

Supplementary Information for

**Marine Heatwave as a Supercharger for the Strongest Typhoon in the East
China Sea**

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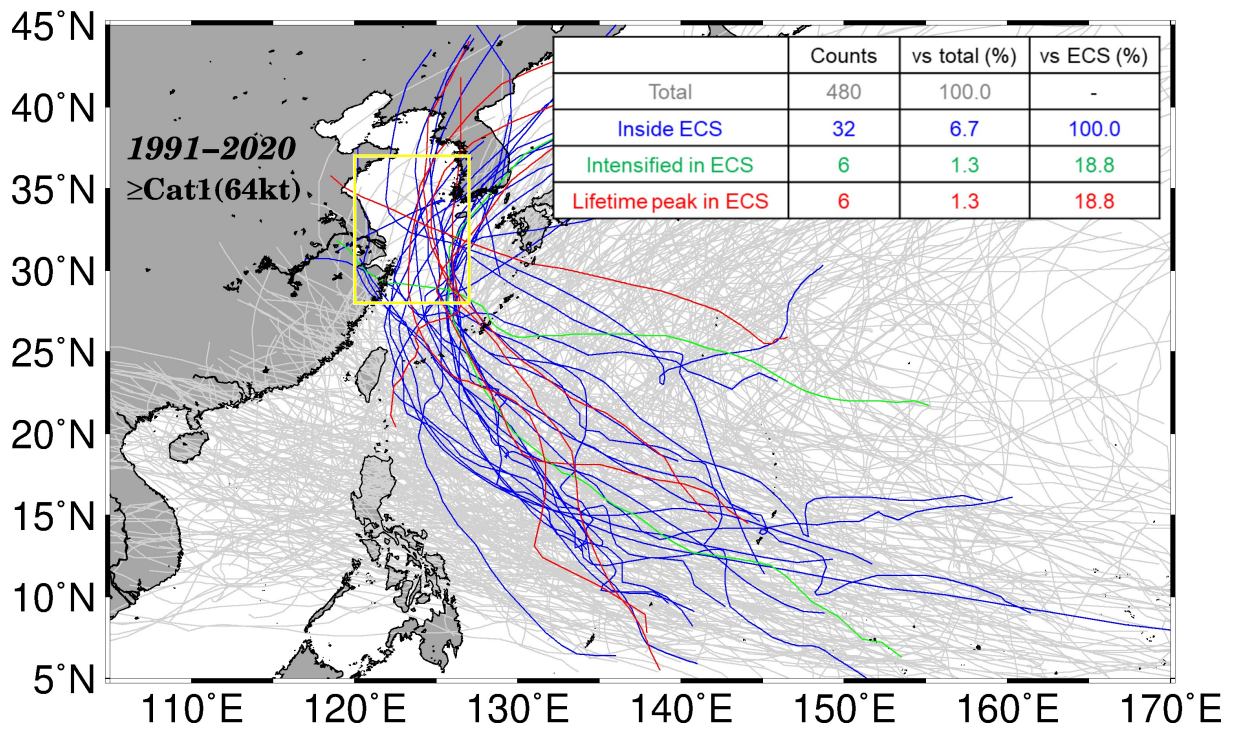
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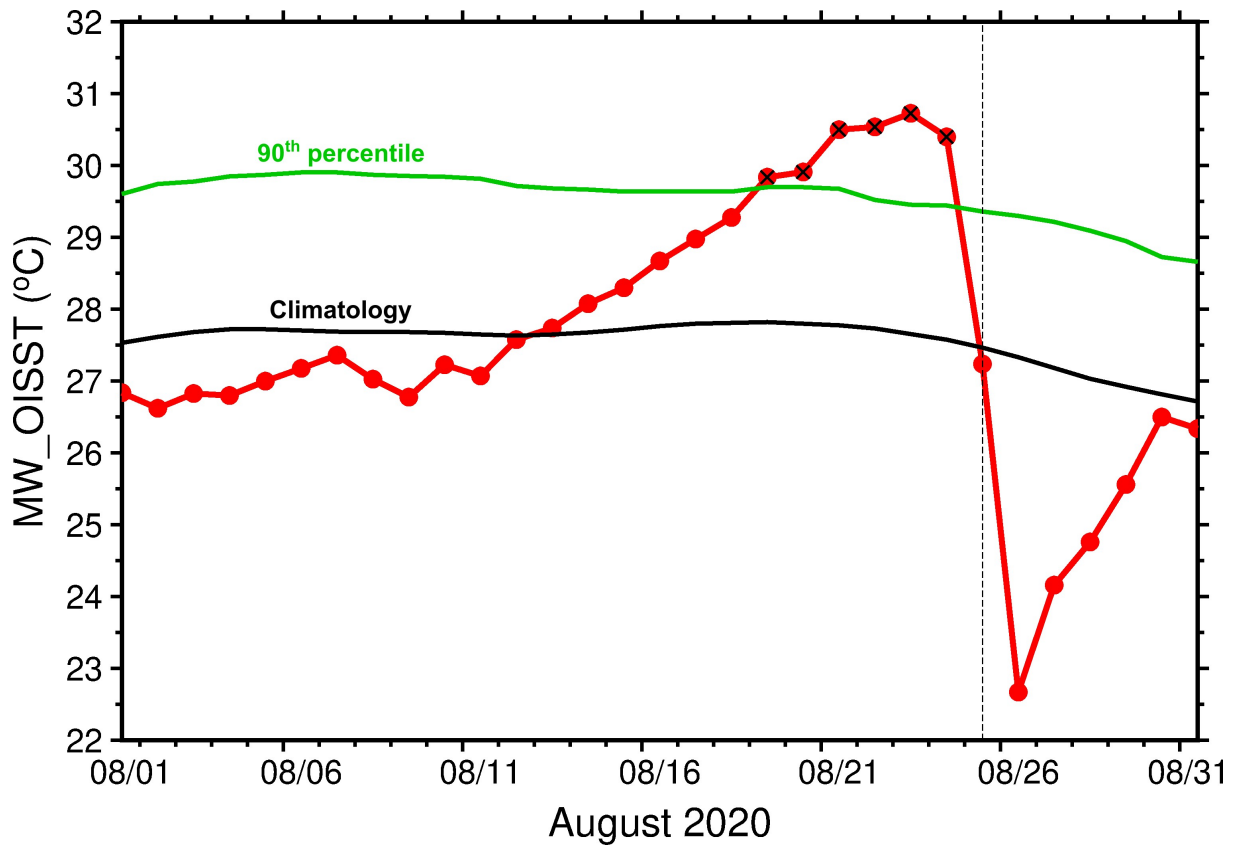
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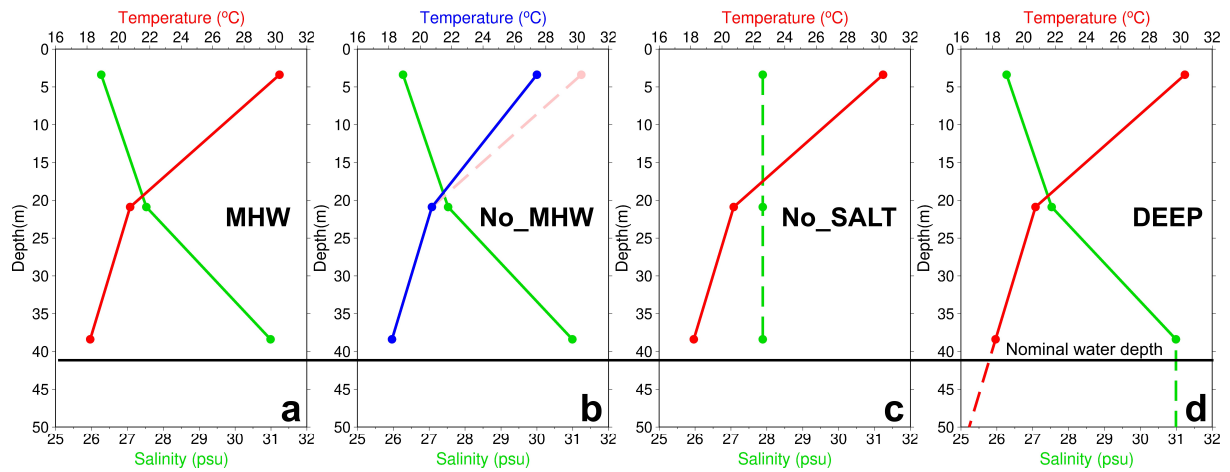
Supplementary Figures 1 to 5



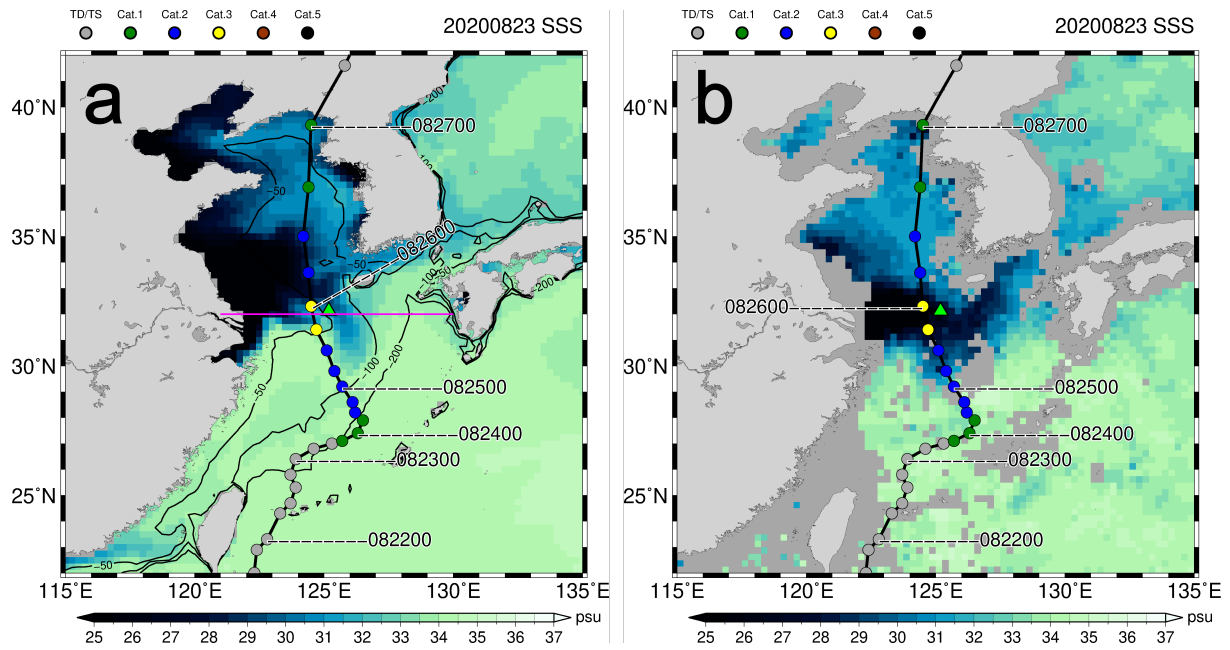
Supplementary Figure 1: 30 years of typhoon best tracks during 1991-2020. In total, there were 480 typhoons (gray tracks) occurring in this period. Note that only typhoons with lifetime maximum intensity ≥ 64 kt are considered here. Blue tracks represent the typhoons that got into the ECS, green tracks represent the typhoons that experienced intensity increase in the ECS, and red tracks represent the typhoons that attained their lifetime maximum intensity in the ECS. The yellow box indicates the domain of the ECS for this statistic. Typhoon counts and percentages for each classification group are shown in the inset table.



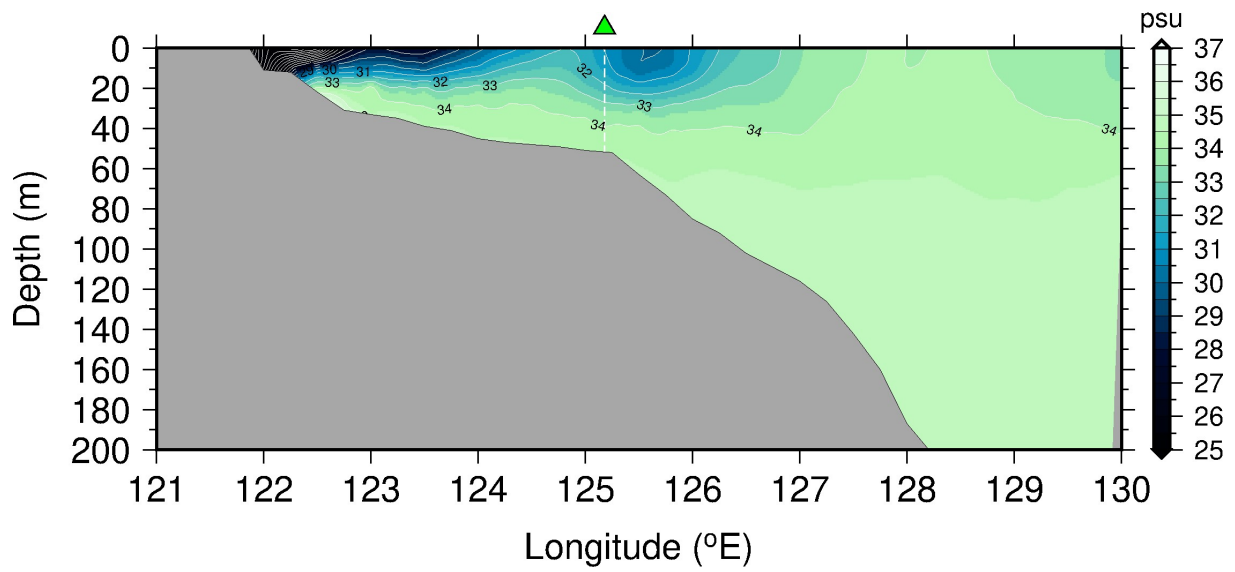
Supplementary Figure 2: SST variation in August 2020 at the IORS site based on satellite microwave observations. The red curve represents the daily SST, the black curve represents climatological daily mean (i.e., 1998-2021), and the green curve represents the 90th percentile level. The black “x” symbols indicate the days satisfying the marine heatwave threshold. The vertical dashed line marks the arrival of the edge of Typhoon Bavi.



Supplementary Figure 3: Initial temperature and salinity profiles. Four PWP experiments were performed in this study, including (a) MHW: observed condition with the marine heatwave, (b) No_MHW: without the marine heatwave, (c) No_SALT: without salinity stratification, and (d) DEEP: without depth limitation. For comparison, the observed temperature profile (light-red dashed) is also shown in (b). The solid circles represent the IORS measurement depths of 3m, 20.5m, and 38m. The black horizontal line indicates the actual water depth (41m) at the IORS.



Supplementary Figure 4: Pre-typhoon sea surface salinity (SSS) maps. (a) ECMWF ORAS5 reanalysis. (b) Satellite observation from the Soil Moisture Active Passive (SMAP) mission. Both data are on 23 August 2020 showing the extensive freshwater plume from the runoff of the Yangtze River. The green triangle depicts the location of the IORS site, while the magenta line in (a) indicates the transect shown in Supplementary Fig. 5.



Supplementary Figure 5: Salinity transect along 32°N. It was extracted from ECMWF ORAS5 reanalysis on 23 August 2020. The transect line is shown in Supplementary Fig. 4a. The green triangle and vertical dashed line indicate the location of the IORS site.