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Interactive comment on "Box canyon erosion along the Canterbury coast (New Zealand): A rapid and episodic process controlled by rainfall intensity and substrate variability" *by* Aaron Micallef et al.

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The reviewer states that "the geophysical resistivity doesn't seem like it was very successful, so it not clear why it is included?"

The inability to fit a 1-D resistivity-vs-depth model to the observed slingram responses, coupled with the observation that the first-time-gate response profiles show considerable along-transect variability (Figs. 9a-c), suggests that the geo-electrical subsurface structure is strongly heterogeneous within the footprint of the G-TEM transmitter.

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Discussion paper

The geo-electrical heterogeneity suggested by the G-TEM responses could be caused by the resistivity signature of discrete subsurface groundwater conduits, perhaps in the form of cylindrical tubes of irregular cross-section, carrying groundwater seaward across the Canterbury Plains and discharging either at the cliffs or the beach.

This is the key information provided by G-TEM in support of the hypothesis of discrete bodies of groundwater flowing along preferential seepage pathways and supporting the growth and evolution of box canyons along the coastal cliffs.

Work is currently underway, as part of a different study, on 2-D forward modelling of the slingram responses; our preliminary results indicate that the G-TEM data can be explained by the aforementioned electrically conductive groundwater conduits. It suffices to say here that, to depths of several tens of metres, the subsurface landward of the box canyons is certainly not one-dimensional from the perspective of electrical resistivity.

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