



Effects of recurring tsunami waves on bedrock erosion along Sanriku Coast, northeastern Japan

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Bedrock erosion by tsunamis has been studied in the middle section of the ria-type rocky coast of Sanriku, northeastern Japan. The tsunami waves induced by the 2011 Tohoku Earthquake were high and strong enough to modify the bedrock surfaces, even in inland slopes and on a coastal terrace with an elevation of ca. 20 m a.s.l. Morphological analyses of the bedrock exposures were performed using an unmanned aerial system, structure-from-motion multi-view stereo photogrammetry, and terrestrial laser scanning. Digital elevation models with decimeter-scale resolutions were obtained, and morphology of the bedrock surfaces was analyzed, and erosional markers likely caused by plucking and abrasion were identified. Also, sedimentological characteristics of thin, angular clasts composed of in-situ rock were also examined on the bedrock terraces, and potential effects of recurring tsunamis were suggested. Furthermore, some angular boulders with several meters of diameter suggest their recent displacements. These observations indicate the significance of repeated significant tsunamis in the past.