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Bruce A. Magnell, Sc.D., M.S., M.S., B.S.

Senior Scientist/Senior Oceanographer

EXPERTISE

Physical oceanography, electrical engineering, coastal ocean dynamics, oceanographic instrumentation design and evaluation, signal processing, data analysis, data acquisition, real-time telemetry, processing system design and implementation, technology evaluation, business management and business development.

QUALIFICATION SUMMARY

- More than 40 years of experience at MIT, EG&G, and Woods Hole Group, Inc. in applied science and ocean engineering for a wide range of commercial and government clients.
- Expertise in the analysis of coastal ocean dynamics, especially circulation and mixing on the continental shelf, as well as tides, waves, and deep ocean features.
- Design and management of major oceanographic measurement and analysis programs.
- Oceanographic instrumentation design and performance evaluation.
- Signal processing and data analysis techniques; data acquisition and processing system design, implementation, and technology evaluation.
- Real-time system design, testing, and installation.

WORK EXPERIENCE

1995-Present	Woods Hole Group, Inc.
1994-1995	EG&G Marine Instruments, Inc.
1984-1994	EG&G Washington Analytical Services Center, Inc.
1974-1983	EG&G Environmental Consultants, Inc.
1973-1974	MIT (Division of Sponsored Research)

Education
1973 - Sc.D., Physical Oceanography Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Degree Program.
1968 - M.S., Physical Oceanography Massachusetts Institute of Technology.
1968 - M.S., Electrical Engineering Massachusetts Institute of Technology.
1966 - B.S., Electrical Engineering Massachusetts Institute of Technology

Licenses and Registrations
- N/A

Professional Affiliations
-- American Geophysical Union
- Institute of Electrical and Electronic Engineers
- American Association for the Advancement of Science
- The Oceanography Society
- Marine Technology Society

Publications & Presentations
31

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KEY PROJECTS

Over the course of more than 40 years as an oceanographic consultant, Dr. Magnell has been the principal scientist and engineer on numerous projects for industry and government. A representative sample is given below.

Real-Time Deep-water Metocean Mooring, Principal Engineer

In 2012-2013, Dr. Magnell was the lead System Engineer for the design, construction and testing of a Real-Time Metocean Mooring (RTMM) in deep water (~1400m) in the Gulf of Mexico. The RTMM is a compound mooring consisting of a WHG-designed 3m foam-hulled surface buoy, similar to the NOAA Value Engineered buoy, tethered by compliant synthetic line to a subsurface taut wire mooring. The RTMM measures current profiles from near the surface to 1000m, as well as directional waves and winds. Current profiles from back-to-back upward-and-downward looking 75kHz ADCPs on a subsurface float at a depth of 450m is telemetered to a 3m surface buoy over an acoustic telemetry link, together with data from a near-bottom single point current meter. Inductive telemetry over a 900m length of jacketed wire rope is used to transmit data from the current meter to a Data Acquisition System in the subsurface float. A 300kHz ADCP on the surface buoy provides detailed current profiles down to 100m. A dual satellite telemetry system is built into the 3m surface buoy, using primarily Globalstar with Iridium backup. All current, wave, and wind data are telemetered to a WHG Base Station in Falmouth, Massachusetts, USA. The RTMM was deployed in early 2013 and is presently in operational service. This moored system was built for an oil industry client and meets the requirements of the Bureau of Ocean Energy Management for real-time data telemetry from offshore oil platforms. Specifically, complete raw ADCP records are telemetered to shore and forwarded to the National Data Buoy Center every 20 minutes, in accordance with the Government's requirements. Dr. Magnell oversaw the entire design of the RTMM system, including mechanical, electrical and electronic components.

Hydrokite – A concept for real-time telemetry and upper ocean profiling using a winged tethered body, Principal Engineer

Beginning in 2011, Dr. Magnell originated, refined, and tested the conceptual design of a new type of tethered moored float called Hydrokite, which can provide rapid vertical profiling of the upper ocean as well as near-real-time data telemetry without a surface buoy. A patent application is pending on this concept. Hydrokite consists of a nearly-neutrally-buoyant streamlined body equipped with wings to generate lift in ambient currents and a programmable electromechanical attitude control system. The Hydrokite can operate in a submerged low-drag mode, or it can operate in a surfaced mode, in which it rises to the surface using the lift provided by ambient currents acting on its wings. Balanced attitude-control planes (tail fins) can be moved under program control to switch between modes. Very little electrical energy is needed to move the control planes, permitting frequent vertical excursions without requiring expenditure of much stored energy. Alternatively, the Hydrokite could be programmed to hold any desired vertical position. Potential applications of Hydrokite could include near-real-time data telemetry from subsurface moored instruments, upper ocean current and water property profiling, directional wave measurements using an upward-looking acoustic profiler, among others. Hydrokite has potential military applications as it can be programmed to surface only under certain conditions. It could also be used to obtain moored instrument data in high-latitude regions where partial or intermittent ice cover precludes the use of moored surface buoys. For this application, Hydrokite could be equipped with sensors to detect the presence of floating ice, and only surface when no ice is present. A scale model of the Hydrokite was built and tested in a tow tank to verify that a very low drag coefficient could be obtained in the submerged, no-lift

KEY PROJECTS (CONTINUED)

configuration, and that the lift/drag ratio exceeded 5:1 in the upward-moving mode. Development partners are being sought.

GEM Accuracy Evaluation, Lead Scientist

The Gulf Eddy Model (GEM) is used by oil companies operating in the Gulf of Mexico to estimate current profiles based on Gulf Loop Eddy parameters provided by Horizon Marine, Inc. GEM is a purely kinematic model (i.e., containing no physics) that uses a pre-determined set of Empirical Orthogonal Function (EOF) eigenmodes (vertical structure functions) to build up a complete current profile at any location and time. GEM translates observable eddy parameters such as current speed near the edge of the eddy, location of the eddy center, ellipticity of the eddy, and the direction and velocity of eddy translation into a set of time- and space-dependent eigenfunctions that govern how the modes are summed to produce current profiles. Dr. Magnell headed a team of WHG scientists who evaluated the accuracy of the GEM model by comparing its predictions with observed current profiles. Initially the investigation focused on the representativeness of the EOF vertical modes, but it was found that the principal source of inaccuracy was due to highly variable and inaccurate eddy parameterization, not the eigenmodes. Dr. Magnell re-directed the work to focus on the time-dependent eigenfunctions and recommend a different approach to providing useful and valid input to GEM.

Database of Quality-Checked Deepwater Ocean Current Data from MMS (BOEMRE) Real-Time Measurement Program, Deepstar Research Consortium, 2011, Lead Scientist.

In 2011, Dr. Magnell has been the lead scientist in a major project to review, edit, and compile into a simple database all of the real-time current profile data collected from 2005-2010 from fixed oil and gas platforms and mobile drilling units in the Gulf of Mexico, as well as data from the MMS (BOEMRE) Environmental Studies Program over the past 20 years or more. In accordance with a directive from MMS (now BOEMRE), oil industry operators (i.e., oil companies) are responsible for collecting current profile data in the upper 1000m of the water column using ADCPs, and transmitting these data in near-real-time to the National Data Buoy Center (NDBC) where the data are subjected to a real-time computerized quality assurance process and placed in a publically-accessible database. However, the usefulness of the data is compromised by various types of error, such as incorrect measurement locations, that are not captured by the NDBC real-time QA process. The uneven quality of the data has made it difficult for industry engineers to use it for the intended design purposes. The Deepstar program subjects the data to review by oceanographers in a higher-level, science-based Quality Assurance process, resulting in a database of dependable data in an easy-to-use format.

Design of Over-the-Side Launch and Recovery System (LARS) for ADCPs on Deepwater Drillship, BP America, 2010. Project Manager.

In 2010, Dr. Magnell supervised and contributed experience and insight to the design of an articulated gantry frame and 2-cable suspension system for 300kHz and 38kHz ADCPs on a new-build deepwater drillship for an oil industry client. This system utilized underwater electronics for the 38kHz ADCP, which permitted the use of load-bearing electromagnetic cables rather than vulnerable, externally attached rubber cables for power and signal communication to the ADCPs. The two ADCPs are attached to a frame that is raised and lowered for deployment and maintenance using a pair of hydraulic winches. The topside electronic system includes easy-to-see analog displays that reveal at a glance whether the ADCPs are pinging, and automated shut-down of the 38kHz ADCP before it is removed from the water.

KEY PROJECTS (CONTINUED)

Design of Moonpool Launch and Recovery System (LARS) for ADCPs on Deepwater Drillships, Chevron Oil Co., 2008-2009, Project Manager.
In 2009 and 2010, Dr. Magnell was the principal design engineer for a moonpool ADCP deployment system for the new-build super-drillships Discoverer Clear Leader and Discoverer Inspiration, both operated by Chevron in the Gulf of Mexico beginning in 2009. The deployment system was based on the successful WHG design of the ADCP deployment system on the Discoverer Spirit in 2000. Dr. Magnell supervised the mechanical design, installation, and testing of this moonpool LARS, which involved a pair of 65-ft vertical rails made of 8" steel H-beams, assembled in sections with bolted joints and attached to the inside walls of the moonpool. A moveable carriage carrying a 38kHz ADCP is raised and lowered for deployment and maintenance by a hydraulic winch. A hold-down mechanism is incorporated to prevent motion of the ADCP carriage during heavy weather.

Performance of the Teledyne RDI 75 kHz Long Ranger ADCP near an oil rig in deep water in the Gulf of Mexico, CASE-EJIP, 2005-2006 - Program Manager and Principal Investigator.
Dr. Magnell proposed and carried out a major intercomparison study to evaluate and understand the performance limitations of the widely used T-RDI LR75 ADCP, which was reported to have limited range and poor accuracy when used in deep water where the density of scatterers is low. Two LR75s and a 300 kHz T-RDI Workhorse Sentinel ADCP were deployed by ROV on the seafloor about 65m away from a semi-submersible oil drilling rig, and a 1200 kHz Workhorse, an Aanderaa RCM-11, and five Nortek AquaDopp current meters were deployed on a nearby taut 500m-tall taut sub-surface mooring. All instruments were configured to sample intensively and provide as much raw data as possible. Analysis of the data showed that the LR75's velocity estimates were corrupted by coherent echoes (possibly reverberation) of the ADCP's acoustic side lobe signals from the nearby vertical steel riser of the oil rig. The result was significant low bias in the reported current speeds, not just at close ranges where some interference had been expected, but out to the maximum observable range of the ADCP as well. The findings of this study have far-ranging implications for the use of this type of instrumentation in the oil industry.

Design and testing of a deep-water, real-time data telemetry relay buoy, C&C Technologies for Petrobras (Brazil) – Senior Engineer.
Dr. Magnell designed and supervised the construction and testing of a deep-ocean telemetry relay buoy to obtain real-time ocean current data from a 75kHz Long Ranger ADCP on a sub-surface mooring. Acoustic telemetry modems (Link Quest) are used to transfer data from the sub-surface ADCP to the surface buoy, where the data are collected and buffered. A satellite transmission system (GlobalStar) is used to send the data from the surface buoy to a shore station. The buoy is deployed offshore Brazil in the Campos Basin.

Near-bottom deep-water current profiling systems for measurements in the Furrows in the Gulf of Mexico, Petrobras America Inc., 2008-2009 – Senior System Engineer
Dr. Magnell was the chief design engineer for a set of six bottom platforms deployed the field of Furrows at the base of the Sigsby Escarpment in 2500m depths of the Gulf of Mexico. Each platform was equipped with a 1 MHz acoustic Doppler current profiler (Nortek AquaDopp) to obtain high-resolution current profiles inside a furrow, and a 300 kHz T-RDI Workhorse ADCP to obtain bottom current profiles above the top of the furrow. The platforms were deployed inside furrows using an ROV from a workboat for a 1-year measurement program.

KEY PROJECTS (CONTINUED)

Each platform was equipped with floatation and dual acoustic releases to permit recovery without needing an ROV. Acoustic telemetry was successfully used to download data at 4-month intervals.

Integrated Marine Monitoring System, West Seno oil production platform, Makassar Strait, Indonesia, Unocal Oil Company, 2003 – Program Manager and Senior System Engineer.
Dr. Magnell was the principal designer of a multi-platform, multi-sensor integrated data collection system on Unocal's West Seno Tension Leg Platform, offshore Borneo in the Makassar Strait. The system collected data on tendon tension, riser tension, platform motion, as well as environmental variables such as current profiles and wind speed and direction. Separate data collection PCs on the platform itself, on an attached drilling vessel, and on a nearby Floating Production Unit were linked over the client's local area network and shared all data. Data were also telemetered in real time to shore stations. Dr. Magnell supervised the design and testing of a comprehensive software suite that integrated all the data into a set of user-selectable displays.

Metocean System for Cassia platform, offshore Trinidad, BP Trinidad & Tobago LLC, 2006-present – Program Manager and Senior System Engineer.
Dr. Magnell designed and supervised the construction and installation of a metocean system on a gas platform off the east coast of Trinidad. In addition to routine meterological measurements, the system utilizes a pair of Nortek AWAC current profilers with Acoustic Surface Tracking (AST). The design includes an innovative mechanical system using guide wires between the surface and an underwater base clamped to a leg of the platform, with a moveable carriage for the current meters that can be winched up and down for service without use of divers. The system has provided excellent quality data for several years. Data are displayed locally on the platform and transmitted in real time to client and WHG facilities via the Internet. An external website is maintained to allow access to the data for authorized users.

Design of a current meter deployment system for the Lankahuasa offshore gas platform in the southern Gulf of Mexico, Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE) for the Mexican national oil company PEMEX, 2007 – Senior System Engineer.
Dr. Magnell was the principal design engineer for a mechanical deployment system for Nortek AWAC AST current profilers on an offshore gas platform in Mexican waters of the Gulf of Mexico. The design was based on that of the successful Trinidad system of 2005-2006.

Moonpool ADCP deployment system for drillship Discoverer Spirit, Unocal Oil Company, 1999-2000 – Senior System Engineer.
Dr. Magnell was the principal design engineer for a moonpool ADCP deployment system for the drillship *Discoverer Spirit,* operated by Unocal in the Gulf of Mexico beginning in 2000. The moonpool ADCP deployment system utilized existing structural elements on the drillship to mount a set of 65-ft tall vertical rails, on which a moveable carriage was mounted. The ADCP was mounted in a frame attached to the carriage, which could be raised to deck level using an air winch. The system has been in use for more than 8 years.

KEY PROJECTS (CONTINUED)

Hudson Canyon Oceanographic Measurement Program, Blue Ocean Energy offshore LNG facility, ExxonMobil Corporation, 2008-2009 – Principal Scientist.
Dr. Magnell is the scientific manager of a one-year coastal oceanographic measurement program offshore NJ, in the upper Hudson Canyon area. Two locations are instrumented with bottom-mounted T-RDI ADCPs and sub-surface moored Nortek AWAC AST current/wave sensors. An ASL Wave Profiler is also deployed, together with two chains of temperature and conductivity sensors suspended from surface buoys. In addition to characterizing the ocean current environment, the study has specific objectives of detecting and characterizing infra-gravity waves (those with periods longer than about 50 seconds) and high-frequency internal waves (solitons) and internal tides. Dr. Magnell will assist in the development of new analytical techniques for these special investigations.

Wave, Current, and Ice Thickness Measurement Program in Beaufort Sea offshore Prudhoe Bay, Alaska, BP Alaska, 2008-2009 – Senior System Engineer and Principal Scientist.
Dr. Magnell is the Principal Investigator and Senior System Engineer for a current, wave, and ice thickness measurement program in the Beaufort Sea, offshore Prudhoe Bay, Alaska. Three bottom-mounted measurement systems consisting of Nortek AWAC AST current/wave sensors and ASL IP5 Ice Profilers were designed, tested and deployed by Dr. Magnell in August 2008. Dr. Magnell worked closely with Nortek AS of Norway to specify and configure an innovative sampling and data recording capability for the AWACs, using Nortek's Internal Processor (NIP) equipped with 4 GB of flash memory. The AWACs are operated in a special diagnostic mode which provides high-resolution acoustic echo amplitude profiles, interleaved with standard wave sampling bursts. The diagnostic mode data are expected to provide data on ice keel depth, and this data will be compared with that from the ASL Ice Profiler. Also, Dr. Magnell originated and supervised the integration of a new type of electromagnetic data telemetry modem with the Nortek AWAC/NIP system, to provide through-the-ice telemetry capabilities during the winter.

Meteorological data collection and telemetry system for Cape Wind offshore wind farm, Cape Wind, 2005 – Senior System Engineer
Dr. Magnell supervised the design and testing of a metocean system installed on a 200-ft offshore research tower in Nantucket Sound, MA. The meteorological part of the system measures wind speed and direction at 3 levels, each equipped with two different types of sensor, as well as vertical temperature gradient and other parameters. Currents and waves were measured for one year using a bottom mounted ADCP. The system is solar powered. Data are rapidly sampled and telemetered on 10-minute intervals to WHG's main office in Falmouth, MA. From there the data are transmitted in real time over the Internet to Cape Wind's public website.

Precision measurement of water depth for the Neptune oil production platform in the Gulf of Mexico, BHP Billiton Co., 2007 – Principal Investigator.
Dr. Magnell worked with WHG's Dr. Leonid Ivanov to analyze several months of pressure data collected using a bottom-mounted Paroscientific quartz sensor (SBE-26) in deep water (about 1500m) in the Gulf of Mexico in connection with the design of a Tension Leg Platform. Long-term average water depth was determined to an

KEY PROJECTS (CONTINUED)

accuracy of +/- 40 cm based on CTD profiles to determine water density. Long-period variability of sea surface height was assessed using satellite altimetry data.

Survey Sensor Package for Clam Dredge, NOAA National Marine Fisheries Service, 2005-2006 – Senior System Engineer.
Dr. Magnell designed and supervised construction and testing of an instrumentation package for NMFS clam surveys. The Survey Sensor Package (SSP) collects and stores rapidly sampled data on tilt (acceleration), temperature, salinity, ambient pressure, and differential pressure in the dredge's hydraulic rake nozzles. The SSP is designed to mount near the front of a bottom-towed clam dredge, which is an environment characterized by extreme vibration and occasional heavy impacts, so ruggedness was a primary design feature. The SSP collects and buffers 1-second sampled data while underwater, and then telemeters the data automatically by radio modem to a shipboard PC when the dredge is brought on deck. The SSP has been used successfully by NMFS for several 3-year clam surveys, and has also been applied to scallop dredges.

Northern California Coastal Circulation Study, U.S. Department of the Interior, Minerals Management Service, Pacific Region OCS Office, Los Angeles, CA - Program Manager.
Program Manager for the NCCCS, a 5-year physical oceanography measurement and analysis program to describe the circulation on the continental shelf and slope between San Francisco and Oregon. The multi-million dollar program, one of the largest coastal oceanography projects ever carried out by the Department of the Interior, involved direct and indirect current measurements using Lagrangian drifters, moored instruments, and CTD/XBT surveys, as well as the collection of meteorology, sea-level, and satellite sea-surface temperature data. Real-time telemetry of near-surface moored current data was successfully achieved from all 16 of the main program moorings using ARGOS telemetry. Data retrieved from Service ARGOS were processed and compiled, together with real-time wind and sea-level data, into real-time data reports distributed to the principal investigators and other users.

Study to Model Cyclone-Generated Currents and Storm Surges on the Continental Shelf off NW Australia for Woodside Petroleum, Perth, AUSTRALIA, Woodside Petroleum Development Pty. Ltd. - Project Scientist.
Conducted an environmental and engineering study to provide information essential for the design and routing of an 82-mile submarine pipeline from an offshore platform area to a shore facility in the vicinity of Dampier on the northwest shelf of western Australia. Designed the field program, staged from a remote desert town, which involved long-term comprehensive measurement and analysis of wave, current, and tidal characteristics, as well as dye studies and drogue tracking to analyze and predict the movement of surface waters in and around a proposed LNG plant. Oversaw the collection of data describing the variations of water temperatures and salinities and extensive meteorological data on the northwest shelf. Supervised a subsequent study, which utilized computer numerical models to predict current and wave conditions in response to cyclones (hurricanes) along the proposed pipeline route. The models were calibrated and verified using data collected during the field program and from historical meteorological records.

KEY PROJECTS (CONTINUED)

Physical-Process-Oriented Study of Extremal Currents in Deep Waters Offshore in the Gulf of Mexico for Conoco, Northern Gulf of Mexico, Continental Oil Company - Project Manager.
Developed a new analysis methodology to provide estimates for a deep-water oil production site on the continental slope of the northern Gulf of Mexico based on identification, characterization, and forecasting of separate physical processes (tides, eddies, wind-driven currents, etc.). Identified and provided long data records, which were necessary to characterize oceanic motions with long time scales. Designed the new study to include the analysis of mooring instrument data, and the study of historical data to find the frequency of occurrence statistics describing the current amplitude of each major process. These were combined with the site-specific results derived from the moored instrument data to produce estimates of extreme currents by depth and for various return periods.

New England Outer Continental Shelf Physical Oceanography Program, U.S. Dept. of Interior/Bureau of Land Management, Minerals Management Service (MMS), Reston, VA - Principal Investigator.
Principal Investigator for Moored Current Measurements on the NEOCSPOP program, a physical oceanography studies for the Bureau of Land Management (now MMS). Responsible for the execution of the Moored Conventional Current Meter/Tide Gauge Program. Participated in the analysis and interpretation of all the data, including almost 18 instrument-years of current and bottom pressure data.

Deep Water Rig Instrumentation System, Makassar Strait, Indonesia, Unocal Corp. - Project Manager.
Managed engineers and scientists in the design, construction, testing and installation of real-time environmental monitoring systems on Sedco 601 and Sedco 602 anchored drill rigs, operating in the Makassar Strait region, Indonesia. Designed and provided the software for a Windows 95 PC-based data acquisition system on the rig, showing the data in a multiplicity of formats and providing daily archival data files.

Real-Time Acoustic Doppler Current Profiler (ADCP) System for Single Point Mooring Facility, Offshore of Barber's Point, Oahu, HI, Tesoro Hawaii (BHP) - Project Manager and Chief Engineer.
Managed and engineered the design, procurement, integration, testing, and installation of a Real Time Current And Wind Monitoring System for Tesoro Petroleum Hawaii. The system is deployed on Tesoro's Single Point Mooring (SPM) buoy, offshore of Barber's Point, Oahu. The system consists of three main subassemblies: 1) the Woods Hole Group Real-Time Data Acquisition and Telemetry System, located on the SPM buoy, which also includes the current and wind sensors; 2) the Base Station PC display and archiving system, located in Tesoro's offices in Honolulu; and 3) the Mooring Masters PC display unit in a waterproof portable case, which is used by the Mooring Master for real-time access to the current and wind information while on the tanker or the tugboats. Both PC-based display units use real-time software developed by WHG.

Deep Water Rig Instrumentation System, Andaman Sea, West of Thailand, Unocal Corp. - Project Manager.
Managed the design, procurement, integration, testing, and installation of a current profiling system on the anchored drillship Sedco 601 in the Andaman Sea. Integrated the system in less than three weeks from award of contract, and was installed by OMS engineers on the drill rig at sea. Developed real-time data acquisition software for the PC that collected the data on the rig showing the current profile information in several ways including vertical profiles, time-series, color-filled contours, and vectors. Successfully collected significant data

KEY PROJECTS (CONTINUED)

concerning large-amplitude internal waves in the Andaman Sea. The Sedco 601 was transferred from the Andaman Sea to the Makassar Straits in early 1998. This project was extended to maintain the real-time current system on the rig during the initial operations in this area. Performed post-process Q/A and reported on data collection.

Lake Current Monitoring System, Ontario, Canada, Ontario Hydro - Project Manager and Chief Engineer.
Designed, built, tested, and installed a pair of identical Real-Time Lake Current Monitoring Systems for the Canadian nuclear utility company Ontario-Hydro. Designed all aspects of the lake current monitoring system including the bottom platform for the upward-looking acoustic RD Instruments Workhorse Acoustic Doppler Profiler, the environmentally protected Remote System Manager installation, the base station computer system, and display software. Ensured the transmission of data to shore over a 6000-ft. double-armored electromechanical cable. Oversaw the collection, buffering, and transmission of the data to the utility company's home office over a land telephone line using the Remote System Manager.

Tide Measurement System, Naval Oceanographic Office - Project Manager and Chief Engineer.
Managed and engineered the design and construction of 5 portable tide measurement systems (TMS) for real-time water level measurements for use by the Navy in coastal surveys worldwide. Designed the system to determine tide height to an accuracy of +/- 1 cm by using high-accuracy measurements of water and atmospheric pressure, as well as water temperature. Each TMS system consists of 3 deployable tide gauge units, which comprise the sensors and the telemetry transmitter; these units can be mounted in the field in remote locations and function autonomously. A shipboard base station unit receives the telemetered data and provides real-time displays.

Estimation of Extremal Currents Offshore Trinidad, Houston, TX, Amoco Inc. - Project Manager.
Managed and served as principal oceanographer for an oceanographic analysis and interpretation study that would determine the probable extremal currents in deep water. Reviewed historical and recent data collected by Amoco to estimate the frequency of occurrence of various extreme currents due to "rings" (eddies spun off by the retroflexion of the Brazil Current).

Deep Water Rig Instrumentation System, Gulf of Mexico, Texaco Inc. - Project Manager.
Managed the instrumentation and installation of the system on several anchored rigs and dynamically positioned drill ships for Texaco in the Gulf of Mexico. For the installation on Transocean's anchored deep-water drig rig Oceanstar, oversaw a team of ocean engineers in the design and construction of a fixed mounting system for the Acoustic Doppler Current Profiler (ADCP) and the other facilities on board the vessel necessary to operate the system. Manages the ongoing maintenance and periodic visits to the rig to inspect and maintain the system, download the collected data, and prepare oceanographic data reports for Texaco.

Deep Water Rig Instrumentation System, Gulf of Mexico, Amoco Inc. - Project Manager.
Managed ocean engineers and scientists in the design, building, testing, and installation of a current and wind monitoring system on the dynamically positioned drill ship Transocean Discoverer 534 working in the Gulf of Mexico. Oversees the periodic service and repair for the system, the downloading of data collected, and the preparation of data reports for Amoco.

KEY PROJECTS (CONTINUED)

Cooling Water Discharge Plume Study, Pilgrim Nuclear Power Station, Boston Edison Co. - Project Manager. Managed a field study to assess the impact of elevated temperatures due to the nuclear generating station's thermal discharge on benthic organisms. Oversaw the installation of 64 self-recording temperature recorders on the sea floor in a dense array around the discharge, out to a range of several kilometers, to determine the factors governing the area of benthic impact. Designed the bottom platforms for the sensors, performed simultaneous calibrations of all sensors, supervised field operations for deployment and recovery, and analyzed the data and wrote the final report.

PUBLICATIONS & PRESENTATIONS

Magnell, B.A., L.I. Ivanov, A.T. Morisson III, and E.G. Hasbrouck. 2015. Current Measurements from a Deep Real-Time Metocean Mooring: Lessons Learned on Real-TimeData QA/QC, Proceedings of the 11th IEEE Current, Wave and Turbulence Measurement Workshop, St Petersburg, FL, March 2015.

Magnell, B.A., L. Gordon, and H. Yamin. 2015. Lithium Battery Safety in a Flooded ADCP, Proceedings of the 11th IEEE Current, Wave and Turbulence Measurement Workshop, St Petersburg, FL, March 2015.

Magnell, B.A. 2014. A Compound Mooring for the Deep Gulf of Mexico, presented at the ONR/MTS Buoy Workshop, San Diego, CA, February 2014.

Magnell, B.A. 2014. Hydrokite: A Low-Profile, Long-Endurance, Data Collection and Exfiltration Platform, presented at the ONR/MTS Buoy Workshop, San Diego, CA, February 2014.

Magnell, B.A. and L. Ivanov. 2011. Wave, Ice Draft and Floe Size Measurements in the Beaufort Sea Using Bottom-Mounted Ice, Wave, and Current Acoustic Profilers, presented at the Arctic Offshore Technology Conference, Houston, TX, February 2011.

Magnell, B.A. and L. Ivanov. 2008. Performance of the 75kHz Long Ranger ADCP in a Low-Scattering Environment, Proceedings of the IEEE/OES/CMTC Ninth Working Conference on Current Measurement Technology, Charleston, SC. March 2008, pp. 101-110.

Bowers, G., B.A. Magnell, T. Jacobsen, and J. Strong. 2000. "A Real-Time Current Monitoring System for the Channel Approaches to Long Beach, California." International Ocean Systems, Vol. 4, No. 2, in press.

Kelly, F.J., L.L. Lee III, N.L. Guinasso, Jr., R.R. Leben, C.A. Fox, and B.A. Magnell. 2000. "Comparison of Shelf-break Currents off Texas Derived from Satellite Altimetry and Observations from TABS Buoys Moored along a TOPEX/Poseidon Ground Track." Proceedings of Oceanology International 2000 Exhibition and Conference, 7-10 March 2000, Brighton, U.K.

Largier, J.L., B.A. Magnell, and C.D. Winant. 1993. "Subtidal Circulation Over the Northern California Shelf." Journal of Geophysical Research, 98 (C10), pp. 18,147 18,180.

PUBLICATIONS & PRESENTATIONS (CONTINUED)

Magnell, B.A., C.D. Winant, N.A. Bray, C.L. Greengrove, J.F. Borchardt, J.M. Federiuk, C.E. Dorman, R.L. Bernstein, and J.L. Largier. 1991. "Circulation on the Northern California Continental Shelf and Slope: Final Report of the Northern California Coastal Circulation Study." Technical Report prepared by EG&G for Department of the Interior, Minerals Management Service, Pacific OCS Region, Camarillo, CA. Report No. MMS-91-0023543 pp.

Magnell, B.A., N.A. Bray, C.D. Winant, C.L. Greengrove, J.L. Largier, J.F. Borchardt, R.L. Bernstein, and C.E. Dorman. 1990. "Convergent Shelf Flow at Cape Mendocino." Oceanography, 3(1):4-11.

Csanady, G.T. and B.A. Magnell. 1987. "Mixing Processes." In: Georges Bank, R. Backus et al. (eds.), pp. 163-169, MIT Press, Cambridge, MA.

Magnell, B.A., K.H. Brink, and M.A. Noble. 1987. "Low-Frequency Current and Bottom Pressure Variability." In: Georges Bank, R. Backus et al. (eds.), pp. 140-146, MIT Press, Cambridge, MA.

Magnell, B.A. and S. Signorini. 1986. "Fall 1984 Delaware Bay Acoustic Doppler Current Profiler Intercomparison Experiment." In: Proceedings of the IEEE Third Working Conference on Current Measurement, 22-24 January 1986. G.F. Appell and W.E. Woodward (eds.), IEEE Publication No. 86CH2305-1.

Magnell, B.A. and S. Signorini. 1984. "Delaware Bay Intercomparison Experiment, Fall 1984." Vols. I and II. Report prepared for NOAA/NOS, Rockville, MD.

Magnell, B.A., T. Sgouros, and S. Signorini. 1984. "Fall 1983 Acoustic Doppler Profiler Measurements and Sea Truth Intercomparison Experiment at Ambrose Light, New York." Report prepared for NOAA/NOS, Rockville, MD.

Butman, B., R.C. Beardsley, B.A. Magnell, D. Frye, J. Vermersch, R. Schlitz, R. Limeburner, W. Wright, and M. Noble. 1982. "Recent Observations of the Mean Circulation on Georges Bank." Journal of Physical Oceanography, Vol. 12, No. 6, 6, pp. 569-591.

Magnell, B.A. 1982. "An Intercomparison of Current Measurements from a Raytheon Special Moored System and a VACM on Georges Bank." In: Proceedings of the IEEE Second Working Conference on Current Measurement, 19-21 January 1982. M. Dursi and W.E. Woodward (eds.). IEEE Publication No. 82CH1704-6.

Mero, T.N., G.F. Appell, J.R. McCullough, and B.A. Magnell. 1982. "Laboratory Verification of an Acoustic Current Meter Error Model." Journal of Oceanic Engineering, Vol. OE-7, No. 4, pp. 161-165.

Magnell, B.A. 1981. "Directional Wave Spectrum Resolution of a Circular Array of Current Sensors." Report to Engineering Development Laboratory, National Oceanic and Atmospheric Administration, Riverdale, MD 20840.

PUBLICATIONS & PRESENTATIONS (CONTINUED)

Magnell, B.A. 1981. "Dynamic Performance of an Acoustic Current Meter - Kinematic Model Prediction and Laboratory Dynamic Tests." 2 Vols, National Oceanic and Atmospheric Administration, Office of Ocean Technology and Engineering Services, Engineering Support Office, Rockville, MD.

Magnell, B.A., J.J. Cura, C.N. Flagg, and D.E. Frye. 1981. "Interpretation of the Physical Oceanography of Georges Bank (preliminary results)." Preliminary report for Contract No. AA851-CT1-39, Bureau of Land Management, U.S. Department of the Interior, Washington, D.C.

Magnell, B.A., R.I. Scarlet, C.N. Flagg, and D.E. Frye. 1980. "Appendix F of Thirteenth Quarterly Report of the New England Outer Continental Shelf Physical Oceanography Program." Technical report prepared for Bureau of Land Management, U.S. Department of the Interior, Washington, DC.

Magnell, B.A., S.L. Spiegel, R.I. Scarlet, and J.B. Andrews. 1980. "The Relationship of Tidal and Low-Frequency Currents on the North Slope of Georges Bank." Journal of Physical Oceanography, Vol. 10, pp. 1200-1204.

Bennett, J.R. and B.A. Magnell. 1979. "A Dynamical Analysis of Currents Near the New Jersey Coast." Journal of Geophysical Research, 84(C3), pp. 1165-1175, March.

Burch, T.L., B.A. Magnell, and S.L. Spiegel. 1979. "Return Period Currents During Cyclones along Submarine Pipeline Route, North Rankin to Withnell Bay." EG&G Environmental Consultants Final Report to Woodside Petroleum Development Pty. Ltd., Perth, West Australia.

Magnell, B.A., R.I. Scarlet, C.N. Flagg, and D.E. Frye. 1979. "Appendix F of Tenth Quarterly Report of the New England Outer Continental Shelf Physical Oceanography Program." Technical report prepared for Bureau of Land Management, U.S. Department of the Interior, Washington, DC.

EG&G. 1978. "Summary of Physical Oceanographic Observations Near the Site of the Proposed Atlantic Generating Station, Offshore of Little Egg Inlet, New Jersey, 1972 through 1976." Technical Report to Public Service Electric and Gas Company, Newark, NJ.

Magnell, B.A. 1978. "Current Meter Measurements for Environmental Studies." In: Proceedings of a Working Conference on Current Measurement. Technical Report DEL-SG-3-78, College of Marine Studies, University of Delaware, Newark, DE.

Magnell, B.A. 1977. "Intercomparison of the EG&G Model 102 Current Meter with EG&G Model CT/3, Endeco Model 105, and AMF VACM Current Meters in Shallow Coastal Waters." EG&G Environmental Consultants Monograph, Technical Report No. B-4518, Waltham, MA.

Magnell, B.A. 1976. "Salt Fingers Observed in the Mediterranean Outflow Using a Towed Sensor." Journal of Physical Oceanography, 6(4), pp. 511-523.