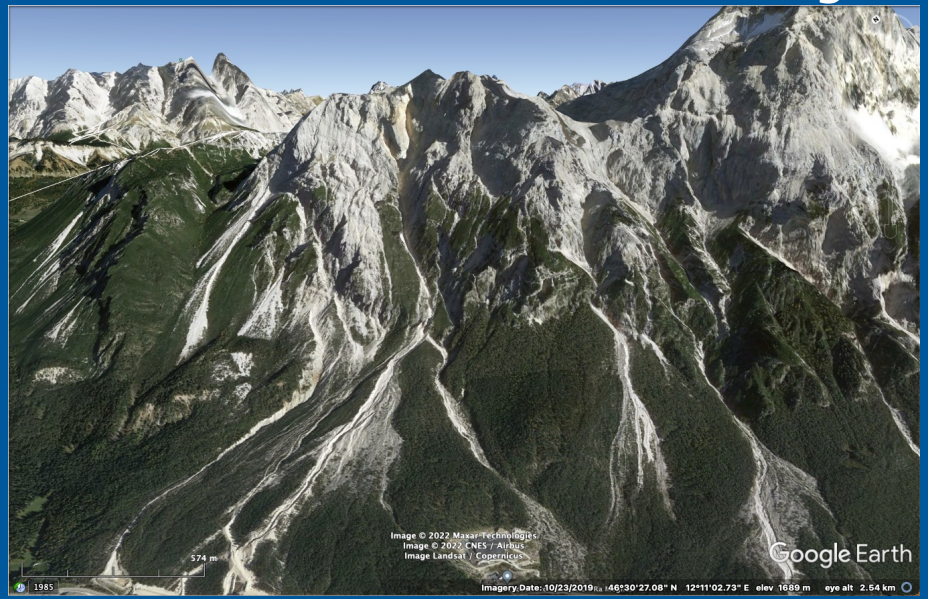
The initiation of runoff- generated debris flows in steep carbonate catchments

Oliver Francis and Hui Tang



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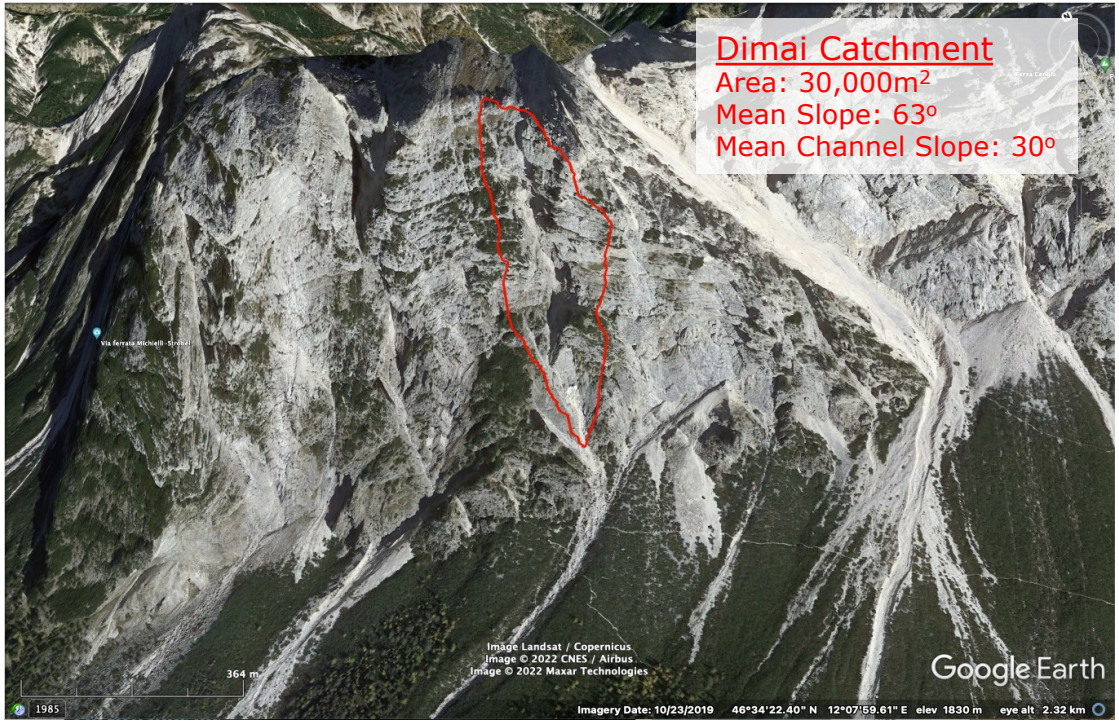
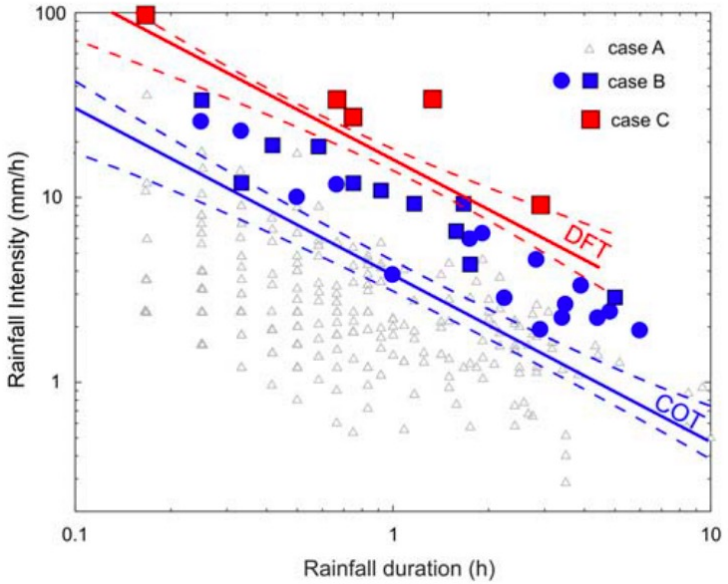
Debris flows in the Italian Alps



All data collected and processed by: Berti, M., Bernard, M., Gregoretti, C. & Simoni, A. Physical Interpretation of Rainfall Thresholds or Runoff-Generated Debris Flows. J. Geophys. Res. Earth Surf. 125, 1–25 (2020).

Physical controls on debris flow initiation

Dimai Catchment



Berti, M., Bernard, M., Gregoretti, C. & Simoni, A. Physical Interpretation of Rainfall Thresholds or Runoff-Generated Debris Flows. J. Geophys. Res. Earth Surf. 125, 1–25 (2020).

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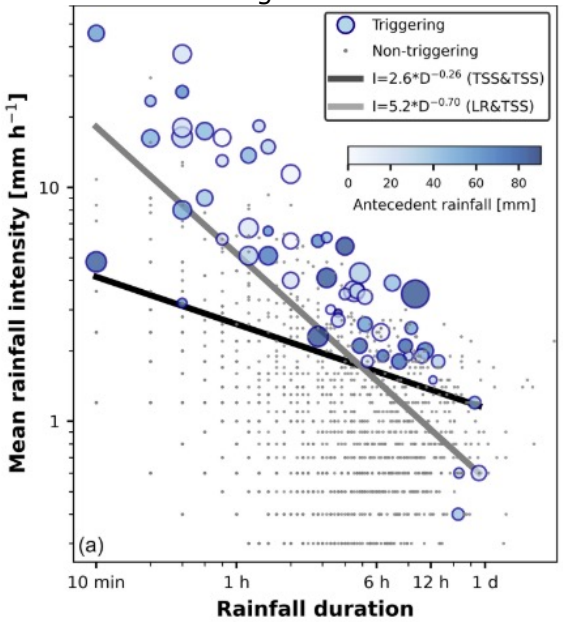

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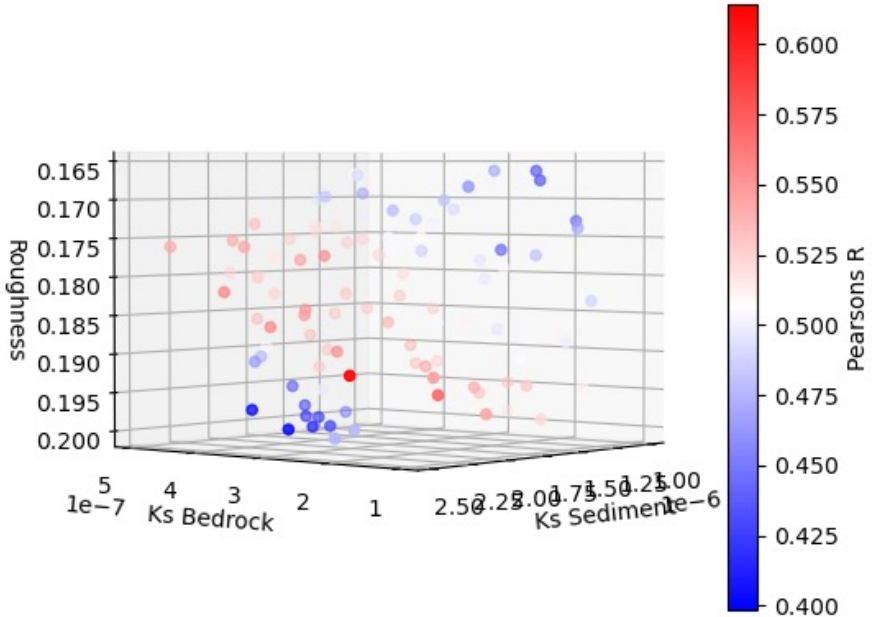
Modelling debris flow rainfall thresholds

The SWEHR model : The model combines the **S**hallow **W**ater **E**quations and **H**airsine-**R**ose soil erosion model with the Green-Ampt Infiltration model to simulate the response of a catchment to a rain storm.

We focus on 3 Parameters in this presentation: Manning's Roughness and the saturated conductivity of bedrock and sediment.



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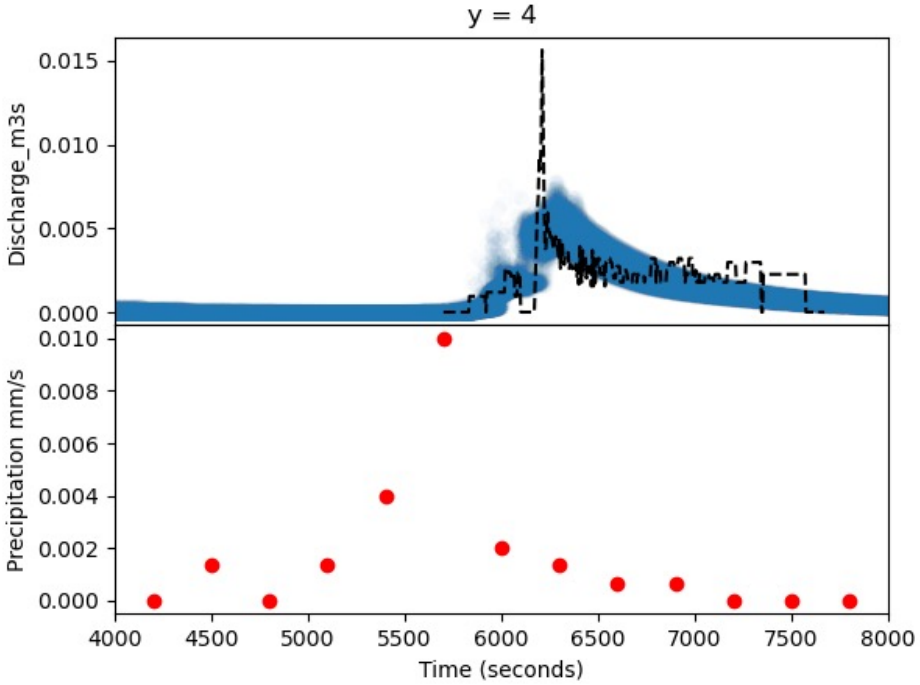
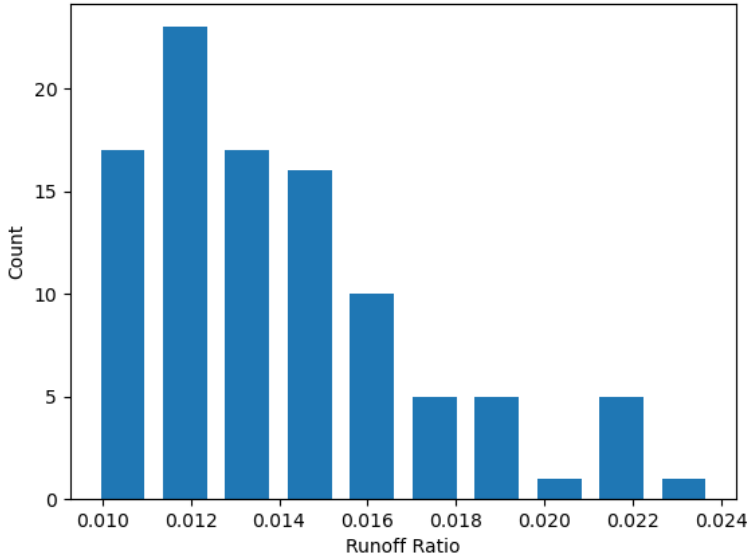
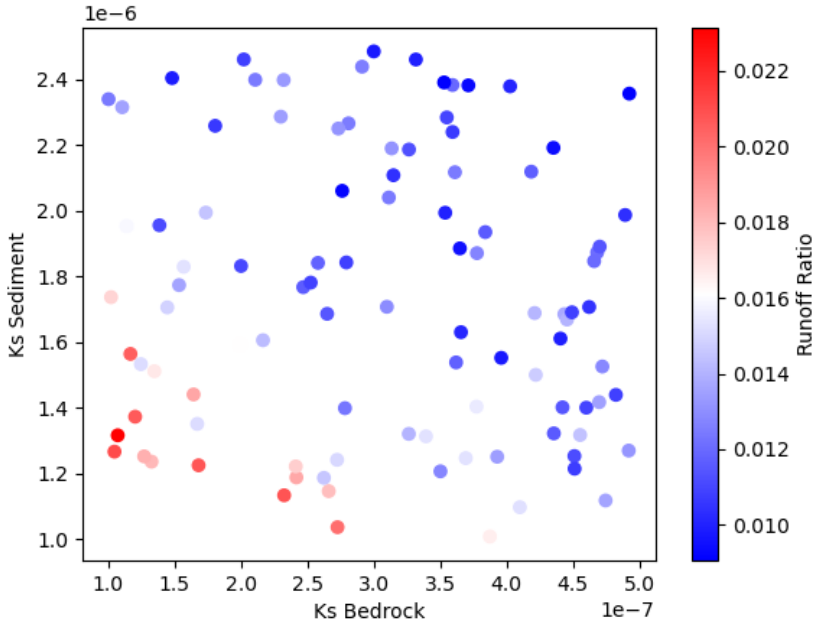
Calibration results

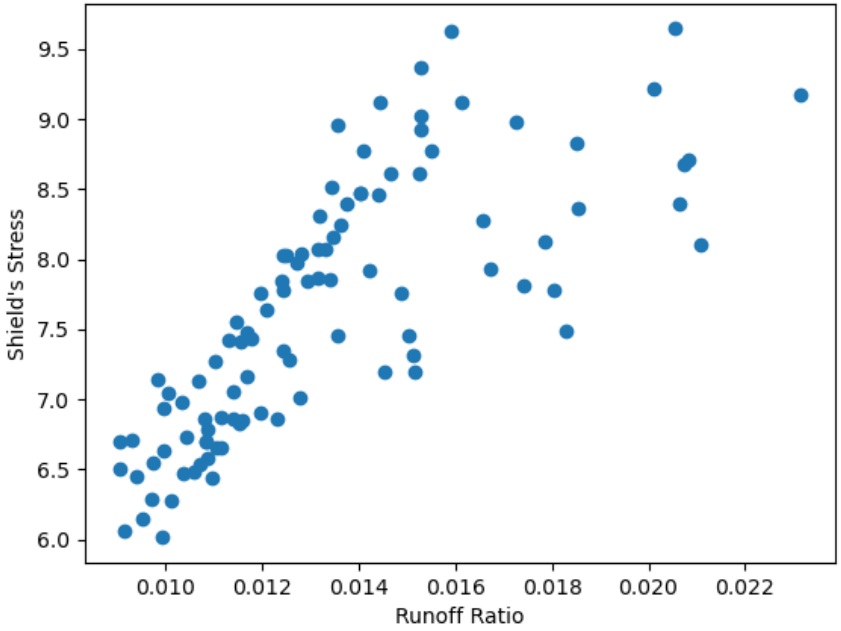




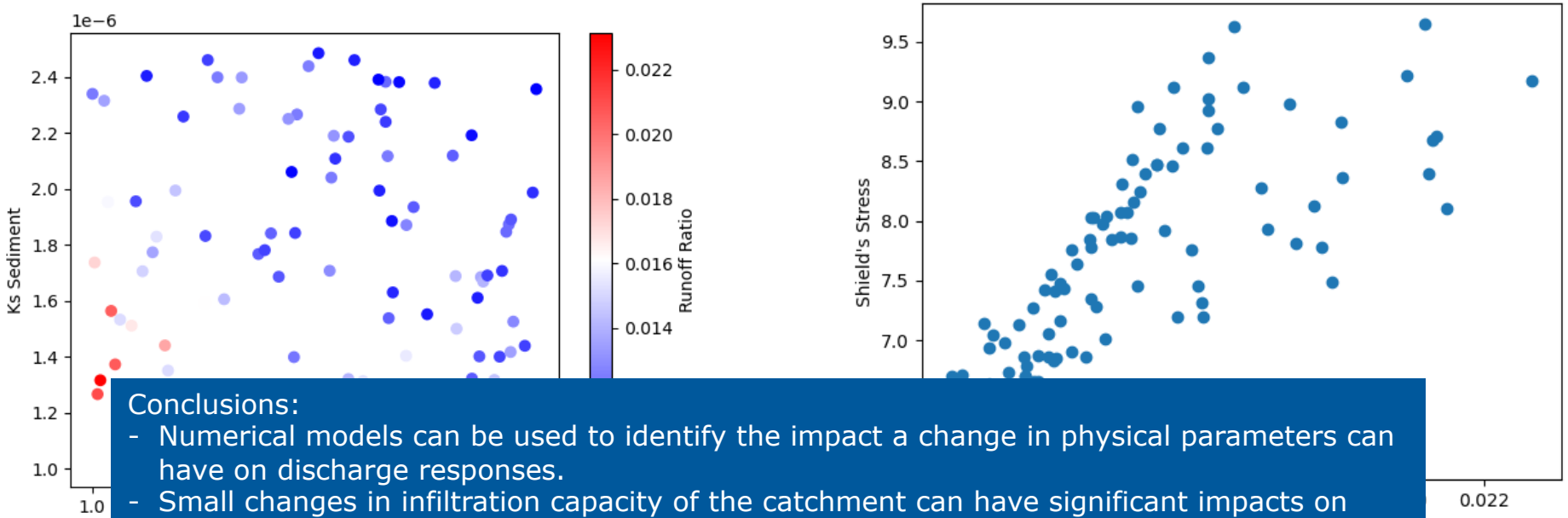
Runoff ratio = total discharge volume /total precipitation volume

Implications for Rainfall – Intensity thresholds





Implications for Rainfall – Intensity thresholds



Conclusions:

- Numerical models can be used to identify the impact a change in physical parameters can have on discharge responses.
- Small changes in infiltration capacity of the catchment can have significant impacts on debris flow initiation which can result in unreliable rainfall intensity thresholds.

Further Questions?
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