SEA-LEVEL GAUGE NETWORKS IN ITALY

Fabio Raicich

CNR, Istituto Sperimentale Talassografico, Trieste, Italy

Introduction

A few sea-level gauges were in operation in Italy already in the last decades of the 19th century, but a coordinated national network started to operate on a regular basis only recently. Long and almost uninterrupted time series of sea-level data are therefore available only for few Italian stations (Spencer and Woodworth, 1993).

In Italy the following Organizations are involved in sea-level measurement:

i) Dipartimento per i Servizi Tecnici Nazionali, Servizio Idrografico e Mareografico Nazionale (SIMN), Rome, with regional Department in Venice;

ii) Istituto Idrografico della Marina (IIM), Genoa;

iii) Comune di Venezia, Centro Segnalazioni e Previsioni Maree (CSPM), Venice;

iv) Istituto Sperimentale Talassografico (IST), Trieste.

This paper gives a short summary of present situation of Italian sea-level gauge stations according to the information from such Organizations.

The networks

SIMN is a section of the Dipartimento per i Servizi Tecnici Nazionali, a governmental Organization formally belonging to the Prime Minister Office. It is the official national service in charge of operating the National Sea-level Gauge Network. Its network (Gasparri et al., 1996) operates since June 1998. It is composed of 28 sea-level gauges located at the following sites: Imperia, Genoa, Livorno, Civitavecchia, Porto Torres, Carloforte, Cagliari, Naples, Salerno, Palinuro, Palermo, Lampedusa Island, Porto Empedocle, Catania, Messina, Reggio Calabria, Crotone, Taranto, Otranto, Bari, Vieste, Tremiti Islands, Ortona, Pescara, Marina di Ravenna, Ancona, Venice Lido and Trieste. At each station the sea level is measured by means of one ultrasonic gauge with temperature compensation and one float

gauge with analog record on paper. The station benchmarks are levelled relative to the closest IGM (Istituto Geografico Militare, Army Geographic Institute) datum. Other parameters are observed, namely wind vector at 10 m height, atmospheric pressure, air temperature and sea temperature. All data are stored locally and transmitted in real time to SIMN headquarters in Rome.

SIMN includes regional Departments, one of which is based in Venice (SIMN-Venice) and operates a regional sea-level gauge network in addition to the national one for civil protection purposes connected with storm surge hazard along the Northern Adriatic coast. The SIMN-Venice network is composed of 49 sea-level gauges. 36 gauges are located within Venice Lagoon, 3 within Marano Lagoon, 7 at the outlets and in front of Venice Lagoon, 2 at the outlets of Marano Lagoon and one on the coast South of Venice Lagoon. Almost half of the stations are provided with real-time data transmission to the central office in Venice.

IIM is a State Organization belonging to the Italian Navy. Its activity mainly deals with navigation, including chart production. It operates two sea-level gauges (IIM, 2000) in the stations of Genoa and Brindisi, equipped with mechanical float gauges. Data is continuously recorded on paper and subsequently digitized.

CSPM is a public Organization belonging to the city administration of Venice. Its activity includes sea-level monitoring at five sea-level gauges and sea-level prediction. It is also in charge of issuing warnings to Venice population when particularly high sea-level events are predicted. CSPM operates 5 sea-level gauges (CSPM, 2000), one within Venice Lagoon, 3 at the lagoon outlets and one located at the CNR platform “Acqua Alta”, approximately 8 nm offshore, where meteorological parameters are also measured. Data is transmitted to the central office at fixed intervals.

IST is a research institute belonging to Consiglio Nazionale delle Ricerche (CNR). It operates one sea-level station in Trieste for research purposes, which is equipped with two float gauges. Analog records are made on paper, and digital records are stored on solid state memory. Atmospheric pressure, wind vector, air temperature and sea temperature are measured at two stations within 500 m from the sea-level gauge. Ferraro (1972) reports the details on the sea-level gauge, including the different zeroes adopted during the secular history of the station. Sea-level related activity includes sea-level modelling (Raicich et al., 1999b) and joint analysis of sea-level and atmospheric data time series on different time scales, namely from hourly/daily, as in the case of seiches and storm surges (Raicich et al., 1999a), to interannual/multidecadal, concerning mean sea level variability (Crisciani et al.,

1994; Raicich and Crisciani, 1999). IST also publishes astronomic tide predictions for Trieste (Maselli and Raicich, 1999).

Figure 1 displays the sea-level gauge locations along the Italian coast. All stations are shown except for the 49 SIMN-Venice stations, mostly located in the Northern Adriatic lagoons.

GPS receivers, operated by University of Bologna, have been installed at the SIMN sea-level station at Marina di Ravenna (July 1996) and IST station at Trieste (March 2000).

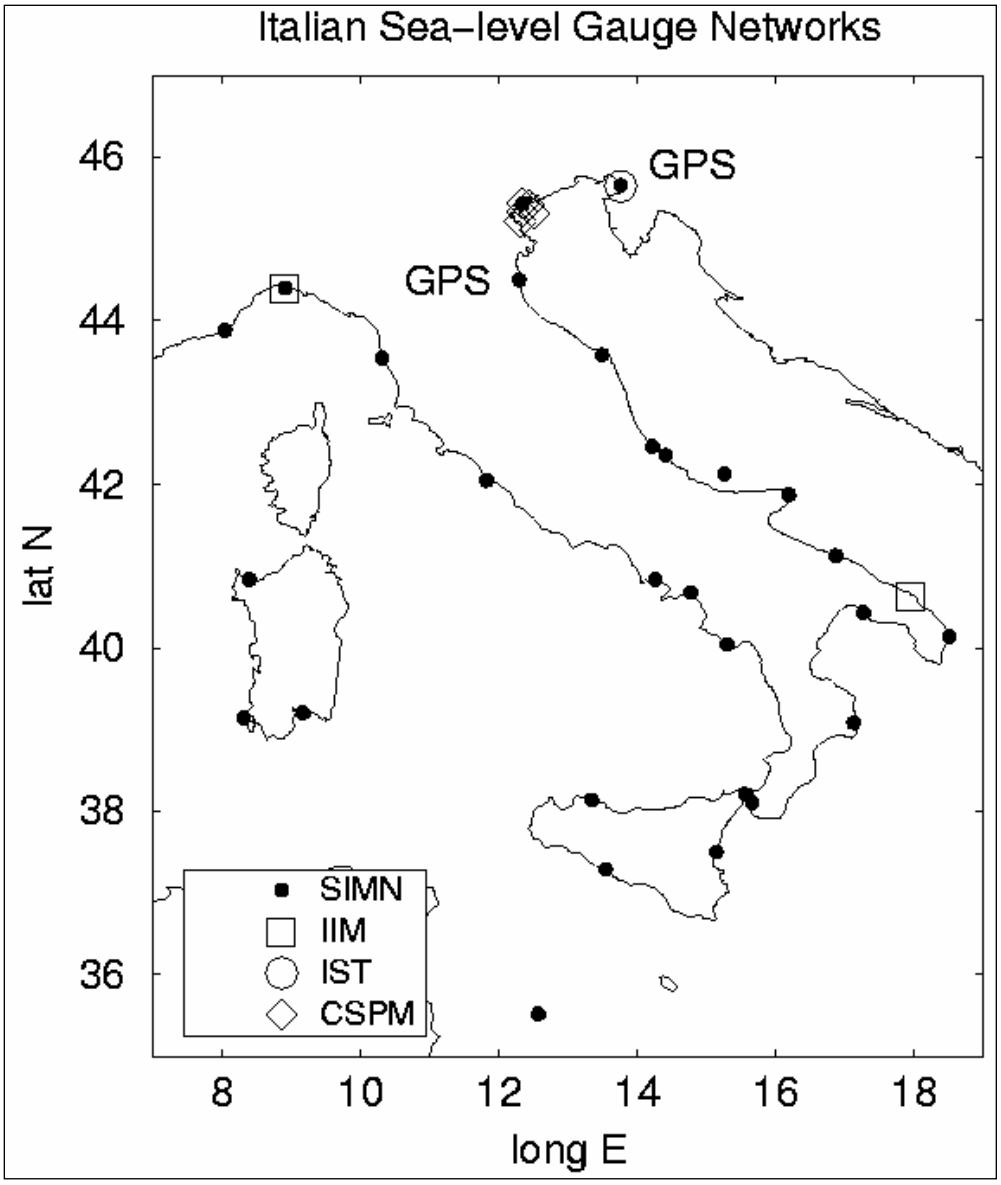

Fig.1 – Sea-level gauge locations along the Italian coast.

(49 SIMN-Venice stations mostly in the Northern Adriatic lagoons are not shown. The two stations with GPS are labelled accordingly.)

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