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SWAT.nz: New-Zealand-based "Sand Waves and Turbulence" experimental programme

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A b s t r a c t

The SWAT.nz ("New-Zealand-based Sand Waves and Turbulence") research programme was carried out to advance understanding of subaqueous sand waves. The programme was based around detailed measurements at varying scales of bed morphologies and associated flow fields as sand waves formed from plane-bed conditions and grew to equilibrium.

This paper outlines the philosophy and details of the SWAT.nz programme, with the aim of providing insight into experiment and analysis design and methodologies for studies of highly-variable bed surfaces and flows. Example challenges addressed in the SWAT.nz programme include the measurement over large spatial domains of developing flow fields and three-dimensional bed morphology, including flow measurements below roughness (sand-wave) crests, and how to interpret the collected measurements. Insights into sand-wave dynamics that have arisen from the programme are presented to illustrate the values of the SWAT.nz programme and the developed methodologies. Results are presented in terms of mobile-bed processes, and flow-bed interaction and flow processes for fixed-bed roughness and erodible beds, respectively.

Key words: sediment, sand wave, ripple, dune, turbulence.

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