

## Oceanic environmental change due to Typhoon Faxai(T1915) and Hagibis(T1919)

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Typhoons are strongly affected by the ocean through heat and momentum fluxes at the ocean surface, while they in turn affect the ocean by the strong cyclonic winds. Typhoon Faxai (2019) and Hagibis (2019) have different features, in terms of their intensity, size and moving speed, whereas they moved over the almost same path and caused enormous damage to Kanto district in Japan. This study investigates the changes in the ocean caused by the two typhoons, Faxai and Hagibis, using a high resolution ocean model (1.85 km) based on the Meteorological Research Institute Community Ocean Model (MRI.COM). The mixing of sea water caused by typhoons leads to decreases in sea surface temperature (SST) during and after the passage of typhoons. Faxai has a relatively small radius of maximum winds and caused the decreases of SST locally by about 0.8°C at the right side of typhoon track after its passage. On the other hand, Hagibis has a relatively large radius of maximum winds and decreased SST widely and remarkably by about 2°C. According to the vertical diffusivity and the tendency of changes in sea water temperature for the model results, the impact of Faxai reached a depth of 35 m in the ocean while Hagibis a depth of about 75 m. The differences of their impacts are resulted from typhoon features, namely Hagibis has higher intensity and larger size with slower moving speed. In addition, the different features in SST are related to the tracks. Faxai passed over the Kuroshio Current with warm water extending to a depth of about 45 m. On the other hand, Hagibis passed over the cold water area associated with large meander of the Kuroshio where there was cold water beneath the surface mixed layer. Furthermore, in the vicinity of the Kuroshio, SST drastically increased about 2°C at two days after the passage of typhoons.

Keywords: typhoon, ocean, SST, mixing effect, ocean model, Kuroshio