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Wave transformation across rocky shore platforms, a new approach

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Wave propagation over shore platforms has mainly been investigated using single linear arrays of instruments deployed in a shore normal direction. This two-dimensional approach allowed basic understanding of wave breaking and dissipation but presents some limitations in term of nonlinear processes impacting wave propagation. The present research aims to revisit characteristics of wave propagation over shore platform in three dimensions. The focus is on the effects of platform morphology on wave directionality and energy as well as the behaviour of gravity and infra-gravity waves. High resolution data were collected for a month using a multi-dimensional array of 14 pressure sensors and two directional wave recorders (tritons) anchored to the platform, the largest field deployment yet accomplished on a rocky shore platform. Off shore incident wave height, period and direction were also recorded using an ADCP in 10 m of water 850 m from the study site. The deployment captured two storms and a spring/neap tidal cycle. Wave directional spectra were used to investigate directional shift between incident waves and waves propagating on the platform. The directional analysis shows up to a 80° shift between off shore and onshore waves. The observed wave direction on the platform corresponds mainly to the normal direction between the instrument and the concave platform edge indicating that strong refraction occurs at the edge. Non-directional spectra analysis was used to investigate the energy level of wind waves, gravity waves and infra-gravity waves over the entire platform. Results represent the variation of the energy of these three frequency bands in three dimensions over the entire platform.