GIS methods for understanding fluvial downcutting processes; Waimata Catchment, Gisborne, New Zealand

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# ABSTRACT

The Waimata Catchment, located immediately north of Gisborne City, comprises eroding deeply incised hill-country underlain by mainly late Cenozoic marine sedimentary rocks. It is situated in the structurally complex forearc province of the active Hikurangi Subduction zone (Mazengarb and Speden 2000) that is broadly uplifting as evidenced by flights of fluvial terraces in this and many of the neighboring catchments (Marden et al. 2008)

The public availability of a 2018 LiDAR Digital Elevation Model (DEM) coupled with open-source GIS technology provides a new lens with which to reinterpret the geology and geomorphology of this area from what was done about 2 decades previously. These new tools have been used to digitize and record geologic and geomorphic features including cataclinal surfaces, terraces, fans, and remnant landscape surfaces bordering the main stem of the Waimata River valley as vector layers.

Once created, vector layers were then attributed with geomorphic type, topographic elevation statistics, relative elevation above local base-level and distance along the main channel of this river from its source to the river mouth. These attributes were obtained in a semi-automated manner using various GIS methods and with reference to a LiDAR-generated DEM in a much more detailed and accurate way than has been possible previously.

It is proposed to use tephra chronology to provide stratigraphic control in the reconstruction of longitudinal terrace profiles and to interpolate these surfaces back in planimetric space, from which rates of fluvial incision and volumes of sediment generated will be calculated for age-constrained periods of time since the Last Glacial Maximum (LGM).

In this presentation we outline the methods used, their strengths and weaknesses and an update of progress towards establishing the downcutting history and sediment volumes removed from this catchment since the LGM.

# REFERENCES

Marden, M, Mazengarb, C., Palmer, A, Berryman, K, Rowan, D., 2008. Last glacial aggradation and postglacial sediment production from the non-glacial Waipaoa and Waimata catchments, Hikurangi Margin, North Island, New Zealand. Geomorphology, 99, 404-419.

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