

Badalona: Pier Based Met-Ocean Monitoring

A weather station and oceanographic sensors provide real time data for scientists and local citizens



The tower provides measurements of meteorological parameters plus sea conditions for scientific research but also provide useful information for users of the beach.

Pont del Petroli was built in the 1960s to enable the transfer of oil from tankers onto land. The pier extends some 250m over the sea near Badalona's sandy beach, close to Barcelona. The platform is 6m above mean water level; water depth is 12m at the deepest point.

The oil pier went out of industrial usage in 1990. In 2001 there was a popular demand to avoid its demolition and reuse it for public use. In 2002 LIM-UPC proposed to use the pier as a scientific station. In 2003 it was handed over to the Badalona City Council who commenced works in 2009 to repurpose the jetty into a leisure facility for public use.

Taking advantage of these works, LIM-UPC designed, integrated and installed a set of systems to use the pier as a scientific base for sea and atmospheric monitoring. Because of this the pier is now the only such coastal station on the Catalan coast, unique on the Eastern coast of Spain, and

very rare in the Mediterranean Sea. The key point is that the station can relate wave data propagated from buoys to a coastal measurement, as well as to provide weather data close to the shore but over the sea, without ground influence and tide measurements in open waters.

The pier has been equipped with a set of instruments to measure sea and weather conditions that may serve, both as a source of information for future research, as well as boundary conditions for the experimental work that can be performed close to the pier. It will act as a platform for scientific studies related to climate change, alternative energy, coastal dynamics, etc. Moreover, the design of instrumentation takes into account public use of the data, highlighting sea state (waves and currents), water quality and atmospheric parameters (temperature comfort level, recommendation sunscreen, etc.) for users of the nearby beaches.

Case Study Summary

Application:

Meteorological and oceanographic real-time monitoring in a pier

Location:

Badalona (Spain)

Contracting Agencies/

Participating Organisations:

Laboratori d'Enginyeria Marítima-
Universitat Politècnica de
Catalunya (LIM-UPC)

Contributors:

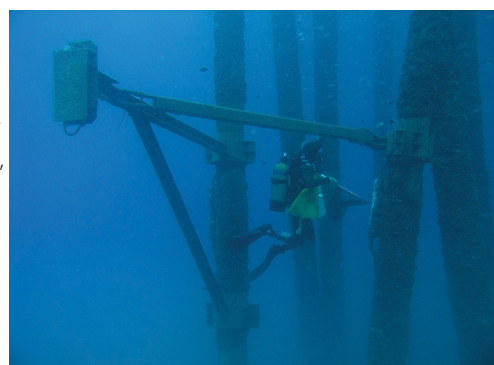
Joaquim Sospedra, Joan
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Products Used:

CR1000, HMP45C, CS100, LP02,
RM Young 52200, Loggernet

Measured Parameters:

Air temperature, Humidity, Air pressure, Total solar radiation, Precipitation, Wind speed and direction, Sea Level, Wave height and direction, Current velocity and direction, Water temperature and salinity



Sensors mounted 5m below the surface measure the oceanographic parameters.

Together with the installation of the equipment, the pier has been fully wired and connections points have been placed in every pile in order to allow the simple installation of additional fixed or temporary measurement devices.

A 7m tall tower, sitting above the deepest part of the pier, contains the measuring station. A Campbell Scientific CR1000 datalogger sits at the heart of the station and collects all of the sensor data.

Weather sensors include a HMP45C that measures air temperature and humidity, a CS100 which provides atmospheric pressure, a LP02 to measure total solar radiation, a RM Young 52200 for precipitation measurements. Wind gust, speed and direction are supplied by a Gill Instrument Windsonic anemometer.

Oceanographic sensors include a pair of radar water level sensors providing sea level, and after some calculations, significant and maximum wave height, peak period and direction. A Nortek Aquadopp current meter gives current velocity and direction and a SBE-MicroCAT Recorder provides water temperature and salinity data. These two sensors are mounted in a subsea structure at a depth of 5m.



Originally constructed for industrial purposes the pier is now open to the public.

Weather and oceanographic data are averaged by the datalogger every 10 minutes and they are sent using a 1km wifi link to the reception PC controlled by Loggernet software. 20 minutes of 1Hz sea level raw data of the pair of sea level radar gauges are sent for wave spectral and statistical calculations.

All data obtained is uploaded to a free web in order to permit the citizens a real time knowledge of sea and weather conditions in Badalona beaches, including webcam

images. Moreover, all data is depurated and saved for scientific purposes.

Thanks to its singularity and flexibility to perform sea measurements Pont del Petroli pier has been used in many research projects with goals ranging from sediment transport studies to developments on new measurement equipments and techniques.

www.pontdelpetroli.org, lim.cat/presentacio.aspx



The pier is 6m above the water and extends 250m into the sea. The water below the monitoring station is around 12m deep.