SOME RESULTS FROM THE AUTOMATIC METOCEAN STATION SPLIT MARJAN-CAPE

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Abstract

From the data measured in 10-minute intervals from March 1999 to February 2000 basic statistics of 10 meteorological and oceanographic parameters were calculated.

Key words: Automatic Metocean Station Split, Adriatic Sea, undersampling error

Introduction

The data from the station situated at the entrance at the Kastela Bay have a special meaning for studying the processes in the Bay, especially for defining boundary conditions for the dynamic model initialisation. Therefore, the Institute of Oceanography and Fisheries (IOF) maintains the station, which worked since fifties. The data set became long enough [1,2,3] for climatic variability studies, especially when assembled with other data [4,3]. Long-term data set from the permanent station consists of discrete measurements, acquired by classical met-ocean instrumentation. Keeping up with GOOS (IOC-UNESCO's program Global Ocean Observing System) recommendation for automatic metocean measurements, advanced measurements techniques and data transmission methods have been introduced in addition to the classical metocean measurements.

Material and methods

Coastal oceanographic station Split Marjan-Cape established in 1946 in front of the main building of the IOF at the entrance of the Kastela Bay, works since 1950, as well as the classical tide-gauge Kepmen with 1:5 reduction. Sea temperature is measured at 0m and 2m, with classical thermometer in the first two climatological terms: 7h and 14h local time. Samples for the salinity determination are taken twice weekly. Meteorological station, established in 1951 (fixed meteorological screen and rain-gauge) is located 25m form the coast, at the 12m altitudes. The thermograph (SIAP) measures continuously, while minimal, maximal and actual temperatures are recorded at 7h (local time), as well as daily precipitation sum. Based on the General Purpose Data Acquisition System [5], the real-time data transmission has been realized in March 1999 through the Internet web page www.izor.hr [6], from the experimental automatic metocean station (AMOS), which utilizes Aanderaa instruments sensors. AMOS measures wind (direction, speed and gust), air and sea temperature, humidity and pressure, precipitation, radiation (solar and net), salinity, and sea level. For all the measured parameters monthly means and variances were analysed. Because of the specific location relative to the coast, wind speed and direction are not always representative for the larger area; the winds from the southeast to northeast direction show considerably lower speeds (relative to the first order meteo-station Split-Marjan). Sea temperature and salinity were measured at 0.5m depth and are considered the sea surface measurements, and other parameters were measured at 10m altitude, acquired in ten minutes intervals, but hourly values were taken for calculations.

Results and discussion

Based on the hourly values, daily means were calculated for all the measured parameters (Fig.1). There were some interruptions of measurements, due to electricity breaks, or other malfunctions. In spite of occasional short breaks and four breaks of measurements longer than a day, and malfunctions of some sensors in some shorter intervals, the overall work of the AMOS could be considered successful. The sea surface daily mean temperature (Fig. 1C), compared to the daily mean air temperature (Fig. 1A) showed that sea surface temperature was higher from September through March, while air temperature was higher in the rest of the year.

Relative humidity (Fig. 1E) showed very high variability. The highest variability was observed from December 1990 to February 2000. It varied in the range from 25-90 %, while the mean value was 61%. Salinity (Fig. 1F) ranged from 29.82 - 37.51 psu, showing occasionally strong pulses of fresh water in fall and winter months, brought in the Kastela Bay by Jadro River. The longer duration of fresh water intrusions occurred in spring season. During most of the 1999, precipitation sensor was out of work, so only data for period January, 2000-November, 2000 were plotted. Very high monthly precipitation sum occurred in November 2000 as a result of unusual weather conditions over Europe. Sea level records were compared to the classical tide-gauge data showing equivalent response of sea surface elevation (not shown). This reflects seasonal heating/cooling processes. The difference between the two temperatures was highest in January (5°C). Fluctuations (not shown) within one month, reached about 10°C, for the air temperature, while sea surface temperature within one month didn't change more than 5°C. The strongest winds (not shown) from N and NE were observed in winter season, however the northward direction was predominant in all the seasons. It is rather peculiar that characteristic summer winds from W directions were not so energetic.

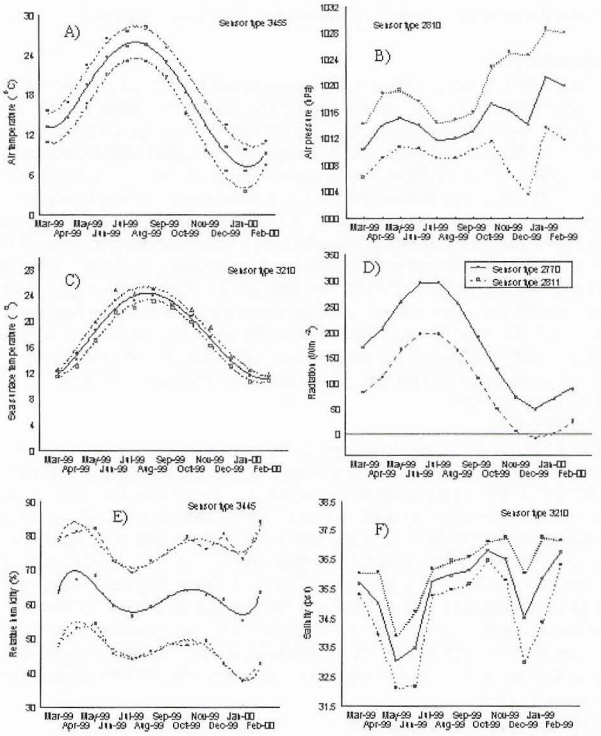

Figure 1. Monthly means and monthly variances for the period March, 1999 - February, 2000 for A) air temperature; B) air pressure; C) sea temperature; D) radiation; E) relative humidity; F) salinity.

Conclusions

The statistical output, based on hourly values of all parameters, calculated first time for a station at the eastern Adriatic coast, matched with data on the monthly scale obtained from a half century long classical measurements at Marjan-Cape station.

Continuous measurements of relevant parameters by AMOS minimise the undersampling error, which impact on output results gathered from classical measurements.

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