COASTAL 'OMNI-LINE': MULTI-SCALE DATA SYNTHESIS, TOP-DOWN AND BOTTOM-UP

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INTRODUCTION

Debate exists on use of large-scale, simplified models for predicting shoreline change, e.g., IPCC AR6, as opposed to local-scale 'compartment-based' studies. An alternative is to act both top-down and bottom-up, integrating multi-scale data. We outline a prototype 'Omni-Line' coastal database, spanning Victoria, Australia (2500 km coastline; Fig. 1), part of the Victorian Coastal Monitoring Program (VCMP).

METHODS

The database framework comprises 30-m alongshore-spaced transects from Digital Earth Australia Coastlines (DEAC; Geoscience Australia; 1988 - 2020), with all datasets interpolated to the same framework. Cross-sections are extracted from the Victorian Coastal DEM (2021). Morphology is from 'SmartLine'. Divisions are by Coastal Compartments (Coastal Sediment Compartment Project). Coastal structures are from the Coastal Asset Management System (CAMS). Wave and water level statistics are interpolated from regional models (Tran et al., 2021; Liu et al., 2022). Aerial imagery shorelines (1930 onward) are extracted at selected locations. Observational data are from VCMP wave buoys (n = 13); and drone surveys (n = 38 sites).

RESULTS

Example applications are provided (Fig. 1, bottom-row). First, DEAC data show the percentage of shoreline eroding (>0.31 m/yr) in Victoria is slightly higher (18%) than the national average (11%). Next, shorelines, morphology and structures are intersected, indicating that sand dune-backed profiles comprise 42% of the VIC non-rocky coast, 31% of which are eroding. Finally, cross-shore variability for drone survey sites is correlated to modelled wave height, as a predictive method to determine beach change envelopes.

CONCLUSIONS AND NEXT STEPS

Example applications of the 'Omni-Line' approach demonstrate the ability to interrogate multi-method, multi-scale coastal data. If further developed and made freely available, this approach will enhance our collective ability to tackle many hard coastal problems.

REFERENCES

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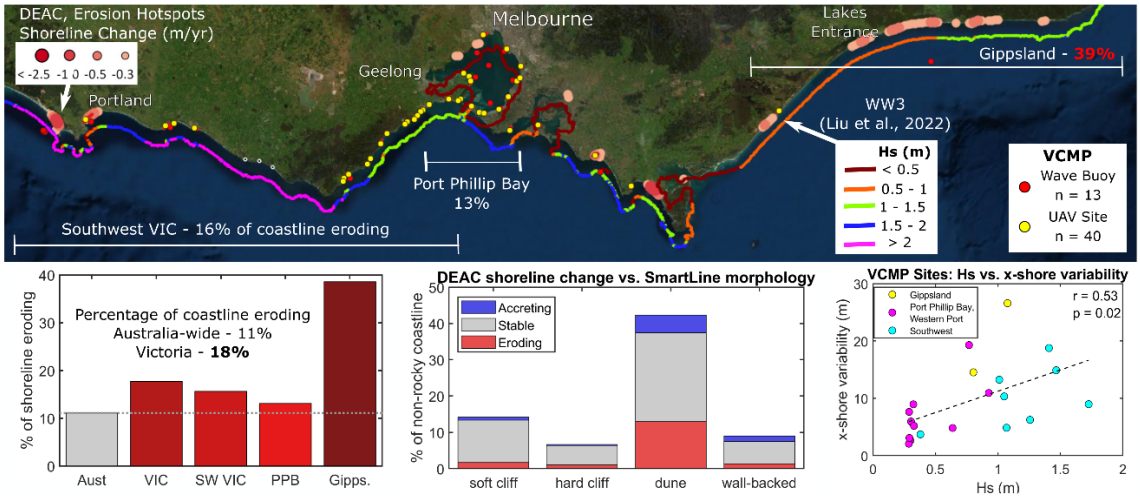

Figure 1. Victorian 'Omni-Line', (top row) example input datasets, including DEAC, modelled wave height and VCMP observational data, (Bottom row) example outputs, using DEAC, SmartLine, wave height and drone survey data.