# Fluvial Research Group

UNIVERSITY OF LEEDS

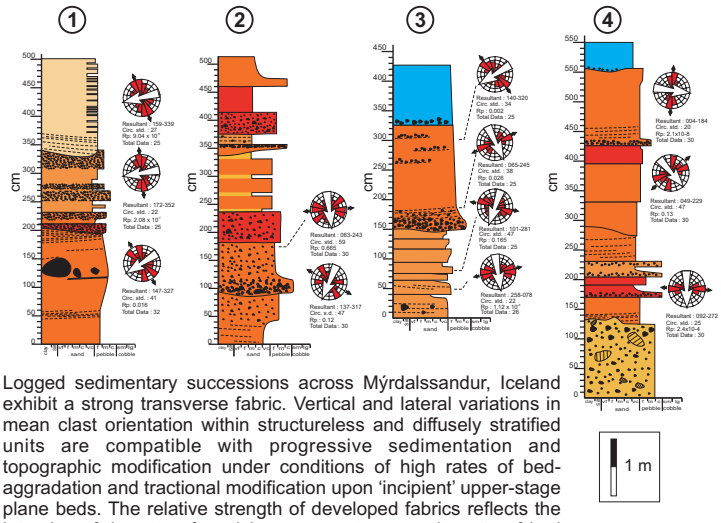
## Sedimentary character and flow behaviour of catastrophic floods, Iceland

**Robert Duller, Nigel Mountney & Andrew Russell**

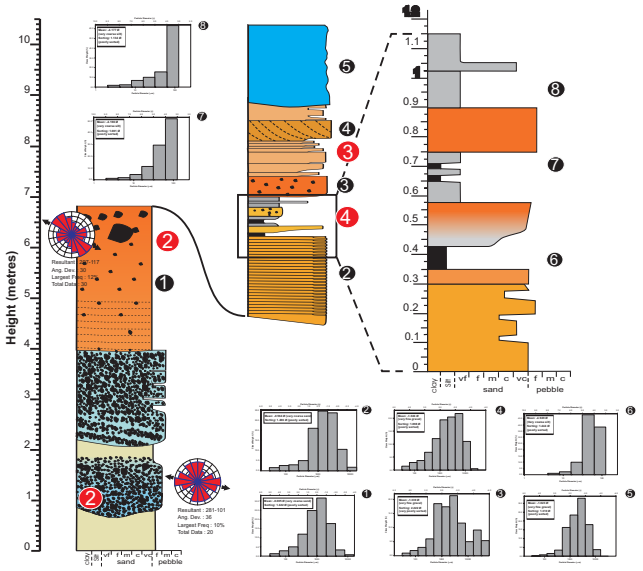
Controversy surrounds the rheological nature of many fluvial outburst flood deposits in Iceland and little is known about their mode of sedimentary preservation and the nature of the flows that generated them. This project is reconstructing the rheological properties of the 1918 Katla outburst flood (jökulhlaup) through a combined sedimentological and architectural approach, and is also investigating sedimentary successions related to previous flood events. The use of architectural analysis, rather than more traditional vertical profile analysis, in the study of high magnitude flow events and their deposits is providing greater insight into the relationship between the outburst flood events and their deposits.

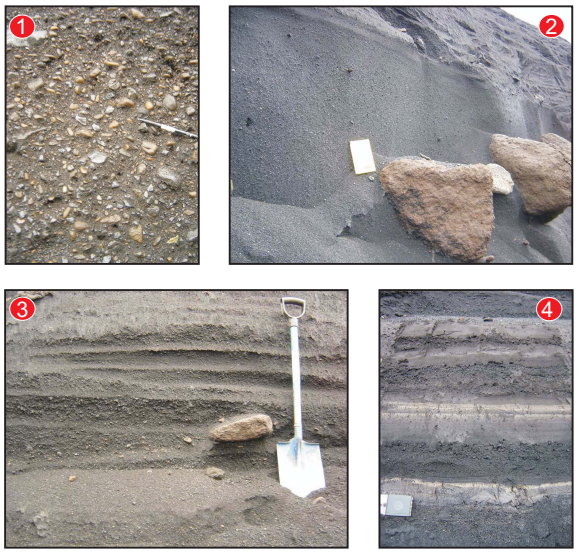
Architectural analysis of the 1918 flood deposits has revealed the presence of extensive bounding surfaces and distinct bed-set geometries that represent transcritical and supercritical flow conditions. The structureless and diffusely stratified characteristics of depositional units that were previously ascribed to deposition from a hyperconcentrated flow and debris flow are now better interpreted as artefacts of rapid deposition following flow deceleration at the stoss side of major antidunes, and at hydraulic jumps. This sedimentary evidence indicates that the 1918 Katla outburst flood was a highly turbulent, sediment-charged flow.

Estimates of flow velocities obtained from this study are in relatively good agreement with flow velocities derived from eyewitness accounts of the flood. This study provides a basis for the recognition of large-scale sedimentary features related to supercritical flows in both the recent and ancient sedimentary record. This is important if assessments are to be made regarding the likely hazards posed by large-scale supercritical flow events.

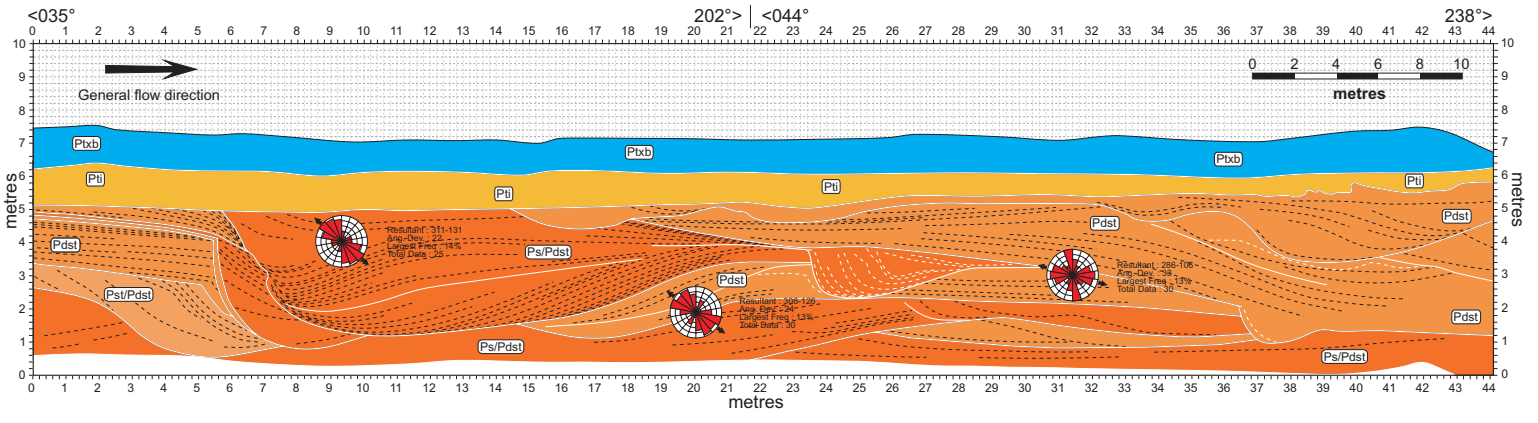



Logged sedimentary successions across Mýrdalssandur, Iceland exhibit a strong transverse fabric. Vertical and lateral variations in mean clast orientation within structureless and diffusely stratified units are compatible with progressive sedimentation and topographic modification under conditions of high rates of bed-aggradation and tractional modification upon 'incipient' upper-stage plane beds. The relative strength of developed fabrics reflects the interplay of the rate of particle movement versus the rate of bed aggradation.




The recognition of sedimentary structures and textures is important for gaining an improved understanding of the behaviour and mechanism of sediment deposition from catastrophic flood events because they provide insight into the nature of large-scale flood processes that cannot be measured directly. The features described in this study constitute environmentally constrained, flood-derived criteria with which to identify similar events or processes in the geological record. This approach is forcing a re-evaluation of previously published interpretations of several well-studied preserved successions.

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