Mn by XRF-core scanning as an indicator of super typhoon: insights from a sediment transect of the South China Sea

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Event deposits (i.e., turbidites) are precious recorders of natural hazards in the sedimentary sequences. Identifying the triggering mechanism of turbidite is crucial for long-term hazard risk assessment. Previous studies found that the Mn signal obtained by high-resolution XRF-core scanning could be a good indicator for flood-triggered turbidites (Wilhelm et al., 2016; Sabatier et al., 2017). Higher Mn content can be associated with the precipitation of Mn oxides due to bottom water re-oxygenation during the flood and flood-related sedimentation. However, such findings were usually focused on a confined lacustrine setting and were not thoroughly tested in an ocean basin. Situated at the plate boundary and western Pacific typhoon corridor, the South China Sea (SCS) is surrounded by a dense population with various potentials of hazard risks. In November 2013, super typhoon Haiyan struck the Philippines with record-breaking rainfall, providing the best modern analog to study flood-related sedimentation in an ocean setting. A sediment transect of five gravity cores was retrieved in the deep sea area of the SCS (>4000 m) along the path of Typhon Haiyan. A brownish sedimentary layer associated with the event was found on the top of all the cores, ranging from 20 to 240 cm, respectively. On the base of the brownish layers, Mn enriched layers can be observed in all the cores by high-resolution XRF-core scanning. This finding may indicate that even in deep-sea basins, super typhoons and their related sedimentation processes are capable of bringing oxygen down to the seafloor. The result may shed new light on the reconstruction of cyclone events in marine settings and the biogeochemical effects in the deep sea.

