OSIL

Environmental Instruments and Systems



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NEW FIELD SWAPPABLE SV SENSOR

SV Xchange

Compatible with all AML Micro Sensors, SV Plus and CTD Plus instruments

- **Applications** - Suitable for high accuracy applications where no downtime is required
- **Features** - Field swappable SV sensors with inbuilt cal constants
- **Benefits** - Saves on calibration and shipping costs, reduces instrument downtime and lowers cost of ownership
- **Accuracy** - Sound velocity ± 0.025 m/s

AML MICRO CTDs AND SVs

Micro CTD

- **Applications** - Designed for use on platforms for measuring pressure, conductivity & temperature
- **Features** - 25 Hz sampling and rapid sensor response times for high speed applications
- **Benefits** - Size and flexibility ensures excellent fit with any host
- **Accuracy** - Conductivity ± 0.01 mS/cm, Temperature ± 0.005°C, Pressure ± 0.05% FS

Micro SV

- **Applications** - Sound velocity measurement for survey, military and academic applications
- **Features** - Compact, hi-tech composite sound velocity sensor
- **Benefits** - Composite sensor provides users with longer intervals between calibrations
- **Accuracy** - Sound velocity ± 0.05 m/s

Micro SV & P

- **Applications** - Sound velocity and pressure measurement for survey, military and academic applications
- **Features** - Compact, hi-tech composite sound velocity and pressure sensor
- **Benefits** - Composite sensor provides users with longer intervals between calibrations
- **Accuracy** - Sound velocity ± 0.05 m/s, Pressure ± 0.05% FS

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Micro SV & T

- **Applications** - Sound velocity and temperature measurement for survey, military and academic applications
- **Features** - Compact, hi-tech composite sound velocity and temperature sensor
- **Benefits** - Composite sensor provides users with longer intervals between calibrations
- **Accuracy** - Sound velocity ± 0.05 m/s, Temperature ± 0.005°C

AML SMART SENSORS

SMART SV

- **Applications** - Sound velocity measurement for survey, military and academic applications
- **Features** - Small size, fast response sensors and high speed sampling rate
- **Benefits** - Ideal for integration into any existing data collection platform
- **Accuracy** - Sound velocity ± 0.05 m/s

SMART SV & P

- **Applications** - Sound velocity and pressure measurement for survey, military and academic applications
- **Features** - Small size, fast response sensors and high speed sampling rate
- **Benefits** - Ideal for integration into any existing data collection platform
- **Accuracy** - Sound velocity ± 0.05 m/s, Pressure ± 0.05% FS

SMART SV & T

- **Applications** - Sound velocity and temperature measurement for survey, military and academic applications
- **Features** - Small size, fast response sensors and high speed sampling rate
- **Benefits** - Ideal for integration into any existing data collection platform
- **Accuracy -** Sound velocity ± 0.05 m/s, Temperature ± 0.005°C

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SV Bar Check System

- **Applications** - Low-cost, high accuracy hand held for sound velocity checks in shallow water
- **Features** - SV Smart, Smart View Data Logger and 20 m cable
- **Benefits** - Can calculate and display average SV in real-time and store multiple profiles in its memory
- **Accuracy** - Sound velocity ± 0.05 m/s

AML PLUS INSTRUMENTS

CTD Plus v2

- **Applications** - High accuracy CTD instrument for long-term monitoring or deep profiling work
- **Features** - 25 Hz sampling, rapid sensor response times, USB download capacity and flexibility to add composite SV sensor
- **Benefits** - Adaptable with surface to deep water capability
- **Accuracy** - Conductivity ± 0.001 S/m, Temperature ± 0.005°C, Pressure ± 0.05% FS

SV Plus v2

- **Applications** - High accuracy SV instrument for long-term monitoring or deep profiling work
- **Features** - 25 Hz sampling, rapid sensor response times and USB download capacity
- **Benefits** - Adaptable with surface to deep water capability
- **Accuracy** - Sound velocity ± 0.05 m/s, Temperature ± 0.05°C, Pressure ± 0.05% FS

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YSI MULTIPARAMETER SONDES AND SENSORS

600 OMS V2

- **Applications** - Short-term *in situ* measurement of turbidity, chlorophyll or rhodamine in conjunction with temperature, conductivity and pressure
- **Features** - Wiped optical sensor, internal battery and memory
- **Benefits** - Small size sensor which is easy to deploy

600 XL & XLM V2

- **Applications** - Short-term monitoring of conductivity, temperature, depth, DO,pH and ORP
- **Features** - Options include internal battery and memory
- **Benefits** - Compact, low-cost multiparameter instruments

6600 V2

- **Applications** - Long-term *in situ* monitoring and profiling of CTD, pH, Chlorophyll, Turbidity, Rhodamine, DO and ORP
- **Features** - Long battery life, memory, wiped optical sensors and up to 200 m deployment
- **Benefits** - Deepest of YSI's multiparameter sondes

6600 EDS V2

- **Applications** - Longer deployments in severe fouling environments
- **Features** - Two optical ports, CTD port, DO, pH/ORP and includes a novel brush wiper
- **Benefits** - Brush wiper keeps all sensors clean in aggressive fouling environments

6820 V2

- **Applications** - Cost-effective sonde for profiling and spot-checking
- **Features** - Monitors turbidity, chlorophyll, conductivity/ temperature, depth, DO and pH/ORP
- **Benefits** - Low-cost versatile system

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6920 V2

- **Applications** - Cost-effective sonde for profiling and spot-checking
- **Features** - Monitors turbidity, chlorophyll, conductivity/ temperature, depth, DO and pH/ORP with onboard memory and battery
- **Benefits** - Low-cost versatile system

650 MDS

- **Applications** - Optional Multiparameter Display System for field use with all YSI 6-Series Sondes
- **Features** - Waterproof IP-7 for reliable field use and optional barometer and GPS interface
- **Benefits** - Log real-time data, calibrate and set-up sondes for deployment and upload data to a PC

Level Scout

- **Applications** - Accurate depth and temperature measurement for any monitoring application
- **Features** - 600,000 data points and level ranges up to 210 m
- **Benefits** - Records readings at user-selected rates and internal batteries provide years of data logging capabilities
- **Range/Accuracy** - 0 – 200 m at ± 0.05% FS

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Accuracy for all YSI Sondes

	Range	Accuracy
Conductivity	0 – 100 mS/cm	± 0.5% of reading + 0.001 mS/cm
Chlorophyll	0 – 400 mg/L	± 0.1% FS
Depth	0 – 200 m	± 0.3m
Rapid Pulse Dissolved Oxygen	0 – 50 mg/L	*circa* 0.2 mg/L
ROX Optical Dissolved Oxygen	0 – 50 mg/L	*circa* 0.1 mg/L
pH	0 – 14 units	± 0.2 unit
Rhodamine	0 – 200 mg/L	± 5% of reading
Temperature	-5 – 50 °C	± 0.15°C
Turbidity	0 – 1000 NTU	± 2% of reading or 0.3 NTU

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ADPs/ADCPs

ADP/ADCP

- **Applications** – Current profiling and wave measurement
- **Features** – Real-time, logging, bottom tracking and GPS input
- **Benefits** – Available in a variety of ranges and configurations suitable to any application
- **Range/Accuracy** – 3 to 180 m, 10 m/s at ± 1% measured velocity

Argonaut - SL

- **Applications** - Side-looking current meter for ports, harbours, platforms, riverbanks and bridge mounting
- **Features** - ADCP, P sensor, T sensor and 4 Gb memory
- **Benefits** - Measures currents, non-directional waves and tides
- **Range/Accuracy** - 0.1 to 120 m, ± 6 m/s at ± 1% measured velocity

Argonaut-SW

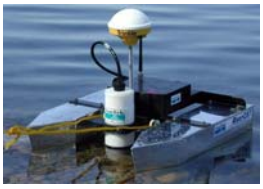
- **Applications** – Designed to monitor flow, water level and velocity in small channels
- **Features** – Automatically adjusts with changing water levels and calculates discharge
- **Benefits** - Measures sites previously thought impossible to measure
- **Range/Accuracy** - 0.2 to 5 m, ± 5 m/s at ± 1% measured velocity

Argonaut - XR

- **Applications** - 10 cell current meter for precise measurement of water velocity
- **Features** - ADCP, P sensor and T sensor
- **Benefits** - Measures currents, non-directional waves and tides
- **Range/Accuracy** - 0.2 to 40 m, ± 6 m/s at ± 1% measured velocity

RiverCat System

- **Applications** – Turnkey river profiler and discharge system
- **Features** - Mini-ADP mounted on a catamaran including P sensor, Bluetooth and DGPS
- **Benefits** - Easily transported, no boat needed
- **Range/Accuracy** - 0.3 to 100 m, ± 10 m/s at ± 1% measured velocity



ADV/VELOCIMETERS

10 MHz ADV

- **Applications** – Measures velocity and turbulence in the laboratory and field
- **Features** – Mono-static Doppler, able to run at speeds of up to 25 Hz
- **Benefits** - Sampling volume of less than 0.25cm^3
- **Range/Accuracy** – 0 to 250 cm/s at ± 1% measured velocity

16 MHz Micro ADV

- **Applications –** Measures velocity and turbulence in the laboratory and field
- **Features** - Mono-static Doppler able to run at speeds of up to 50 Hz
- **Benefits** – Sampling volume of less than 0.09cm^3
- **Range/Accuracy** – 0 to 250 cm/s at ± 1% measured velocity

ADV Hydra

- **Applications** – Autonomous measurement of current and waves with ability to add CTD and turbidity
- **Features** - 5,10,16 MHz ADV, up to 1Gb memory and onboard P sensor
- **Benefits** - Robust, synchronised instrument for measuring turbulence
- **Range/Accuracy** - 0 to 500 cm/s at ± 1% measured velocity

Triton ADV

- **Applications** - Shallow, coastal and surf zone measurement of directional waves
- **Features** - ADV doppler with high accuracy pressure sensor
- **Benefits** - Low-cost wave, tide and current measurement from a single instrument
- **Accuracy** - 0.001 to 4.5 m/s at ± 1% measured velocity

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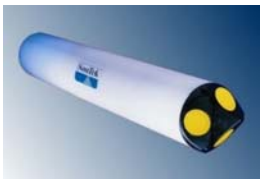
SINGLE POINT CURRENT METERS

Argonaut - MD



- **Applications** - Single point current meter designed for mooring deployments
- **Features** - 6000 m rated acoustic doppler current meter
- **Benefits** - Easily moored for mid-water application
- **Range/Accuracy** - ± 6 m/s at ± 1% measured velocity

HF RADAR

The SeaSonde

- **Applications** – Non-contact surface current and wave measurement system
- **Features** – Three configurations available which produce extremely accurate 2D surface current, velocity and wave maps
- **Benefits** – Land-based equipment, reliable data, flexible software parameters and remote access
- **Spatial Range** – 20 to 220 km, only possible with this system

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SALINOMETERS AND ACCESSORIES

SALINOMETERS

Autosal Salinometer 8400B

- **Applications** - Recognised industry standard instrument for measuring salinity in the laboratory
- **Features** - Large volume high stability temperature control bath with unique continuous flow system
- **Benefits** - The most accurate salinometer available
- **Range/Accuracy** - 0.004 to 76 mS/cm at ± 0.002 Salinity

Portasal Salinometer 8410A

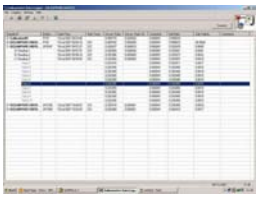
- **Applications** - Portable salinometer for ship-board or laboratory use
- **Features** - Digitised, user interface calculating salinity directly
- **Benefits** - Small and compact for onboard salinity analysis
- **Range/Accuracy** - 0.004 to 76 mS/cm at ± 0.003 Salinity

SALINOMETER ACCESSORIES

Autosal Computer Interface ACI-2000

- **Applications** - Allows automated data collection from the Autosal Salinometer
- **Features** - Connects directly to the Autosal's BCD output for real-time data collection via RS232 output
- **Benefits** - Increases data recording quality and decreases analysis time by removing the need to manually record data
- **Voltage** - 12 Volts dc

Portasal Data Logger



- **Applications** - Allows automated data collection directly from the Portasal Salinometer
- **Features** - Connects to the Portasal's RS232 port and connecting cables provided with Windows software
- **Benefits** - Increases data recording quality and decreases analysis time by removing the need to manually record data

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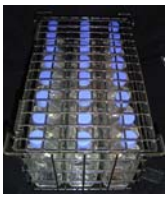
Salinity Bottle and Crates

- **Applications** - Storage of salinity samples
- **Features** - Bottles are type II glass with disposable plastic insert and polypropylene screw cap and crates are plastic coated wire mesh
- **Benefits** - Clear bottles allows analysts to identify samples with high particulates and crates provide secure storage of bottles, helping facilitate faster temperature equilibrium



Salinometer Pump

- **Applications** - Peristaltic pump designed for improved sample handling on Guildline's Salinometers
- **Features** - Three speed, self-priming pump which allows use of inline filters
- **Benefits** - Increases sample throughput by up to 30% and allows remote sampling

THERMOMETERS

Digital Platinum Resistance Thermometer 9540

- **Applications** - Highly accurate, micro processor thermometer for use in the laboratory
- **Features** - IEEE 488 interface, wide temperature measurement range in °C
- **Benefits** - Variable zero set for recorder output providing full width hi-resolution analogue recording
- **Range** - -180°C to 240°C

Precision Dual Channel Thermometer 5150

- **Applications** - Highly accurate, micro processor thermometer for use in the laboratory
- **Features** - Two channel measurement for SPRTs, PRTs/RTDs from 0.25Ω to 100Ω and Thermistors 1 to 10kΩ
- **Benefits** - High accuracy, low-cost, dual channel thermometer
- **Range** - -200°C to 1000°C

SEDIMENT CORERS

Box Corer

- **Applications** - Samples an area of 0.1 m^2 of sediment with minimal disturbance and sample contamination
- **Features** - Unique double shovel and removable box design allows easy access to the sediment for sub-sampling
- **Benefits** - Easily deployed from a deck and removable weights allow the corer to be used with a range of sediment types
- **Weight/Dimensions** - 600 kg and 30 x 30 x 120 cm

Mini-Box Corer

- **Applications** - Quarter scale version of the Box Corer for sampling an area of 0.05 m^2 with minimal disturbance and sample contamination
- **Features** - Constructed of aluminium and stainless steel to reduce it's weight making deployment from small boats easy
- **Benefits** - Removable weights allow the corer to be used with a range of sediment types
- **Weight/Dimensions** - 30 kg and 20.3 x 20.3 x 40.6 cm

Piston Corer

- **Applications** - Robust sediment corer designed for applications relating to geological studies, marine chemistry and sedimentology
- **Features** - Messenger operation, minimal 'down' time and varying core lengths
- **Benefits** - Collects longer, less disturbed and more complete samples than a Gravity Corer
- **Weight/Core Depth -** 1500 kg and up to 18m

Custom Build Corers

OSIL offers a range of custom built gravity corers to suit a wide range of applications, please contact us with your requirements.

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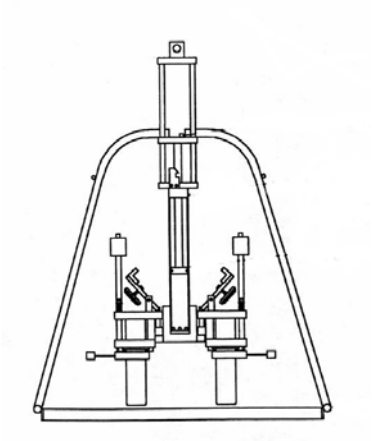
Multiple Corers

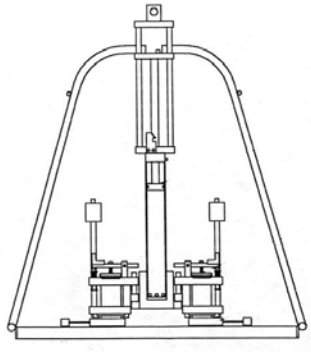
- **Applications** - Simple and reliable way of collecting a truly undisturbed sediment sample for chemical, biological and geochemical applications
- **Features** - Unique hydrostatically damped coring mechanism used to collect the sample
- **Benefits** - Can collect up to 12 cores in a single deployment

Multiple Corer Specifications

	Mega Corer	Maxi Corer	Midi Corer	Mini Corer
Core Tubes	12	8	4	4
External Diameter (mm)	110 or 65	110 or 65	110 or 65	65
Length (mm)	600	600	600	300
Maximum Core Length (mm)	400	400	400	150
Corer Weight (kg)	300	250	185	88



Corer Before Release



Corer After Release

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WATER SAMPLERS

Hydrocamel

- **Applications** - Unique point source automated submersible water sampler
- **Features** - Submersible to 70 m depth, can collect up to 20 samples and Windows based software allows you to set collection criteria
- **Benefits** - Time or event triggered multiple sampling
- **Sample Volume** - 1 litre

Niskin Bottles

- **Applications** - Non-metallic, free-flushing sampler for general water sampling
- **Features** - PVC bottle, latex tubing spring closure (optional stainless steel), clamp bolts for attachments on a cable and mounting blocks for Multisampling System attachment
- **Benefits** - Can be individually or serially attached on a hydrocable and activated by messenger, remote or pre-programmed command
- **Sample Volume** - 1.7 to 20 litres

OIL SPILL DETECTION

Slick Sleuth Oil Spill Detection Station

- **Applications** - Non-contact oil and hydrocarbon monitoring and detection on water or land
- **Features** - Real-time monitoring system with alarm and data transmission function
- **Benefits** - Easy installation and virtually no maintenance
- **Range** - 0.2 m to 5 m above surface target

ACOUSTIC RELEASES

Lightweight Release Transponder (LRT)

- **Applications** - Versatile release ideal for shallow, light-weight mooring applications
- **Features** - Both transmit and receive functions and optional rope canister
- **Benefits** - Compact and low-cost release with up to 52 month battery life
- **Depth/Load** - 500 m, 125 kg

ORT/DORT

- **Applications** – Rugged and reliable acoustic release ideal for deep water deployments
- **Features** – Spring-assisted release mechanism suitable for long deployments
- **Benefits** - Compact size allows easy installation onto subsea frames or AUVs
- **Depth/Load** - 2000 or 6000 m, 1275 kg

Heavy Load DORT

- **Applications** – Rugged and reliable acoustic release ideal for heavy, deep water deployments
- **Features** – Spring-assisted release mechanism suitable for long deployments
- **Benefits** – Available in different housing lengths
- **Depth/Load** – 7000 m, 2500 kg

P-DORT

- **Applications** - Heavy duty release suitable for deep water deployments
- **Features** - Automatic release function at depth and conventional release mode, suitable for deployments of 12 months
- **Benefits** - Reliable release mechanism and corrosion resistant
- **Depth/Load** - 7000 m, 2500 kg

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SeaLion Remote Operated Vehicle

- **Applications** - Mobile underwater camera system ideal for pipeline work, river and ocean searches and hazardous site inspection
- **Features** - Six motor propulsion which operates at up to 3 mph
- **Benefits** - More powerful version of the SeaOtter, reduces deep water search time and allows you to locate and video target from a vessel
- **Depth Rating** - 150 m (optional 300 m)

SeaOtter Remote Operated Vehicle

- **Applications** - Mobile underwater camera system ideal for pipeline work, river and ocean searches and hazardous site inspection
- **Features** - Four motor propulsion which operates at up to 2 mph
- **Benefits** - Reduces deep water search time and allows you to locate and video target from a vessel
- **Depth Rating** - 150 m

YSI AUV Mobile Sensor Platform

- **Applications** - Allows wide area survey without a work boat or associated staff at fixed depth or undulating missions
- **Features** - Measures up to 10 water quality parameters, backed up by photo documentation
- **Benefits** - Low running costs, robust, simple to use and Li-Ion batteries offer long run-time and quick recharge
- **Depth Rating/Endurance** - 60 m and 12 hours at a speed of 3 kts

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UNDERWATER CAMERAS AND VIDEO

DV-1 Dropped Video

- **Applications -** Ideal for site checking and provides a variety of underwater searches
- **Features -** High resolution camera, two 100 watt quartz halogen lights and 45 m cable
- **Benefits -** Quick and easy low-cost site checking
- **Depth Rating -** up to 300 m

MC-1 Mini Camera

- **Applications** - Lightweight, underwater camera system that can be easily mounted
- **Features** - High resolution camera with 45 m cable
- **Benefits** - Ideal for applications where low-cost and small size are essential
- **Depth Rating** - up to 150 m

PIC-1 Pipeline Inspection Camera

- **Applications** - AUV for long pipeline inspections
- **Features** - Self-contained video camera, underwater lighting, batteries and computer system
- **Benefits** - Records 2.7 mile pipe in one trip and ‘delayed start’ allows almost any length of pipe to be surveyed in multiple trips
- **Depth Rating** - up to 150 m

TOV-1 Towed Vehicle

- **Applications** - Large scale underwater searches
- **Features** - High resolution camera, wide angle lens, corrosion proof housing, two 100 watt halogen lights and 45 m cable
- **Benefits** - Compact system for rapid deployment
- **Depth Rating** - up to 150 m

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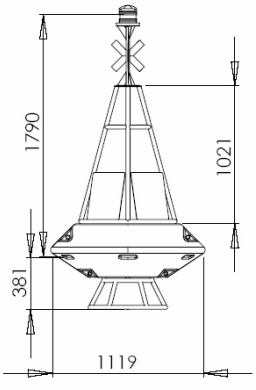
DATA BUOYS

OSIL Data Buoys

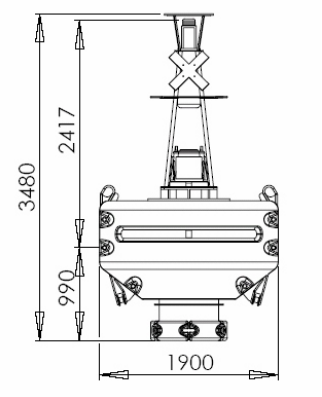
- **Applications** - Dredge monitoring, in-shore, coastal, off-shore and metocean
- **Features** - Range of adaptable, rotationally moulded polyethylene hulls, around a galvanised steel central structure
- **Benefits** - Cost-effective, robust data platforms which can be designed specifically to the applications needs

OSIL Data Buoy Specifications

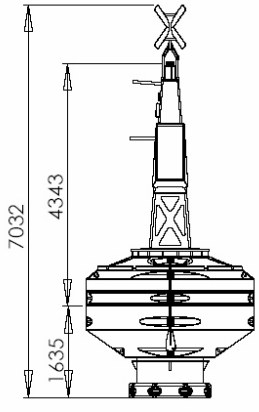
	Shearwater	Fulmar	Skua	Albatross
Diameter (m)	1.2	1.9	2.6	3
Buoyancy (kg)	200	2000	7000	9000
Weight (kg)	28	540	1500	1850
Height (m)	1.8	2.4	4	4.3
Ballast Weight (kg)	-	240	600	800



Shearwater



Fulmar



Albatross

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EMM68 Dredge Monitoring Buoy

- **Applications** – Ideal for monitoring around dredging or civil engineering sites
- **Features** – Low-maintenance and supports a variety of instrumentation
- **Benefits** – Deployable from shore, Remote telemetry, Quick response in emergencies

EMM700 Water Quality Monitoring Buoys

- **Applications** - Designed for long-term monitoring in lakes, rivers and coastal applications
- **Features** – Heavy duty hull and stainless steel construction
- **Benefits** – Extra buoyancy supports a wider range of equipment
- **Diameter/Buoyancy** – 120 cm and 320 kg

EMM2000 Coastal Monitoring Buoy

- **Applications** - Ideal for harsh monitoring conditions with significant wind and waves activity
- **Features** - Heavy duty hull and stainless steel construction
- **Benefits** - Large, high volume hull capable of surviving in a harsh environment
- **Diameter/Buoyancy** - 185 cm and 910 kg

EMM350 PISCES Pontoon for High Speed Environments

- **Applications** – Ideal for coastal, estuary and river monitoring
- **Features** - Sonde standpipe is retractable for transportation and towing
- **Benefits** – Designed to cope with currents up to 12 knots

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DATA LOGGERS

Campbell Data Logger

- **Applications** - Industry standard logger for scientific, commercial and industrial applications
- **Features** - 100% compatibility with any sensor on the market and up to 4 Mb memory
- **Benefits** - Cost-effective data storage and telemetry solution

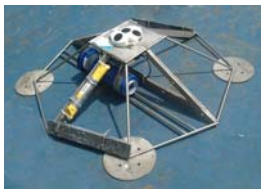
YSI EcoNet

- **Applications** - Provides remote data to multiple users via a dedicated website
- **Features** - Analogue, digital, RS232 and SDI-12 inputs, 32 Mb memory and configurable website
- **Benefits** - Saves time and money by delivering data direct to multiple users

SUBSEA FRAMES

Seabed Mounting Frame

- **Applications** – For sub-sea mounting of ADCPs, CTDs, ADVs, turbidity sensors and more
- **Features** - 316 stainless steel, acoustic release, retrieval buoy and low profile anti-trawl design
- **Benefits** - Robust frame built to the application's needs
- **Size** - Sizes from 1m^2 and 300mm high



MOORING SYSTEMS

Custom Moorings

OSIL offer custom build mooring systems for a wide range of applications, please contact us with your requirements.

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UNDERWATER TOW VEHICLES

MiniBAT FC60

- **Applications** - Lightweight towed vehicle with undulating wings, designed for use with a variety of data collection instruments
- **Features** - Tow body, onboard control electronics, onboard pressure sensor, remote adjustable wings, graphical interface software, control box and a 7-conductor Y-cable

- **Benefits** - Allows rapid profiles to be collected at a much quicker rate than traditional data collection methods, saving time and money
- **Depth/Speed** - up to 60 m and 1 to 10 kts

MiniBAT FW100

- **Applications** - Lightweight towed vehicle with fixed wings, designed for use with a variety of data collection instruments
- **Features** - Tow body, user adjustable fixed wings and tow cable with 8 conductors

- **Benefits** - Allows rapid profiles to be collected at a much quicker rate than traditional data collection methods, saving time and money
- **Depth/Speed** - up to 150 m and 1 to 20 kts

V-Fin Depressors

- **Applications** - Stable, lightweight platform used to deploy instruments from a moving vessel
- **Features** - Available in standard sizes or can be customised for specific applications, constructed of rugged fibreglass and stainless steel ensuring durability

- **Benefits** - Can be flown at a variety of depths by adjusting tow speed and cable length

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METEOROLOGICAL INSTRUMENTS

Barometric Pressure Sensor OMC-506

- **Applications** – High precision sensor for land based Met systems, offshore platforms and Metocean buoys
- **Features** - 16 bit stable piezoresisitive transducer
- **Benefits** - Robust design for the marine market
- **Range/Accuracy** - 800 to 1100 hPa at 0.05% FS

MultiMet Probe OMC-410

- **Applications** - Multiparameter weather measurement system suited to industrial, coastal and marine monitoring
- **Features** - Wind speed and direction, temperature, humidity, pressure and optional internal data logger
- **Benefits** - All-in-one solution for the hardest environments
- **Accuracy** - Wind Speed: ± 2 %, Wind Direction: ± 3˚,
  Temperature: < ± 0.3˚C,
  Humidity: 23˚C < ± 1.5% RH 10-95%,
  Barometric: 0.2 hPa

Rain Gauge OMC-210

- **Applications** – High precision and reliable rain gauge
- **Features** - Catchment funnel and gold-plated bucket
- **Benefits** - Designed to work under extreme conditions
- **Bucket Size** - 0.1 mm or 0.2 mm

Temperature Sensor OMC-443

- **Applications** - Highly accurate temperature sensor for land or ship based systems
- **Features** - Built in amplifier with 4 to 20 mA output, requires radiation shield
- **Benefits** - Measuring range of -40 to +60˚C
- **Accuracy** - < ± 0.3˚C

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Temperature and Humidity Sensor OMC-406

- **Applications** - Highly accurate and precise combined temperature and humidity sensor
- **Features** - Two 4 to 20 mA outputs from a single probe, requires radiation shield
- **Benefits** - Humidity range: 0 to 100% RH, Temperature range: -40 to +60˚C
- **Accuracy** - Humidity at 23˚C < ± 1.5% RH 10-95%, Temperature < ± 0.3˚C

Wind Speed and Direction Sensor OMC-160

- **Applications** - Combined inline wind speed and direction sensor
- **Features** - Stainless steel body with cup and vane sensors
- **Benefits** - Robust, corrosion resistant and easy to install
- **Accuracy** - Speed < 2% typical, Direction < 3˚

Wind Speed and Direction Sensor-IS OMC-150

- **Applications** - Intrinsically safe combined inline wind speed and direction sensor
- **Features -** Stainless steel body with cup and vane sensors
- **Benefits** - Robust, corrosion resistant and easy to install
- **Accuracy** - Speed < 2% typical, Direction ± 3˚

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DISPLAY UNITS

Meteorological Display OMC-938

- **Applications** - Specifically designed to display wind speed and direction and four other parameters
- **Features** - Multi-purpose display, compatible with multitude of sensor outputs
- **Benefits** - Display in m/s, knots, mph, km/h or Beaufort and selectable intervals

Multi-Functional Display OMC-934

- **Applications** - A DIN 144 instrument for indicating four different parameters
- **Features** - Multi-purpose display, compatible with multitude of sensor outputs
- **Benefits** - Interface available for most common sensors

Wind Display OMC-138

- **Applications** - Digital combined display for wind speed and direction suited to the meteorology market
- **Features** - Easy read out of wind information via numerical display and LEDs
- **Benefits** - Display in m/s, knots, mph, km/h or Beaufort and selectable intervals

Wind Display OMC-139

- **Applications** - Digital combined display for wind speed and direction suited to the marine market
- **Features** - Easy read out of wind information via numerical display and LEDs
- **Benefits** - Display in m/s, knots, mph, km/h or Beaufort

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CALIBRATION STANDARDS – SALINITY STANDARDS

IAPSO Standard Seawater

Standard Seawater, as approved by the International Association for Physical Sciences of the Ocean (IAPSO), is the only transfer standard for Practical Salinity that is recognised by all the major oceanographic bodies.

- **P-Series**

Normal Standard Seawater, (S=35) is accurately calibrated in electrical conductivity ratio (K15) and in salinity. This is the main single-point calibration standard for salinity measurement.

- **10L-Series**

Low Salinity Standard Seawater, (S=10) is accurately calibrated in conductivity ratio for the temperature range 15°C to 30°C. This standard provides an additional calibration point for low salinity work, e.g. Baltic Sea.

- **30L-Series**

Low Salinity Standard Seawater, (S=30) is accurately calibrated in conductivity ratio for the temperature range 15°C to 30°C. This standard is used in conjunction with P-Series to determine instrument offset and linearity at lower salinities.

- **38H-Series**

High Salinity Standard Seawater, (S=38) is accurately calibrated in conductivity ratio for the temperature range 15°C to 30°C. This standard is used in conjunction with P-Series to determine instrument offset and linearity at higher salinities, e.g. Mediterranean Sea.

- **Linearity Pack**

When analysing samples at salinities away from 35, it is important to know the salinometers' offset across the working range to improve data quality. Developed to enable the linearity of instruments to be checked more easily, this pack contains;
4 x P-Series, 2 x 38H-Series, 2 x 30L-Series and 2 x 10L-Series, complete with full instructions.

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NUTRIENT STANDARDS

Freshwater Nutrient Standards Kit (FNSK)

For the preparation of non-marine working standards, this kit contains concentrates of Nutrient Standard Solutions (50ml each of phosphate, nitrite, nitrate, silicate, ammonia) and de-ionised water (2 x 1 Litre) for the preparation of fresh standards. Each kit contains full instructions.

Low Nutrient Seawater (LNS)

Seawater matrix salts affect the kinetics and colour intensities of the colorimetric methods widely used in the determination of dissolved nutrients. In order to eliminate these salt effects, it is essential that working calibration solutions are prepared in a seawater matrix. Low Nutrient Seawater (LNS) can be used for the preparation of fresh standards, as a refractive-index blank, or as wash solutions. For lower accuracy work, LNS may also be used to define the zero-concentration calibration points.

LNS has defined maxima for phosphate, nitrite, nitrate and silicate. Owing to atmospheric effects, the ammonia concentration (although low at the time of bottling), cannot be guaranteed. LNS is available in packs of 10 x 1 Litre bottles.

Marine Nutrient Standards Kit (MNSK)

Calibration of analytical systems for nutrients in seawater requires standards to be prepared in seawater. This kit contains concentrates of Nutrient Standard Solutions (50ml each of phosphate, nitrite, nitrate, silicate, ammonia) and Low Nutrient Seawater (2 x 1 Litre) for the preparation of fresh standards. Each kit contains full instructions.

Nutrient Standard Solutions (NSS)

Concentrated solutions of phosphate, nitrite, nitrate, silicate and ammonia are available for the preparation of working standards. NSS should be diluted with Low Nutrient Seawater (LNS) or de-ionised water to prepare working standards for the measurement of nutrients in seawater/freshwater samples respectively.

NSS Concentrations: Phosphate 100µM, Nitrite 100µM, Nitrate 1000µM, Silicate 1000µM, Ammonia 10000µM.

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OTHER STANDARDS

Iodate Standards

These high precision standards are available for the laboratory determination of dissolved oxygen in seawaters. The standards comprise 0.01 Normal Potassium Iodate solutions which are used to standardise the thiosulphate solution in the widely used Winkler titration method.

Iodate standards are supplied in packs of 5 x 100ml and 10 x 100ml brown glass bottles.

Atlantic Seawater Conductivity Standard

This filtered natural ocean water has a salinity of 35. It may be used for a wide range of applications, including; field probe calibration/checks, chemical analysis, particle studies and any other applications which require open-ocean seawater. The label value is quoted in salinity and in specific conductance (mS/cm) with a confidence of ± 0.2%.

Atlantic seawater is available in packs of 4 x 5L bottles or 10 x 500ml bottles.

Performance Evaluation (PE) Standards

Designed to be used as part of ongoing quality assurance programmes, these uniquely coded samples are supplied to the laboratories for analysis. After analysis the laboratory-determined value is sent to Ocean Scientific, who issue a certificate showing the true value, the analysts' value and any error. PE Samples for salinity, phosphate, silicate, nitrite, nitrate and ammonia are available.

RENTAL EQUIPMENT

A wide range of OSIL equipment is available to rent, here is a selection:

MULTIPARAMETER SONDES, CTDS AND SVS

6600 Multiparameter Sonde

SMART SV & P

SV Plus v2

SEDIMENT CORERS AND WATER SAMPLERS

Box Corer

Mini-Box Corer

Square Box Gravity Corer

Niskin Bottle

UNDERWATER TOWED VEHICLES

MiniBAT FC60

MiniBAT FW100

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APPLICATION NOTE

MONITORING HABs IN SPAIN'S RIA DE VIGO WITH OSIL's FC60 MINIBAT

Situated in Galicia in the north west of Spain, the Ria de Vigo is a river valley that has sunk tectonically and has been flooded by the sea. The Ria is connected to the open sea via a narrow northern channel and a wider and deeper southern channel. Due to the low tidal Circulation, the Ria de Vigo can be susceptible to harmful algal blooms (HABs), which can kill fish, contaminate seafood with toxins and fundamentally alter whole ecosystems.

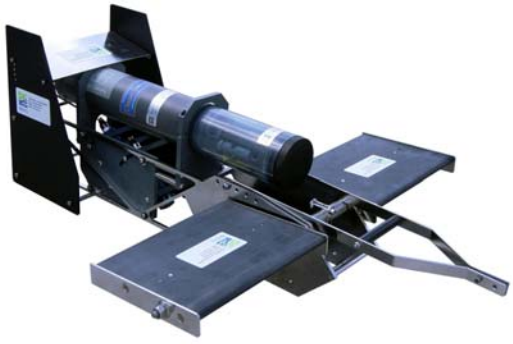
The Ria de Vigo

Due to the potential impact of HABs a project was funded by the Xunta de Galicia to investigate the high productivity and the sporadic occurrence of HABs in the Ria de Vigo.

The main interest was in an invasion of warm downwelling waters that seem to coincide with rapid developments of HABs at various times of the year. The project was designed to closely examine this phenomenon using spatial and temporal datasets collected using OSIL's lightweight tow vehicle, the MiniBAT FC60.

The field data was collected in two phases, the first in September 2006 during the change of water conditions from summer upwelling to winter downwelling, which is when harmful algal blooms often occur. The second phase will take place in June 2007 during conditions of typical summer upwelling to form a contrast with the conditions of the first phase. Dr Barton, the project's co-ordinator explains, *"our observations will be crucial in interpreting the dynamics of the HABs that coincided with the warm water inflow."*

The field data was collected using a range of instruments, including the MiniBAT FC60 which was fitted with a variety of apparatus to measure chlorophyll and turbidity, amongst other parameters. The MiniBAT FC60 allows rapid profiles to be collected behind a vessel and it eliminates the need to continuously stop and take profiles as in traditional data collection. It also gave the team time to cover the whole Ria at a much quicker rate and better spatial resolution was achieved.



OSIL's MiniBAT FC60

The MiniBAT FC60 was the ideal instrument to use for this type of investigation as Dr Barton explains, *"we chose the MiniBAT FC60 as the towed vehicle as it is the most capable of carrying a flexible payload and it is well proven in the field."*

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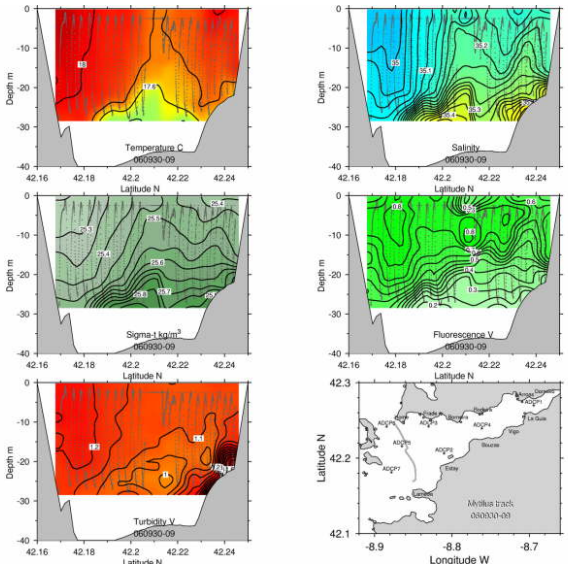
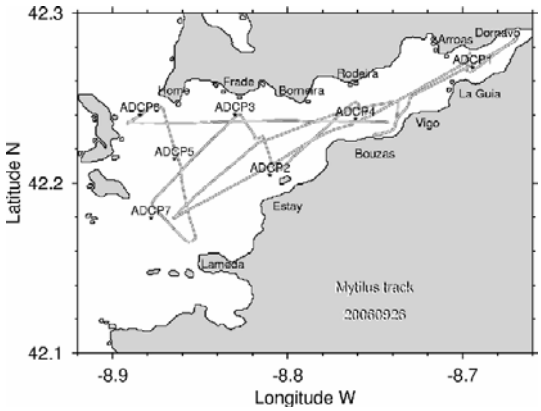
MONITORING HABs IN SPAIN'S RIA DE VIGO WITH OSIL's FC60 MINIBAT

The FC60 MiniBAT was fitted with an AML Micro CTD to measure conductivity, temperature and pressure and a Wet Labs WetStar to measure fluorescence plus an OBS 3 to measure turbidity. By monitoring these parameters spatially and temporally in the ria the team were able to identify the conditions that most favoured the HAB. Dr Barton clarifies *"with the back up of the experienced OSIL team, we were able to maximise the use of the system and succeeded in capturing previously unseen aspects of the inflow."*



Data collected with the MiniBAT on 30th Sept 2006

The versatility of the MiniBAT FC60 was a great advantage to the team as it offered them the possibility of undulating the vehicle between the sea surface and a depth of 30 metres, the MiniBAT FC60 can reach 60 metres where required. In addition the MiniBAT FC60 can be towed at speeds of up to 10 knots in suitable circumstances, allowing huge areas to be profiled in a day. The team were able to control the profiling of the vehicle automatically using the MiniBAT's FC60 dedicated software on the boat.



The route taken with the FC60 MiniBAT on 26th Sept 2006

The team cycled the MiniBAT FC60 to a depth of 30 metres every few hundred meters and, because the sensors were taking samples every 25 seconds, *"a dense array of data was obtained which provided great detail on the parameter distributions,"* Dr Barton explains, *"overall the MiniBAT has proved a huge success for the HABs project."*

In summary the MiniBAT FC60 offers the perfect solution to collecting profiled spatial data sets, quickly and efficiently using a wide range of equipment and sensors.

For further information on the MiniBAT please contact:

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APPLICATION NOTE

LOW-COST DREDGE MONITORING SYSTEM IN ONE WEEK

With the wide range of instruments that OSIL represent, they pride themselves in being able to provide complete solutions to the many marine and environmental problems that their clients present them with. When GEMS, Geotechnical Engineering and Marine Surveys, approached OSIL with an urgent requirement for a low cost, dredge monitoring system that they needed to be ready to ship within a week, their reaction was no different.

OSIL decided that with the short time scale and low cost specification, YSI's EMM375 Compact Monitoring Buoys would be the ideal solution to GEMS problem. OSIL offer a series of buoys which range from a buoyancy of 175lbs to 2000lbs. The different features attributed to each buoy means that whatever the requirements, OSIL can deliver a buoy to suit the application. Each buoy provides mounting for telemetry and data acquisition electronics, meteorological sensors, solar panels and antennae and much more.

YSI EMM375 Low-Cost Buoy in Fos Sur Mer Port

OSIL selected two YSI EMM375 Buoys as the solution for GEMS as they are specifically designed for monitoring around dredge sites and are very reasonably priced. The buoys are unaffected by chemicals, solvents and fuel in such situations and are very robust. They can be fitted with an array of instruments and with a small diameter of nominally 1 meter they are easy to transport and install for rapid deployment.

The GEMS buoys

The buoys were delivered to OSIL who then performed a turnaround within 24 hours, which involved fitting the buoy with waterproof housing containing electronics, a YSI multiparameter sonde, batteries and a warning lamp. Richard Davies of GEMS verifies, *"we are very happy with the turnaround OSIL were able to provide."*

The installation of the buoys was performed by GEMS in the Fos Sur Mer Port in France. The buoys were installed to enable both background and real-time turbidity data to be collected around a dredge barge. This is in line with the port authorities dredge compliance monitoring requirements. A YSI 6600 Sonde was used to monitor the turbidity, temperature and salinity of the water just below the surface.

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LOW-COST DREDGE MONITORING SYSTEM IN ONE WEEK

The data collected by the sonde was telemetered back in real-time providing the client, Dredging International, with real-time data via both the internet and, more importantly, SMS text message directly to the barge. This system enables the levels to be monitored and if they are seen to rise above the background of 50mg/l then the dredging operation can be temporarily halted to keep in line with the legislation.

One of the buoys in Fos Sur Mer Port

As well as observing the dredging effects, the buoys can also be used for general environmental protection monitoring. In this case they are also being used to monitor around commercially sensitive oyster beds situated in the port. The first buoy was positioned near the dredging operations, while the second was deployed next to the oyster beds ensuring that they were not affected by the dredging activity.

Richard Davies explains why GEMS looked to OSIL to provide the instant solution for their client, *"we work closely with OSIL and enjoy a strong working relationship."* At this current stage GEMS can report that they have a *"very happy client"* and that *"the buoys have been very cost-effective, allowing us to add value by fitting out for this project."*

For further information on OSIL's capabilities and range of data buoys please contact:

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APPLICATION NOTE

ARGONAUT-SL USED IN BERTH MANAGEMENT SYSTEMS

One of Strainstall UK Limited's primary marine safety systems is their Berth Management System, which is used chiefly for the docking of VLCCs (oil tankers) and LNG (liquid natural gas) carriers. The Berth Management System provides assistance to vessels on their approach to the berth and during mooring by monitoring the conditions of the sea and surrounding area to ensure the complete safety of the vessel. The system undertakes continuous surveillance of the mooring and vessel related parameters, such as speed and position of the vessel on approach, weather conditions and oceanographic parameters.

An example of a berth vessel

A system such as Strainstall's needs to be in place to ensure that the docking operation is performed within defined environmental limits and strict approach speed limits, as large impact on the fenders and jetty equipment may cause considerable damage. In relation to this, environmental monitoring of parameters such as current and tides needs to be undertaken as the conditions will affect the manoeuvring of the ship during berthing.

Strainstall use SonTek's Argonaut-SL sideways facing ADCP in their Berth Management Systems

The Argonaut-SL range

to monitor the current present at the time of berthing. SonTek recognised the need to measure water velocity and level in open channels during applications such as this and the SL was their solution. The SL, known as the Side-Looker, is intended for side mounting on bridges, canal walls and riverbanks, ideally on an existing structure. It is available in three models all with different sampling ranges, the SL3000's being 0.1m - 5m, the SL1500 0.2m - 20m and the SL500 reaching up to 120m. The assortment of ranges mean that the SL is suited to a variety of channels from narrow rivers to wide ports.

The Argonaut-SL's narrow beam width, combined with unmatched side lobe suppression, provides the superior acoustic directivity necessary for achieving maximum horizontal range, which is free of interference from boundaries and obstacles. The SL comes with the Windows software packages ViewArgonaut and FlowPack, but it is also compatible with other software, which Strainstall illustrates by using it with their Berth Management software.

The right position for the Argonaunt-SL needs to be ascertained for each Berth Management System set up by Strainstall so that sufficient data can be provided. To achieve the most accurate results in

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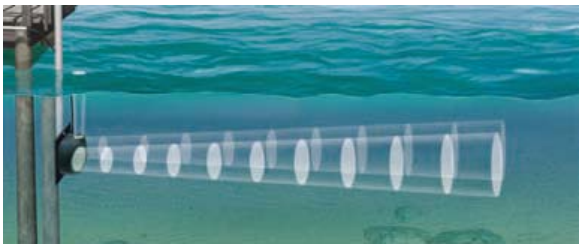
ARGONAUT-SL USED IN BERTH MANAGEMENT SYSTEMS

this application, Strainstall considered the installation, survivability, maintenance and cost constraints of the SL and deduced that the berth itself would be the most appropriate structure for the sensor. From this position the SL can monitor the current as the vessel is approaching the berth which is the primary operational requirement and when current measurement is most critical.

Within the berth, Strainstall must also take practical restraints into consideration. The mooring dolphins can have an affect on the water flow into the berth and, therefore, can affect the data recorded. From this Strainstall have deduced that whenever possible the SL should be deployed from a catwalk, which is a walkway that links the mooring dolphins. To install an Argonaut-SL onto a catwalk a deployment frame or support is needed which must be designed to suit the structural design of the catwalk, allowing for easy deployment and recovery. The frame will need to be light enough so that it can be lifted for cleaning and be stiff enough to avoid vibration in strong currents.

A typical deployment frame

If deploying the SL on a catwalk the signal cable can be routed to a junction box on the catwalk which is then connected to a central control room via fixed site cabling. A PC is located in the control room running Strainstall's Berth Management software which integrates the SL's data with the other measured parameters.



An example of the SL in use

Mr Dave Vodden, Engineering Manager at Strainstall, explains that the Argonaut-SL was chosen because, "being an ADCP, marine fouling is far less of a problem than with impellor type current meters." This means that time can be saved by only having to clean the instrument every three months.

For further information on the Argonaut-SL please contact:

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APPLICATION NOTE

YSI SONDES USED ON FERRIES IN WATER QUALITY MONITORING

Ferries crossing the Neuse River and Pamlico Sound in North Carolina have been equipped with a water quality monitoring system for continuously collecting water samples and water quality data as part of the state-funded FerryMon program. The Neuse River Estuary and surrounding waters are nurseries for a variety of important fish species so researchers need to be able to predict how this ecosystem will respond to water quality changes so the state agencies responsible for water quality and fisheries habitat can take quick action as necessary.

North Carolina followed Finland's ferry-monitoring Baltic Sea Algaline Project and installed systems on three ferries that travel in the Neuse River vicinity. The heart of the monitoring system is the YSI 6200 Data Acquisition System, interfaced with the simple, small and durable YSI 6600 multiparameter monitoring sonde, which was customized for FerryMon.

YSI's sensors measure surface water temperature, salinity, dissolved oxygen, pH, turbidity and chlorophyll a fluorescence (algal biomass). *"YSI was certainly a pioneer in getting multi-probe sensors in a sonde that not only is sensitive but also compact,"* Hans Paerl of the University of North Carolina explains. Global Positioning System (GPS) time-stamps the data collected by the sensors and stores it in the 6200 system. It is then sent nightly from the ferry by mobile phone to a laboratory where it is processed and made available to the NC-DENR, U.S. EPA, NOAA, local water quality and fisheries agencies, researchers and schools.

During the ferry's journey, the system also collects surface water samples, documenting where and when they were taken. *"A refrigerated automatic water sampler stores samples for later study in the lab. A technician then travels onboard the ferry once every few days to collect samples and program the sampling unit,"* Paerl explains.

Hans Paerl with a YSI 6600 Multiparameter Sonde

Underway monitoring is capturing more attention from the scientific community as a reliable, inexpensive way to collect a wealth of water quality data that otherwise would be too impractical and expensive to collect. Unlike other underway monitoring systems, which often need researchers' ongoing attention and frequent maintenance, YSI's sonde operates self-sufficiently. Maintenance is performed every 10 to 14 days by a technician, who simply swaps the sonde on each ferry with a newly calibrated one.

By installing these systems on ships of opportunity it is possible to create accurate, high-resolution baseline datasets to observe how water quality, water conditions and ocean life change in the same area over long periods of time.

During this programme, FerryMon has documented variations in estuary and coastal waters and detected certain water quality issues that otherwise would not have been captured. In spring 2007, FerryMon helped reseachers identify a large dinoflagellate bloom, which can trigger low oxygen, toxicity and kill fish. *"The ferries picked up this bloom and raised the red flag,"* Paerl said. *"An algal bloom may only be a few*

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YSI SONDES USED ON FERRIES IN WATER QUALITY MONITORING

hundred meters across, so we might not catch it with standard monitoring. Ferry monitoring is proving to be an incredibly good tool for monitoring and assessing long-term decadal changes, or changes due to hurricanes, sea level rise and global warming."

FerryMon data has helped researchers learn how different storms affect water quality in Pamlico Sound, and how long these impacts last. Shortly after the first ferry was instrumented in November 2000, it documented the lingering effects of Hurricane Floyd, which struck the area in September 1999. *"Elevated chlorophyll a levels and changes in species of algae were seen 18 months later,"* Paerl said.

The Carteret, one of the three NC-DOT ferry fitted with a water quality monitoring system

Since then, several 'wet' and 'dry' storms have hit the North Carolina coast such as Hurricane Isabel in 2003 which was a large, windy, 'dry' storm that churned the waters but delivered little rainfall, therefore, little runoff. *"FerryMon saw elevated chlorophyll a and turbidity right after this hurricane, but the system recovered quickly,"* Paerl noted. However, FerryMon found that tropical storm Ernesto and other 'wet' coastal storms that brought significant rainfall, produced longer lasting effects. *"We saw more freshwater and more nutrients carried downstream to the open sound system,"* Paerl said.

Researchers used to make assumptions about the effects of hurricanes on water quality, *"now we can reliably document these effects for the state, which maintains a database for looking at issues such as climate change, long-term impacts and increased frequency of hurricanes,"* Paerl explains.

Since 2000, FerryMon has uncovered many water quality problems, such as toxic algal blooms, changes in water clarity and excessive nutrient loadings, that could not have been detected by standard water quality monitoring techniques. They have eliminated the need for monitoring groups to charter research vessels for expensive sampling cruises, and minimized the need to set up numerous automatic monitoring stations on buoys, both of which can collect data only in limited areas. The programme has shown that an automated, continuous water quality monitoring program can be implemented on ships of opportunity for a relatively modest investment.

For further information on YSI's 6600 and other instruments please contact:

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APPLICATION NOTE

CODAR'S HF RADAR SYSTEM HELPS SPANISH AUTHORITIES MONITOR THEIR COASTLINES

In 2002, Spain witnessed the Prestige oil tanker sink off its north-west coast and it acted as a wake up call highlighting the importance of preparing for such a crisis. It led to Spain's government prioritising the improvement of maritime protection and coastal management proceedings.

Puertos del Estado is part of the Spanish Ministry of Public Works and as well as supporting the development of technologies, they operate various oceanographic monitoring networks for measurement and prediction of physical variables such as waves, sea levels and point currents. One of their primary functions involves finding new technology which could help increase the safety of navigation and the efficient management of Spain's harbours.

The HF Radar is identified worldwide as an essential component for improving the monitoring of coasts and, as Codar Ocean Sensors' SeaSonde currently accounts for 80% of the worlds operational HF Radar systems it is an obvious place for anyone interested in monitoring waves and current to start.

A Codar HF Radar System

An agreement was signed in April 2005 by the Spanish Ministry of Public Works, which has responsibility in Maritime Security and Pollution

The Silleiro Site In Galicia

in the sea, to install two Codar HF Radar current and wave monitoring systems in the Galician Rias Baixas coast.

Codar's SeaSonde combines state of the art technology with reliability and convenience, providing it's customers with the only solution for their ocean observation needs. It is the only system that can offer ranges of up to 200km with a proven track record, and will provide years of real-time data over large coverage areas. It is able to provide surface current and wave maps and will deliver quality data, while being easy to maintain due to positioning on land. Codar can provide between two and fifty stations for a system based around a central site.

The purpose of the two systems in Galicia was to:

- Validate the reliability and flexibility of the radar technology for real applications.
- Validate the quality of the data in hard topographic and environmental surroundings.
- Run trajectory spill models with radar data input.

The locations of the two systems are the lighthouses in Finisterre and Silleiro, making a distance of 92km between the radar systems. The Finisterre site is well suited to such a system because of the SeaSonde's flexibility and Finisterre's existing buildings. It is important to Codar to have as little influence on the surrounding environment as possible and as

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CODAR'S HF RADAR SYSTEM HELPS SPANISH AUTHORITIES MONITOR THEIR COASTLINES

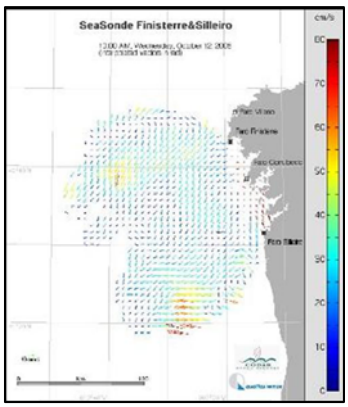
Finisterre is a tourist site is was a main priority. At the site it was possible to position the transmission antenna inside the lighthouse's fenced area, laying the cables through existing lanes. The receiving antenna could then be placed on an existing mast, which conveniently positioned the two antenna over one wavelength apart. Both the antenna at the Silleiro site were placed on a platform at a distance of 100m from the sea.

The radars send out a signal every second and the reflected spectre is then analysed by the computers installed in the respective lighthouses. Current maps and wave information are generated every 20 minutes and data is archived every hour. The central server is connected online to a second server at Puertos del Estado who then make the data available to the public online at www.puertos.es.

The Lighthouse at Finisterre

The Galicia experience has shown that Codar's SeaSonde can provide reliable, high quality data and that it is ready to be integrated into operational oceanography monitoring schemes. The radars have shown a reliability higher than 99.5% in the three month's since they have been installed.

After careful analysis and application studies conducted by Merchant Marine it was concluded that the SeaSonde data could provide a significant improvement to emergency planning and response in the area. Merchant Marine have supplied



A Current Map from the Radar

funding for continued operations, making the SeaSonde units permanent deployments in Galicia.

For further reading on the initial SeaSonde deployment in Galicia and the results, please refer to the following publication which is available to download from both OSIL and CODAR's websites:

Comparison of CODAR SeaSonde HF radar operational waves and currents measurements with Puertos del Estado buoys. Final report of Puertos del Estado, Spain, March 2006. Marta Alfonso, Enrique Alvarez and Jose Damian Lopez.

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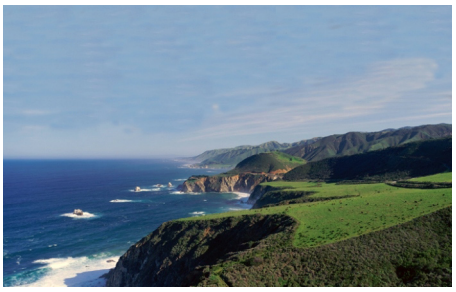

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