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TITLE: Morphodynamic characterization of beaches on a Pacific atoll island: Tetiaroa, French Polynesia

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ABSTRACT:

Jeanson, M., Anthony, E.J., Etienne, S., Dolique, F., 2014. Morphodynamic characterization of beaches on a Pacific atoll island: Tetiaroa, French Polynesia. In: Green, A.N. and Cooper, J.A.G. (eds.), Proceedings 13th International Coastal Symposium (Durban, South Africa), Journal of Coastal Research, Special Issue No. 70, pp. 176?181, ISSN 0749-0208.Beach profile types and wave characteristics were monitored in April 2013 on the small islet of Onetahi in the south Pacific coral reef atoll of Tetiaroa, French Polynesia, with the aim of characterizing atoll islet beach morphodynamics. Twelve beach profiles were each surveyed using a theodolite, and water levels and wave characteristics measured over four semi-diurnal tidal cycles using four miniature pressure sensors deployed in the subtidal zone. Water levels corresponded to a very narrow microtidal range (~0.2 m). Wave heights were extremely low throughout (<0.15 m), and spectral decomposition showed a mix between gravity and infragravity energy. The latter dominant at high water, whereas energy was virtually nil at low tide. The wave characteristics, which reflect significant filtering of large Pacific waves by the atoll reef, were not in phase with the intertidal beach morphology. These were interpreted as largely inherited from differential exposure to higher-energy events that occasionally impacted the atoll, notably Cyclone Oli in February 2010. Sand aprons in the lagoon, moving from the eastern to the southern and ultimately the western shores of the island in response to wave pumping, locally enhance build-up of the lower beach where shoreline orientation changes. Confrontation of these observations with long-term islet shoreline trends identified by Le Cozannet et al. (2013) suggests that high-energy event-scale changes and daily background beach cosmetic changes associated with subtidal sand apron mobility, and intertidal swash reworking during the narrow tidal excursion are embedded in long-term morphological stability likely hinged on sand circulation around the islet.

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