



A synthesis of the 2013 Typhoon Haiyan storm surge, the deposits and the post event state of the coast.

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Here we synthesise our team's investigation on the geomorphic changes and sedimentary record of Typhoon Haiyan in 2013, an extremely intense and fast-moving storm. Typhoon Haiyan claimed more than 6000 lives, caused widespread damage, and affected more than 16 million people along its path in central Philippines (Soria et al, 2016). Overwash associated with its 5 to 8 m storm surge also left behind a variety of geomorphic and sedimentologic imprints, which provide a valuable dataset for modern storm deposits in different landform settings. We present the geomorphic and sedimentologic record from sites that span siliciclastic, mixed siliciclastic-carbonate, and carbonate coasts affected by contrasting surge mechanisms. On the sheltered siliciclastic coast where overwash was dominated by wind-induced setup surge, the overwash sediments occur as a sand unit of no more than 20 cm thick near the shore, and then spread into a sub-cm thin sand sheet that blankets the pre-Haiyan soil surfaces up to ~1.6 km inland (Pilarczyk et al., 2016; Soria et al., 2017a). Thicker sections of the overwash sand exhibit sharp, depositional contacts, planar stratification, and generally coarsen upward and fine landward. On the mixed siliciclastic-carbonate coast, the Typhoon Haiyan deposits extend over ~350 m inland, are generally thin (<10cm), massive, poorly sorted, and consist of a fine carbonate sand containing foraminifera and mollusks fragments (Pilarczyk et al., 2016; Soria et al., 2017a). On the open carbonate coast that was affected by a wave-dominated setup surge or surf beat, the overwash sediments include two distinct assemblages: carbonate boulders that now occupy the reef flat surface, and a sand sheet that blankets the pre-Haiyan soil surfaces up to ~300 m inland (Soria et al., 2017b). Overall, Haiyan's overwash sediments exhibit characteristics that are consistent with other overwash sediments from comparably intense storm surges, but are also observed in recent tsunami deposits. Thus, although the Haiyan overwash sediments represent a rare modern-day record of an extreme storm, the sediment signatures of Haiyan do share many of the characteristics of tsunami deposits suggesting caution when interpreting inundation events in the geologic record.

References - Pilarczyk, JE., et al. 2016 Micropaleontology of the 2013 Typhoon Haiyan overwash sediments from the Leyte Gulf, Philippines. *Sed. Geol.* 339, 104-114. – Soria, JLA., et al. 2016 Repeat storm surge disasters of Typhoon Haiyan and its 1897 predecessor in the Philippines. *Bull. Amer. Met. Soc.* 97.1, 31-48. – Soria, JLA., et al. 2017a Typhoon Haiyan overwash sediments from Leyte Gulf coastlines show local spatial variations with hybrid storm and tsunami signatures. *Sed. Geol.* 358, 121-138 – Soria, JLA., et al. 2017b Surf beat-induced overwash during Typhoon Haiyan deposited two distinct sediment assemblages on the carbonate coast of Hernani, Samar, central Philippines. *Mar. Geol.*