Coastal Mapping & Research

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Applied geoscience across the coastal zone

Rapidly emerging data across the coastal zone is inspiring a new generation of applied coastal research. Here we describe two examples:

- **Seamless geological mapping and modelling:** filling the '*White Ribbon*'; improving geological knowledge across the difficult-to-access coastal zone

- **Drowned shorelines:** as a record of sea-level change; predicting the response of the coast to future sea-level rise
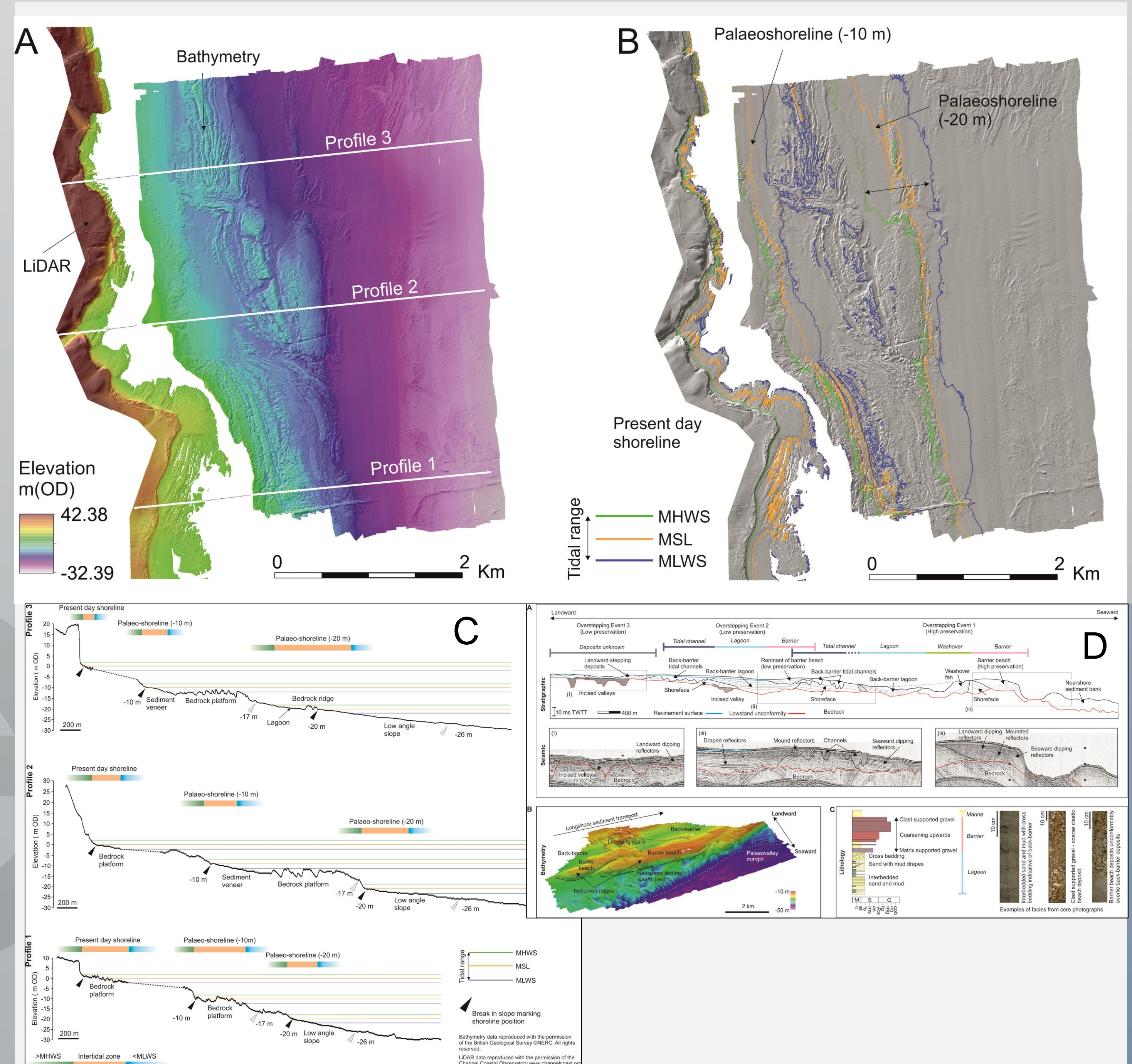

Figure 2 –A & B) *Coastal Lidar & bathymetry, Northumberland; using geomorphology to identify drowned shorelines and reconstruct paleogeography linked to archaeology - cross-shore profiles shown on C; D) Hastings Bank, UK, recognizing detailed drowned barrier morphologies.*

References: For A, B, D: Mellett & Plater (*in press*). Book chapter for: *Barrier Dynamics & the Impact of Climate Change on Barrier Evolution*. Springer; For C: Bicker (*in press*)
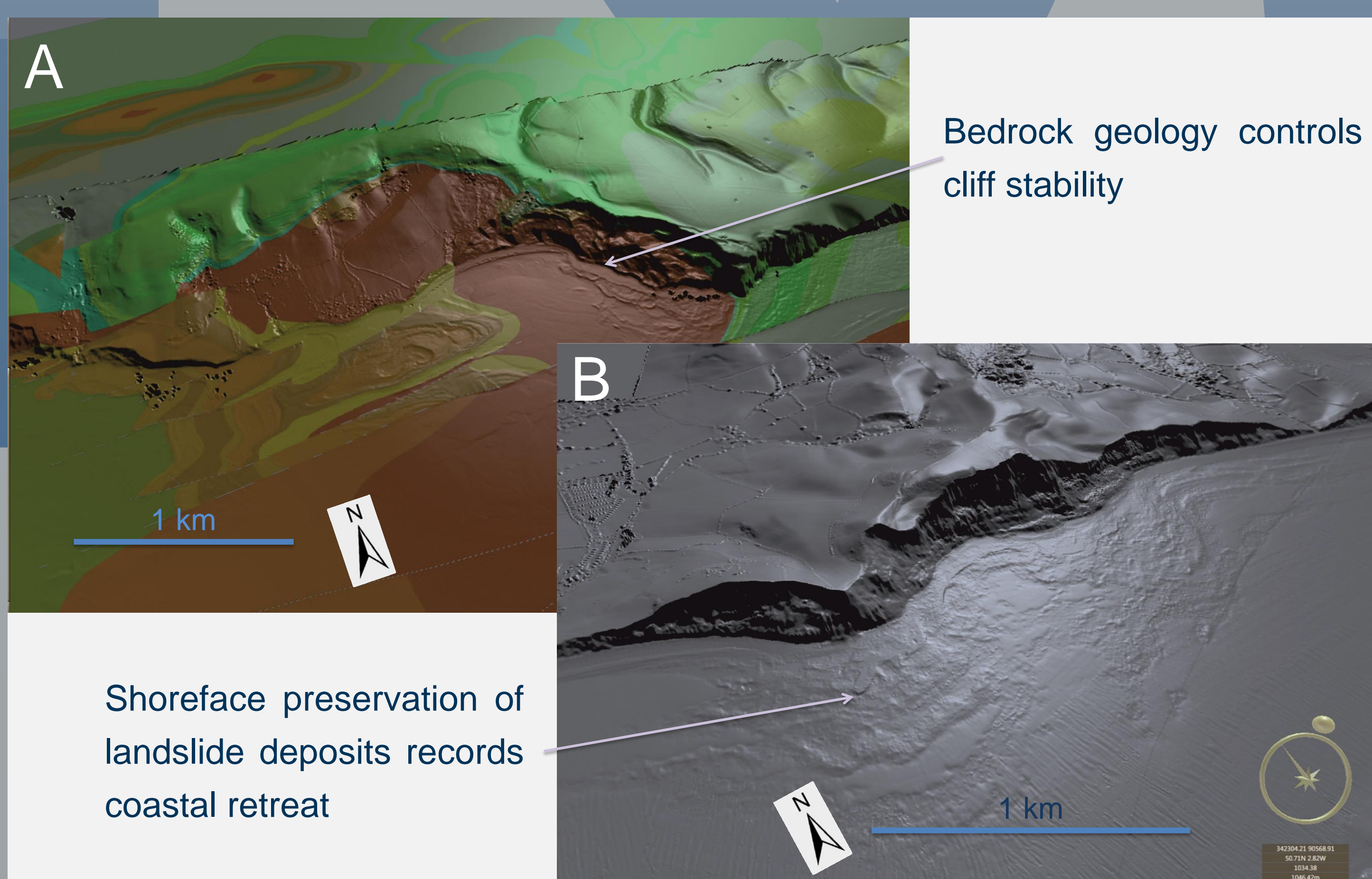

Understanding the coastal zone as a whole system is crucial for predicting its future behaviour, including how changes may impact on the environment and society, for instance:

- Seamless bedrock mapping helps predict coastal erosion rates (Fig. 1A)
- Studies of active landslides and drowned landslide deposits in the shoreface help predict stability of steep coastal areas (Fig. 1B)
- Mapping and sub-surface modelling of drowned coastal barriers, enables better prediction of coastal response to ongoing sea-level rise (Fig. 2)

Figure 1 –*Seamless mapping through the White Ribbon, Dorset Coast , Southern England; undertaken using BGS-Virtalis 3D GeoVisionary (as shown) and BGS SIGMA digital mapping software.*

A)   Seamless Bedrock mapping, near Lulworth;

B)   Onshore - offshore landslides, near Lyme Regis

Reference: Sanderson, Dix, **Westhead** & Collier (*in press*). Bathymetric mapping of the coastal and offshore geology and structure of the Jurassic Coast, Weymouth Bay, UK. *Journal of the Geological Society*

Such seamless coastal zone studies enable us to produce better applied products, such as, 'traffic light' coastal vulnerability indices and coastal flooding mapping (Fig. 3)
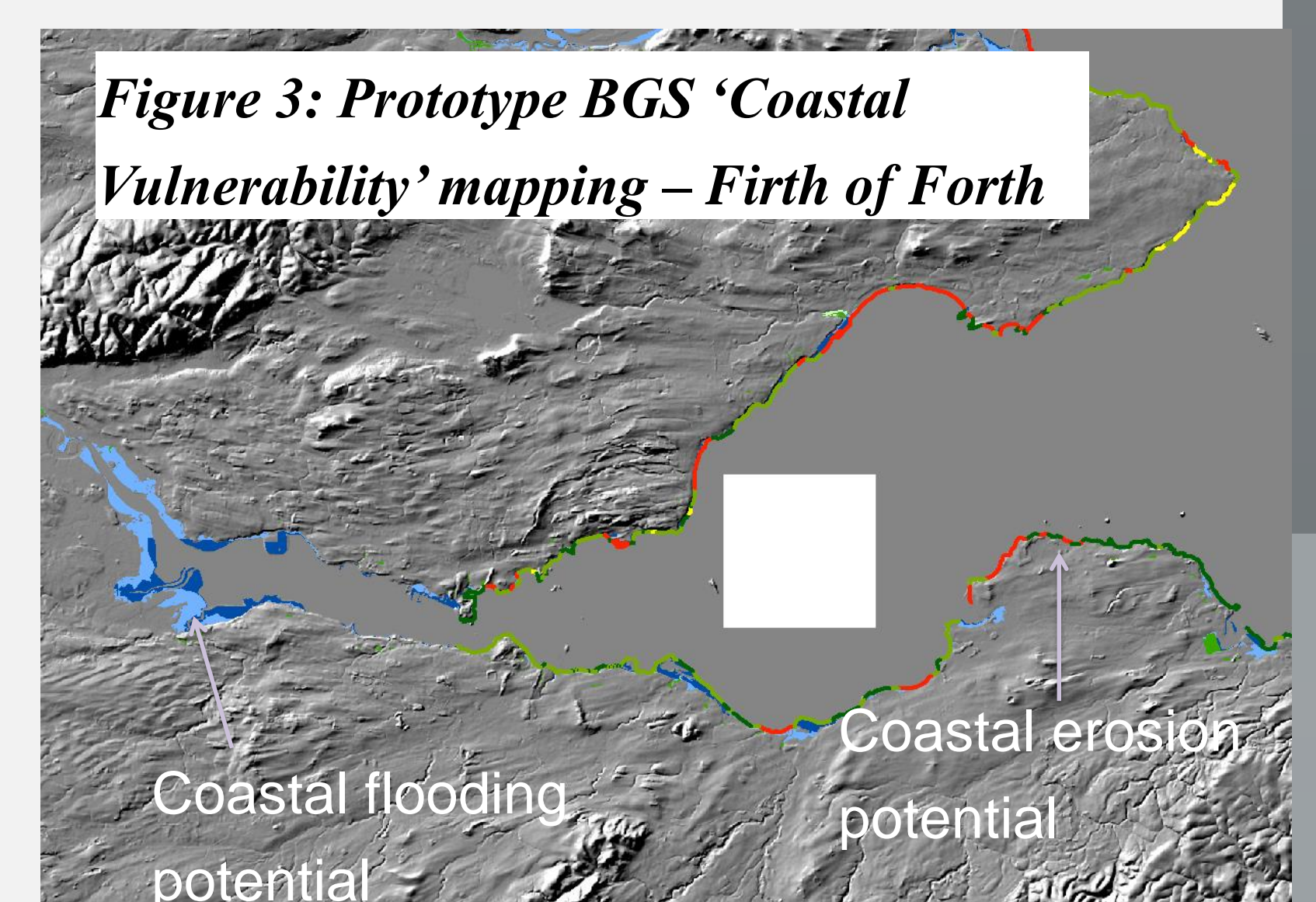

Figure 3: Prototype BGS 'Coastal Vulnerability' mapping – Firth of Forth