tion grid, coordinates to a source cell, and the desired inundation level. Software utilities that accompany the model translate United States Geological Survey digital elevation maps, as well as ASCII grids, into the correct format. The source cell is specified in the coordinates of the elevation grid, and the inundation level (a floating-point number) is specified in a unit of measurement compatible with that used for the input elevation. The rainfall simulations were performed for various hurricane landfall scenarios that included different intensities, storm sizes, forward speeds, and landfall locations.

Typically, each hurricane simulation, started 3 days of simulated time before Camille's landfall, took about 5 hours of computing time in parallel processing on all sixteen processors. The results of the ADCIRC and rainfall simulations were composited to determine the highest storm-surge value possible for each grid node; the resulting maps are known as maximum envelope of water (MEOW) maps.

Figure 1 shows the maximum storm surge for a Category 3 storm in the vicinity of the back bay of Biloxi, MS. The maximum storm surge is approximately 20 ft (≈6 m) inside the bay. Over most of the bay area, the storm surge varies between 15 and 25 ft (≈4.5 and 7.6 m). Published ground measurements at various discrete locations during Hurricane Camille show that a maximum storm surge of over 22 ft (≈6.7 m) occurred at Pass Christian, MS, west of Biloxi. Emergency planners and local government officials make public evacuation plans based on MEOW maps.

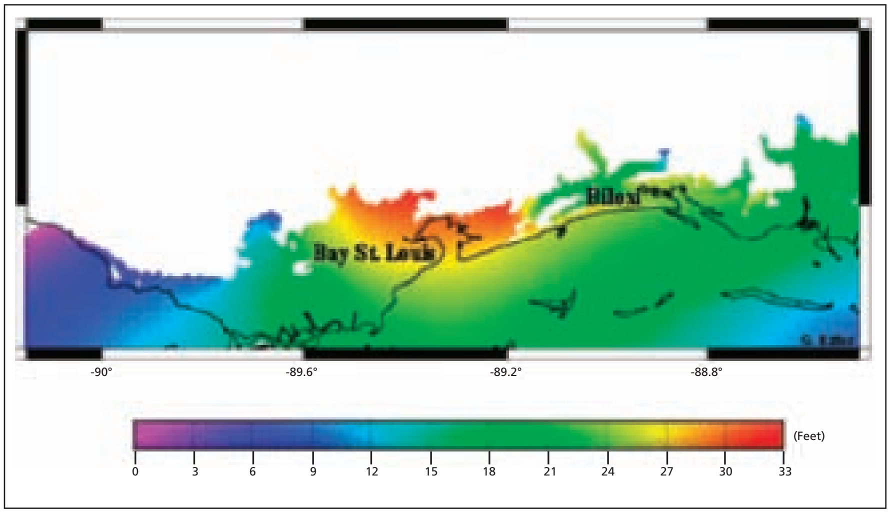

Figure 2. **ADCIRC Calculated Storm-Surge Heights** for Hurricane Katrina on August 29, 2005, at 11 a.m. local time. This image shows a 25- to 30-ft (≈4.5- to 9.1-m) storm surge in the Bay St. Louis and Pass Christian communities.

Figure 2 depicts ADCIRC computer model simulation of Hurricane Katrina's storm surge, showing a 25- to 30-ft (≈4.5- to 9.1-m) wall of water, pushed by 140-mph (≈225-km/h) winds, slamming into the Louisiana/Mississippi Gulf Coast. The maximum surge from Katrina was higher than Camille and covered a wider region, even though the intensity of the wind was slightly less. This happened because Katrina's strong winds covered a larger area and Katrina moved more slowly than Camille, allowing more time for the water to accumulate.

At the time of this reporting, technical support and parallel-computing resources have been provided to the Louisiana Department of Natural Resources, one private firm, and NASA, to model hurricane storm-surge flooding in southeastern Louisiana and along the Mississippi Gulf Coast.

This work was done by Elizabeth Valenti and Patrick Fitzpatrick of WorldWinds, Inc. for **Stennis Space Center**.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for the commercial use should be addressed to:

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Refer to SSC-00229, volume and number of this NASA Tech Briefs *issue, and the page number.*

User Interactive Software for Analysis of Human Physiological Data

Ames Research Center, Moffett Field, California

Ambulatory physiological monitoring has been used to study human health and performance in space and in a variety of Earth-based environments (e.g., military aircraft, armored vehicles, small groups in isolation, and patients). Large, multi-channel data files are typically recorded in these environments, and these files often require the removal of contaminated data prior to processing and analyses.

Physiological data processing can now be performed with user-friendly, interactive software developed by the Ames Psychophysiology Research Laboratory. This software, which runs on a Windows platform, contains various signal-processing routines for both time- and frequency-domain data analyses (e.g., peak detection, differentiation and integration, digital filtering, adaptive thresholds, Fast Fourier Transform power spectrum, auto-correlation, etc.). Data acquired with any ambulatory monitoring system that provides text or binary file format are easily imported to the processing software.

The application provides a graphical user interface where one can manually select and correct data artifacts utilizing linear and zero interpolation and adding trigger points for missed peaks. Block and moving average routines are also provided for data reduction. Processed data in numeric and graphic format can be exported to Excel. This software, PostProc (for post-processing) requires the Dadisp engineering spreadsheet (DSP Development Corp), or equivalent, for implementation. Specific processing routines were written for electrocardiography, electroencephalography, electromyography, blood pressure, skin conductance level, impedance cardiography (cardiac output, stroke volume, thoracic fluid volume), temperature, and respiration.

PostProc users do not need programming experience or extensive knowledge of human electrophysiological signal processing. Routines written in Series Processing Language (SPL) can be modified to accommodate different biomedical instruments, calibration levels, or sampling rates.

This program was written by Patricia S. Cowings and William Toscano of **Ames Research Center** *and Bruce C. Taylor and Soumydipta Acharya of the University of Akron. Further information is contained in a TSP (see page 1).*

Inquiries concerning rights for the commercial use of this invention should be addressed to the Ames Technology Partnerships Division at (650) 604-2954. Refer to ARC-15287-1.

Representation of Serendipitous Scientific Data

NASA's Jet Propulsion Laboratory, Pasadena, California

A computer program defines and implements an innovative kind of data structure than can be used for representing information derived from serendipitous discoveries made via collection of scientific data on long exploratory spacecraft missions. Data structures capable of collecting any kind of data can easily be implemented in advance, but the task of designing a fixed and efficient data structure suitable for processing raw data into useful information and taking advantage of serendipitous scientific discovery is becoming increasingly difficult as missions go deeper into space. The present software eases the task by enabling definition of arbitrarily complex data structures that can adapt at run time as raw data are transformed into other types of information. This software runs on a variety of computers, and can be distributed in either source code or binary code form. It must be run in conjunction with any one of a number of Lisp compilers that are available commercially or as shareware. It has no specific memory requirements and depends upon the other software with which it is used. This program is implemented as a library that is called by, and becomes folded into, the other software with which it is used.

This program was written by Mark James of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP (see page 1).*

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-42086.