



Coastal Engineering Technical Note



Management of the Field Wave

Gaging Program Data Base

Purpose: To describe the purpose and plan of the data base management subtask of the Field Wave Gaging Program (FWGP)

Introduction: The Field Wave Gaging Program is a work unit of the U.S. Army Corps of Engineers Coastal Field Data Collection Program (CFDCP). It is charged with collecting and distributing coastal wave data to contribute to a national wave climatology for use in planning, design, and operation of coastal projects. The development of a national gaging network has resulted from ongoing research in instrumentation design, systems analysis, and data analysis techniques. The current network provides near-real-time collection and processing of wave conditions from 36 near-shore gages and 7 deep-water buoys. For maximum usefulness to the coastal engineering community, the program will rely equally on a well-planned data base management structure to ensure timely dissemination of the data and its reliable, accessible archival. Data base management consists of analyzing, quality checking, reporting and archiving the individual wave measurements.

Analysis: The Coastal Engineering Research Center (CERC) Prototype Measurement and Analysis Branch (PMAB) has developed analysis

routines for use with most types of directional and non-directional wave gages. The CERC Wave Data Analysis Standard (WDAS), which is in preparation, will contain program specifications and sample data sets to facilitate correct spectral analysis of all wave data, regardless of source. Later versions of this standard will specify output formats and allow the controlled production of standardized products by contractors for input into a common archive.

Quality Control/Quality Assurance: The analysis routines used by PMAB contain subroutines that identify problem or unusable data sets through automatic editing of the data signals, including tests for spikes, mean-crossing intervals, and mean trends. Questionable data are verified or rejected by inspection. In many instances, however, the discrimination between an atypical, but real phenomenon and an incipient system failure can only be made with human judgment. This determination can be facilitated through rapid access and display of a broad spectrum of information, from physical, such as the local bathymetry or stage of the tide, to procedural, such as sensor calibration parameters, to logistical, for example the commercial fishing season in waters near a gage. PMAB is developing an integrated system using relational data base software design to provide this information quickly and efficiently. On-line access to tables of ancillary information and plots of intermediate analysis results will be available through a window-environment, menu driven screen.

Quality control issues also affect decisions regarding the data

collection mode, i.e., whether real-time or internally stored. Self-contained gages eliminate the added cost of telemetry hardware and allow more flexible gage placement. However, the task of editing, verifying and qualifying wave data is simplified considerably if performed as soon as practical after collection. Spurious points caused by signal errors can be diagnosed while the often ephemeral electronic symptoms are still occurring; anomalies due to real events can be verified with supporting observations while the conditions exist. This benefit, combined with the secure capture of data collected prior to any instrument loss or damage, helps justify the effort of obtaining real-time data.

Reporting and Archiving: All raw wave records are analyzed to produce one (non-directional) or two (directional) dimensional energy spectra of the sea surface. Each spectrum is further reduced to provide basic parameters, such as wave height, period, and direction at a specific time and place. The FWGP is also responsible for reduction and review of all prototype, or measured, wave data obtained from outside sources, such as the National Data Buoy Center (NDBC), that is of sufficient quality and duration for inclusion in the data base. A synopsis of the available data and schedules for future gage sites is provided in the annual FWGP 5-Year Deployment Plan.

When a sufficient quantity of data has been collected from one site, it can be used in the calibration of numerical hindcast

models and the statistical calculation of climatological parameters. Presently, raw and spectrally analyzed data are stored on 9-track magnetic tapes, with tabular and graphic time series of reduced wave parameters for each station distributed in monthly and annual printed reports. Ongoing efforts include: development of software to permit on-line access, via PC, to the analyzed data products; the statistical analysis of all historical data; and the archival, onto optical disc media, of the entire data base.

Another CFDCP work unit is developing a system to allow Corps designers and planners ready access to this information - the Coastal Engineering Data Retrieval System (CEDRS), a PC-compatible data base of both measured and hindcast wind and wave measurements. CEDRS will provide all of the data obtained within the boundaries of a Corps Division on an external hard disc drive, which will be updated periodically as the hindcast is extended and measured data accumulated. Measured data collected after the latest updated disc will be maintained at PMAB and distributed in monthly reports.

Summary: The management of measured data requires a commitment of resources equivalent to its collection to insure quality, timely distribution, and safe, accessible archival. The benefit of this effort will be realized through enhanced quality and efficiency of Corps coastal projects.

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