SandyDuck'97 Nearshore Field Experiment Data Archive

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Award Numbers: N0001404MP20016 (US Army Corps of Engineers)
http://frf.usace.army.mil/SandyDuck/SandyDuck.stm

LONG-TERM GOALS

The long-term goal of this effort is to compile and distribute data collected during the SandyDuck'97 nearshore field experiment so that these data may be accessible by coastal researchers worldwide.

Figure 1. Instruments being deployed during SandyDuck

OBJECTIVES

Conducted in the fall of 1997, SandyDuck '97 was an intense, large-scale, investigation of surf zone winds, waves, currents, sediment transport, and morphology within a 1 x 0.5 km region at the U.S. Army Corps of Engineers Field Research Facility (FRF) in Duck, North Carolina. SandyDuck and its predecessor DUCK94 (1994), were sponsored by the Office of Naval Research, the US Army Corps of Engineers, and the US Geological Survey. SandyDuck '97 experiment included 30 investigations of varying complexity, using a variety of instruments (Table 1, Figure 2). While the collected data were initially of interest to the participating investigators, they are also useful to a wide range of government, academic, and private researchers. By agreement it was resolved that experimenters' data would become publicly available three years after the experiment. The goal of this work was to compile the most important SandyDuck '97 geophysical nearshore process data into a single coherent data set, and to make the data publicly available via the web for broad usage by those interested in physical processes in the littoral zone. The SandyDuck '97 data set will be added to the DUCK94 data (http://dksrv.usace.army.mil/jg/dk94dir), and the 1990 DELILAH experiment data (http://dksrv.usace.army.mil/jg/del90dir).

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 SEP 2004		**00-00-2004 to 00-00-2004**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
SandyDuck-97 Nearshore Field Experiment Data Archive	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **US Army Engineer Research and Development Center,,Coastal and Hydraulics Laboratory Field Research Facility,,1261 Duck Road,,Kitty Hawk,,NC,27949**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**6**	

SandyDuck Experiments			Wave Shoaling	Nearshore Circulation	Boundary Layers	Swash Processes	Small Scale Sediments	Meso/Macro Morphology	Water Properties
No.	Investigators	Experiment Title							
1*	**Beach, Holman, Sternberg, Ogston, Conley**	**Fluid-sediment interactions in the surf zone**		**X**	**X**		**X**		
2	**Drake, Snyder**	**Side-scan sonar studies of nearshore morphology in the vicinity of Duck, NC**						**X**	
3	**Dugan**	**Nearshore measurements for long-range remote sensing**		**X**				**X**	
4	**Edson**	**Application of a marine surface layer model to the Coastal Environment**			**X**				
5*	**Elgar , Herbers, O'Reilly, Guza**	**Surf zone waves currents and morphology**	**X**	**X**		**X**		**X**	
6*	Friedrichs, Brubaker, Wright, Vincent	Cross-shoreface suspended sediment: a response to the intersection of nearshore and shelf processes		X	X		X		
7	Haines, Gelfenbaum, Wilson	Vertical structure, bedforms, turbulence		X	X		X		
8*	**Hanes,Vincent**	**Near bed intermittent suspension**		**X**			**X**		
9*	**Hay, Bowen, Doering, Zedel**	**Nearshore sediment dynamics: suspension, bedforms, and bubbles**		**X**	**X**		**X**		**X**
10	**Heitmeyer**	**Surf-noise experiment**							**X**
11	**Herbers, O'Reilly, Guza**	**Wave propagation across the continental shelf**	**X**						
12	**Holland, Sallenger**	**Swash zone morphology**				**X**			
13	**Holman**	**Large scale morphology**						**X**	
14*	Howd, Beavers	Geologic signature of storm events on the inner continental shelf and outer surf zone						X	
15*	**Howd, Hathaway**	**Shoreface processes and bed response**	**X**	**X**				**X**	
16	Jensen	Evolution of wave spectra in shallow water	X						
17	Jol	Ground penetrating radar of the beach						X	
18	**Lippmann**	**Observations of nearshore wave breaking, whitecapping, and large scale sand bar morphology**	**X**		**X**				
19*	List	Regional shoreline change						X	
20*	Long	Wind wave frequency-direction spectral measurements	X						
21*	Miller, Resio	Sediment transport rates during storms		X	X		X		
22	Sallenger	Coastal applications of scanning airborne laser (LIDAR)						X	
23*	**Smith**	**Observations of waves and currents near the surf zone**	**X**	**X**					
24	**Su, Teague**	**Coastal breaking wave and bubble measurements**							**X**
25	**Svendsen, Grosskopf**	**Models of nearshore circulation**	**X**	**X**					
26	**Thornton, Stanton**	**Nearshore wave & sediment processes**	**X**	**X**	**X**		**X**		
27	**Trizna, Kirby**	**Experimental tests of Boussinesq wave models in the near surf zone**	**X**	**X**					
28	**Trizna**	**Marine radar remote sensing of bar & rip morphology**						**X**	
29	**Trowbridge**	**Measurement of bottom stress in the wind- and wave-forced nearshore environment**	**X**	**X**	**X**				
30	Wu, Shih, Kobayashi	Nearshore water level profiles during storms	X						X

Table 1. SandyDuck Experiments. ONR projects (partial or fully funded) are in bold. Experiment numbers with an asterisk have sent data for the server/archive.

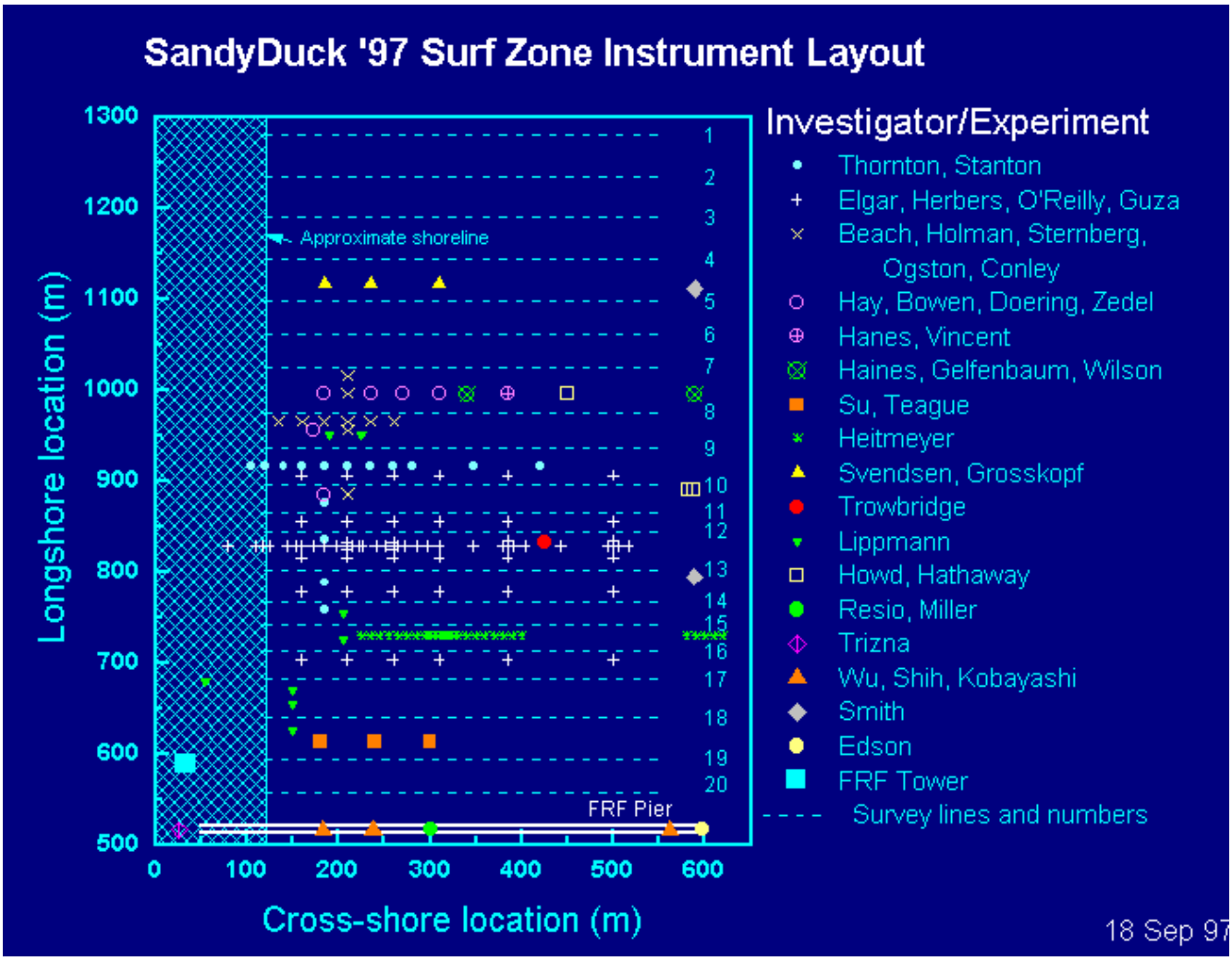

Figure 2. Instrumentation layout for 18 experiments during SandyDuck '97. Twenty cross-shore survey locations are indicated with dashed lines.

APPROACH

The SandyDuck data include a wide variety of data types stored by the individual investigators in many different formats on a network of widely distributed computers and media. Because of this and to make the data widely available, we adopted and adapted a UNIX/web based data management system originally developed for the Joint Global Ocean Flux Study *(JGOFS)*. It has several features that made it desirable for this application.

Even though the JGOFS server was designed for serving distributed data sets it was decided for practical purposes, to use a single server for the data. This alleviated requiring multiple investigators to maintain web servers for access to their data, and insured that the data remain online, even as interest by the collecting investigators wanes. The original data were translated into a common format, columnar ASCII files which are MATLAB and spreadsheet compatible, making them easy to use by all users. Times were adjusted to Eastern Standard Time and units were converted to MKS. Identical

formats have been used for similar data types collected by different investigators (mean current statistics, wave height measurements, etc.). Several data sets are also provided in MATLAB "mat" files for direct loading onto any platform running MATLAB.

Some data were not compatible with the data server and are handled by other web tools such as FTP and HTML pages. In particular the "raw" binary time series sampled from single-channel sensors (current component, pressure, optical backscatterance, sonic altimetry, temperature, wind speed, wind direction, etc.), could not be efficiently delivered with a columnar ASCII format but are available with FTP in organized directory structures with associated metadata. Digital image data (camera snapshots, time-averaged images, movie loops of various processes) are delivered with static web pages and FTP

WORK COMPLETED

The SandyDuck '97 data can be found at http://dksrv.usace.army.mil/jg/sd97dir (Figure 3). This is the web page for the data server, and has links to the other Duck data sets as well as to the experiment home pages that contain summaries and documentation on each experiment. Data from the DELILAH 1990 and DUCK94 nearshore experiments were added to the data server in FY01, complete with a data report (PDF and HTML formats), statistics, binary time series, and extensive documentation on data quality and analysis methods (metadata). There are presently 74 GB of experiment data on the server with about 120 GB of raw binary timeseries which will be added when a larger server is put online in November 2004. The entire archive was also duplicated on CD and DVD for offsite storage.

The SandyDuck Archive includes the most important and generally useful data sets, those that monitored surf zone dynamics, circulation, and beach response. However, delays in receiving data from some SandyDuck PI's resulted in their data not being included (see table). Although ONR funding for this activity ends in FY04 the US Army Corps of Engineer's Field Research Facility will continue to maintain the server and add data sets should they ever be received.

RESULTS

The data server has proven to be an efficient means to deliver SandyDuck '97 processed data, raw data, and metadata. Over 45 GB of data has been transferred in the past two years. Monthly web statistics are now available online (see http://dksrv.usace.army.mil/cgi-bin/webstats.pl). Feedback on the server=s data accessibility and presentation are requested and will be used in future refinements.

IMPACT/APPLICATIONS

By making SandyDuck data available to researchers worldwide it will hopefully achieve maximum utilization and permanence. In addition to making these data sets available to other researchers, the archive also provides high quality data for students working on Masters or PhD degrees. Based on the amount and success of research accomplished following earlier FRF experiments, the more comprehensive SandyDuck data will have wide use and great potential for advancing nearshore science.

RELATED PROJECTS

We plan to continue this effort with support of the FRF Measurements Program with the objectives of adopting common formates (NetCDF) and linking this archive to the potentially more powerful Distributed Ocean Data System (DODS) for improved availability and distribution.

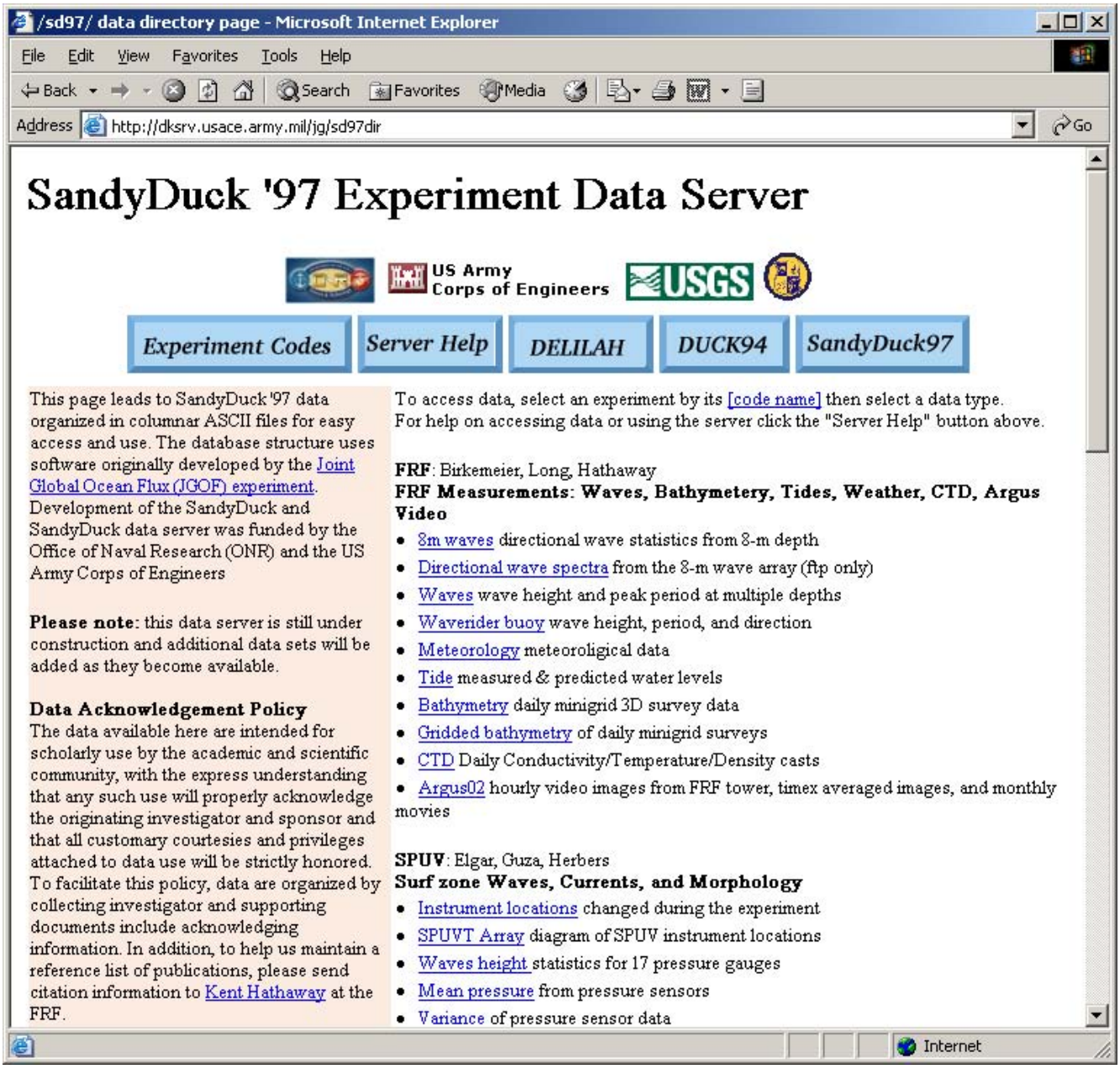

Figure 2. SandyDuck '97 data server home page showing funding agencies and links to a variety of data sets from the most significant SandyDuck '97 experiments. The page includes links to DELILAH, DUCK94, and SandyDuck '97 home pages.