Scaling Law of Internal Run-up Duration

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ABSTRACT

This paper describes a simple mathematical relation – a scaling law – between the length of an initial elevation of a thermocline in the ocean, the internal linear long wave speed and the resulting duration of the internal run-up across a shelf slope. Mathematically the duration of the run-up, T, the internal linear long wave speed, c_0 and the depth of the location of the thermocline, H, provides a relevant non-dimensional period by Tc_0/H. This is a function of the length of the initial elevation, l, divided by H. Recent experiments by Grue and Sveen (2009) support that the two dimensionless parameters are related by $(Tc_0/H)/\sqrt{l/H} = const.(\simeq 8.9)$ meaning that $T\sqrt{g'/l} = const.$ where g' denotes the reduced gravity. The relations will be illustrated by observations in the physical laboratory and from the field. Details of internal run-up, formation of gravity currents on a slope, and boluses will be compared to field observations. Strong bottom current events will be discussed.

REFERENCES

[1] J. Grue and J. K. Sveen. Fluid velocities induced by internal run-up. *J. Geophys. Res.*, 2009 (submitted).

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