Sculpturing of wave-cut platforms by tsunami

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Bedrock-sculpturing of semilithified Miocene sandy mudstone exposed on a wave-cut platform has produced a variety of erosional forms that include grooves, which may be straight or sinuous. Straight grooves form by preferential incision of regional joints. Sinuous grooves are not fracture-controlled, are oriented parallel to wave run-up, and exist as closely-spaced subparallel, non-connecting, internally-drained grooves that are best developed on higher platform ramparts. Sinuous grooves have a mean length of 258 cm, mean maximum width of 14 cm, mean width/length ratio of 0.08. They are not as deeply incised as straight grooves, do not serve as conduits for low-tide runoff during winter months, and typically terminate by shallowing and narrowing in both seaward and landward directions. Sinuous appearance results from trains of linked comma-shaped depressions, commonly with the blunt, highly curved end of each being most deeply incised and oriented seaward. While a seasonal cycle of beach aggradation and degradation combined with sediment transport and bedrock erosion accompanying low-tide runoff and high-tide wave motion accounts for form modification of sinuous grooves, it is unlikely to account for their origin. Groove genesis reflects corrasion of bedrock highs and/or cavitation associated with turbulent vortices during tsunami run-up. Auguring and coring in a back-barrier bog and analysis of diatoms reveals a landward-thinning, ~17 cm-thick, laterally continuous clean (tsunami-emplaced) sand layer with a sharp basal contact up to 125 m inland of the modern high tide line. Since all coasts are potential sites of tsunamis due to earthquakes or ocean island collapse, efforts should be made to correlate tsunami sands in coastal bogs with bedrock platform erosional features and extensively reworked (hummocky cross-stratified) shelf sediments.