

Ocean Meteorological Marine systems for:

- **Ports and Harbour**
- **Fish farming and fishing authorities**
- **Climatologic authorities**
- **Research**
- **Regional Tourism directorates etc.**





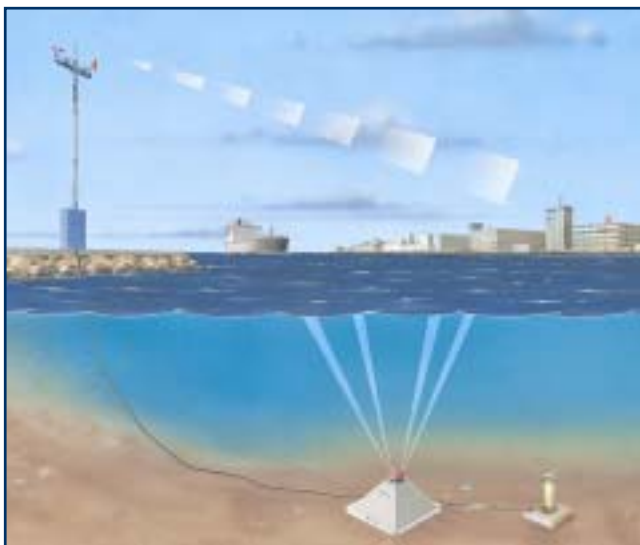
Oceanographic and Meteorological Systems

Oceanographic and Meteorological systems aid in the development of activities that improve knowledge of marine climate, which is of vital importance to e.g.

- Ports and harbours
- Fishing sectors
- Organization of marine rescue
- Marine research centers
- Public users of coastal waters and beaches

These systems provide information that has great social and public interest as well as high economic impact as they provide:

- Continuous monitoring of the sea conditions; this is essential for safety in e.g. navigation, port logistics, fish farming and sea recreation activities (beach, sports, fishing etc).
- Information about amount and displacement of pollution. This is necessary to provide quick response in management of floating debris, coastal spills and other catastrophes.
- Continuous measurements of Oceanographic and Meteorological parameters that contribute to the validation and improvement of numerical models used in predicting and forecasting tools.
- Data as an aid for optimal design and construction of ports, sub sea emissary, fish farming etc. It also provides valid information about the environmental impact of these human activities.
- Critical information to ship companies, fishing sector, insurance agencies etc. after natural accidents or catastrophes at sea.
- Information valid for monitoring the environmental evolution of natural coastal waters.



One major advantage of this system is that one single company manufactures the whole hardware system: the Complete Weather Station and the Oceanographic station (The Doppler Current Profiler, Thermistor String and the Wave and Tide Recorder). Additionally, the joint venture provides Optimized Data Visualization Software (VIDOM®).

Description of Separate system Components

Oceanographic Stations:

Our latest oceanographic current profilers are based on the Acoustic Doppler shift principle for measuring current speed and direction. One great advantage of these instruments is that there are no moving parts, making the instrument less sensitive to fouling. The Transducer Head Assembly requires no regular recalibration, hence the instrument has low maintenance needs and can be deployed for very extensive periods.

Our Wave and Tide Recorder and Thermistor string for temperature profile measurements are self contained instruments.

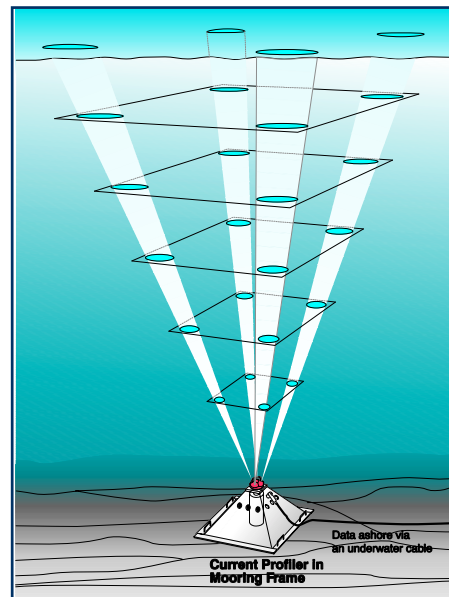


Illustration of the Doppler Current Profiler deployed in a bottom-framed mooring.

The instrument measures the current speed and direction at several levels as well as at the surface.

Standard parameters of Oceanographic instruments:

- Current direction and speed
- Wave and Tide parameters (hydrostatic pressure, significant wave height, mean zero crossing period, maximum wave height, water level)
- Water Temperature in 5 depth levels

Optional parameters:

- Oxygen
- Salinity
- Turbidity

Weather Stations:

The Automatic Weather Station provides data such as:

- Wind speed and direction
- Air temperature
- Air pressure
- Visibility
- Net radiation
- Relative humidity



The main features of our Meteorological and Oceanographic system can be summarized as follows:

- Compact, robust and field-friendly design
- High quality data
- Mains, Battery or Solar Cell powered
- Complete 'Turnkey'
- Minimum maintenance
- Easily interfaced to VTS, Berthing Aid and similar systems
- IP68 degree of protection throughout
- Ease of installation and operation
- Standard off-the-shelf equipment
- A large choice of supplementary sensors available

Data Presentation

Visualization Software provides the user statistics and graphic view of the measured Meteorological and Oceanographic parameters.

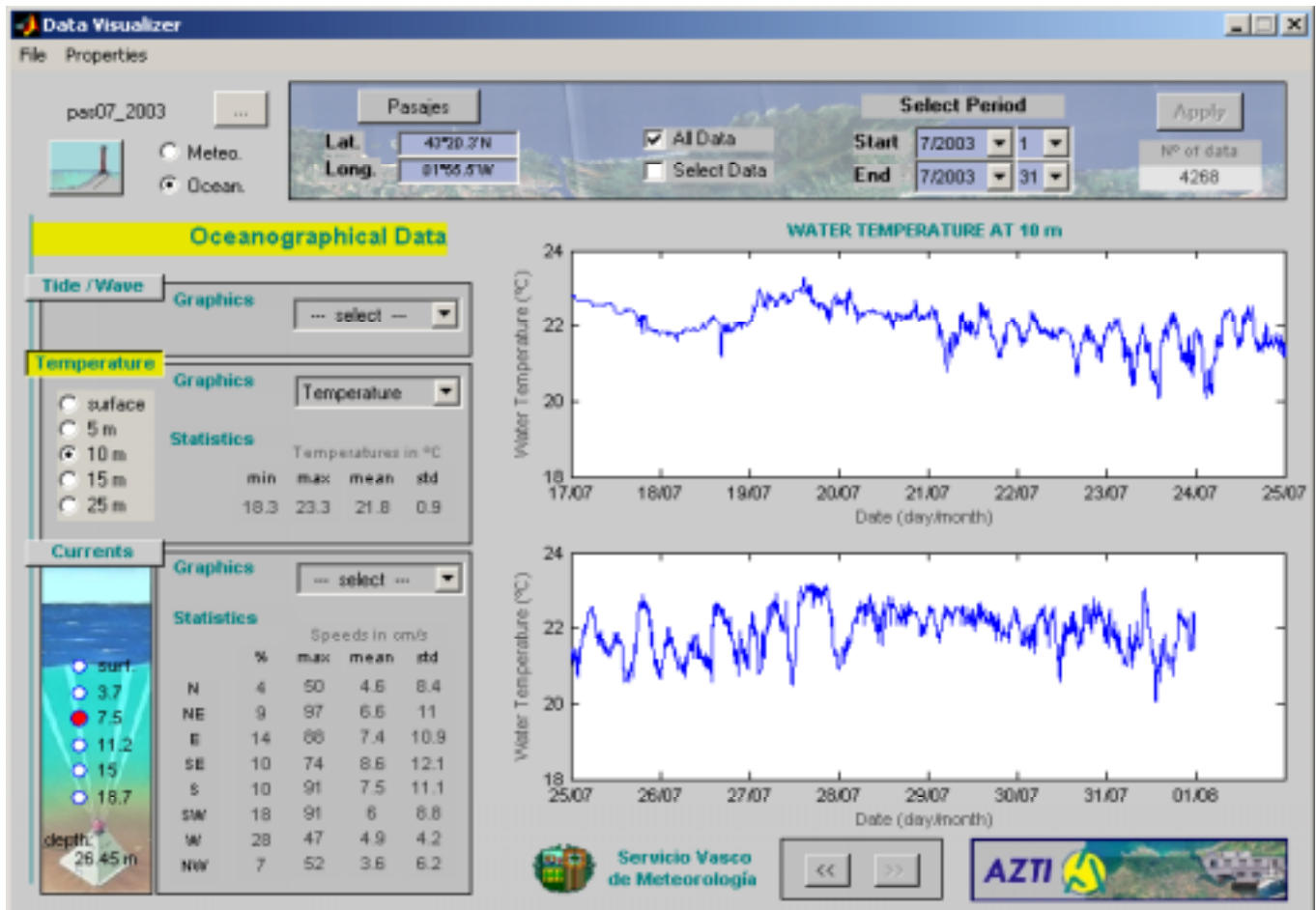
Data is easily exported from the visualization program, either as individual data, statistics, or as a copy of the graphic view.

The output data from the visualization program is in a standardized format for direct input in other Software and models predicting e.g. climatic processes.

We design Software and graphic interfaces for presentation of data on the inter/intranet and bulletin boards in Ports and public places.



Automatic Weather Station



Data Visualization Software



System Specifications



WEATHER STATIONS:

Wind Speed Sensor 2740

Range: 0 to 79m/s

Accuracy: $\pm 2\%$ of reading

Wind Direction Sensor 3590 (Averaging)

Threshold speed $< 0.3\text{m/s}$

Accuracy: $\pm 5^\circ$

Air Temperature Sensor 3455

Range: -43 to $+48^\circ\text{C}$

Resolution: 0.1°C

Accuracy: $\pm 0.1^\circ\text{C}$

Air Pressure Sensor 2810

Range: 920 to 1080hPa

Accuracy: $\pm 0.2\text{hPa}$

Resolution: 0.2hPa

MIRA Visibility Sensor 3544

Range: 20 – 3000m

Net Radiation Sensor 2811

Wave length: 0.3 – 60 microns

Range: $\pm 2000\text{W/m}^2$

Accuracy: $\pm 1\%$ of full scale

Resolution: 4W/m^2



OCEANOGRAPHIC STATIONS

Doppler Current Profiler:

Current profiling

Water Level

Wave Height

Current Speed and direction at the Surface.

Current Speed and direction at many Depths.

Wave and Tide Recorder WTR 9:

Max. deployment depth: 60m; measures:

Temperature:

Hydrostatic pressure:

CSignificant wave height, H_{m0} :

Mean zero crossing period, T_{m02} :

Maximum wave height, $E_{[H_{max}]}$:



Example of output data from an Oceanographic Station in Pasaia

The data output from this Station is Significant Wave Height, Surge Height, Water Temperature and Current Speed and Direction.



Illustration of the measured Water Temperature at the surface and in 4 levels below the surface: 5m, 10m, 15m and 20m.



Illustration of the measured Current Speed and Direction at the surface and at 5 levels below the surface: 4m, 8m, 12m, 16m and 20m.



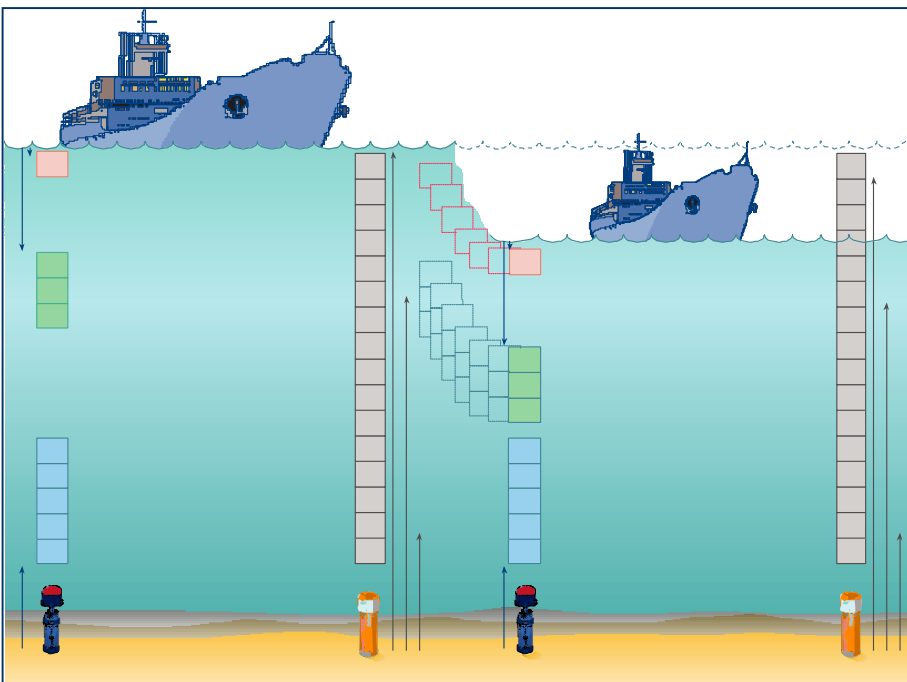
Turnkey Project:

- We design monitoring systems in accordance with our clients' requirements. We install, maintain and see to correct functioning of the equipment.
 - We give expert advice for setting up measurement stations according to clients' requirements.
 - We design software, graphical interface and data management. We make data available to the user on Internet or mobile phone (WAP).
- Our system provides both weather data and oceanographic data simultaneously.
 - We design software, graphical interface and data management. We make data available to the user on Internet or mobile phone (WAP).
 - Oceanographic data: Wave and Tide features, Current speed and direction in several layers, water temperature profile etc. Weather data: air temperature, atmospheric pressure, wind direction and speed, gust, visibility, net radiation etc).
- Integrated Systems: Aanderaa Instruments manufactures all the hardware equipment (Weather stations and Oceanographic station), giving the whole measurement system a high level of compatibility and compactness.
- We guarantee the quality of the measured data. Continuous control of data provided by the measurement stations and remote access to the information recorded by the stations, which allows for fast response in supervision and maintenance service.
- Data provided by the measurement stations can be used directly in software developed by AZTI for prediction of marine climatic processes.

Proven Reliability

- Reliable equipment with minimum maintenance
 - Rugged and Robust Construction. Less affected by fouling.
 - Low Power Consumption. Mains, Batteries, and Solar cell Powered.
- Secure, Real-time Transmission of Weather- and Oceanographic data. Simultaneous in-situ recording.
 - Data Transmission via cable, UHF/VHF, GSM or Satellite.
 - Recording interval defined by the user from minutes to hours (depending on user requirements).
- Modular Stations: Optional sensors available.
 - Easy to expand with wide range of sensors. Ease of connection/disconnection of sensors.
- Experience
 - AZTI-Aanderaa has wide local experience in these projects. We have installed and now maintain the Ocean-Meteorological Stations Network of the Basque Government, located along the Basque coastline. This Net is composed of 7 stations in the ports of Bizkaia and Gipuzkoa: Bilbao, Armintza, Bermeo, Ondarroa, Getaria, Pasaia, and Hondarribia.

For information about our Pilot in the Port of Pasaia:
http://www.aixeder.com/azti/pasaia/azt_act_pres.asp



Surface referenced column react to changes in sea level

The Doppler Current Profiler has some unique features that make it especially suited for harbour applications:

- **Multiple columns**
- **Surface referenced columns**
- **Surface cell**

Multiple columns can be set up in one single deployment. Different cell sizes may be used in different columns in the same deployment allowing for improved vertical resolution in specific parts of the water column.

The maximum number of cells in one column is 100, and the maximum number of cells in one deployment is 150.

A surface referenced column will, e.g. automatically compensate for tidal variations, see illustration.



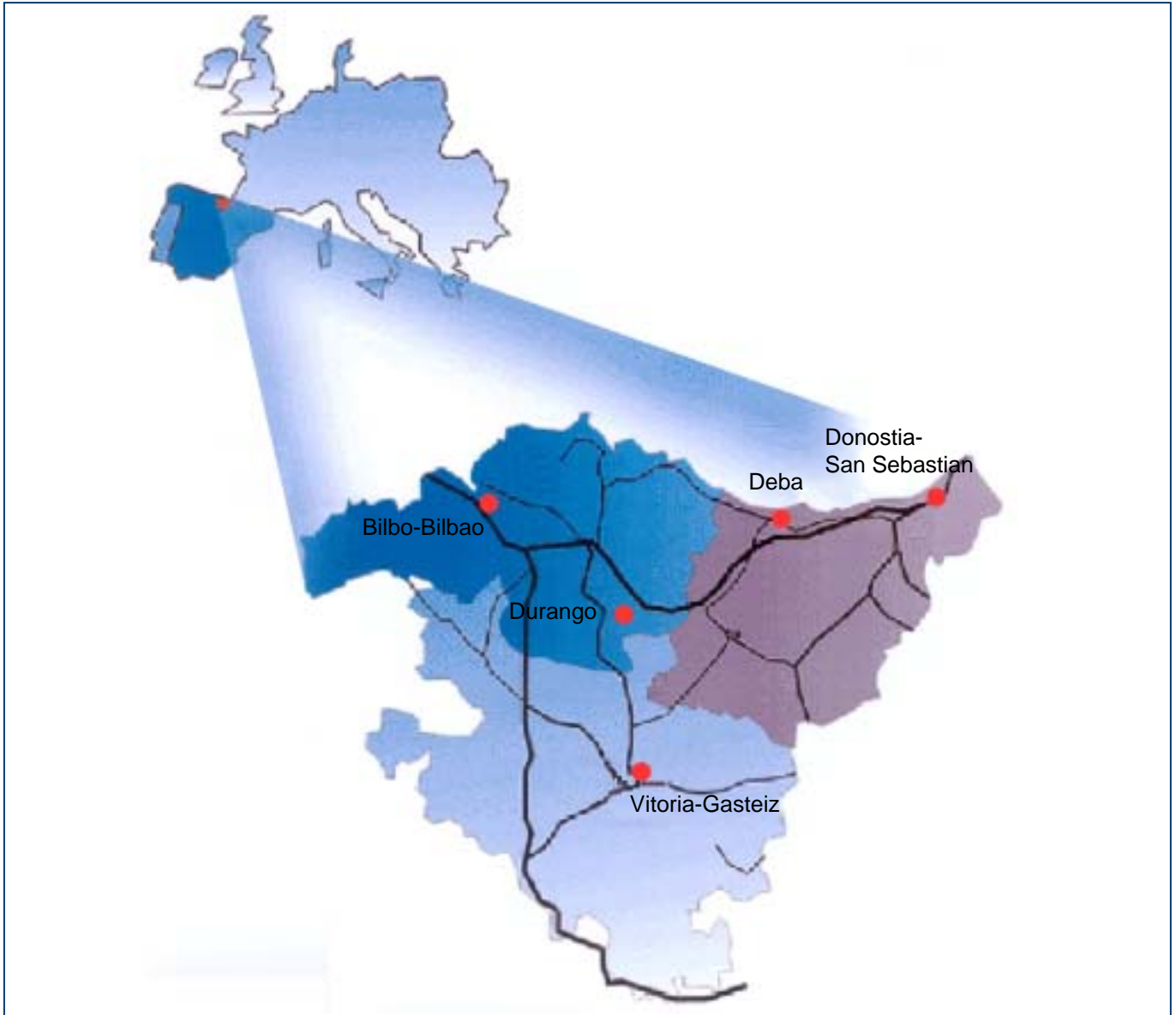
Synergy of Joint Venture AZTI-AANDERAA

AZTI is a technological center of internationally recognized prestige, with more than 20 years experience in the oceanographic investigation and the marine environment.

AANDERAA Instruments has manufactured and sold more than 15,000 oceanographic units, which guarantee the quality of its products and services.

These instruments have proven to be rugged and reliable and are deployed all over the world, from the Arctic to the Antarctic.

The combination of such specialized institutions adds value and credibility to the development of specific ports applications. This synergy extends to the design, installation and maintenance of the measurement stations.



AZTI provides knowledge to customers in search of co-financing Ocean Meteorological Marin Systems.
Aanderaa Current Profilers can provide current measurement of up to 150 levels.

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