ANALYSIS OF THE SST HETEROGENEITIES OF THE KARA SEA BASED ON THE MEASUREMENTS OF THE IR RADIOMETER FROM THE BOARD OF THE VESSEL

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Introduction
Recently, scientists have been paying more and more attention to mesoscale processes, trying to study energy and mass transfer in more detail on larger scales. Oceanology is no exception. Vortices and internal waves are directly involved in the transfer of heat, energy and momentum inside the ocean. Most researchers prefer to isolate these phenomena from satellite SAR images due to the high cost of contact measurements. Nevertheless, experiments on the collection of sub-satellite information have been repeatedly carried out in world practice [Johannessen et el., 1996; Marmorino et al., 2010].

Relevance
From August 8 to September 8, 2021, an expedition took place on the vessel “Akademik Ioffe” as part of the Floating University of the P.P. Shirshov Institute of Oceanology RAS. During the expedition, remote measurements of the SST were carried out from the ship using an IR-radiometer. The main purpose of the study was to collect sub-satellite information: to detect eddies and internal waves at the surface and at depth, as well as to compare SST with satellite products. The use of an IR temperature sensor to identify processes inside the ocean makes it possible to obtain information from relatively large water areas with little time.

Equipment

Fig. 1. Location of (a) HIERTONICS IR radiometer, (b) GOPRO photo/video camera.

SST measurements in the IR range were carried out using a HEITRONICS KT19 II (fig.1a). IR radiometer placed on the starboard side of the ship at an angle of 30° to the surface. Measurement accuracy 0.1 °C. Measurement frequency 1dB. Photofixation was carried out with a frequency of 10-60 seconds.

Gratitude
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Results

- During the expedition, 26 days of continuous SST recording with a frequency of 1 second and the same number of continuous photographic records of the state of the sea surface were obtained.
- A relationship between the positions of slicks on radar images and their manifestations in the ocean surface temperature measured by an IR radiometer has been established (fig.2).
- A statistical analysis of the measured SST and SST obtained from satellite data was carried out.
- A comparison of SST was carried out according to the data of the flow-through system equipped by a ctd instrument and rosette at a depth of 2 m. On average, the difference between the flow-through system and rosette is 2.1 °C (fig.3). However, the strong fluctuation of such a correction depending on the latitude does not give us the right to use it for all values.
- The slicks recorded in the photographs were compared with the fluctuations of the SST and the flow-through system.

Fig.4. Difference between SST measured in situ and SST from satellites

Fig.3. SST track for August 13, superimposed on a Santinel-1A satellite image for August 13, 2021.