

Air-Sea Interaction Monitoring by Remote and Contact Measurements: The Results of the CAPMOS'05 and CAPMOS'07 Experiments on an Oceanographic Platform in the Black Sea

Michael N. Pospelov, Yury N. Goryachkin, Natalia Y. Komarova, Alexey V. Kuzmin, Alexander S. Kuznetsov, Paolo Pampaloni, Irina A. Repina, Mikhail T. Smirnov, and Stefano Zecchetto

Abstract—The paper presents the results of the experiments CAPMOS'05 and CAPMOS'07 performed on an offshore oceanographic platform in the Black Sea. The platform equipped with contact and remote sensors is located approximately 600 m to the south of Crimea coast, Ukraine. The experiments aimed at air-sea interaction monitoring were carried out by an international research team during summer months in 2005 and 2007. Spectral parameters of wind and waves were estimated from direct and remote measurements. A comparison with known spectrum models was performed.

Index Terms—Microwave radiometry, remote sensing, sea surface.

I. INTRODUCTION

THIS paper presents some results of the experiments CAPMOS'05 and CAPMOS'07 performed on an offshore oceanographic platform in the Black Sea. The series of experiments aimed at air-sea coupling investigations by means of direct and remote measurements was carried out in frames of the project CAPMOS (“Combined Active / Passive Microwave Measurements of Wind Waves for Global Ocean Salinity Monitoring”) sponsored by INTAS (International Association for the promotion of co-operation with scientists from the New Independent States of the former Soviet Union).

Manuscript received April 18, 2008. This work was supported by INTAS under project 03-51-4789 and in part by RFBR under projects 05-05-64451 and 08-05-00890.

M. N. Pospelov, N. Y. Komarova, A. V. Kuzmin, and I. A. Repina are with the Space Research Institute, Moscow, 117997 Russia (phone: +7-495-333-5078; fax: +7-495-333-1056; E-mail: Michael.Pospelov@iki.rssi.ru).

Y. N. Goryachkin is with the Marine Hydrophysical Institute, Sevastopol, 99011 Ukraine (e-mail: yngor@alpha.mhi.iuf.net).

A. S. Kuznetsov is with the Experimental Department of the Marine Hydrophysical Institute, Katsiveli, 98688 Ukraine (e-mail: edmhi@ukr.net).

P. Pampaloni is with the Institute of Applied Physics, Firenze, 50019 Italy (e-mail: P.Pampaloni@ifac.cnr.it).

M. T. Smirnov is with the Institute of Radioengineering and Electronics, Fryazino, 141190 Russia (e-mail: smirnov@sunclass.ire.rssi.ru).

S. Zecchetto is with the Institute of Atmospheric Sciences and Climate, Padova, 35127 Italy (e-mail: s.zecchetto@isac.cnr.it).

The project joined several research teams from Russia, Ukraine, Denmark and Italy experienced in experimental study of ocean and atmosphere. The major goal of the experiments was to compare the results of synchronous active and passive microwave measurements of waved sea surface, focusing on the ocean wave spectrum and wind speed retrieval.

The task of wave parameters measurement in an open sea is a considerable challenge, especially for short gravity-capillary waves. During the experiments, the wave parameters were measured directly with a 6-string wavegauge and remotely with microwave scatterometer and radiometers. A novel approach for the short gravity-capillary wave spectrum retrieval from radiometric measurements has been proposed. In the following sections, the experiments are briefly described, and a more detailed description of the results obtained with the microwave instruments is presented.

II. THE EXPERIMENTS

The experiments CAPMOS'05 and CAPMOS'07 were performed on an offshore oceanographic platform in the Black Sea in June 2005 and August 2007. A specialized research platform managed by the Marine Hydrophysical Institute is located approximately 600 m to the south of Crimea coast near Katsiveli, Ukraine. The sea depth at the site is 28 to 32 m, so the deep water and long fetch conditions were ensured for prevailing winds from the south, south-east and south-west.

The platform was installed on the shelf slope in 1980 and since then it is being used for meteorological and oceanography observations as well as for ground truth observations during several satellite campaigns. It provides ability of long-term measurements at any season excluding the winter period of strong storms. The platform (Fig. 1) has several working levels. The lowest deck at 4 m above the surface is used for various instruments installation. At the main deck at 14 m, the living rooms and laboratories are situated. The mast on the roof is used for the meteorological equipment installation.

List of research instruments and equipment used in the