

## ***Interactive comment on “Comparing Thixotropic and Herschel-Bulkley Models for Avalanches and Subaqueous Debris Flows” by Chan-Hoo Jeon and Ben R. Hodges***

### **Anonymous Referee #2**

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#### General remarks:

This paper presents an interesting work conducted on the rheological characterization of natural heterogeneous mixtures (e.g. debris flows, avalanches, etc.). The paper is clearly written and the figures are all useful. Most of the information is very useful for viscous fluids rheology. The paper should be accepted with minor revision. Some specific comments:

- Authors should clarify the different terms used for the definition of the flow-like phenomena they are discussing. They should insert a synthesis figure showing the rheological characteristics of natural flow-like phenomenon discussed within this work (i.e.

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debris flows, avalanches, etc.). They should insist on the main differences between those fluids in terms of viscosity, mono/biphasic fluid, grain-size distribution, etc.). They should also mentioned somewhere that lahars are considered as very specific viscous fluid in most of those classifications;

- Authors do not discuss some key elements concerning debris flows: (1) the triggering can be a fluidization of deposits within the channel or laying on connected side slopes (solid to fluid), but also can be an enrichment of a “classical” flood with solid material during the runout (fluid to solid); (2) the rheology of a single debris flow event can vary during its runout due to entrainment processes;

- Authors should explain somewhere the influence of clays on the flow motion and how it varies according to this clay content;

- A comparison between their results and observations of real study case is missing. They could insert a simple table with the main rheological and morphological characteristics of their experiments and some characteristics of other case studies;

- A sensitivity analysis could be discussed somewhere in the discussion part where authors could identify which input data has the most influence on the output data;

- Where's the final conclusion?

#### Specific remarks:

Page 14, Figs 5 & 6: Why the scale of X and Y-axis of both graphs are different? It could mislead the readers;

Page 19, Figs 11 & 12: Same remark as above.

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