



Monitoring Sea Level by Radar Tide Gauge and GPS in the North Western Mediterranean

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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. Three Spanish sites for monitoring sea level are located in Ibiza island, l'Estartit and Barcelona.

In the framework of a Spanish Space Project, the instrumentation of sea level measurements has been improved by providing the Barcelona site with a radar tide gauge and

with a continuous GPS station nearby. The radar tide gauge is a Datamar 3000C device and a Thales Navigation Internet-Enabled GPS Continuous Geodetic Reference Station (iCGRS) with a choke ring antenna. It is intended that the overall system will constitute a CGPS Station of the ESEAS (European Sea Level) and TIGA (GPS Tide Gauge Benchmark Monitoring) networks.

Puertos del Estado (Spanish Harbours) installed the tide gauge station at Ibiza harbour in January 2003. The station belongs to the REDMAR network, composed at this moment by 21 stations distributed along the whole Spanish waters, including also the Canary islands (<http://www.puertos.es>). The tide gauge also belongs to the ESEAS (European Sea Level) network. Also it has a radar tide gauge at Barcelona harbour.

A description of the actual infrastructure at Ibiza, l'Estartit and Barcelona is presented and its applications to sea level monitoring and altimeter calibration in support of the main CGPS at Ibiza harbour. Three Begur Cape experiences on radar altimeter calibration and marine geoid mapping were made on 1999, 2000 and 2002. One campaign was also made in June 2003 at the Ibiza island area. GPS buoys and GPS catamaran were used. We present a synthesis of the sea level results obtained from Topex/Poseidon and Jason-1 altimeter calibration campaigns using the direct measurements from GPS buoys and the derived marine geoid. The Ibiza results, related to Jason-1, agree relatively well with results obtained at Corsica, Harvest and Bass Strait calibration permanent sites. The main objective of the marine campaigns is to check the value of Ibiza Island as a permanent calibration site in the western Mediterranean Sea, to complement the Corsica site in the network of altimeter calibration sites.

Now there is preparation for a new Ibiza altimeter calibration campaign after launch of Jason-2. These campaigns were supported by the Spanish Ministry of Science and Technology under projects of the National Space Program ref: ESP1997-1816-CO4-03 and ESP2001-4534-PE.