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Reverse-engineering a submarine pyroclastic flow from its deposit

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Pyroclastic density currents occur in many ocean island and other ocean-proximal settings, in which there is potential for flows to propagate from the land in to the sea. There are several well observed examples of this, both recently (e.g. Tar River valley, Montserrat), and in the geological record (e.g. Grande Savanne, Dominica).

The transition between subaerial and submarine flow requires a switch between gas fluidisation to water fluidisation. This in turn will lead to changes in the transport dynamics of the flow, as properties including viscosity, particle buoyancy, and compressibility change. By constraining the initial parameters for the submarine portion of the flow, a better understanding of the transition conditions can be gained.

We present an approach using the Move turbidity current modelling software to reconstruct the parameter ranges required to form a known Tar valley offshore deposit East of Montserrat.