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SUPPLEMENTARY INFORMATION

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The amplitude and origin of sea-level variability during the Pliocene epoch

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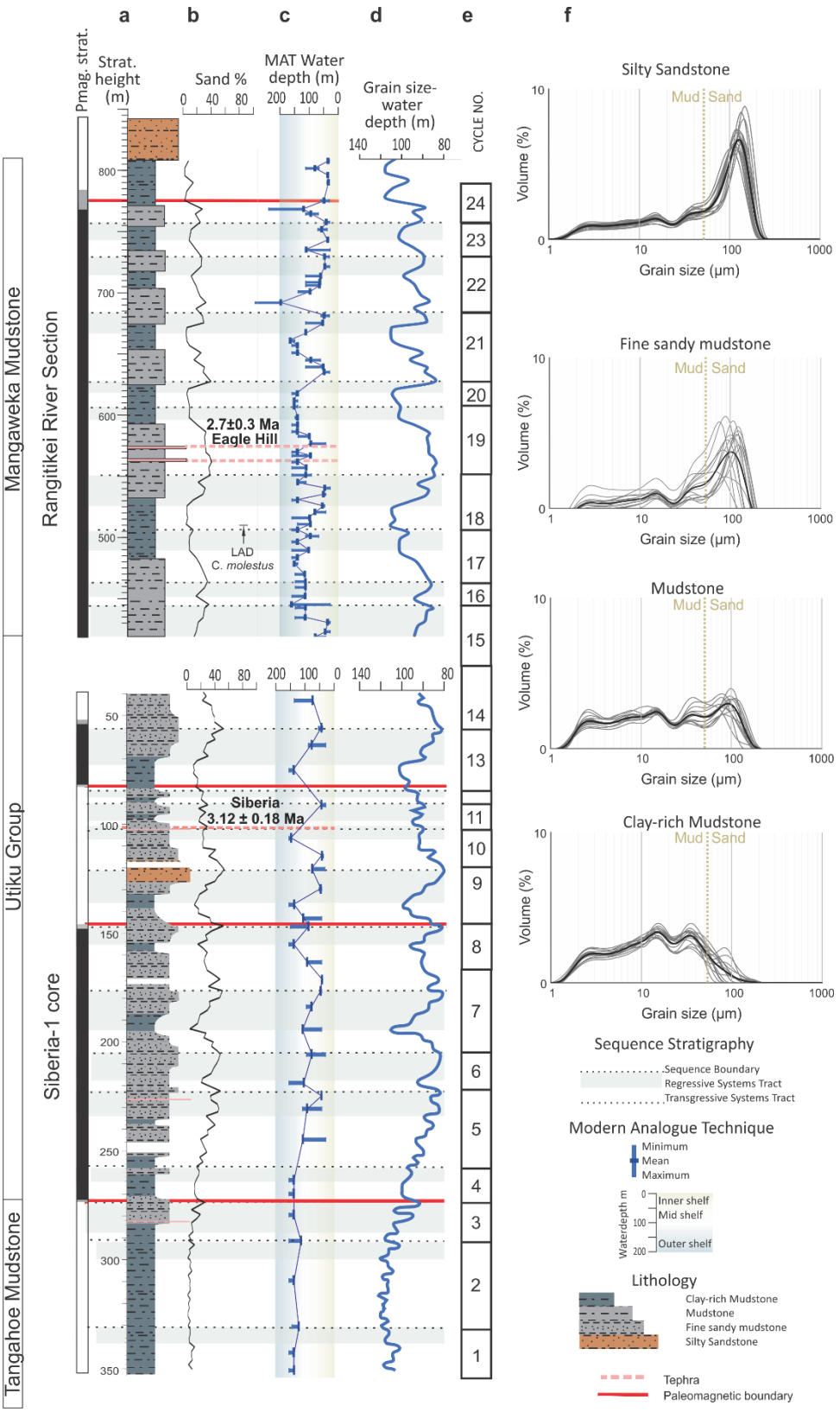
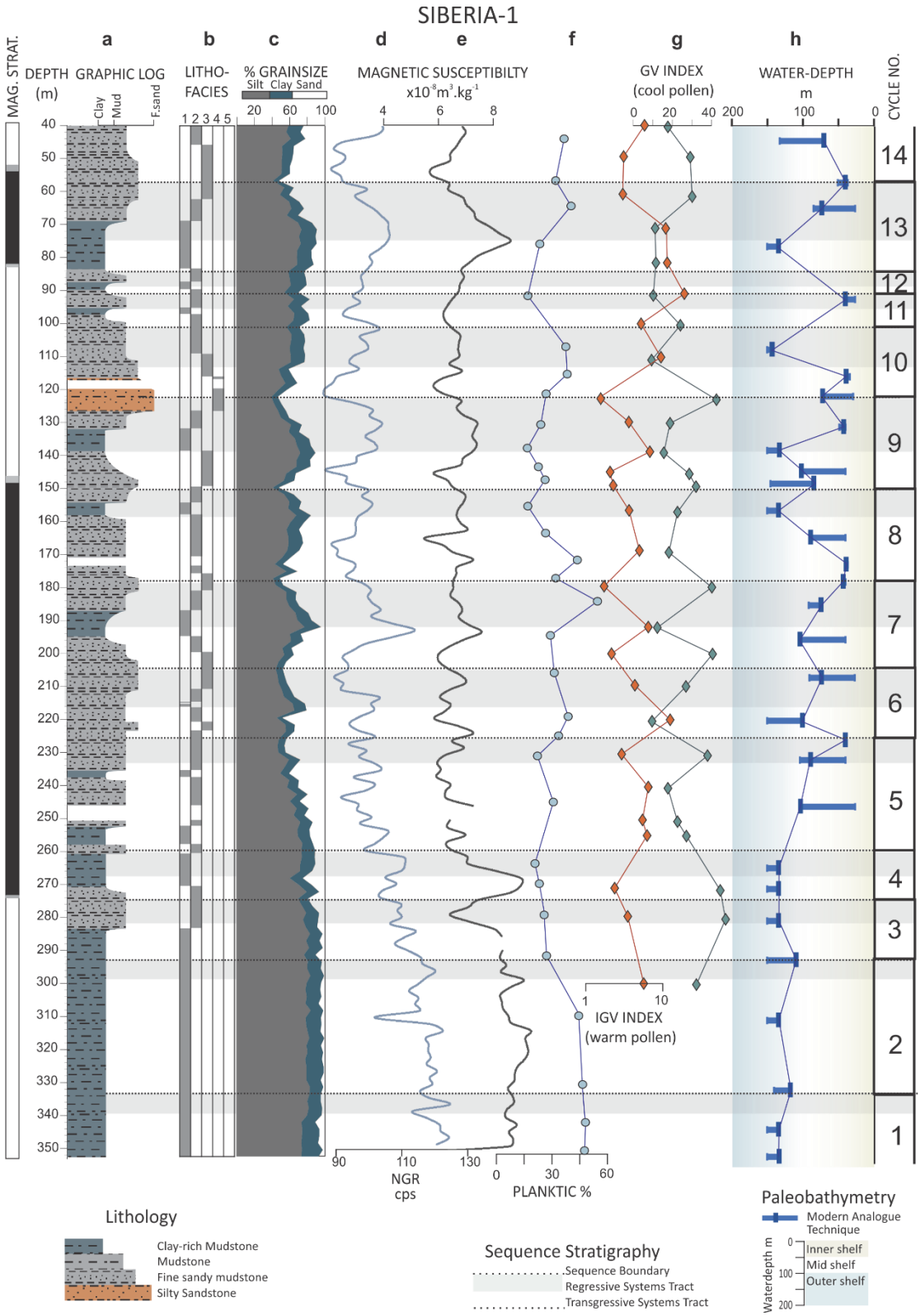
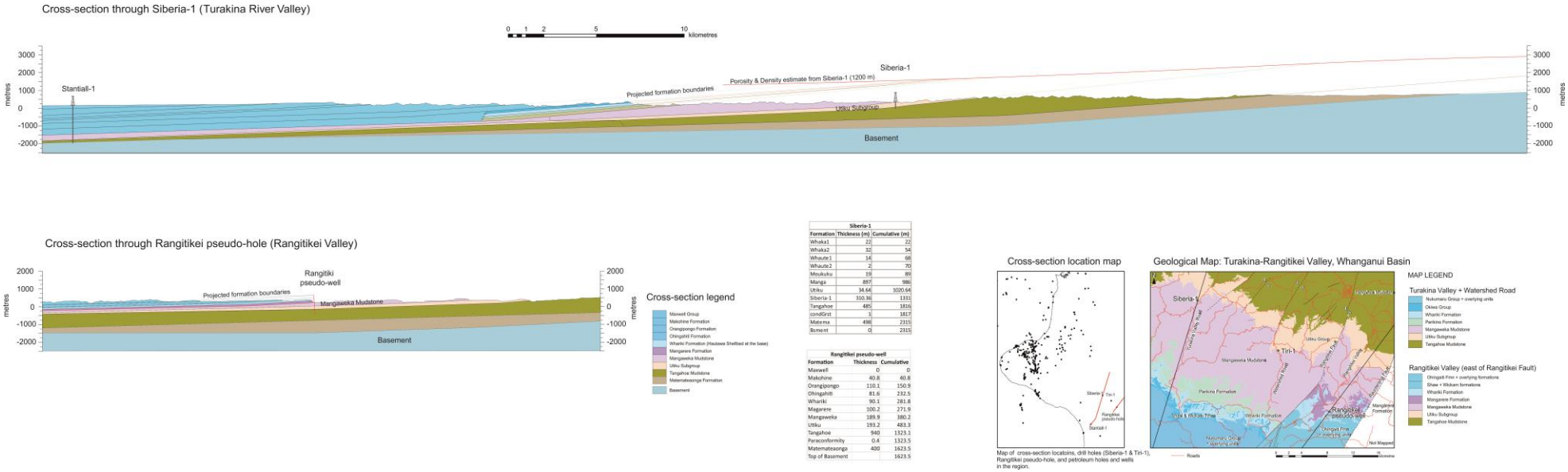


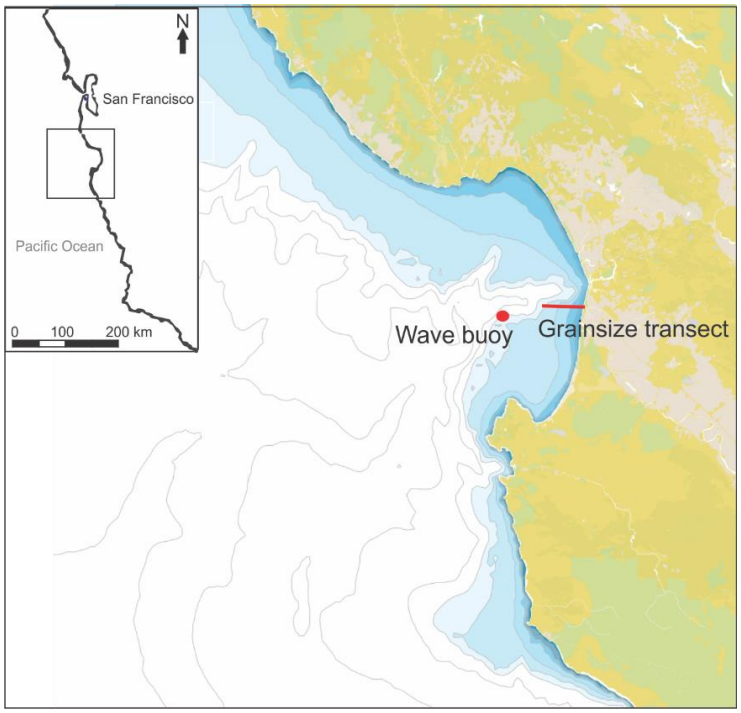
Supplementary Fig. 1 Detailed stratigraphy of the PlioSeaNZ record. **A** Sequence stratigraphic and lithostratigraphic framework of the Siberia-1 core and Rangitikei River Section, with magnetostratigraphic and tephrochronological age datums. **A** Lithology, **b** Percentage sand, and water depth estimates from **c** benthic foramininferal Modern Analogue Technique [6] and **d** the grain size -water depth technique presented in this paper, with **e** sediment cycle numbers and **f** grain size histograms of each lithology.



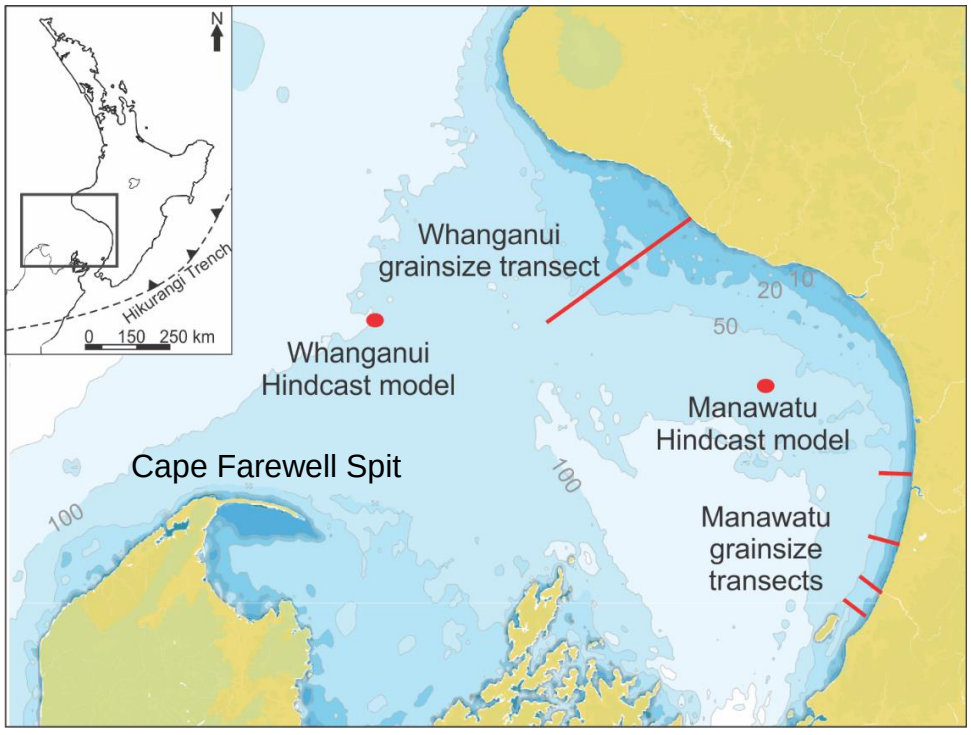
Supplementary Fig. 2. Sedimentary and climatic cyclicity of the Siberia-1 core [6]. Cyclicity is highlighted by **a** lithology, **b** lithofacies, **c** grain size, physical property logs **d** Natural gamma-ray (NGR) and **e** Magnetic susceptibility, **f** percentage planktic foraminifera, **g** pollen assemblages and **h** water depth. All are described in ref. 7.



Supplementary Fig. 3 Geologic map of central-northern part of Whanganui Basin and cross-sections through Siberia-1 core and the Rangitikei pseudo-well. Stratigraphic thickness of mapped units from core top to Mesozoic basement are given for Siberia-1 and for the Rangitikei pseudo-well. An estimate of the section eroded from the top of Siberia-1 is shown in the upper cross-section (see Methods).



Supplementary Fig. 4 Location map[42] of the wave buoy used and modern transect of Monterey Bay. Used to determine wave height (Hs) and peak wave period (Tp) for sea floor near-bed velocity calculations[41] and modern grain size transect for the Monterey Bay dataset[35] (Extended Data Fig. 1).



Supplementary Fig. 5. Location map[42] of the hindcast wave models and modern transects of Whanganui and Manawatu. Used to determine wave height and period for sea floor near-bed velocity calculations[40,42] and grain size transects for the Whanganui[39] and Manawatu[36] coastlines (Extended Data Fig. 1).