



Transported beachrock slabs and coral boulders for interpreting high-energy waves: a case study from Ludao (Green Island) in south eastern Taiwan

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Eastern Taiwan is frequently impacted by powerful typhoons that track close by or make direct landfall. On a beach in the SW of Ludao Island, a small volcanic island lying 35 km SE off mainland Taiwan (22.67°N 121.48°E), the presence of abundant beachrock slabs provides evidence of the sediment transport capabilities of high-energy waves generated by these storms. Our field-based investigation at Ludao explores the potential value of such beachrock slabs for wave analysis. One feature of the work is our rearrangement of the hydrodynamic transport equations of Nandasena *et al.* (2011) so that they are appropriate for this particular geomorphic setting, where exposed *in situ* beachrock outcrops liberate clasts which may then be transported either by run-up or backwash flow onto adjacent reefs. Such settings are common on tropical coastlines with fringing coral reefs and beaches comprising mostly biogenic sediments. Results show that the lowest flow velocities required to transport all measured beachrock slabs from their known outcrop sources to current positions are 3.16 m/s for run-up and 3.24 m/s for backwash. Elsewhere, 60 further coral and limestone boulders were also mapped and measured along the eastern coastline of Ludao. While most do not exhibit signs of recent transportation, several boulders up to 6.9 m³ in size were evidently moved by Typhoon Tembin in August 2012. Taken in conjunction, these complementary datasets provide a means for interpreting the characteristics of storm waves on Ludao during both recent and older events.