

SandyDuck'97 Nearshore Field Experiment Data Archive

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<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.

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>).



Figure 1. Instruments being deployed during SandyDuck

Report Documentation Page

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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.

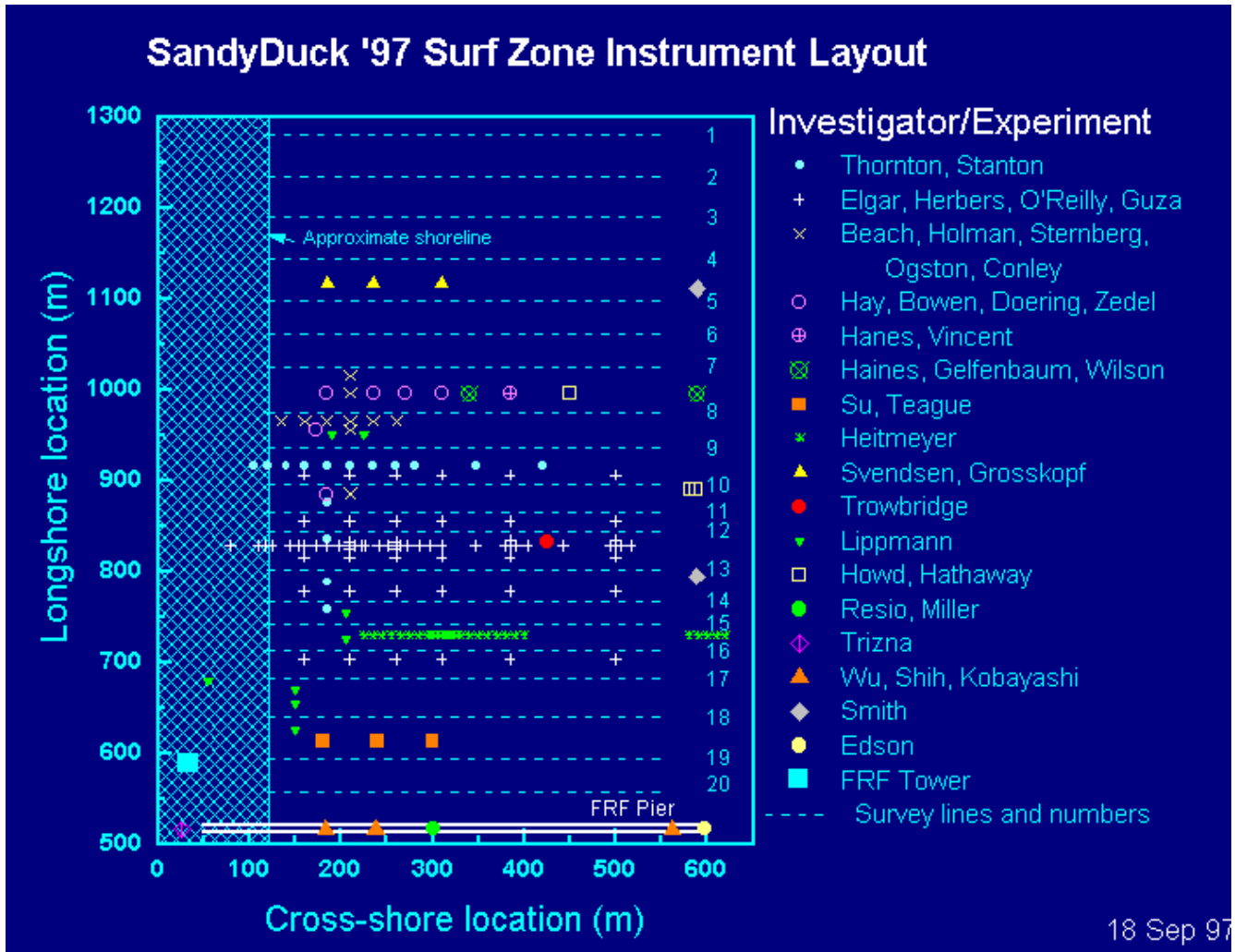


Figure 2. Instrumentation layout for 18 experiments during SandyDuck '97. Twenty cross-shore survey locations are indicated with dashed lines.

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 formats (NetCDF) and linking this archive to the potentially more powerful Distributed Ocean Data System (DODS) for improved availability and distribution.

The screenshot shows a Microsoft Internet Explorer browser window displaying the SandyDuck '97 Experiment Data Server. The address bar shows the URL <http://dksrv.usace.army.mil/jg/sd97dir>. The page title is "SandyDuck '97 Experiment Data Server".

At the top of the page, there are logos for the US Army Corps of Engineers and USGS. Below the logos are five navigation buttons: "Experiment Codes", "Server Help", "DELILAH", "DUCK94", and "SandyDuck97".

The main content area is divided into two columns. The left column contains introductory text and a "Please note" section. The right column contains a list of data sets and their descriptions.

Left Column Text:

This page leads to SandyDuck '97 data organized in columnar ASCII files for easy access and use. The database structure uses software originally developed by the [Joint Global Ocean Flux \(JGOF\) experiment](#). Development of the SandyDuck and SandyDuck data server was funded by the Office of Naval Research (ONR) and the US Army Corps of Engineers

Please note: this data server is still under construction and additional data sets will be added as they become available.

Data Acknowledgement Policy
The data available here are intended for scholarly use by the academic and scientific community, with the express understanding that any such use will properly acknowledge the originating investigator and sponsor and that all customary courtesies and privileges attached to data use will be strictly honored. To facilitate this policy, data are organized by collecting investigator and supporting documents include acknowledging information. In addition, to help us maintain a reference list of publications, please send citation information to [Kent Hathaway](#) at the FRF.

Right Column Text:

To access data, select an experiment by its [\[code name\]](#) then select a data type. For help on accessing data or using the server click the "Server Help" button above.

FRF: Birkemeier, Long, Hathaway
FRF Measurements: Waves, Bathymetry, Tides, Weather, CTD, Argus Video

- [8m waves](#) directional wave statistics from 8-m depth
- [Directional wave spectra](#) from the 8-m wave array (ftp only)
- [Waves](#) wave height and peak period at multiple depths
- [Waverider buoy](#) wave height, period, and direction
- [Meteorology](#) meteorological data
- [Tide](#) measured & predicted water levels
- [Bathymetry](#) daily minigrd 3D survey data
- [Gridded bathymetry](#) of daily minigrd surveys
- [CTD](#) Daily Conductivity/Temperature/Density casts
- [Argus02](#) hourly video images from FRF tower, timex averaged images, and monthly movies

SPUV: Elgar, Guza, Herbers
Surf zone Waves, Currents, and Morphology

- [Instrument locations](#) changed during the experiment
- [SPUVT Array](#) diagram of SPUV instrument locations
- [Waves height](#) statistics for 17 pressure gauges
- [Mean pressure](#) from pressure sensors
- [Variance](#) of pressure sensor data

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.