

Assessing modern sediment distributions as tsunami indicators for coastlines facing the Japan Trench

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Geologic studies conducted in coastal areas of Japan have revealed evidence of earthquakes and tsunamis that predate the historical record. These studies assess the long-term seismic trends along subduction zones, and provide improved hazard assessment by constraining the possible magnitudes of future events. However, one of the obstacles facing the proper identification of paleo-tsunami deposits is the lack of a modern analogue.

In 2013 we collected modern surface samples along two coastal transects located on Hasunuma Beach (Kujukuri), a region with a history of tsunamis, and documented their foraminiferal (taxonomy and taphonomy) and grain size distributions. Highest concentrations of foraminifera were found in swash and foreshore zones and markedly decreased landward towards the back-shore and dune. Swash and foreshore assemblages were dominated by *Pararotalia nipponica*, *Quinqueloculina* sp., and planktics, whereas the backshore and dune contained only species with robust tests (e.g., *Pararotalia nipponica*, *Ammonia parkinsoniana*, and *Lenticulina* sp.).

Taphonomic analysis (surface condition of individual tests) revealed that swash and foreshore samples contained higher abundances of unaltered and fragmented foraminifera, whereas the majority of foraminifera in dry beach samples were corroded due to subaerial exposure. Results of particle size analysis show a marked decrease in size from the swash zone (coarse sand) to the dunes (fine to very fine sand).

Partitioning Around Medoid (PAM) cluster analysis of the modern surface data indicated that foraminiferal taphonomy, a proxy that is not commonly applied to overwash deposits, discriminated coastal zones more effectively than taxonomy or grain size. Although a multi-proxy approach is necessary to properly assess overwash deposits, foraminiferal taphonomy will be most useful in determining sediment provenance and aiding in the interpretation of anomalous sand layers previously identified at this location.

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