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Shipwreck and Sherbrook supersequence regional gross depositional environments, offshore Otway Basin

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1. Introduction

Regional Gross Depositional Environment (RGDE) maps for the Shipwreck and Sherbrook Supersequences were compiled to constrain the distribution and composition of potential reservoir, seal, and source rock intervals of the upper Cretaceous succession across the offshore Otway Basin.

2. Regional geological setting

The upper Cretaceous Shipwreck and Sherbrook supersequences consist of fluvial, coastal plain, deltaic, and marine shelf sediments (Fig. 1a). Accommodation for the upper Cretaceous depocenter (Fig. 1b) was created by pronounced late Cretaceous crustal thinning and extension.

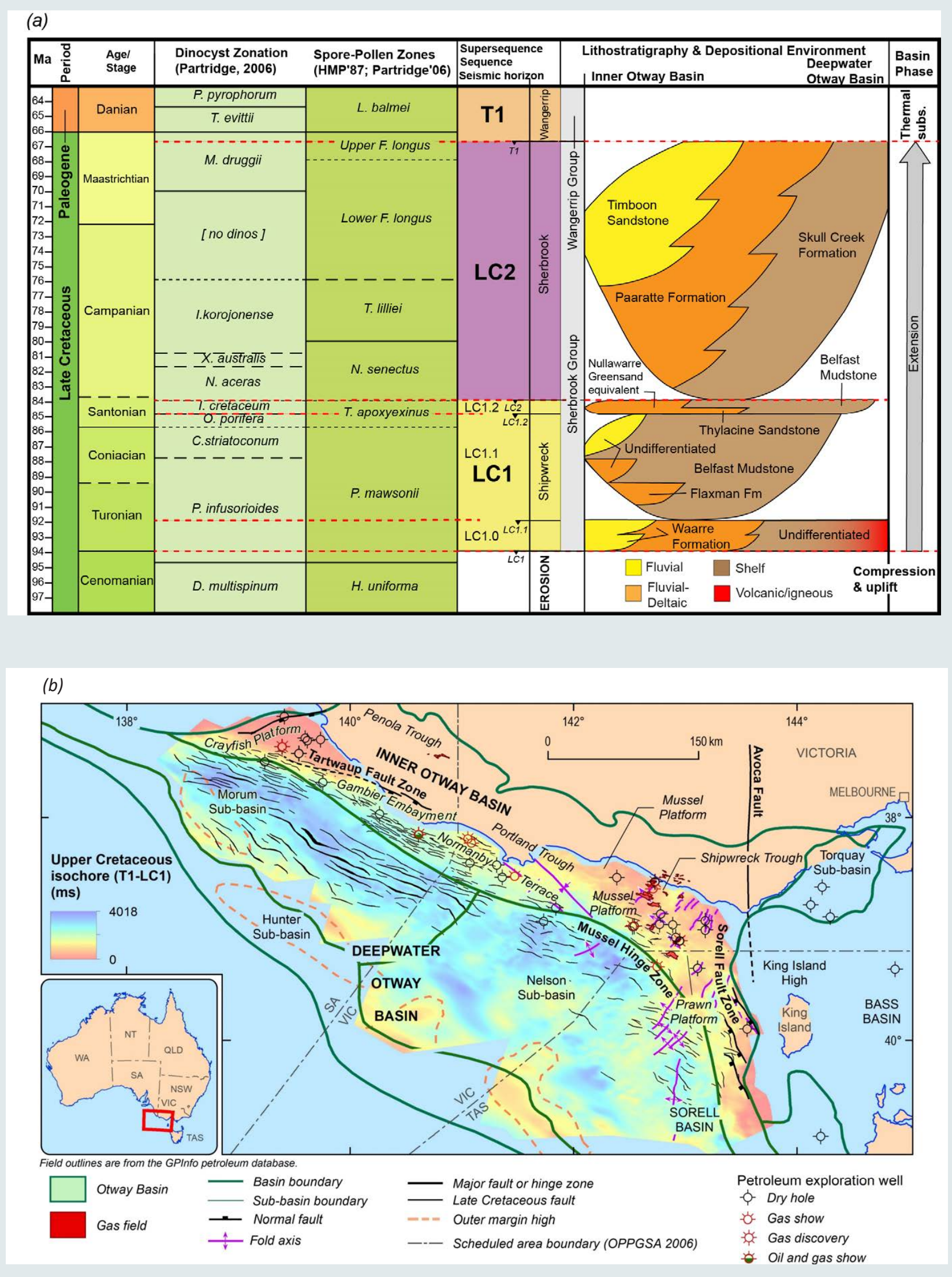

Figure 1: Regional geological setting of the Otway Basin upper Cretaceous (a) Stratigraphic chart and (b) Time-isopach and structural elements map.

3. Depositional environments from core & wireline logs

Composite core logs (e.g. Fig. 2) compiled from 19 wells include interpretation of depositional environment (DE) and gross depositional environment (GDE). Wireline log motifs were applied to interpret DEs and GDEs for the non-cored intervals in 37 wells.

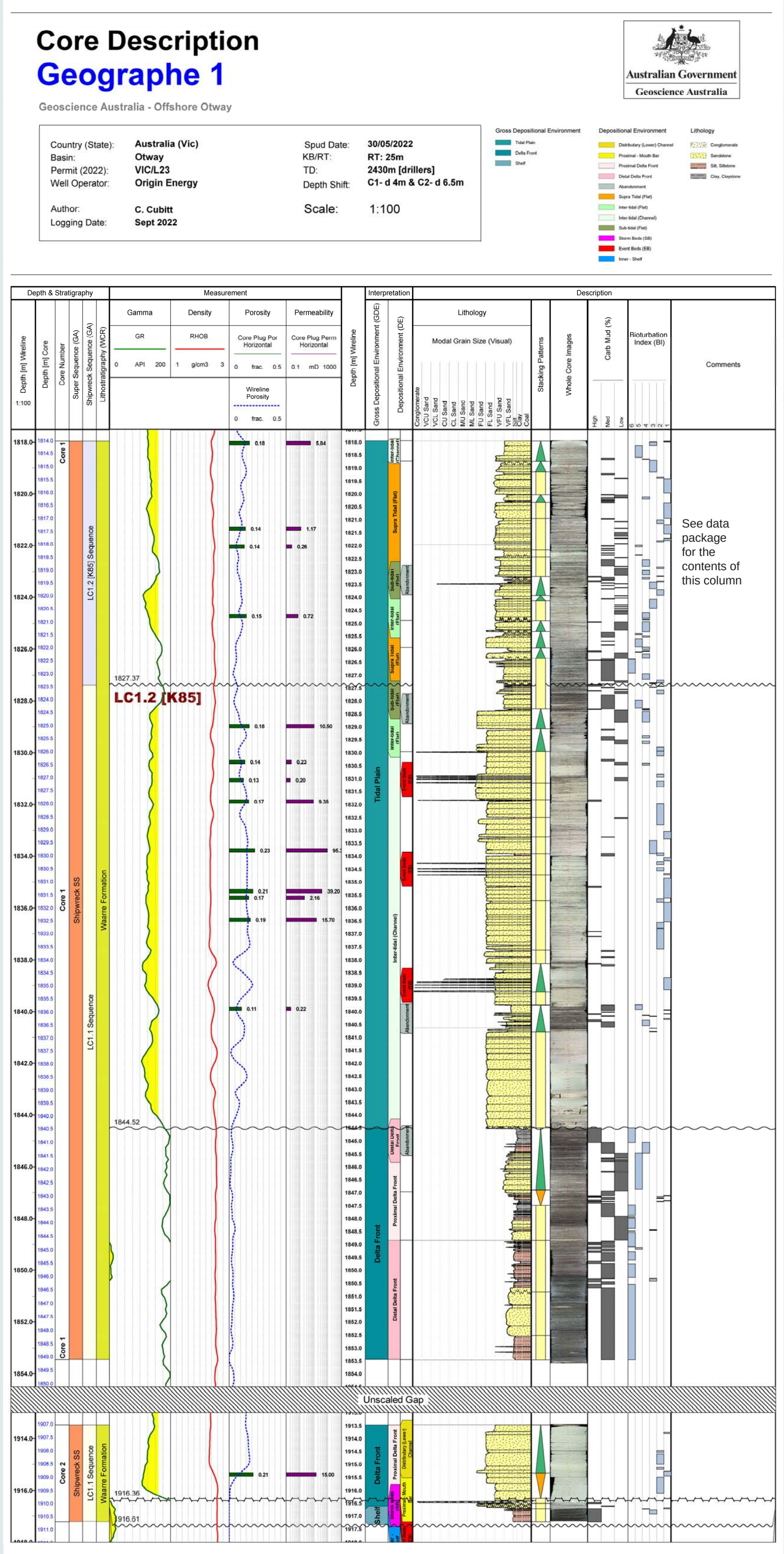

Figure 2: Core log example from Geographe 1.

4. Regional gross depositional environment (RGDE) characterisation

Observations from wells (core and wireline logs), together with seismic facies analysis, were integrated to formulate three basin-scale RGDEs:

- Fluvial Plain
- Coastal-Deltaic Plain
- Shelf

Interpreted seismic paths depict the distribution of RGDE across the Morum (Fig. 3a) and Nelson (Fig. 3b) sub-basins.

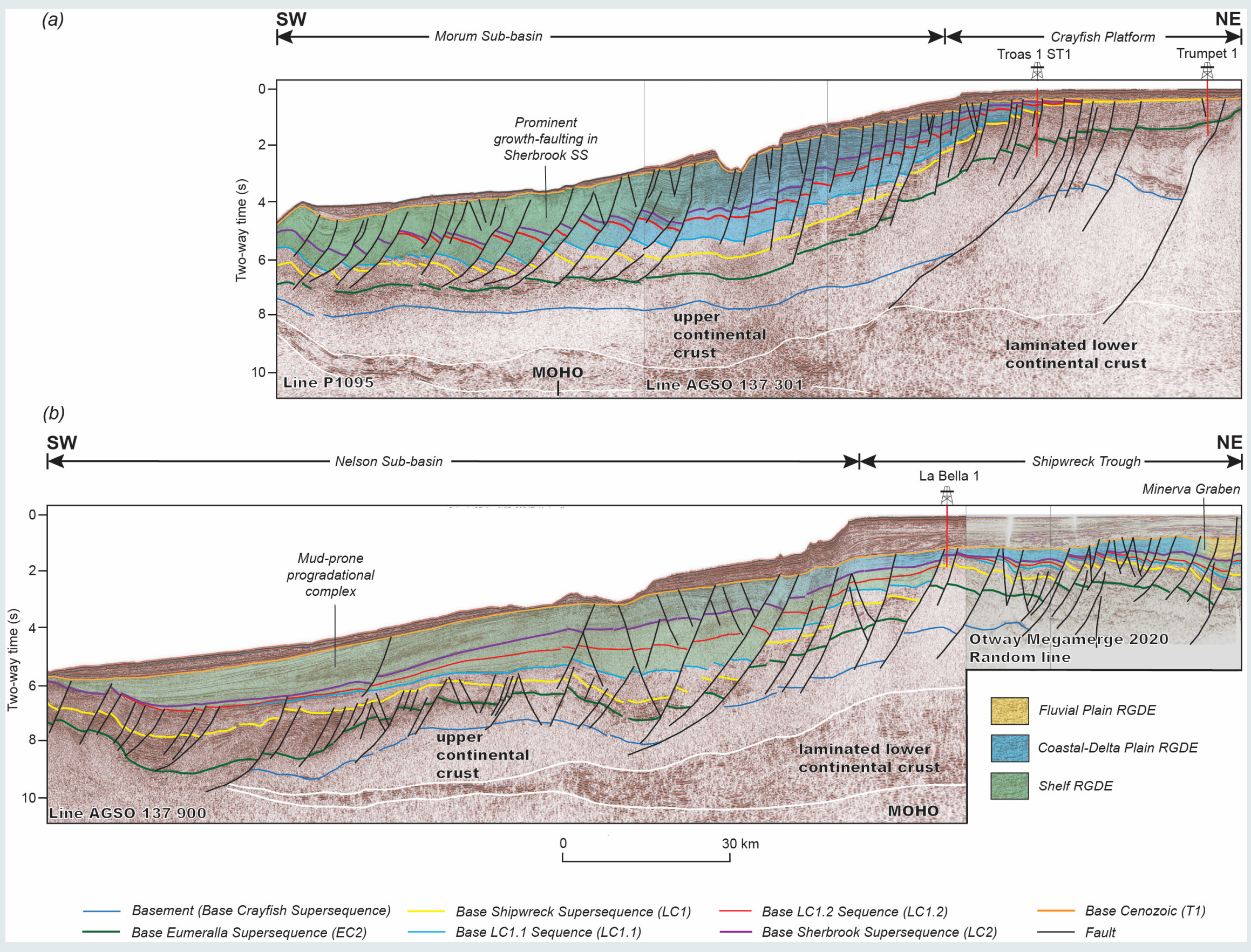

Figure 3: RGDE distribution across the (a) Crayfish Platform and Morum Sub-basin, and (b) Shipwreck Trough and Nelson Sub-basin. See Fig. 4 for profile locations.

5. RGDE maps

Markers placed on RGDE boundaries on seismic profiles were used to guide the creation of RGDE polygons in plan view (Fig. 4). Basin-wide map coverage was completed using published sources for the onshore basin.

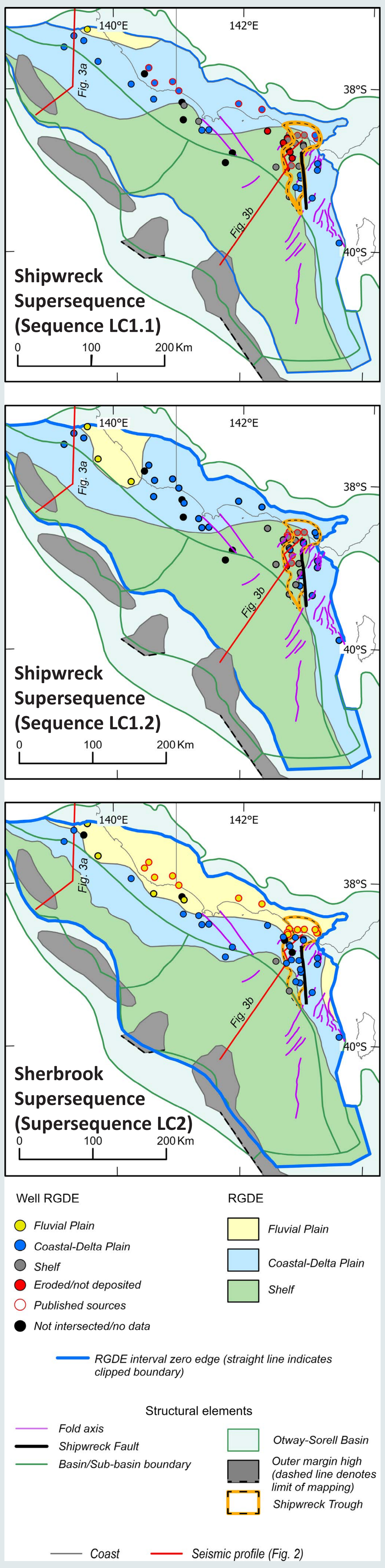

Figure 4: Regional gross depositional environment maps for three upper Cretaceous intervals.

6. Conclusions

The RGDE maps presented here indicate the composition and distribution of source, reservoir, and seal play elements. Results of this study will inform area selection for detailed GDE mapping, formulation of new hydrocarbon and CO_2 storage plays, and provide new inputs for petroleum and CO_2 systems modelling.

Further reading

Abbott S, Cubitt C, Bernardel G, Nicholson C, and Nguyen D (2023) Towards a regional understanding of Sherbrook Supersequence Gross Depositional Environments, offshore Otway Basin (abs.). In '4th Australasian Exploration Geoscience Conference, Brisbane, 2023' (Australian Society of Exploration Geophysicists Extended Abstracts), https://doi.org/10.5281/zenodo.7980133.

Cubitt C, Abbott S, Bernardel G, Gunning M-E, Nguyen D, Nicholson C, and Stoate A (2023) Cretaceous depositional environment interpretation of offshore Otway Basin cores and wireline logs; application to the generation of basin-scale gross depositional environment maps (abs.). The APPEA Journal 63, S215–S220, https://doi.org/10.1071/AJ22090.

Cubitt C, Nguyen D, and Stoate A (2024) Offshore Otway Basin Core logs [metadata statement and digital data package]. Geoscience Australia eCat#149190, Commonwealth of Australia, Canberra, https://dx.doi.org/10.26186/149190.

GA https://dx.doi.org/10.26186/149421 | eCat# 149421