



Monitoring Sea Level by Tide Gauges and GPS at Barcelona and Estartit Harbours

J.J. Martinez Benjamin (1), J. Gili (1), R. Lopez (1), A. Tapia (1), E. Bosch (2), B. Perez (3), and F. Pros (4)

(1) Technical University of Catalonia, Dpt. Geotechnical Engineering and Geosciences, Barcelona, Spain (jj.benjamin@upc.edu), (2) Cartographic Institute of Catalonia, Barcelona, Spain, (3) Puertos del Estado, Madrid, Spain, (4) Autoritat Portuaria de Barcelona, Spain

Sea level is an environmental variable which is widely recognised as being important in many scientific disciplines as a control parameter for coastal dynamical processes or climate processes in the coupled atmosphere-ocean systems, as well as engineering applications. A major source of sea-level data are the national networks of coastal tide gauges, in Spain belonging to different institutions as the Instituto Geográfico Nacional (IGN), Puertos del Estado (PE), Instituto Hidrográfico de la Marina (IHM), etc.

The tide gauge of l'Estartit is a traditional floating gauge placed 21 years ago and has an accuracy of ± 2 mm. Since 1996, l'Estartit tide gauge has been co-located with geodetic techniques (GPS measurements of XU, Utility Network, and XdA, Levelling Network,) and it is tied to the SPGIC (Integrated Geodetic Positioning System of Catalonia) project of the Cartographic Institute of Catalunya (ICC).

In 2006, due to the work for the expansion of the harbour, the tide gauge had to be moved. Before the work started, appropriate GPS measurements were carried out in order to ensure the connection of the tide gauge data. During October 2006 and May 2008, the tide gauge was inactive and it has been moved on to a new location inside the harbour.

In June 2008, new GPS and levelling measures have been done in order to tie the new location into SPGIC project and to co-locate old data respect the new one.

Although l'Estartit does not have a GPS permanent station, it is possible to build a virtual one from the service "CATNET web" of the ICC. "CATNET web" is a data distribution system of a virtual GPS permanent station via web. From the coordinates where you want to place the virtual station, the time interval and the measurement rate, the system generates a RINEX file under the requested conditions.

At Barcelona harbour there is one MIROS radar tide gauge belonging to Puertos del Estado (Spanish Harbours). It is placed at the dock 140 of the ENAGAS Building. The radar sensor is over the water surface, on a L-shaped structure which elevates it a few meters above the quay shelf. 1-min data are transmitted to the ENAGAS Control Center by cable and then sent each 1 min to Puertos del Estado by e-mail. This sensor also measures agitation and sends wave parameters each 20 min. A provisional tide gauge bench mark has been defined while the levelling has being done. There is a GPS station Leica Geosystems GRX1200 GG Pro and antenna 1202. Bathymetric campaigns inside the harbour have been made.

The presentation is directed to the description of the actual situation of the geodetic infrastructure of Barcelona and l'Estartit sites for sea level determination and contribution to regional sea level rise.