



US Army Corps  
of Engineers

# On-Line Resources of the Field Research Facility

by William A. Birkemeier and Clifford F. Baron





U.S. Army Corps. of Engineers  
Waterways Experiment Station (WES) Coastal & Hydraulics Laboratory (CHL)  
**Field Research Facility**



Welcome to the Field Research Facility (FRF) located on the Atlantic Ocean near the town of Duck, North Carolina. Open since 1977, the FRF is internationally recognized for its coastal studies. Instruments at the facility constantly record the changing waves, winds, tides, and currents. Central to the facility is a 560-m-long (1840 ft) pier and unique specialized equipment like the CRAB, LARC, and SIS.

Online visitors can take a tour of the facility, meet the staff, learn about our research, access our most recent measurements, take a look from our tower, and download archived data, graphs, and reports.

Looking for a place to conduct a coastal experiment? **FRF use** by other agencies, universities, and private industry is encouraged. Here's how to get here.

**USACE, Field Research Facility, 1261 Duck Road, Kitty Hawk, NC 27949-4472**  
phone: 252/261-3511 fax: 252/261-4432

**Facilities**

- [Buildings and Offices](#)
- [Vehicles](#)
- [Staff](#)
- [On-line Tour](#)
- [Temporary student employment](#)

**Data**

- [Data - Past & Present](#)
- [Storms at the FRF](#)
- [Preliminary Data Summaries](#)  
[ie Monthly Reports](#)
- [Instruments](#)
- [Publications](#)
- [Climatology](#)

**Projects**

- [DELILAH](#)
- [DUCK94](#)
- [SandyDuck97](#)
- [RIB](#)
- [STORM](#)

[email to webmaster:](#)  
Clifford Baron  
U.S. Army Computer Specialist

The findings in this world wide web site are not to be construed as an official Department of the Army position unless so designated by other authorized documents. The contents of this world wide web site are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

*A primary mission of the Coastal and Hydraulics Laboratory's (CHL's) Field Research Facility (FRF) located in Duck, NC, is to collect, analyze, and distribute coastal field measurements. The rich set of collected variables includes long-term measurement of coastal meteorology, tides, currents, waves, sediment transport, morphology, and other processes that affect the coastal environment. Most data date back to 1980, some to 1977. In addition, the FRF has hosted a series of short-term experiments that have generated additional data, techniques, software, and reports. Much of this information, including most data, is available via the web.*

**PURPOSE:** The Coastal Engineering Technical Note herein briefly summarizes FRF information available on the web. Web-savvy readers may want to simply point their browser to <http://www.frf.usace.army.mil> and start exploring; however, the site is extensive, and this document will introduce it. Since links may change, they are not listed. All are easily found from the FRF's homepage, which can be reached from the CHL homepage <http://www.chl.wes.army.mil> or the WES homepage <http://www.wes.army.mil>.

**GENERAL FRF INFORMATION:** Visitors unfamiliar with the FRF will find a wealth of information, including a virtual tour of the facility. Pictures and specifications about the FRF's unique vehicles and equipment are presented, including the following:

- a. The 10-m-tall, three-wheeled Coastal Research Amphibious Buggy (CRAB) used for surveying, instrument deployments, and other surf-zone activities.
- b. Lighter Amphibious Resupply Cargo (LARC) used for hydrosurveying, deep-water deployments, geophysical surveying, and diver support.
- c. Sensor Insertion System (SIS) mounted on the pier and capable of deploying a suite of specialized instruments anywhere along the pier in waves up to storm conditions.
- d. Observation tower and video cameras used to constantly monitor the changing waves and morphology by collecting hourly images from five cameras.
- e. Buildings and facilities including the research pier, computer room, technical library, and conference room.

Additional information is provided concerning use of the FRF, staff members, local hotels and rental agencies, and travel directions from the Norfolk, VA, airport.

**PROJECTS AND EXPERIMENTS:** Integral to the history of the FRF has been involvement in a series of increasingly complex and comprehensive experiments that began in 1978. Each of the recent experiments, DELILAH (1990), DUCK94, and SandyDuck '97, is presented on the web.

- a. DELILAH was the surf-zone part of the SAMSON & DELILAH experiment during the fall of 1990. A surf-zone array consisting of 19 current meters and 18 pressure gauge wave sensors arranged in two cross-shore and two longshore subarrays was deployed. Daily surveys of the region around these arrays were collected with the CRAB to monitor the changing morphology. Video data, sediment samples, and other supplemental data were also collected. DELILAH data are summarized in Technical Report CHL-97-24, published by the U.S. Army Engineer Waterways Experiment Station in September 1997. This report along with all the data is accessible on-line.

- b.* DUCK94 added a sediment-transport component to a DELILAH-like effort and was a pilot to SandyDuck '97. DUCK94 took place in the fall of 1994 and included 29 separate experiments conducted by coastal researchers from 19 universities, agencies, and companies. A more extensive surf-zone array of instruments was deployed including a central cross-shore array that measured waves, currents, temperature, and bottom changes. On-line offerings include descriptions of each experiment, a database of collected data, a summary of experiment conditions, and contact information for the investigators. An enormous amount of data were collected. Although the actual data are not yet on-line, individuals can identify the data they are interested in and contact the appropriate investigator directly.
- c.* SandyDuck '97, the most ambitious of the series, took place during the fall of 1997 and involved the placement of over 400 instruments with an emphasis on sediment transport within the framework of the changing nearshore dynamics. Many new instruments were used for the first time. On-line offerings include experiment summaries, listings of collected data, descriptions of the instruments, sensor layout maps, a gallery of photographs documenting activities, and other information about the experiment. More information will be added as it becomes available from the investigators.

Descriptions of other FRF projects are also described on-line including the FRF's involvement in the RIB (Rapidly Installed Breakwater) and the "Sediment Transport in Storms" experiment.

**COASTAL DATA:** Archived and real-time FRF data are available on-line and presented in several forms including data files, postscript plots, and gif or jpg format graphics. The latter are useful for on-line viewing, while the postscript plots produce high quality graphics when printed on a postscript printer. Descriptions of the type and location of instruments used to collect the data are also provided along with specifications of the data formats so that users who download the data will be able to access it. The different data types are listed below:

- a.* **Instrument Data** - This includes measurements of oceanography (waves, tides, currents) and meteorology (winds, atmospheric pressure, air temperature). These data are organized into monthly "statistics files" by data type. Each line in the file lists the gauge identifier, date, time, and parameters that are appropriate for the gauge type (e.g., significant wave height for a wave gauge and mean value for tide). Parameters are computed based on 2-Hz data collected for 34 min. Monthly plots provide graphic display of these data.
- b.* **Wind-Wave Directional Spectra** - Since 1986, the FRF has operated a high-resolution directional wave array at 8-m water depth. Although the mean information from this instrument is included in the instrument data files described above, the complete frequency-directional spectrum is provided in ASCII files, one per 2-hr 50-min observation. Postscript plots are also available.

- c. **Supplemental Observations** - These are daily visual observations that are not electronically recorded. They include weather information (high and low air temperature, atmospheric pressure, percent cloud cover, rainfall) and oceanographic data (wave angle, surf-zone width and water temperature, visibility, density, salinity). The data are organized in monthly ASCII files.
- d. **Video Data** - These are hourly black and white jpg images taken from the FRF's observation tower. Both instantaneous "snapshot" and 10-min time-average images are taken looking north, south, and offshore. Images taken "today" and "yesterday" are available on-line; older images are available but archived. The snaps characterize the incident wave conditions; the time-averages show underlying morphology.
- e. **Survey Data** - Since 1981, the CRAB has been used to map the changing bathymetry surrounding the FRF pier. Data files are provided for four survey lines surveyed biweekly from 1981 to 1991 along with PC computer programs useful for entering and processing the data. Monthly bathymetric data files are also available.

These data have been routinely reported in a series of Monthly Data Summaries that provide daily data and Annual Data Reports that climatologically summarize the data. Beginning with the 1998 reports, the monthly reports are published on the web using Adobe® PDF format for easy downloading and printing. Past monthly reports are being added.

**REAL-TIME DATA:** Most FRF data can be observed in near real-time via the "Present Conditions" page, which displays a table of the day's observations, continuously updated plots, and quick access to recent video, survey, and other data. Checking out the wave conditions or following a hurricane passing Duck, NC, is thus made easy.

**FUTURE DEVELOPMENT:** The FRF web site continues to evolve, and some significant changes are planned for 1999. Standardized data file formats that match the formats of other CHL datasets including the Wave Information Study and the Field Wave Gaging Program will be added. Climatological data summaries, similar to what has been published in the FRF Annual Data Summaries, will also be added along with multiyear data files. Many other changes and enhancements are planned. Comments on the material presented, its clarity, and ease of use are appreciated.

## **ADDITIONAL INFORMATION**

For further information contact William Birkemeier (*w.birkemeier@cerc.wes.army.mil*) or Clifford Baron (*c.baron@cerc.wes.army.mil*) at the Field Research Facility, 1261 Duck Road, Kitty Hawk, NC 27949; Phone: 252-261-3511; FAX: 252-261-4432.