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Publication date
2018

Document Version
Final published version

Citation (APA)

Important note
To cite this publication, please use the final published version (if applicable).
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The Curious Undular Bore

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The curious undular bore
Propagates onward to shore
The energy flies
From low freqs to high
Until the wavefront is no more

So What?
• Low-lying tropical islands with coral reef-lined coasts are highly vulnerable to the combined effects of sea level rise and wave-induced flooding (Storlazzi, 2018)
• To accurately predict wave-driven flooding, we need to understand how waves transform as they move across reefs and run up on beaches
• Undular bores are ubiquitous in field observations (Gallagher, 1972) and in numerical models of ringing coral reefs (Pearson, 2016), but their role in reef hydrodynamics has received limited attention
• Undulations increase the height of the wave front and modify the frequency distribution of the wave energy, which is likely to affect runup on the shore land hence flooding.

What Next?
• Recent laboratory experiments and analysis (Dekkers, 2018; Tissier et al., 2018) suggest that infragravity waves can also transform into undular bores, but further investigation using field measurements is necessary
• These experiments will be extended to analyze the influence of large roughness elements (as typically found on coral reefs) on nonlinear wave transformation

References
Gallagher, B. (1972), 'Some qualitative aspects of nonlinear wave radiation in a surf zone', Geophysical Fluid Dynamics 3(1), 347–354.