Supplementary Information for:

The role of enhanced velocity shears in rapid ocean cooling during Super Typhoon Nepartak 2016

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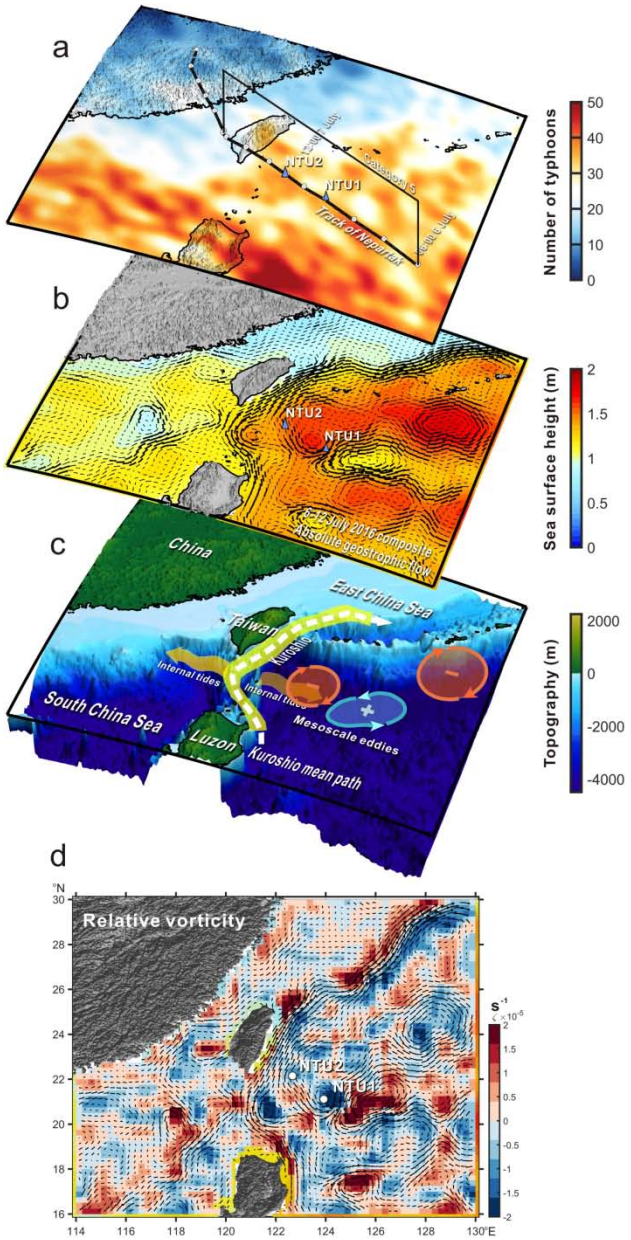
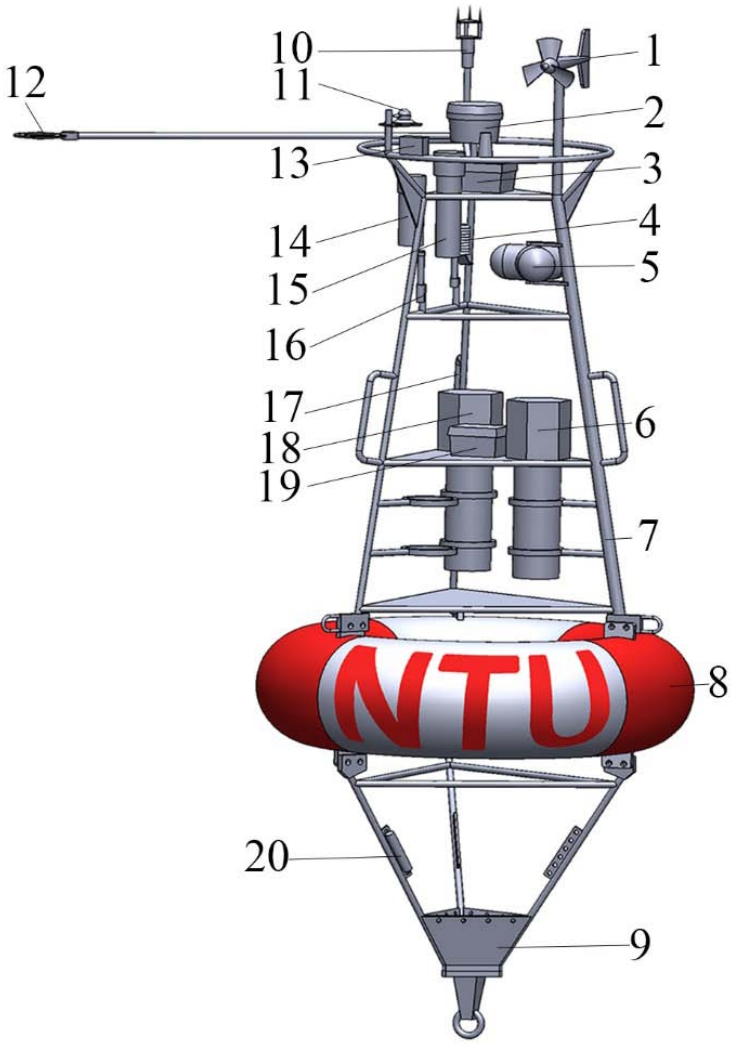
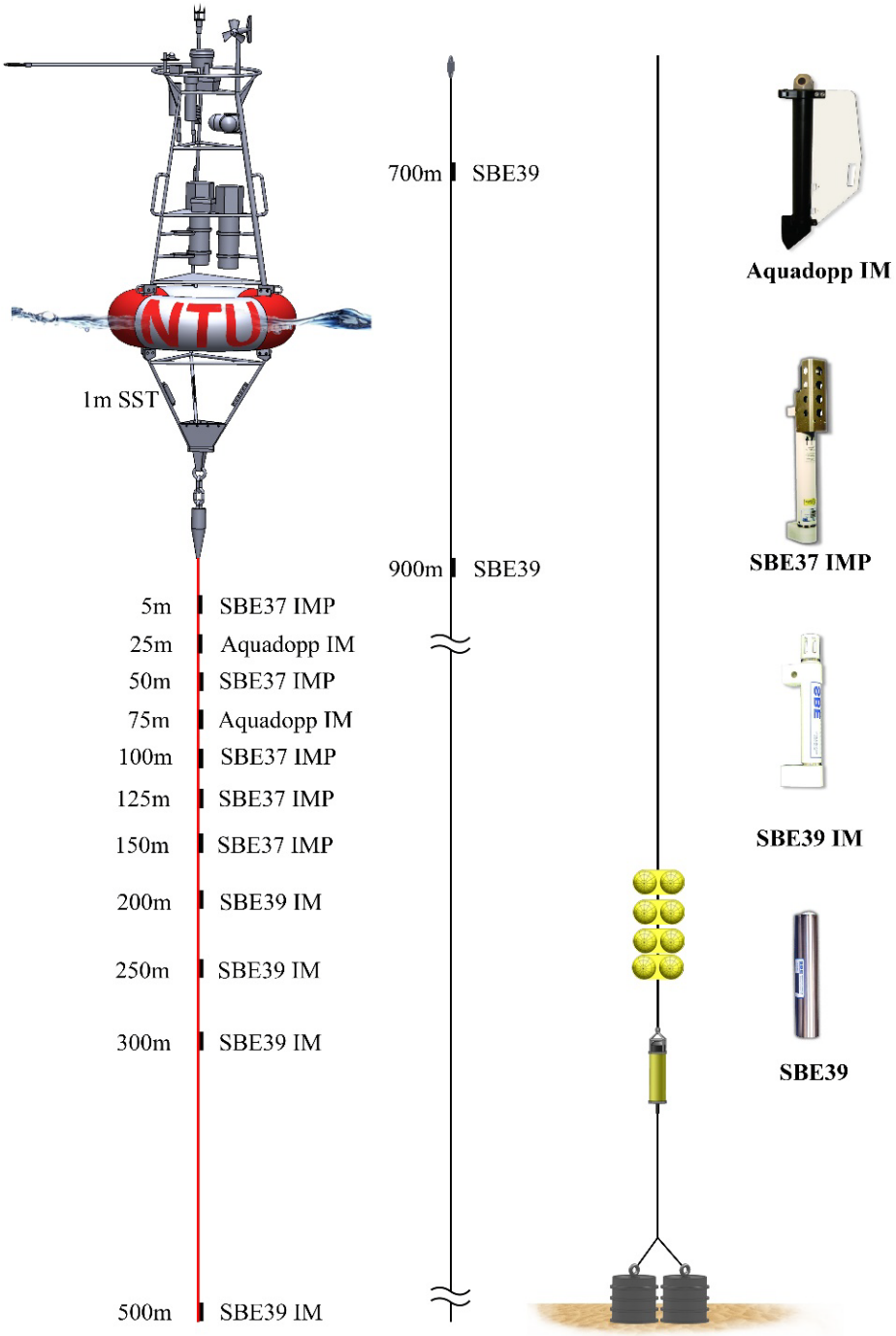


Supplementary Figure 1. Statistics of typhoons and oceanic background environment during July 2016. a Numbers of typhoon passage in each 0.5°×0.5° grid (color shading) during 1951 and 2017, overlaid with Super Typhoon Nepartak's track (white line) and the two buoy's location (blue triangle). **b** Composite satellite sea surface height (color shading) and associated absolute geostrophic currents (arrows) during 6-12 July 2016 obtained from AVISO. **c** Schematic diagram showing the Kuroshio, mesoscale eddies, and internal tides off Taiwan in the western North Pacific. **d** Relative vorticity (color shading) of the geostrophic flow field in **b**.



Supplementary Figure 2. Schematic showing relative locations of instruments and meteorological sensors on the surface buoy: 1-propeller anemometer, **2**-solar marine navigation light, **3**-Iridium satellite antenna, **4**-air temperature and relative humidity probes, **5**-radar reflector, **6**-control and communication unit, **7**-stainless steel tower, **8**-fiberglass buoy, **9**-bride, **10**-ultrasound anemometer, **11**-pyrometer, **12**-net radiometer, **13**-time lapse camera, **14**-Iridium GPS beacon, **15**-rain gauge, **16**-UHF antenna, **17**-barometer, **18**-meteorological data acquisition unit, **19**-digital compass, and **20**-temperature sensor.



Supplementary Figure 3. Schematic showing the mooring diagram and relative depths of subsurface instruments of the buoy. Aquadopp IM is current meter with inductive modem; SBE37 IMP is CTD with inductive modem and pump; SBE39 IM and SBE 39 are temperature-pressure recorder with and without inductive modem, respectively.