



On wave motions at the steep slope of a coral reef

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Wave-driven circulation in coral reef systems is an important mechanism for water renewal behind the reefs and for maintaining a complex and fragile habitat. Coral reefs transform arriving waves and thus create special currents that are important for the biodiversity and distribution of larval fishes, phyto- and zooplankta. One important element for the overall understanding of coral reef systems is their interaction with surrounding hydrodynamics. Wave-induced currents are analyzed for a coral reef off the coast of Moorea, French Polynesia. The isolated location of the island and the unique characteristics, like small tidal and wind influences, has various advantages for the analysis of the main physical characteristics. Analytical models describing particle velocities, Stokes drift, and radiation stress are compared to ADCP observations from an in situ deployment in 2007/2008 in Paopao Bay, Moorea. It is shown that the observed radiations stress and the Stokes drift are very close to linear shallow water wave theory allowing an easy implementation into numerical models.