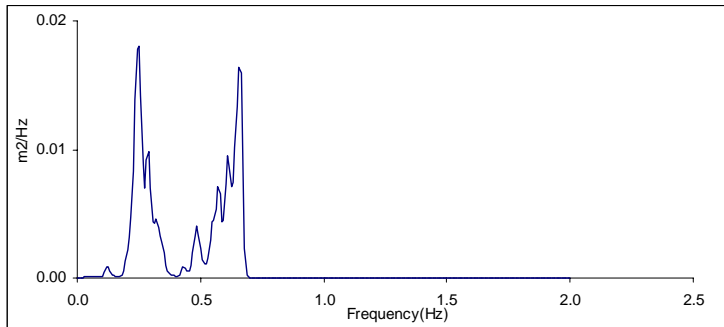
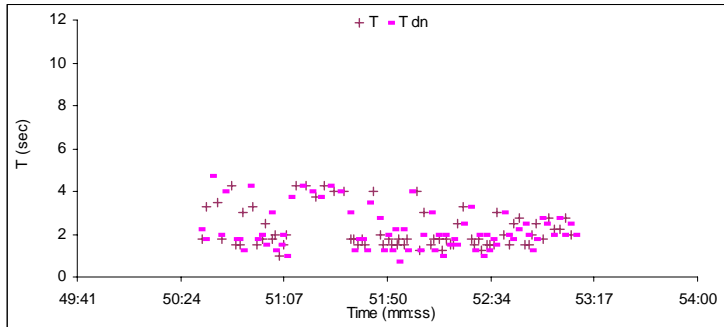
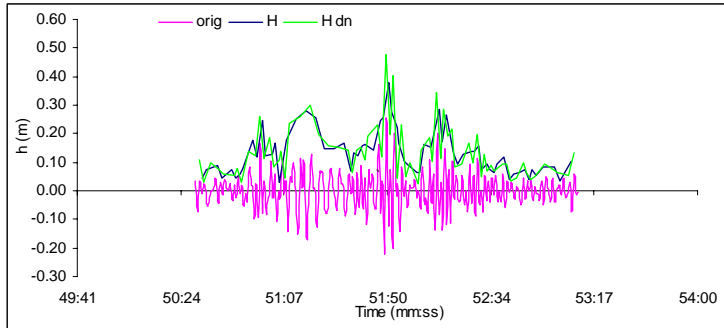
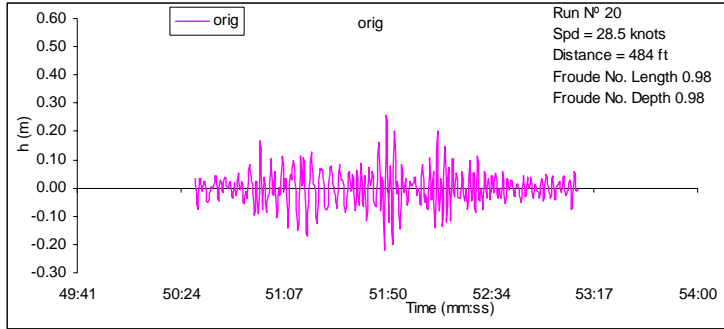


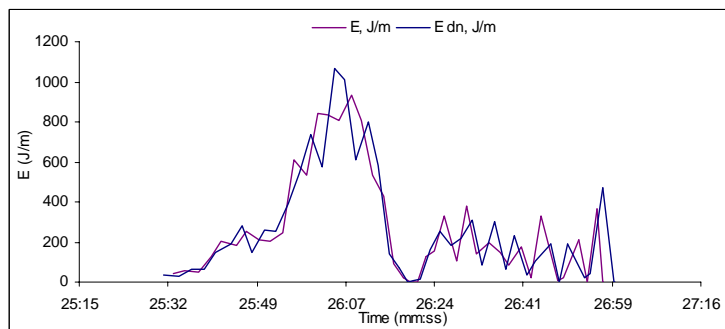
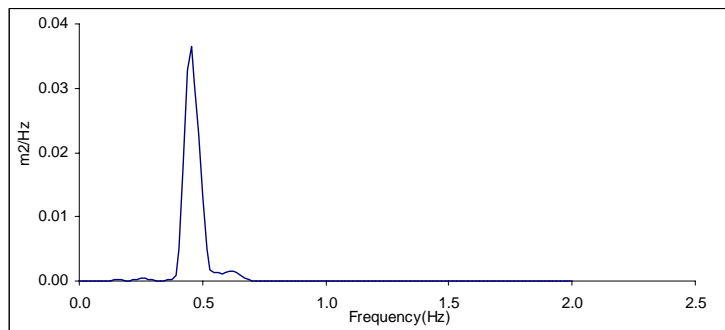
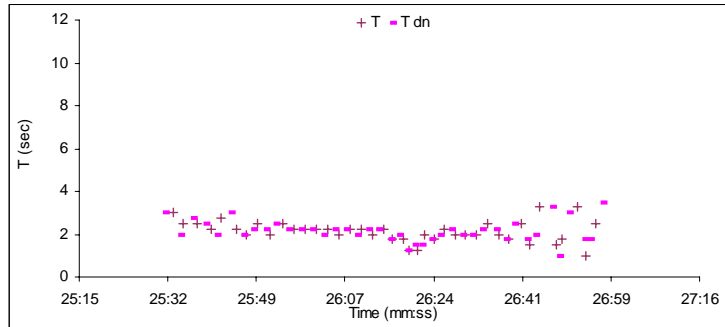
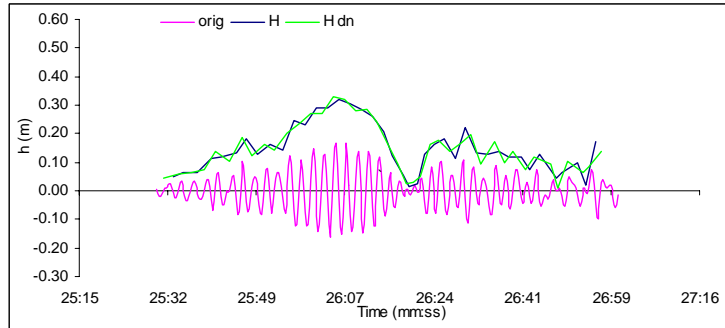
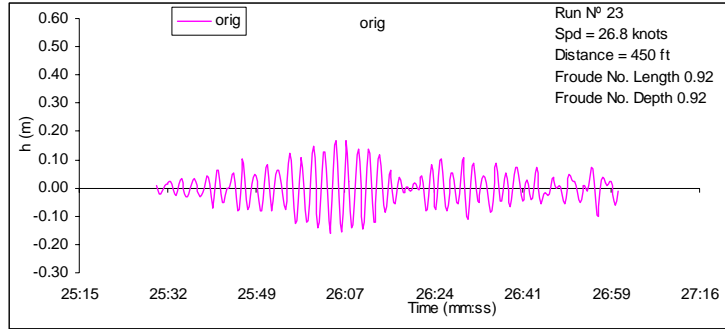


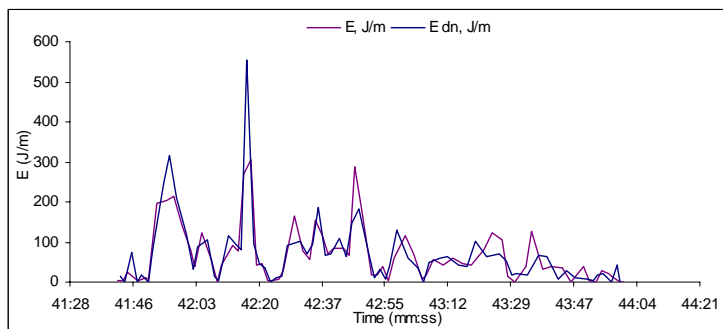
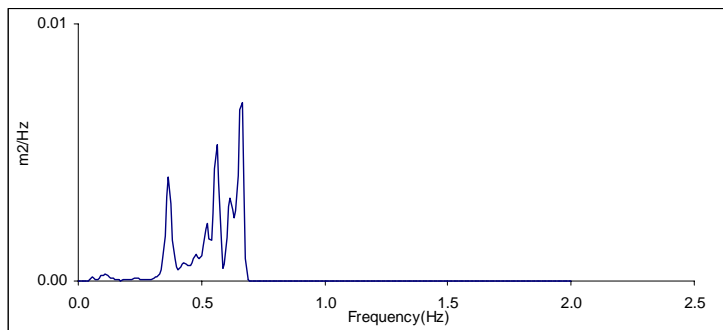
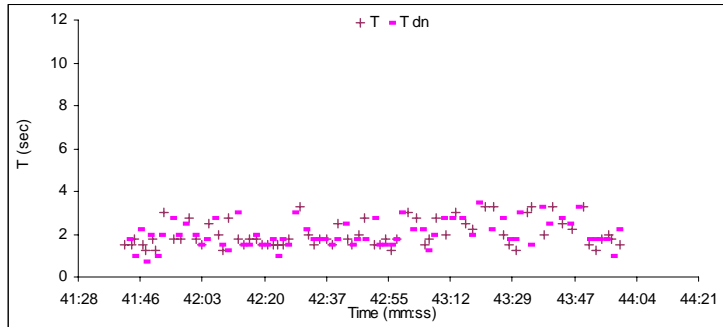
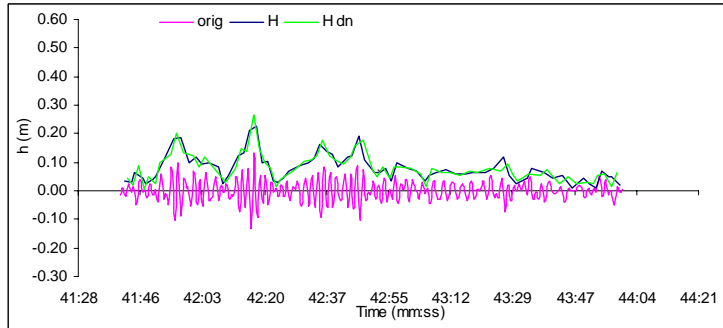
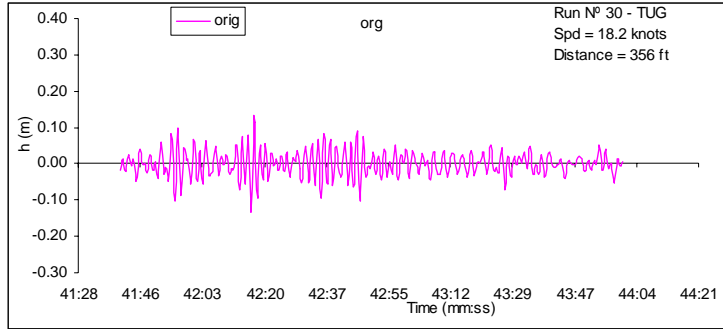


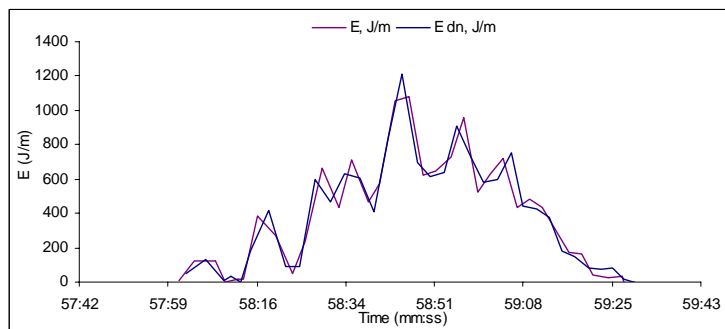
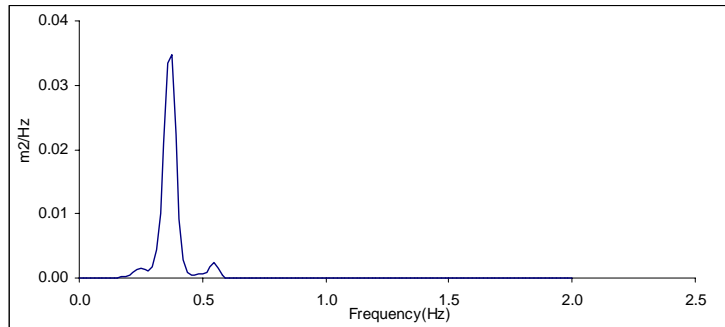
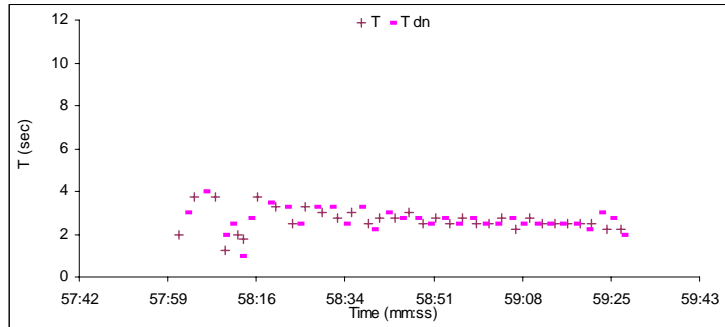
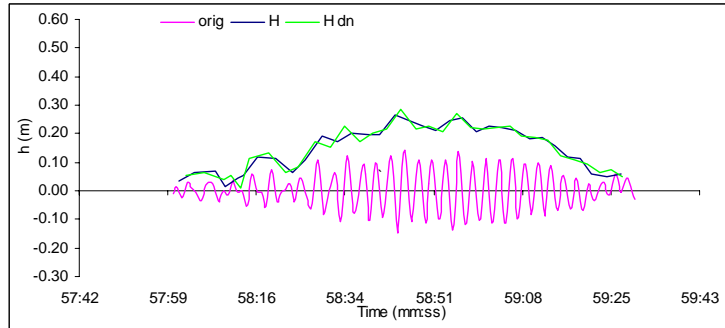
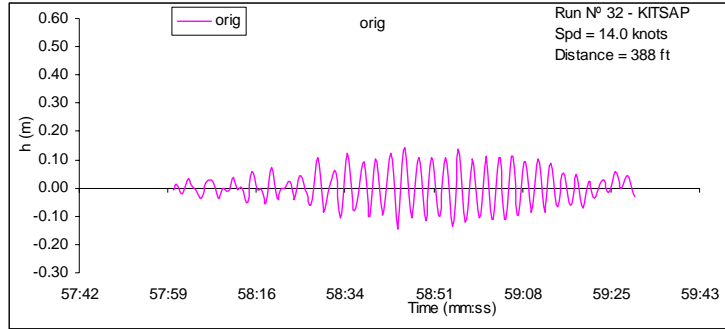


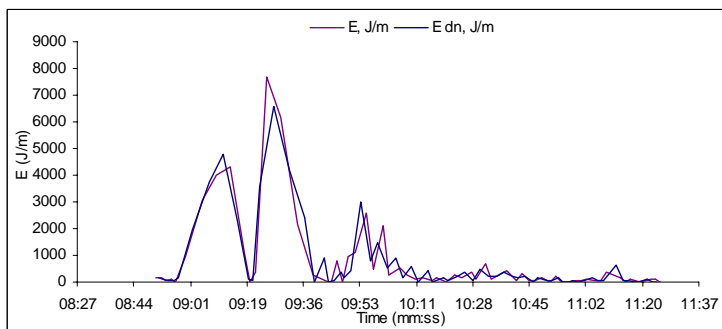
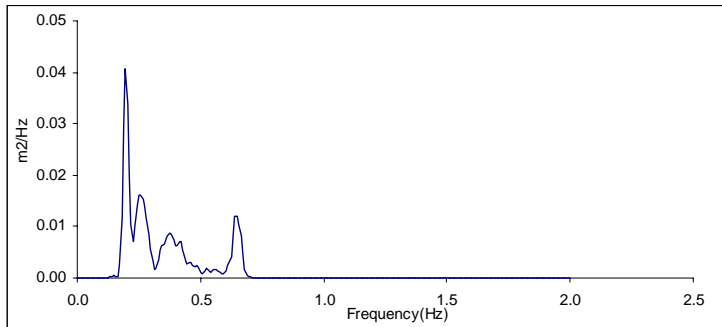
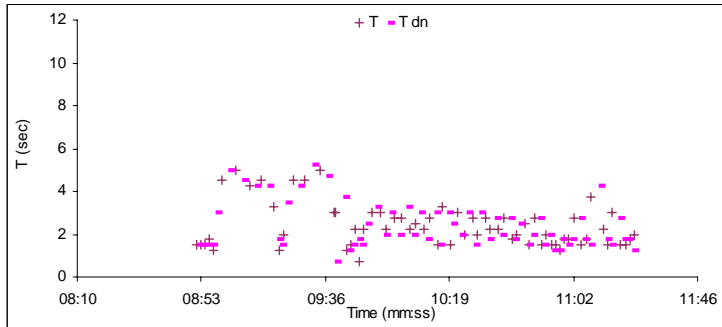
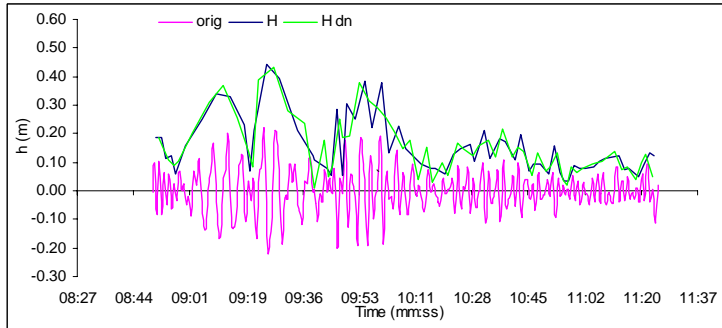
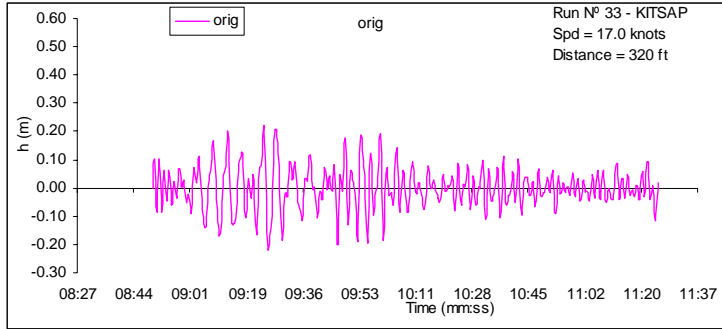


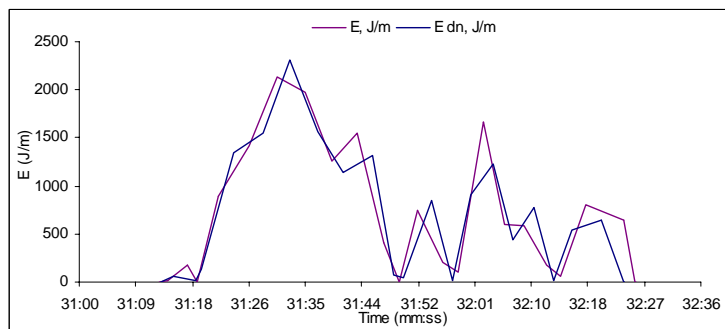
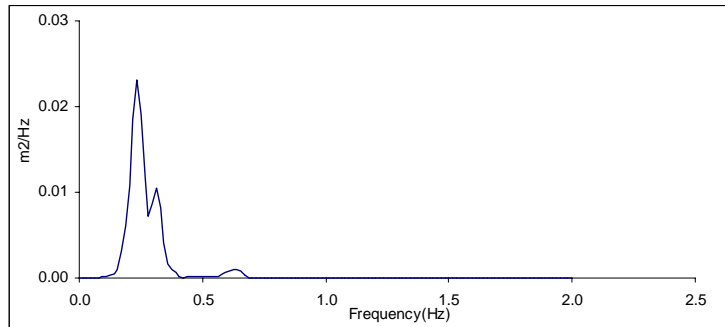
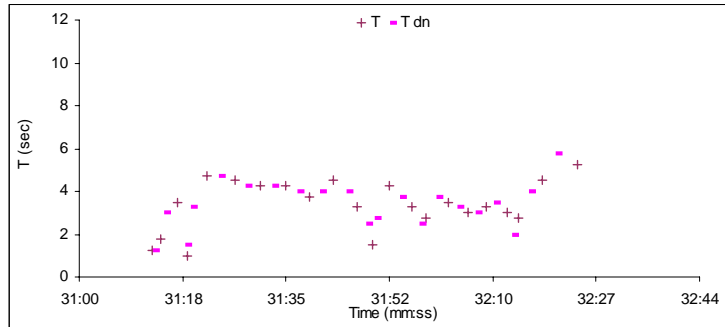
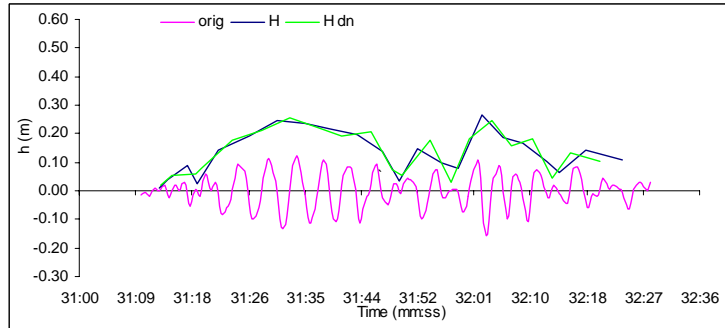
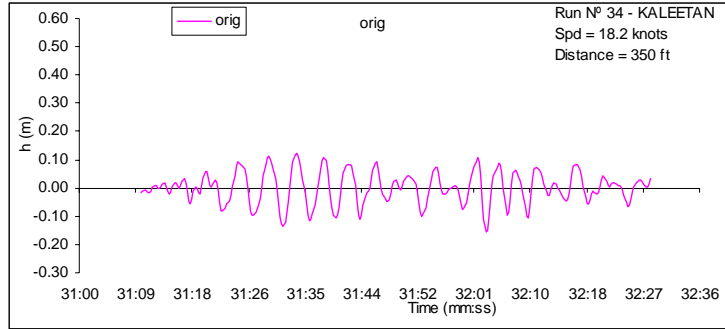


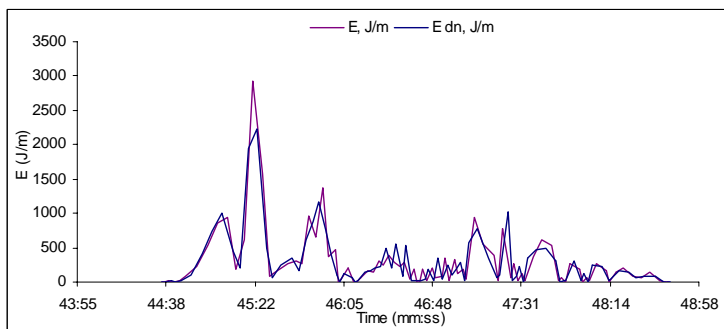
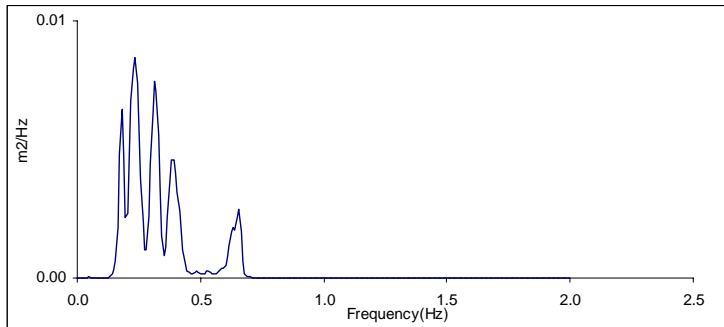
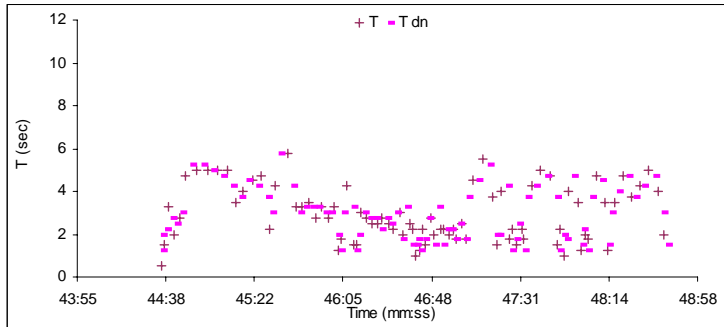
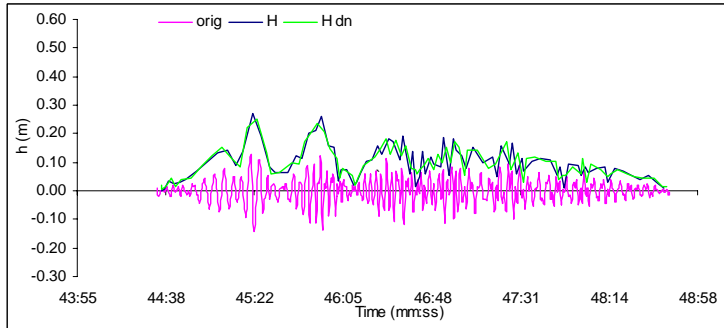
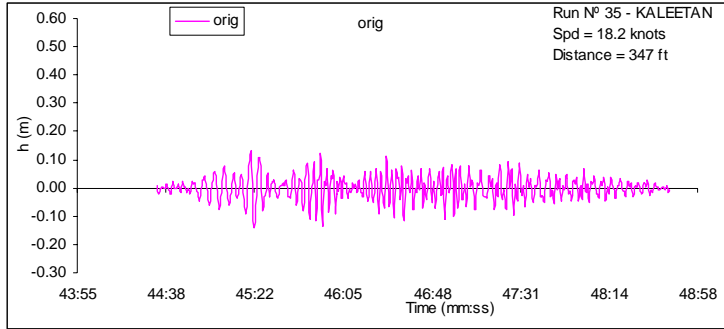


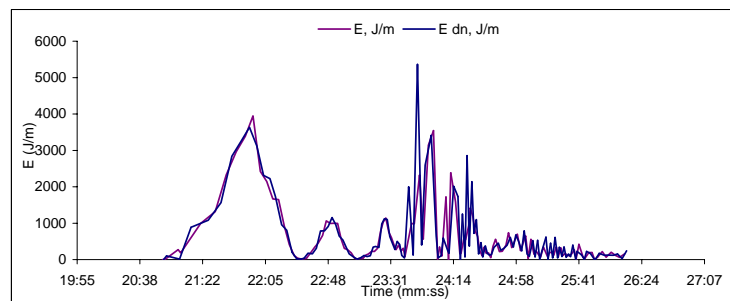
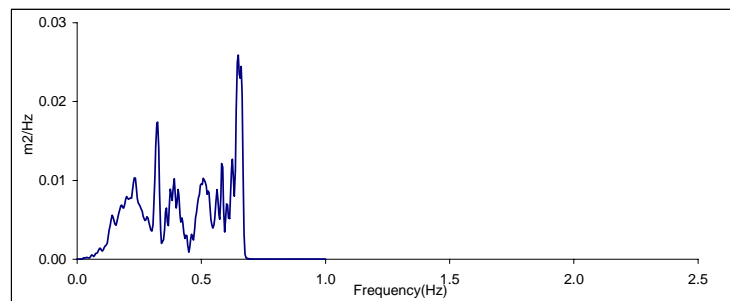
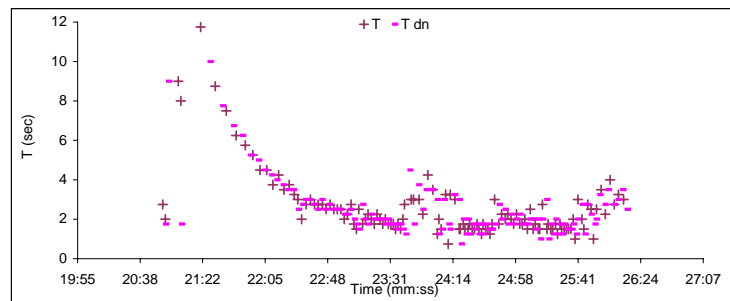
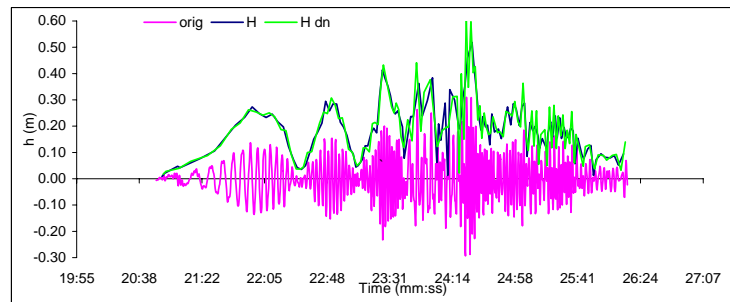
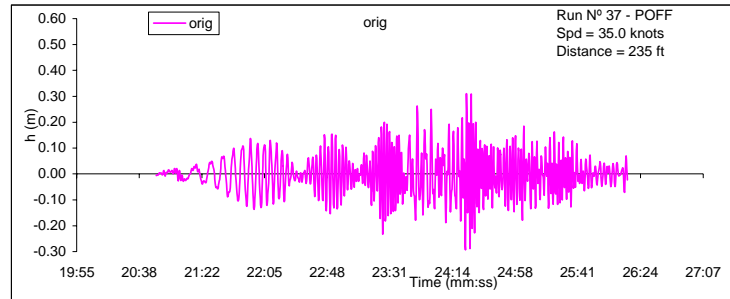












APPENDIX C-f

Wake Trial Time Series *M/V Condor Express*

M/V Condor Express

The M/V Condor Express is a hydrofoil-supported catamaran designed by Teknikraft Design Ltd., NZ and built by All American Marine, Inc of Bellingham, WA for Condor Cruises of Santa Barbara, CA.

Vessel Specifications*	
Length overall (m)	21.9
Breadth overall (m)	7.8
Draft (m)	0.9
Displacement (light) (t)	38.5
Displacement (laden) (t)	59.1
Passenger capacity	149
Crew	3
Launch date	Feb 16, 2002
Hull type	aluminum
Propulsion	Hamilton Water Jet - HJ362
Maximum Speed (knots)	35
Cruising Speed (knots)	28
Engines	4 - Detroit diesel Series 60 – 740 HP each

*Source: http://www.allamericanmarine.com/cats/72_condorexpress.html#

Wake trials were conducted with Condor Express by Fox & Associates on 22 February 2002 in Bellingham Bay (Figure C-x). Wave heights and periods were measured using a submerged pressure sensor recording pressure internally at 4Hz. The instrument package is anchored to the bottom and suspended from a buoy that is held 6 to 10 ft below the water surface by a taut line to the anchor. The taut line mooring arrangement is illustrated in Figure C-x.

Fox & Associates adjusted the time series to a distance of 300 m for comparison with other vessels. The original data were provided to Pacific International Engineering for analysis in this study. The data were used to calibrate the LSV model as described in Section 5. The time series analysis of the Condor Express wake trial measurements is presented below.

