MEDGLOSS PRESSURE GAUGE IN THE SPLIT HARBOUR: INSTALLATION AND PRELIMINARY ANALYSIS OF THE DATA

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Abstract
The paper reports on the installation procedure and some preliminary results based on the data collected at the MedGLOSS pressure gauge installed in the Split harbour in June 2000. Some problems related to the levelling procedure are discussed. In addition, applicability of the sea level data is stated, and some preliminary results based on the data is presented.

Keywords: Adriatic Sea, sea level, tide gauge

Introduction

MedGLOSS program (Mediterranean Global Sea Level Observation) was initiated 5 years ago [1], in order to join together various national services dealing with the measurements of sea level around the Mediterranean. Besides the network of existing tide gauges operating along the coast and situated mostly along the northern part (mostly based on the mechanical float-type devices operating in the stilling wells), a few of newer pressure gauges were installed after 1999, in particular in the Split harbour in June 2000. Herein will be presented some applicability of the sea level data, installation procedure of the gauge placed in Split harbour and some preliminary examinations based on the pressure data collected there.

The data collected by the Split station will be useful within the climatological studies in the Adriatic, particularly those dealing with the global sea level rise, which is coming into focus over the last two decades [2]. Sea levels on the time scale of several days (storm surges) are also of typical interest nowadays; an example strongly emerges when considering the flooding in the North Adriatic [3,4], particularly in the Venice lagoon (so called "acqua alta"). In addition, free oscillation of the sea level, especially occurring within the semi-enclosed basins and harbours, can endanger the safety of navigation [5].

Pressure gauge at Split harbour

Pressure gauge in the Split harbour was installed in June 2000, on the pier close to the lighthouse placed at the harbour entrance. Such position was chosen because of the requirements needed for the proper work of the instrument, namely: (1) the sea is deep enough (minimum 3 m below the Chart Datum) to put down the pressure sensor deep enough to avoid the influence of the sea level oscillations in general, (2) central unit has to be placed close to the sensor in a well protected location (here it is placed within the rocky walls of the lighthouse), and (3) the place has to be protected in general from any other source of eventual damage (sea traffic, people, ...).

The equipment of the new stations includes an underwater pressure sensor of Paroscientific Inc. manufacture, type Digiquartz Intelligent sensor, model 8DP060-1 with an RS-232 communication cable; Setra atmospheric pressure sensor, type 470, Garmin GPS II Plus Personal Navigator unit with serial output and remote antenna for accurate time recording, computer (Pentium II 350MHz computer with Windows 98 and 6 MB disk and US Robotics 32,000 baud rate modem), connections and power supply unit.

When installed, connection of the gauge to the geodetic reference network was done by classical geodetic methods. As the old float-type tide gauge is placed approximately 1 km from the new one, Geodetic Datum on the pressure gauge was acquired by using the existing geodetic benchmarks on the way from the old gauge to the new one. However, an error of 12 cm occurred as a result of the errors within the geodetic network related to its oldness, but it is fixed by assuming that the Chart Datum is the same at both locations.

The data are qualitatively analysed by using day-to-day analysis. Thus, after more than 6 months of working, it can be said that the pressure gauge worked properly in that time, without any problems. Moreover, the study of harbour seiches and resonance is performed4, as a rather strong synoptic disturbance occurred over the area, exciting very strong sea level response on the periods lower that 1 hour and having amplitudes up to 40 cm. An example of filtered high-frequency series is displayed in Fig. 1.

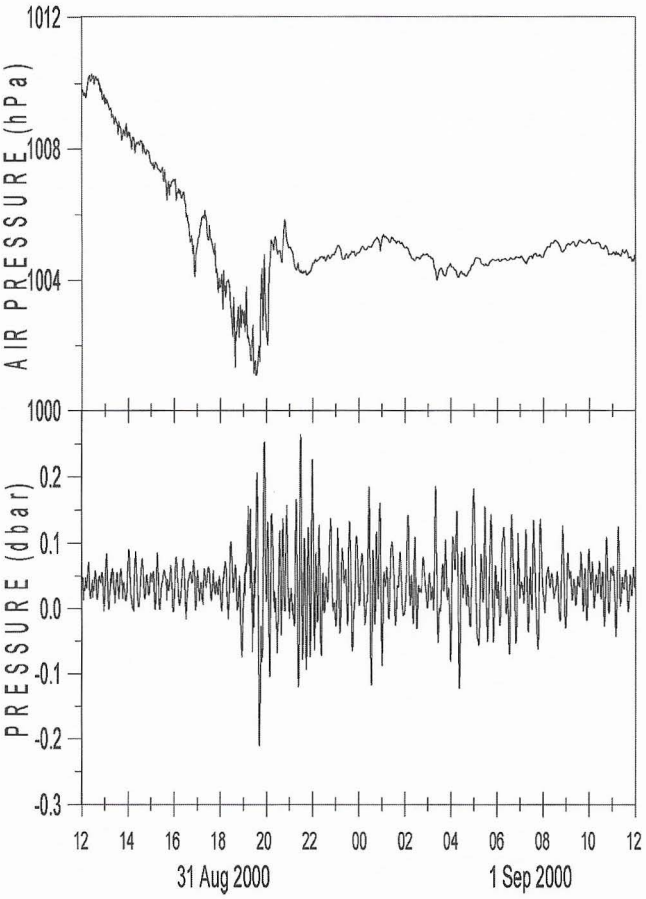

Figure 1. Time series of air pressure and high-pass filtered sea pressure time series (cut-off frequency around 1 h) of the data collected during the passage of strong synoptic disturbance.

References

1 -Rosen D. S., 1997. Physical aspects of the Mediterranean versus integrated sustainable coastal and marine development. International Forum "The Fragility of the Mediterranean Ecosystem, a Conflict of Uses and Resources", Vilanova, Spain, 19 pp.
2 - Zerbini S., Plag. H-P., Baker T., Becker M., Billiris H., Burki B., Kahle H-G., Marson I., Pezzoli L., Richter B., Romagnoli C., Sztobryn M., Tomasi P., Tsimplis M., Veis G., Verrone G., 1996. Sea level in the Mediterranean: a first step towards separating crustal movements and absolute sea level variations, *Global and Planetary Change*, 14, 1-48.
3 -Robinson A.R., Tomasin A., Artegiani A., 1972. Flooding of Venice - phenomenology and prediction of the Adriatic storm surge. *Quarterly Journal of the Royal Meteorological Society*, 99, 686-692.
4 - Vilibic I., Leder N., Smircic A., Grzetic Z. 1995. Seiches inside the Middle Adriatic islands, Workshop on "Mediterranean Sea - Circulation, Strait Exchange and Dense Water Formation Processes", Trieste, October.
5 - Vilibic I., Mihanovic H., 2001. High-frequency sea level oscillations observed and modelled in the Split harbour (Adriatic Sea). *this volume*.