Can we distinguish tsunami and storm deposits based on their microbial composition?

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One of the challenges in the study of coastal hazard is to reliably distinguish between storm and tsunami deposited sediments. This limitation compromises the quality and accuracy of reconstructing historical coastal flooding records, and is thus an issue to a variety of policy makers and stakeholders interested in assessing the risk and vulnerability of coastal communities. Here we describe a microbial community signature based on amplicon sequencing of DNA extracted from environmental samples collected from two different locations i.e. Cuddalore, India and Phra Thong Island, Thailand. Both locations were impacted by the 2004 Indian Ocean Tsunami and a subsequent storm event. Our results show that the microbial community in the tsunami deposits are significantly different from that found in the storm deposits as well as soil and terrestrial sediments (PERMANOVA, p-value <0.01) in both locations. The microbial community differences between the tsunami deposits and storm deposits are not statistically correlated with chemical data such as total Nitrogen, total Carbon and total Sulfur, implying that our microbial signature is insensitive to environmental and geochemical variability. Integrating molecular techniques to investigate geological records is powerful and statistically robust in discriminating between modern tsunami and storm deposits.