

## **Influence of warm surface water originating from the East China Sea on surface water temperature off the south coast of Korea in summer**

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Surface seawater temperature in the southwestern coast of Korea suddenly rose in the summer of 2017. This rapid temperature rise event occurred simultaneously with a change in wind direction in the Korea Strait from northwesterly to southeasterly due to the approach of typhoon Noru. To identify the causes of the abrupt rise in surface temperature, the variations of the surface currents and temperature were investigated using a three-dimensional ocean circulation model. Warm and less saline surface water, a mixed shelf water of the Changjiang Diluted Water and saline water from an onshore branch of the Kuroshio in the East China Sea (ECS), flowed northeastward to the west and south of Jeju Island, proceeding eastward through the Jeju and Korea Straits. While westerly winds prevailed, wind-driven ageostrophic currents flowed southeastward, moving away from the south coast of Korea, due to Ekman transport. The shallow coastal region was occupied by cool and saline surface water ( $T < 22^{\circ}\text{C}$ ,  $S > 32.5$  psu). However, after the wind shifted to an easterly direction, the surface ageostrophic currents realigned northwestward, and the warm and less saline water moved into the shallow coastal region. In a passive tracer dispersal experiment, dyes injected from the ECS flowed to the west of Jeju Island and through the Jeju Strait via geostrophic currents. These dyes did not affect the shallow southern coastal region of Korea while the westerly winds dominated. However, during the easterly wind event, the dyes were advected toward the coast by the coastward Ekman transport. An analysis of temperature data observed at Cheongsando over 16 years and the tracer experiment revealed that the abrupt temperature rise in the summer of 2017 was a marine heatwave event generated by the advection of warm and less saline surface water from the ECS to the southwestern coast of Korea through the Jeju Strait.