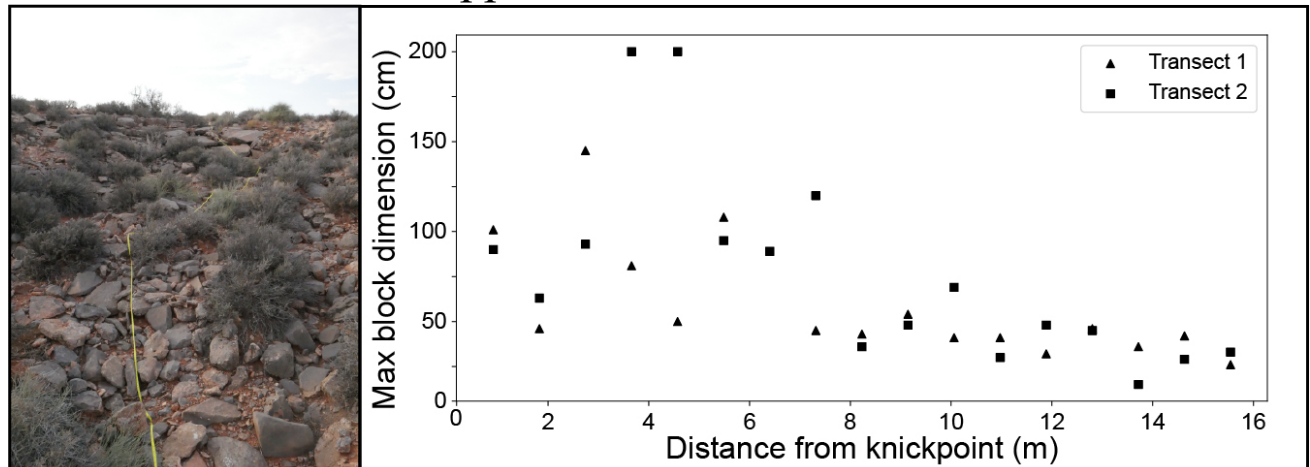


## Supplemental Material



**Figure S1.** Example of knickpoint formed where channels cross the Upper McKim escarpment and the respective max block size moving downstream.

Sediment deposition



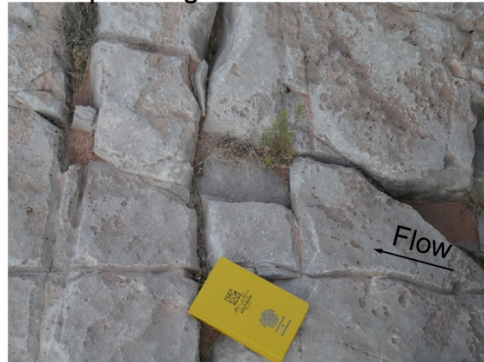
Imbrication



Abrasion marks



Block plucking



Colluvial slope



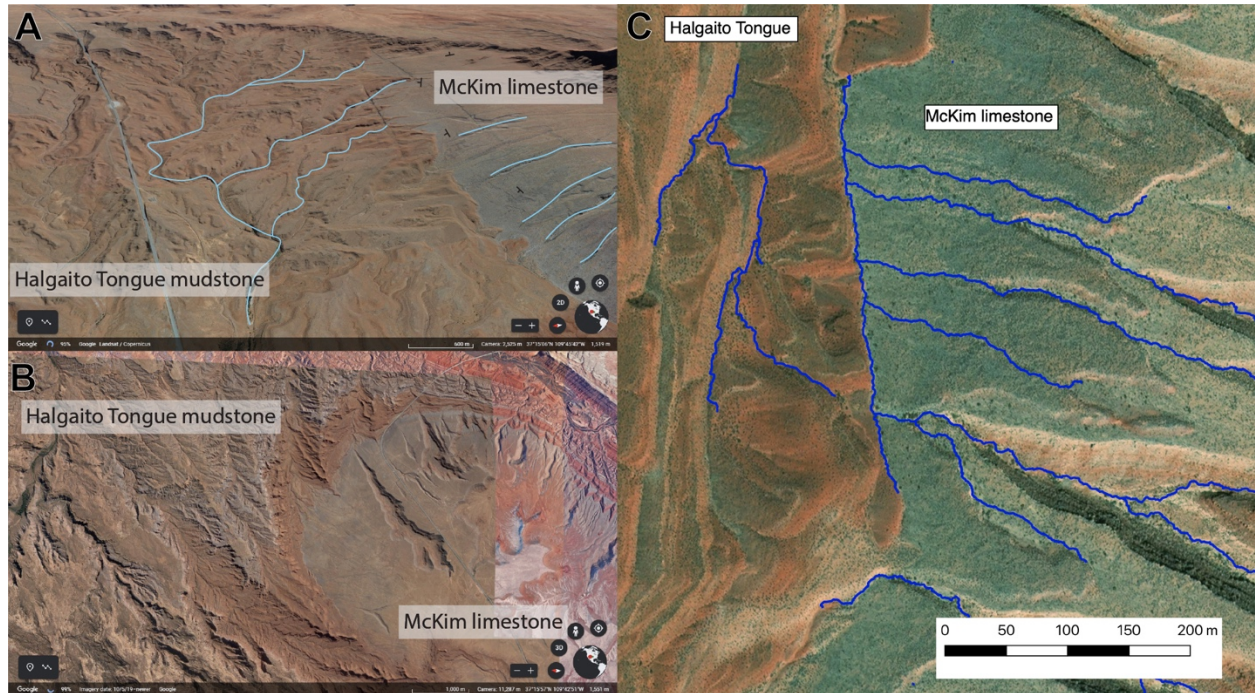
Block sliding



Debris flow



**Figure S2.** Evidence for various modes of transport observed in the gullies incised into Raplee Ridge.



**Figure S3.** A) Drainage patterns in the Halgaito Tongue mudstone are cross-cut by the contact with the Halgaito Tongue. Imagery courtesy of Google Earth. B) Well-established drainage patterns in the Halgaito Tongue end abruptly at the contact with the McKim limestone, suggesting they are not superimposing into the limestone. Imagery courtesy of Google Earth. C) Example of transverse drainage that follows the contact between the Halgaito Tongue and McKim limestone



**Figure S4.** Multiple examples of the blocky, fractured nature of the McKim limestone.