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ON THE VARIATION OF WATER TEMPERATURE DUE TO THE PASSAGE OF TYPHOON

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Typhoons (tropical cyclones) which are mighty meteorological disturbances give rise to various hydrographical phenomena in the waters such as wind-waves, swell, turbulent mixing in the stratified waters, upwelling, overturning of watermasses, stormy currents, storm-surges, seiches, the variation of water temperature and turbidity. Basing on the observed data in the waters adjacent to Japan, the author studied the variation of the water temperature due to the passage of typhoons.

In general, the variations of water temperature in such cases are mostly due to the turbulent mixing and the horizontal transport of water masses.

When the Muroto Typhoon (Pc = 911.9 mb.) attacked Japan on 21 Sept. 1934, the coastal water temperature adjacent to Japan showed a marked variation. During the approach of a typhoon the water temperature rises gradually and consequently it attains a maximum about 2 or 3 days before the passage. Then it drops down to its minimum within 3 days after the passage.

In case of another severe typhoon (Pc = 896 mb.) of 5—6 Oct. 1949, the «Kaiyōmaru No. 4» (Japanese Hydrographic Dept.) carried out the oceanographic and meteorological observations in the seas south of Shiono-Misaki (about 24°—25°N, 135°—136°E) through the heart of this typhoon at the risk of the lives of crew, and

obtained the results that the air temperature and surface water temperature show their maxima at about 32 hours before the passage of the typhoon centre.

In the third case, during the passage of the typhoon (Pc = 933 mb.) of August 27, 1942, which landed on the western Japan, we observed the currents by an Ekman current meter and measured the water temperature, salinity etc. in the Bungo Strait (the western entrance of Seto Naikai) in the period from 25 August to 2 September. As the typhoon approaches nearer in this case, the north-going current flowing into the Inland Sea (Seto Naikai) became stronger and reversely the outflow (South-going current) from the Inland Sea increased after its passage of typhoon centre. After the passage the stratification of water masses was completely destroyed by the effect of turbulent mixing due to the gales and the water temperature showed a marked rise of + 1° — + 4°C compared to that before the passage. This perhaps proves the effect due to the continued inflow of the warm water of Kuroshio (i.e. advectional effect).

In the flood period (from H. W. to about 1 hour after it) temrature maximum with the velocity maximum of the north-going flood current 1—2 kn. at 1—2 hours preceding H. W. and in the ebb period the south-going current maximum with the velocity of 1—2,5 kn. and with the temperature max. at about L. W. were shown and the phenomena were repeated in conformity with the semidiurnal tidal current.

Cancelling them, the inflow effect by the integrated velocity in the cross sectional area of Bungo Strait and the consequent temperature rise by the horizontal transport were proved. Locating the boundary between the inland and the oceanic waters, the variation of water temperature is remarkable in this case by the horizontal transport.