A cpation, for those who don't have me around to explain...

This poster makes a comparison between tsunami deposits and ignimbrites (a type of volcanic deposit). The left 1/3 presents the hypothesis. In the middle is data from the 1992 Nicaragua tsunami deposit. And on the right is an interpetation based on ignimbrites. One thing of particular importance to what I'm hoping to learn in Sri Lanka is the figure on the lower left labeled "Tsunami?" This shows the very front of a tsunami carrying lots of sediment, which is a pet hypothesis of mine. The photo behind depicts a tidal bore, which is very similar to a tsunami.

# Pyroclastic flow analogy for deposition in the 1992 Nicaragua tsunami deposit

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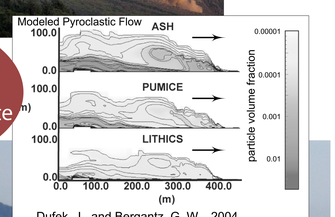
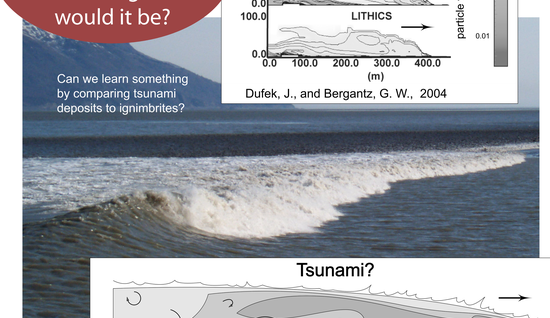
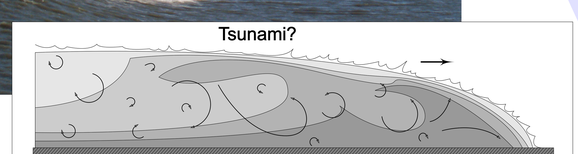
If a tsunami deposit were an ignimbrite, what sort of ignimbrite would it be?

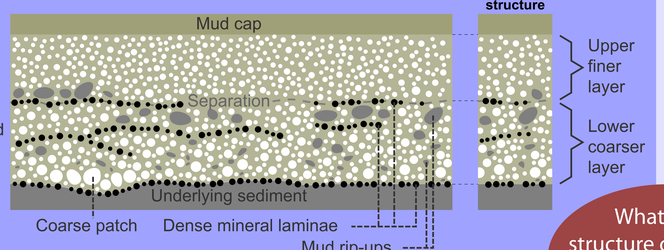



Dufek, J., and Bergantz, G. W., 2004



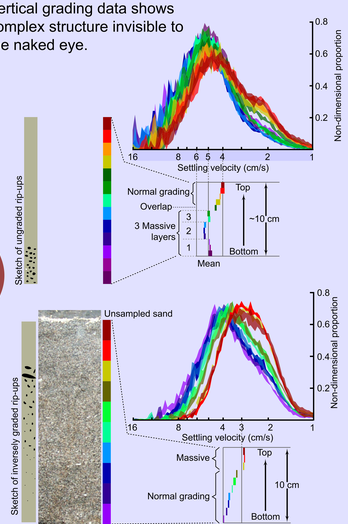




The 1992 Nicaragua tsunami deposit has a two-layered structure with a complex lower layer and finer, simpler upper layer.




What is the structure of the 1992 Nicaragua tsunami deposit?

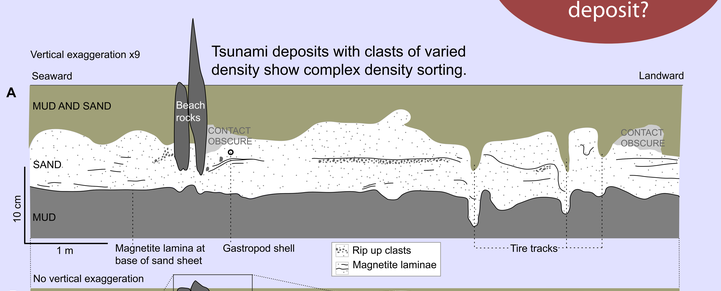
Vertical grading data shows complex structure invisible to the naked eye.

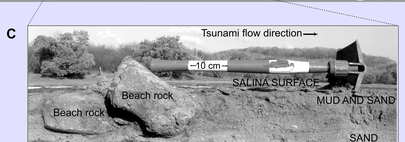



VERTICAL GRADING

In many cases tsunami sediment is not diverse enough to make grading clear, and even when clear, grading can be better described if samples are collected and measured. These plots show settling velocity distributions for samples collected at different depths within the tsunami deposit. In each case there is an abrupt break in the grading that separates the deposit into a couplet. Generally, both the top and bottom of the couplet are normally graded.

Tsunami deposits with clasts of varied density show complex density sorting.




A trench through the 1992 Nicaragua tsunami deposit shows complex structure in the tsunami deposit. This location is about 150 m from the beach at a location where the tsunami ran across a shallow lagoon. The trench location was selected because the deposit was exceptionally thick here. From top to bottom this shows: **A)** 9x vertically exaggerated sketch of a 8 m long section of the trench **B)** actual scale generalized sketch **C)** photo of a small section of the trench.

Location Map

THE 1992 NICARAGUA TSUNAMI

This 4-6 meter tsunami consisted of a single wave and was generated by a Mw 7.7 thrust earthquake associated with the subduction of the Cocos Plate beneath the Caribbean plate. The data presented here was collected at a location where topography prevented energetic withdrawal after tsunami inundation.

BIBLIOGRAPHY

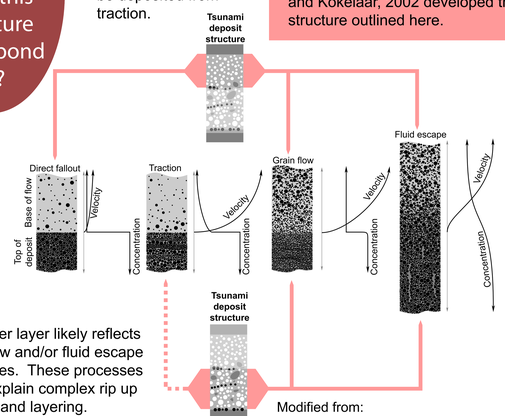
Branney, M.J. & Kokelaar, P. 2002. Pyroclastic density currents and the sedimentation of ignimbrites. Geological Society. London, Memoirs, 27.

Dufek J. and Bergantz, G.W. 2004 The Over-Water Transport of Pyroclastic Flows: A Coupled Grain Size Distribution and Multi-fluid Numerical Approach. IAVCEI 2004 General Assembly Volcanism and its Impact on Society, Pucon, Chile.

What sort of ignimbrite does this structure correspond to?

Workers in pyroclastic flow deposits (ignimbrites) have outlined how different depositional processes and flow conditions express themselves in deposits. Branney and Kokelaar, 2002 developed the structure outlined here.

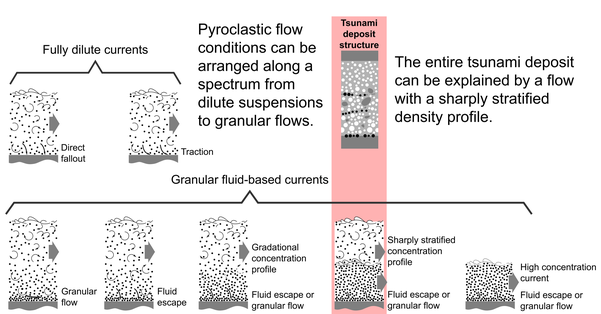
The upper layer has too little structure to be deposited from traction.




The lower layer likely reflects grain flow and/or fluid escape processes. These processes could explain complex rip up grading and layering.

Modified from: Branney and Kokelaar, 2002

Pyroclastic flow conditions can be arranged along a spectrum from dilute suspensions to granular flows.




The entire tsunami deposit can be explained by a flow with a sharply stratified density profile.

Modified from: Branney and Kokelaar, 2002

MAIN POINTS

- The 1992 Nicaragua tsunami deposit can be compared to ignimbrites in order to understand tsunami sedimentation.
- Given this comparison, it can be explained by a sharply stratified flow where granular flow and/or fluid escape controls the lower portion and dilute suspension controls the upper portion.