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**Understanding Sedimentary Systems and Processes of the
Hikurangi Subduction Margin; from Trench to Back-Arc.
Volume 1**

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Manuscripts

1 **Understanding Sedimentary Systems and Processes of the Hikurangi**

2 **Subduction Margin; from Trench to Back-Arc. Volume 1.**

3 Lorna J. Strachan¹, Julien Bailleul², Kyle J. Bland³, Alan R. Orpin⁴ and Adam D. McArthur⁵

4 ¹ School of Environment, University of Auckland, Auckland, New Zealand

5 ² U2R UNIL-UPJV 7511, Basins-Reservoirs-Resources (B2R), Geosciences department, UniLaSalle,
6 60026 Beauvais, France

7 ³ GNS Science, Lower Hutt, New Zealand

8 ⁴ National Institute of Water and Atmosphere Research (NIWA), Wellington, New Zealand

9 ⁵ School of Earth and Environment, University of Leeds, Leeds, United Kingdom

10

11 **ABSTRACT**

12 This is the first of a two-part *New Zealand Journal of Geology and Geophysics* Special Issue that
13 focuses on improving our understanding of sedimentary systems of the Hikurangi Subduction
14 Margin, Aotearoa-New Zealand. It is amongst the world's youngest and most accessible active
15 subduction margins and its sedimentary basins preserve a rich history of inception and ongoing
16 evolution, spanning trench to back-arc positions. These sediments and sedimentary rocks provide
17 a record of surface processes from the latest Paleogene to today, and reflect the spatio-temporal
18 variability of the effects of subduction, seismicity, volcanism, evolving sediment sources, routing
19 systems and processes, all imprinted upon by glacio-eustatic sea-level changes. The papers in this
20 volume focus on the interplay between controlling mechanisms and the dynamics of these
21 systems, from both onshore and offshore sedimentary environments. This issue is divided into
22 two themes, distinguished by geological age: 1. Miocene Sedimentary Systems and intra-slope
23 basin evolution, and 2. Insights from Quaternary Sedimentary Systems from the trench to the
24 inner margin. Collectively, these papers represent significant advances into our understanding of
25 sedimentary systems within the Hikurangi Subduction Margin, with innovative results that may
26 find applications to other convergent settings.

27 **Keywords**

28 Hikurangi Subduction Margin, Basins, Forearc; Subduction Wedge, Trench; Miocene, Quaternary,
29 Sedimentary Systems, New Zealand

30 **Introduction**

31 This is the first of two special issue volumes dedicated to the understanding of sedimentary
32 systems of the Hikurangi Subduction Margin (HSM), located to the east of the North Island,
33 Aotearoa-New Zealand (Fig. 1). The HSM forms the southern part of the Tonga-Kermadec-
34 Hikurangi subduction system, where the oceanic Pacific plate is obliquely subducting beneath the
35 continental Australian plate (Fig. 1; (Ballance 1976, 1993; Spörli 1980; Cole and Lewis 1981;
36 Pettinga 1982; Chanier and Ferrière 1991; Lewis & Pettinga 1993; Field et al. 1997; Lewis et al.
37 1998; Nicol et al. 2007; Barnes et al. 2010). Subduction is interpreted to have initiated ~25 Ma
38 and continues today (Rait et al. 1991; Nicol et al. 2007; Jiao et al. 2014). For the purposes of this
39 special issue, the HSM region encompasses a broad deformation zone, at least 200 km across,
40 stretching from the offshore Hikurangi Trough to the onshore Taupō Volcanic Zone (Ballance
41 1993; Lewis & Pettinga, 1993; Nicol et al. 2007; Pedley et al., 2010) (Fig. 2). It contains many of
42 the tectono-geomorphic elements of an idealised subduction system (e.g., Ballance 1993; Bailleul
43 et al. 2013) (Fig. 3).

44 To the east of the sea-floor expression of the subduction deformation front, the Hikurangi Trough
45 forms an elongate, trench-parallel depocentre infilled with gravity flow, contourite, and mass-
46 wasting deposits (Lewis 1994; Lewis et al. 1998; Lewis and Barnes 1999; Lewis and Pantin 2002;
47 Barnes et al. 2010; Bland et al. 2015; McArthur and Tek 2021; Tek et al. 2021, this volume; Fig. 3).
48 Moving westward, the upper (Australian) plate comprises a submerged subduction (accretionary)
49 wedge (Lewis and Pettinga 1993), that incorporates (1) an outer accretionary prism close to the
50 Hikurangi Trough, formed from accreted trench-fill sediments and overlain by Quaternary trench-
51 slope basins (e.g. Davey et al. 1986; Lewis and Pettinga 1993; Collot et al. 1996; Barnes and
52 Mercier de Lépinay 1997; Lewis et al. 1999), and (2) an inner imbricated wedge cored by pre-
53 subduction rocks that have been deformed by Neogene–Quaternary folds and thrusts (Barnes et
54 al. 2002; Bailleul et al. 2013; Barnes et al. 2010; Bland et al. 2015).

55 Small sedimentary basins within the imbricated wedge are often filled with thick successions of
56 syn-subduction sedimentary rocks (Fig. 3) (e.g. Lewis 1980; Cole and Lewis 1981; Pettinga 1982;
57 Davey et al. 1986; Lewis and Pettinga 1993; Collot et al. 1996; Barnes et al. 2010; Bailleul et al.
58 2007, 2013; Paquet et al. 2009; Bland et al. 2015; Strogon et al. 2018; McArthur et al. 2019; Griffin
59 et al. 2021, this volume). The offshore margin displays extensive evidence of intense fluid
60 migration (e.g. Katz 1981; Lewis and Marshall 1996; Barnes et al. 2010; Crutchley et al. 2010,
61 2011; Faure et al. 2010; Greinert et al. 2010; Pecher et al. 2010; Plaza-Faverola et al. 2012;
62 Kroeger et al. 2015, 2019; Watson et al. 2020a; Hillman et al. 2020), mass-wasting occurrences
63 (Collot et al. 2001; Lamarche et al. 2008; Mountjoy et al. 2009; Joanne et al. 2010, 2013; Watson
64 et al. 2020b), frequent downslope turbidity currents (e.g. Orpin et al. 2006, Pouderoux et al.,
65 2012a, 2012b, 2014; Crisóstomo-Figueroa et al. 2020) and contourite deposition (Carter et al.
66 2002; Lewis and Pantin, 2002; Fernandes et al. 2018; Bailey et al. 2020). To the west, an exhumed
67 emergent part of the subduction wedge, within the North Island's Coastal Ranges, allows for
68 careful outcrop-based approaches to understand the origins and architecture of the margin's
69 many trench-slope basins and depositional processes within gravity-driven systems (e.g. Van der
70 Lingen and Pettinga 1980; Pettinga 1982; Van der Lingen 1982; Neef 1992, 1999; Lewis and
71 Pettinga 1993; Reid 1998; Field 2005; Bailleul et al. 2007, 2013; Burgreen and Graham 2014;
72 Buckeridge et al. 2018; McArthur and McCaffrey 2019; Caron et al. this volume; Claussmann et
73 al. 2021b, this volume; McArthur et al. 2021a, this volume). In addition to active onland mud
74 volcanoes and oil and gas seeps (Field et al. 1997; Pettinga 2003; Hollis et al. 2005; Sykes et al.
75 2012; Malié et al. 2022), that part of the margin displays outcropping paleo-methane seeps and
76 expressions of their plumbing systems (tubular carbonate concretions) hosted by Cretaceous to
77 Miocene rocks (Ledéseret et al., 2003; Campbell et al., 2008; Nyman et al., 2010; Kiel et al., 2013;
78 Malié et al., 2017, 2022). Inboard of the Coastal Ranges lies a comparatively little-deformed
79 partially exhumed forearc basin, in places containing >5 km of Neogene–Quaternary mixed
80 clastic-carbonate sedimentary fill (e.g., Lillie 1953; Kingma 1971; Beu and Edwards 1984; Harmsen
81 1985; Haywick et al. 1991; Ballance 1993; Beu 1995; Field et al. 1997; Begg and Johnston 2000;
82 Mazengarb and Speden 2000; Lee and Begg 2002; Nelson et al. 2003; Bland et al. 2004, 2013;
83 Caron et al. 2004a, 2004b, 2005; Lee et al. 2011; Bertaud-Gandar et al. 2017). The forearc basin

84 is back-stopped by uplifted by fault-bounded Mesozoic metasedimentary basement rocks of
85 North Island's Axial Ranges, which are closely associated with many active crustal-scale strike-slip
86 faults (North Island fault system) (e.g., Spörli 1980; Browne 1986, 2004; Cashman et al. 1992;
87 Erdman and Kelsey 1992; Beanland et al. 1998; Lee and Begg 2002; Mouslopoulou et al. 2007;
88 Nicol et al. 2007; Lee et al. 2011; Jiao et al. 2014; Bland et al. 2019; Ninis, this volume). The active
89 back-arc Taupō Volcanic Zone, incorporating voluminous rhyolitic, andesitic, and basaltic eruptive
90 centres, defines the western extent of the region of interest for this volume (e.g., Ballance 1976,
91 1988; Ballance et al. 1985; Cole 1986; Wilson et al. 1995; Kear 2004; Leonard et al. 2010; Lee et
92 al. 2011; Mortimer and Scott 2020; Stagpoole et al. 2021; Pittari et al. 2021) (Fig. 3).

93 This volume includes nine original research papers that represent a diversity of topics,
94 approaches, geological ages, and research groups from around the globe, including both
95 emerging and established researchers (Table 1). They are linked by the significance of the HSM
96 as an accessible global laboratory for tectonic, sedimentological, and paleontological research.
97 Many of these studies build on a legacy of several decades of outcrop and marine geology
98 research, requiring cumulative months of fieldwork and numerous voyages (e.g., Lillie 1953;
99 Kingma 1971; Van der Lingen and Pettinga 1980; Pettinga 1982; Harmsen 1985; Rait et al. 1991;
100 Chanier and Ferrière 1991; Neef 1992; Lewis et al. 1993, 1999; Lewis and Pettinga 1993; Van der
101 Lingen and Pettinga 1993; Beu 1995; Delteil et al. 1996; Barnes et al. 2010, 2019; Pecher et al.
102 2019; Wallace et al. 2019). In addition, several authors have utilised freely available petroleum
103 exploration (2D seismic-reflection and drillhole) data sets (e.g. Barnes et al. 2002; Barker et al.
104 2009; Sutherland et al. 2009; Plaza-Faverola et al. 2012; Bland et al. 2015; Griffin et al. 2021, this
105 volume) and proprietary 3D seismic data volumes (e.g. McArthur et al. 2019, this volume; Tek et
106 al. 2021b this volume) to provide broader-scale context to understanding sedimentary system
107 scale processes.

108 The overarching theme of this volume is subduction and its profound influence on the spatio-
109 temporal evolution of sedimentary systems. The papers span some of the earliest preserved
110 records of subduction within the HSM (e.g. Caron et al., Griffin et al., McArthur et al.) through to
111 expressions of Late Pleistocene–Holocene upper-plate fault mechanics within southern parts of
112 the margin (Ninis et al.). A staggering array of depositional sequences from Early Miocene to

113 Holocene age are encompassed, including indurated to unconsolidated clastic successions
114 deposited in paleo-lakes through to shelf and deep-marine environments, and a diversity of
115 lithofacies that includes mixed carbonate-clastic, reworked carbonates, siliciclastic-dominated,
116 and volcanoclastic successions.

117 The authors have employed a wide range of methodologies, from fundamental field-based
118 stratigraphic logging (McArthur et al., Caron et al.) to cutting-edge structure-from-motion
119 photogrammetry (Claussmann et al.), optically stimulated luminescence dating (Ninis et al.) and
120 paleontologically based dating techniques (Caron et al., Griffin et al.), permeability (Dutilleul et
121 al.), 2D and 3D seismic-reflection interpretation (McArthur et al., Tek et al.), petrophysical well-
122 log analysis (Griffin et al.), taphonomy (Claussmann et al.), palynology (Marden et al.), and
123 International Ocean Discovery Program (IODP) drilling of deep-water sites (Allen et al., Dutilleul
124 et al.).

125 The volume is divided into two themes, distinguished by geological age. The papers of theme 1
126 focus on Miocene sedimentary systems and basin evolution within the early history of the HSM;
127 they are ordered here in terms of scale, moving from discrete sedimentary systems (Claussmann
128 et al., Caron et al.) to integrated basin-scale syntheses focussed on longer-term system evolution
129 (Griffin et al., McArthur et al.). The papers of theme 2 focus on Quaternary sedimentary systems.
130 They are ordered here in terms of position within the HSM (Fig. 3) moving from the offshore
131 Hikurangi Trough (Tek et al., Allen et al.), outer subduction wedge (Dutilleul et al.), to the inner
132 subduction wedge (Marden et al.) and North Island forearc basin and Axial Ranges (Ninis et al.).

133 **Theme 1 Miocene sedimentary systems and basin evolution**

134 Special Issue Volume 1 and Theme 1 opens with Claussmann et al. who integrate mapping (3D
135 outcrop models from drone acquisitions), high-resolution photography, sedimentology,
136 paleontology, and taphonomy to unravel the spatio-temporal distribution of outcropping Early to
137 Middle Miocene mass-transport deposits (MTDs) along the central Wairarapa coast (Fig. 2). The
138 paper includes amazing images focussing on outcropping shelf-derived MTDs deposited in trench-
139 slope basins (Fig. 4). The authors describe a range of distinct MTD textures, and link them to
140 variable MTD transport processes and distance from the contemporaneous shelf, resulting in the

141 identification of complex slope stratigraphies consisting of multi-scaled coalescing deposits. The
142 authors invoke ongoing fold-thrust belt deformation associated with evolving subduction as the
143 principle MTD trigger.

144 Although the sedimentary succession of the HSM is overwhelmingly siliciclastic strata, distinctive
145 carbonate-rich intervals form prominent landscape and seafloor features throughout the region.
146 Addressing such rocks, is the second paper in Theme 1 by Caron et al., who take an outcrop-based
147 approach at Akaroa Peak quarry, northern Wairarapa, where a shallowing-upward carbonate
148 succession is overlain by turbidite lobes. Through detailed field-based and petrographic analyses
149 (Fig. 5), a series of biofacies and lithofacies are defined and used to understand the
150 palaeoecological and tectono-eustatic depositional conditions that allowed these unusual
151 carbonates to form within a lower trench-slope setting. The authors conclude that the succession
152 is explainable within a tectono-eustatic based framework.

153 The volume's third paper, by Griffin et al., explores an offshore part of the Miocene subduction
154 wedge. The authors reappraise multiple data-sets from the petroleum exploration drillhole
155 Titihaoa-1, one of only three within the entire offshore HSM. The authors utilise digital image-
156 and wireline-log and new foraminiferal-based biostratigraphic data to refine the age, lithologies,
157 sedimentary structures, faults and fractures, and *in-situ* stress within the drillhole's ~2740 m-
158 thick Holocene to early-Middle Miocene sedimentary succession (Fig. 6). They identify a new
159 unconformity based on biostratigraphy, and refine the previous age model. Through comparison
160 with nearby onshore outcrops, the geological evolution within the Titihaoa-1 area is framed
161 within the context of the evolving HSM imbricated wedge.

162 This theme's fourth paper, by McArthur et al., presents a comprehensive reconstruction of the
163 Early to Middle Miocene geological history of the onshore Akitio sub-basin. The outcrop-based
164 study uses detailed lithofacies and stratigraphic analyses integrated with micropaleontological,
165 and geological mapping data, to build realistic architectural models for trench-slope basins.
166 Results also provide insights for the more proximal parts of the sedimentary system. Moreover,
167 by using proprietary seismic reflection data, the authors compare the onshore outcrop
168 stratigraphy to the offshore, actively filling Akitio Trough, highlighting controls on trench-slope

169 basin fill. Using these case studies together, they present a schematic model of the evolution of
170 Neogene–Quaternary trench-slope basins within the Hikurangi Margin (Fig. 7). Although the
171 offshore area represents a subtly different setting with no shallow-marine incursions, a similar
172 evolution is proposed, from confined to semi- to unconfined basin filling.

173 **Theme 2 - Quaternary Sedimentary Systems - from trench to inner margin**

174 The opening paper of Theme 2 is by Tek et al., who provide a comprehensive, detailed
175 quantitative study of Quaternary sediment waves on the outer and inner bends of the submarine
176 Hikurangi Channel (Fig. 8). The authors employ quantitative geomorphic techniques to both
177 bathymetric and subsurface 3D seismic-reflection data-sets to obtain detailed statistical
178 extractions of sediment-waves fields with the aim to help understand what controls their
179 formation. The paper presents nine controls, many of which have been cited in similar overbank
180 studies from different locations. However, a novel and significant outcome from this paper is the
181 recognition that overbank flows and their deposits can interact, being sourced from different
182 locations within the same system. This does not produce the typical decay in bed thickness away
183 from thalwegs, as might be expected. Of perhaps more importance is the recognition of inner-
184 channel wave-fields and the identification of at least two modes of formation depending upon
185 orientation.

186 The second paper in Theme 2 is by Allen et al. They present a volcanoclastic sedimentological and
187 petrological study of two IODP Expedition 375 core-sites (U1520 and U1526) associated with
188 Tūranganui Knoll, a Cretaceous-aged seamount located in the northern part of the Hikurangi
189 Trough, east of the subduction interface (Fig. 2). The study aims to offer insights into fluid-flow,
190 paleoenvironmental conditions, and diagenetic processes within this part of the HSM, providing
191 analogues for other margins. Strata within the studied interval at U1520 were found to be
192 composed of volcanoclastic debris transported downslope, whereas strata at U1526 are thought
193 to be subaerial eruption products reworked by wave action. This study provides useful insights
194 into what some of the dozens of seamounts within the wider HSM and associated subducting
195 Hikurangi Plateau (Pacific plate) are likely to be composed of and their potential impact on the
196 subduction process itself.

197 Datasets from recent IODP drilling are also used to explore active sea-floor processes off the
198 Hawke Bay coast, by Dutilleul et al. in the third paper in Theme 2. Using data from IODP
199 Expeditions 372 and 375 (sites U1517 and U1519) (Fig. 9), the authors assess changes in porosity,
200 pore structure, and permeability between the two drill sites to determine potential links between
201 excess pore-pressure, gas hydrates, and creeping of the large submarine Tuaheni Landslide
202 Complex (TLC). The authors combine shipboard data including logging-while-drilling (LWD) data
203 with physical core-sample analyses to determine interstitial porosity, pore-size distribution, and
204 permeability. Despite evidence for variations in porosity and pore-pressures within and between
205 sites, the authors conclude that there is no obvious evidence of the involvement of gas hydrate
206 in active creeping at the TLC, which is more likely induced by hydro-geomechanical processes.
207 Further, they suggest that their results support studying other mechanisms of creeping at the TLC
208 and at other analogous locations where gas-hydrates and submarine landslides co-exist.

209 The penultimate paper in the Special Issue Volume 1 and in Theme 2 is by Marden et al., who use
210 a well-preserved stratigraphic record from 26, shallow (up to 20 m long) sediment cores from an
211 upland paleolake — Redpath Lake — that is thought to have existed for c. 12 kyr (17.3–5.5 cal ka
212 BP). Redpath Lake is located in the Waipaoa River sedimentary system (Fig. 2), and interpreted
213 to be a transient landslide-dammed lake. The authors integrate sedimentological and
214 stratigraphic analyses, with radiometric ^{14}C , tephrochronology and palynology to provide an
215 interpretive window into Late Pleistocene paleoclimate, paleovegetation and paleoecological
216 changes in the region. They reveal a mean storm frequency of c. 226 years and a counterintuitive
217 absence of seismic-shaking related sedimentary structures. Pollen analyses focus on a shorter,
218 but significant period between c. 16.3–14.1 cal ka BP (Fig. 10). Although perhaps representing a
219 snap-shot of paleo-ecological conditions, this comprehensive study shows the complex nature of
220 the latter part of the climatically variable Last Glacial-Interglacial Transition.

221 The concluding paper of Volume 1 and Theme 2 is a key study by Ninis et al., that aims to
222 understand the distribution of permanent upper-plate tectonic uplift across the southern HSM.
223 This superb paper reassesses the age, elevation, and distribution of a spectacular flight of Late
224 Pleistocene wave-cut marine terraces (Fig. 11) along the southernmost coast of the North Island
225 by integrating sedimentology, stratigraphy, numerical dating techniques (Optically Stimulated

226 Luminescence, OSL dating) with differential Global Navigation Satellite System (GNSS)
227 measurements. The authors correlate the marine terraces by age along the coast, enabling the
228 identification of uplift patterns associated with active faulting and subduction at this plate margin.
229 They provide the first numerical ages for most of these terraces, allowing the first regional-scale
230 correlations to be made, with some surprising temporal clustering of tectonic uplift. We chose to
231 conclude the volume with this paper as it encapsulates the interplay between the sedimentary,
232 climatic, and tectonic processes highlighted in the volume's papers, and which have resulted in
233 the spectacular landscapes and seascapes of today's HSM (Fig. 2).

234 **Conclusion**

235 This is the first of two *NZJGG* special issue volumes dedicated to the understanding of sedimentary
236 systems of the Hikurangi Subduction Margin (HSM). Volume 1 includes nine research papers from
237 a diverse group of international researchers. This points to a very vibrant and exciting period of
238 intense research into the HSM that builds upon many decades of work. Two themes of Volume
239 1 reveal two sides of HSM evolution, with the papers that focus on Miocene Sedimentary Systems
240 revealing details of a very different continental margin to today, but one that would lay the
241 foundation for the Quaternary Sedimentary System(s) that were to follow. Tantalising results
242 from these papers also reveal a margin rattled by frequent storms, floods, landslides, earthquakes
243 and volcanic eruptions that may have some temporal ordering to them. Collectively, these papers
244 represent significant advances into our understanding of the geology of the HSM, with innovative
245 results that may find applications to other convergent settings.

246 **Acknowledgements**

247 The guest editors thank all the authors that have contributed their work, making this Special Issue
248 a success. We would also like to warmly acknowledge all the reviewers who willingly shared their
249 time and scientific experience to improve these contributions. This volume would not have been
250 possible without the help and hard work of Fei He as well as of the publishing and editorial
251 managing teams both at the New Zealand Royal Society and from Taylor & Francis. A special
252 thanks to Yolaine Rubert for her help in constructing the topographic and bathymetric maps from
253 the NIWA data set.

254 **Figures**

255 **Figure 1.** New Zealand and the Hikurangi Subduction Margin (HSM) in the South-West Pacific.
256 Background map from Google Earth Pro V 7.3.4.8248 (July 16, 2021), -31.38°S, 163.61°E, Eye
257 altitude 7211 km, February 15, 2022).

258 **Figure 2.** Bathymetric and topographic map of North Island, New Zealand showing: 1) The main
259 morpho-structural and morpho-sedimentary elements of the HSM; 2) The study areas of the
260 papers contained within this special issue, and 3) The location of the geological cross-section of
261 Figure 3. Mapping data come from the 250 m resolution gridded bathymetric data set 2016 from
262 NIWA (Mitchell et al., 2012).

263 **Figure 3.** Schematic cross-section of the Hikurangi subduction margin showing: 1) The main
264 subduction-related morpho-structural features; and 2) The relative distribution across the margin
265 of the studies published within the special issue. Modified from Chanier et al. (1999) by Bailleul
266 et al. (2007) and Claussmann et al. (2021, this volume). Subdivisions of the subduction wedge
267 follows McArthur et al. (2019). C.R. – Coastal Ranges, corresponding roughly to the trench-slope
268 break of the margin; A.P. – Accretionary prism and protothrust zone (Barnes et al., 2018).

269 **Figure 4.** This figure, from Claussmann et al. (this volume), shows impressive coastal exposures of
270 Middle Miocene shelf-derived MTDs infilling syn-subduction intra-slope basins (image provided
271 courtesy of Claussmann et al. and with permission from the Royal Society of New Zealand.
272 doi:10.1080/00288306.2021.1918729).

273 **Figure 5.** This figure, from Caron et al. (this volume), outlines the high diversity of microfacies that
274 can be found in the Early Miocene limestones of the Coastal Ranges, pointing out contrasted and
275 tectonically-controlled shallow water depositional settings on top of the early Hikurangi
276 subduction wedge (image provided courtesy of Caron et al. and with permission from the Royal
277 Society of New Zealand. doi:10.1080/00288306.2021.1960865).

278 **Figure 6.** This figure, from Griffin et al. (this volume), illustrates comparisons between spectacular
279 outcropping thin-bedded Miocene turbidites along the central Wairarapa coastline, and similar
280 strata that were imaged by a FMI(™) resistivity image-log within the nearby, offshore Titihaoa-1
281 drillhole. Such rocks and sedimentary lithofacies are widespread within trench-slope basins in the

282 HSM (image provided courtesy of Griffin et al. and with permission from the Royal Society of New
283 Zealand. doi:10.1080/00288306.2021.1932527).

284 **Figure 7.** This figure, from McArthur et al. (this volume), is a schematic reconstruction of the
285 evolution of a trench-slope basin based on a detailed sedimentological analysis and systematic
286 mapping of a Miocene field analogue outcropping within the Coastal Ranges (image provided
287 courtesy of McArthur et al. and with permission from the Royal Society of New Zealand.
288 doi:10.1080/00288306.2021.1977343).

289 **Figure 8.** This figure, from Tek et al. (this volume), displays several maps showing the seafloor
290 expression of an overbank sediment wave field for a part of the deep-water Hikurangi Channel
291 covered by 3D seismic data (image provided courtesy of Tek et al. and with permission from the
292 Royal Society of New Zealand. doi:10.1080/00288306.2021.1978509).

293 **Figure 9.** This figure, from Dutilleul et al. (this volume), locates IODP sites of Expeditions 372/375
294 and the Tuaheni submarine landslide Complex on a bathymetric map of the northern part of the
295 HSM (image provided courtesy of Dutilleul et al. and with permission from the Royal Society of
296 New Zealand. doi:10.1080/00288306.2021.1990088).

297 **Figure 10.** This figure, from Marden et al. (this volume), corresponds to the pollen spectra
298 identified from a Late Pleistocene upland paleolake recently discovered onshore the HSM (image
299 provided courtesy of Marden et al. and with permission from the Royal Society of New Zealand.
300 doi:10.1080/00288306.2021.1947327).

301 **Figure 11.** This figure, from Ninis et al. (this volume), shows spectacular flights of Late Pleistocene
302 wave-cut marine terraces along North Island's southern coastline, products of ongoing
303 subduction and upper-plate faulting within the HSM (image provided courtesy of Ninis et al. and
304 with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.2011329).

305 **Tables**

306 **Table 1.** Summary of the main themes covered by the scientific contributions to the *New Zealand*
307 *Journal of Geology and Geophysics* Special Issue: Understanding Sedimentary Systems and
308 Processes of the Hikurangi Subduction Margin; from Trench to Back-Arc, Volume 1.

309 **References**

- 310 Allen, SM, Marsaglia KM, Morgan J, Franco A. 2021 (this volume). Origin and diagenetic priming
311 of a potential slow-slip trigger zone in volcanoclastic deposits flanking a seamount on the
312 subducting plate, Hikurangi margin, New Zealand. In Strachan LJ, Bailleul J, Bland KJ, Orpin AR,
313 McArthur AD, (Eds); Understanding sedimentary systems and processes of the Hikurangi
314 Subduction Margin - from trench to back-arc (Volume 1); New Zealand Journal of Geology and
315 Geophysics Special Issue. <https://doi.org/10.1080/00288306.2021.1975776>.
- 316 Bailey WS, McArthur AD, McCaffrey WD. 2020. Distribution of contourite drifts on convergent
317 margins: examples from the Hikurangi subduction margin of New Zealand. *Sedimentology*.
318 68(1):296–323.
- 319 Bailleul J, Robin C, Chanier F, Guillocheau F, Field B, Ferrière J. 2007. Turbidite systems in the inner
320 forearc domain of the Hikurangi convergent margin (New Zealand): new constraints on the
321 development of trench-slope basins. *Journal of Sedimentary Research*. 77: 263-283.
- 322 Bailleul J, Chanier F, Ferrière J, Robin C, Nicol A, Mahieux G, Gorini C, Caron V. 2013. Neogene
323 evolution of lower trench-slope basins and wedge dynamics in the central Hikurangi
324 subduction margin, New Zealand. In Gaullier V, Basile C, Roure F, Scheck-Wenderoth M (Eds.);
325 Basin dynamics; Tectonophysics Special Issue. 591:152-174.
326 <https://dx.doi.org/10.1016/j.tecto.2013.01.003>.
- 327 Ballance PF. 1976. Evolution of the Upper Cenozoic Magmatic Arc and plate boundary in northern
328 New Zealand. *Earth and Planetary Science Letters*. 28(3):356–370.
329 [https://doi.org/10.1016/0012-821X\(76\)90197-7](https://doi.org/10.1016/0012-821X(76)90197-7).
- 330 Ballance PF. 1988. Late Cenozoic time-lines and calc-alkaline volcanic arcs in northern New
331 Zealand — further discussion. *Journal of the Royal Society of New Zealand*. 18:347–358.
- 332 Ballance PF. 1993. The New Zealand Neogene forearc basins. In Hsü KJ (Ed.); *South Pacific
333 Sedimentary Basins. Sedimentary Basins of the World*. 2:177–193.
- 334 Ballance PF, Hayward BW, Brook FJ. 1985. Subduction regression of volcanism in New Zealand.
335 *Nature*. 313:820.
- 336 Barker DHN, Sutherland R, Henrys S, Bannister S. 2009. Geometry of the Hikurangi subduction
337 thrust and upper plate, North Island, New Zealand. *Geochemistry Geophysics Geosystems*.

- 338 10(2):23 p. <https://doi.org/10.1029/2008GC002153>.
- 339 Barnes PM, Mercier de Lépinay B. 1997. Rates and mechanics of rapid frontal accretion along the
340 very obliquely convergent southern Hikurangi margin, New Zealand Journal of Geophysical
341 Research. 102:24931–24952.
- 342 Barnes PM, Nicol A, Harrison T. 2002. Late Cenozoic evolution and earthquake potential of an
343 active listric thrust complex above the Hikurangi subduction zone, New Zealand. Geological
344 Society of America Bulletin. 114:1379–1405.
- 345 Barnes PM, Lamarche G, Bialas J, Henrys S, Pecher I, Netzeband GL, Greinert J, Mountjoy JJ, Pedley
346 K, Crutchley G. 2010. Tectonic and geological framework for gas hydrates and cold seeps on
347 the Hikurangi subduction margin, New Zealand. Marine Geology. 272(1–4):26–48.
348 <https://doi.org/10.1016/j.margeo.2009.03.012>.
- 349 Barnes PM, Ghisetti FC, Ellis S, Morgan JK. 2018. The role of protothrusts in frontal accretion and
350 accommodation of plate convergence, Hikurangi subduction margin, New Zealand. Geosphere.
351 14:440–468.
- 352 Barnes PM, Pecher IA, LeVay LJ, Bourlange SM, Brunet MMY, Cardona S, Clennell MB, Cook AE,
353 Crundwell MP, Dugan B, Elger J, Gamboa D, Georgiopoulou A, Greve A, Han S, Heeschen KU,
354 Hu G, Kim GY, Kitajima H, Koge H, Li X, Machado KS, McNamara DD, Moore GF, Mountjoy JJ,
355 Nole MA, Owari S, Paganoni M, Petronotis KE, Rose PS, Screamon EJ, Shankar U, Shepherd CL,
356 Torres ME, Underwood MB, Wang X, Woodhouse AD, Wu, H-Y. 2019. Expedition 372A
357 summary. In Pecher, I.A., Barnes, P.M., LeVay, L.J., and the Expedition 372A Scientists
358 *Proceedings of the International Ocean Discovery Program* Volume 372A publications.iodp.org.
- 359 Beanland S, Melhuish A, Nicol A, Ravens J. 1998. Structure and deformational history of the inner
360 forearc region, Hikurangi subduction margin, New Zealand. New Zealand Journal of Geology
361 and Geophysics. 41:325–342.
- 362 Begg JG, Johnston MR. 2000 (compilers). Geology of the Wellington area. Institute of Geological
363 and Nuclear Sciences 1:250 000 geological map 10. Lower Hutt, New Zealand: Institute of
364 Geological and Nuclear Sciences Ltd. 64 p. + 1 folded map.
- 365 Bertaud-Gandar TLB, Atkins CB, Hannah MJ. 2017. New stratigraphic constraints on the late
366 Miocene–early Pliocene tectonic development of the Aorangi range, Wairarapa. New Zealand

- 367 Journal of Geology and Geophysics. 61:26–43.
- 368 Beu AG. 1995. Pliocene limestones and their scallops: lithostratigraphy, pectinid biostratigraphy
369 and paleogeography of eastern North Island late Neogene limestone. Institute of Geological &
370 Nuclear Sciences monograph, Institute of Geological & Nuclear Sciences, Lower Hutt. 10:243
371 p.
- 372 Beu AG, Edwards AR. 1984. New Zealand Pleistocene and Late Pliocene glacio-eustatic cycles.
373 Palaeogeography, Palaeoclimatology, Palaeoecology. 46:119–142.
- 374 Bland KJ, Kamp PJJ, Pallentin A, Graafhuis RB, Nelson CS, Caron V. 2004. The early Pliocene
375 Titiokura Formation: stratigraphy of a thick mixed carbonate-siliciclastic shelf succession in
376 Hawke's Bay basin, New Zealand. New Zealand Journal of Geology and Geophysics. 47:675–
377 695.
- 378 Bland KJ, Hendy AJW, Kamp PJJ, Nelson CS. 2013. Macrofossil biofacies in the late Neogene of
379 central Hawke's Bay: applications to palaeogeography. New Zealand Journal of Geology and
380 Geophysics. 56:200–222.
- 381 Bland KJ, Uruski CI, Isaac MJ. 2015. Pegasus Basin, eastern New Zealand: A stratigraphic record of
382 subsidence and subduction, ancient and modern. New Zealand Journal of Geology and
383 Geophysics. 58(4):319-343.
- 384 Bland KJ, Nicol A, Kamp PJJ, Nelson CS. 2019. Stratigraphic constraints on the late Miocene–
385 Pleistocene evolution of the North Island fault system and axial ranges in the central Hikurangi
386 subduction margin, New Zealand. New Zealand Journal of Geology and Geophysics. 62(2):248–
387 272. <https://doi.org/10.1080/00288306.2018.1545675>.
- 388 Browne GH. 1986. Basement-cover relationships and tectonic significance of Mt Miroroa, western
389 Hawke's Bay. Journal of the Royal Society of New Zealand. 16:381–402.
- 390 Browne GH. 2004. Late Neogene sedimentation adjacent to the tectonically evolving North Island
391 axial ranges: insights from Kuripapango, western Hawke's Bay. New Zealand Journal of Geology
392 and Geophysics. 47:663–674.
- 393 Buckeridge JS, Beu AG, Gordon DP. 2018. Depositional environments of the Early Pleistocene
394 Castlepoint Formation, New Zealand: a canyon fill in situ. New Zealand Journal of Geology and
395 Geophysics. 61(4):524–542.

- 396 Burgreen B, Graham S. 2014. Evolution of a deep-water lobe system in the Neogene trench-slope
397 setting of the East Coast Basin, New Zealand: Lobe stratigraphy and architecture in a weakly
398 confined basin configuration. *Marine and Petroleum Geology*. 54:1–22.
399 <https://doi.org/10.1016/j.marpetgeo.2014.02.011>.
- 400 Campbell KA, Francis DA, Collins M, Gregory MR, Nelson CS, Greinert J, Aharon J. 2008.
401 Hydrocarbon seep-carbonates of a Miocene forearc (East Coast Basin), North Island, New
402 Zealand. *Sedimentary Geology*. 204:83–105.
- 403 Caron V, Nelson CS, Kamp PJJ. 2004a. Contrasting carbonate depositional systems for Pliocene
404 cool-water limestones cropping out in central Hawke's Bay, New Zealand. *New Zealand Journal
405 of Geology and Geophysics*. 47:697-617.
- 406 Caron V, Nelson CS, Kamp PJJ. 2004b. Transgressive surfaces of erosion as sequence boundary
407 markers in cool-water shelf carbonates. *Sedimentary Geology*. 164:179–189.
- 408 Caron V, Nelson CS, Kamp PJJ. 2005. Sequence stratigraphic context of syndepositional diagenesis
409 in cool-water shelf carbonates: Pliocene limestones, New Zealand. *Journal of Sedimentary
410 Research* 75, 231-250.
- 411 Caron J, Bailleul J, Chanier F, Mahieux G. 2021 (this volume). Episodes of seabed rise and rapid
412 drowning as primary controls for the development of regressive and transgressive heterozoan
413 carbonates and rhodolitic limestones in a tectonically-active setting (Early Miocene,
414 Wairarapa region, New Zealand). In Strachan LJ, Bailleul J, Bland KJ, Orpin AR, McArthur AD
415 (Eds); *Understanding sedimentary systems and processes of the Hikurangi Subduction Margin
416 - from trench to back-arc (Volume 1)*; *New Zealand Journal of Geology and Geophysics Special
417 Issue*. <https://doi.org/10.1080/00288306.2021.1960865>.
- 418 Carter L, Manighetti B, Elliot M, Trustrum N, Gomez B. 2002. Source, sea level and circulation
419 effects on the sediment flux to the deep ocean over the past 15 ka off eastern New Zealand.
420 *Global and Planetary Change*. 33(3–4):339–355.
- 421 Cashman SM, Kelsey HM, Erdman CF, Cutten HNC, Berryman KR, 1992, Strain partitioning
422 between structural domains in the forearc of the Hikurangi subduction zone, New Zealand.
423 *Tectonics*. 11:242–257.
- 424 Chanier F, Ferrières J. 1991. From a passive to an active margin: tectonic and sedimentary

- 425 processes linked to the birth of an accretionary prism (Hikurangi Margin, New Zealand). *Earth*
426 *Science Bulletin* (Bulletin de la Société Géologique de France). 162: 649–660.
- 427 Chanier F, Ferrière J, Angelier J. 1999. Extensional deformation across an active margin, relations
428 with subsidence, uplift, and rotations: The Hikurangi subduction, New Zealand. *Tectonics*.
429 18(5):862–876. <https://doi.org/10.1029/1999TC900028>.
- 430 Claussmann B, Bailleul J, Chanier F, Mahieux G, Caron V, McArthur AD, Chaptal C, Morgans HEG,
431 Vendeville BC. 2021a (this volume). Shelf-derived mass-transport deposits: origin and
432 significance in the stratigraphic development of trench-slope basins. In Strachan LJ, Bailleul J,
433 Bland KJ, Orpin AR, McArthur AD (Eds); *Understanding sedimentary systems and processes of*
434 *the Hikurangi Subduction Margin - from trench to back-arc* (Volume 1); *New Zealand Journal*
435 *of Geology and Geophysics* Special Issue. <https://doi.org/10.1080/00288306.2021.1918729>.
- 436 Claussmann B, Bailleul J, Chanier F, Caron V, McArthur AD, Mahieux G, Chaptal C, Vendeville BC.
437 2021b. Contrasting mixed siliciclastic-carbonate shelf-derived gravity-driven systems in
438 compressional intra-slope basins (southern Hikurangi margin, New Zealand). *Marine and*
439 *Petroleum Geology*. 134: 31 p. <https://doi.org/10.1016/j.marpetgeo.2021.105252>.
- 440 Cole JW, Lewis KB. 1981. Evolution of the Taupo-Hikurangi subduction system. *Tectonophysics*.
441 72:1-21.
- 442 Cole JW. 1986. Distribution and tectonic setting of late Cenozoic volcanism in New Zealand. In:
443 Smith IEM, editor. *Late Cenozoic volcanism in New Zealand*. Royal Society of New Zealand
444 bulletin 23:7–20.
- 445 Collot JY, Delteil J, Lewis KB, Davy B, Lamarche G, Audru JC, Barnes P, Chanier F, Chaumillon E,
446 Lallemand S, Mercier de Lépinay B, Orpin A, Pelletier B, Sosson M, Toussaint B, Uruski C. 1996.
447 From oblique subduction to intracontinental transpression: structures of the southern
448 Kermadec-Hikurangi margin from multibeam bathymetry, side-scan sonar and seismic
449 reflection. *Marine Geophysical Researches*. 18:357–381.
- 450 Collot J-Y, Lewis KB, Lamarche G, Lallemand S. 2001. The giant Ruatoria debris avalanche on the
451 northern Hikurangi margin, New Zealand: result of oblique seamount subduction. *Journal of*
452 *Geophysical Research*. 106:271–297.
- 453 Crisóstomo-Figueroa A, McArthur AD, Dorrell RM, Amy L, McCaffrey WD. 2020. A new modelling

- 454 approach to sediment bypass prediction applied to the East Coast Basin, New Zealand. GSA
455 Bulletin. 133(7-8):1734–1748.
- 456 Crutchley GJ, Pecher IA, Gorman AR, Henrys SA, Greinert J. 2010. Seismic imaging of gas conduits
457 beneath seafloor vent sites in a shallow marine gas hydrate province, Hikurangi Margin, New
458 Zealand. *Marine Geology*. 272(1-4):114-126.
- 459 Crutchley GJ, Gorman AR, Pecher IA, Toulmin S, Henrys SA. 2011. Geological controls on focused
460 fluid flow through the gas hydrate stability zone on the southern Hikurangi Margin of New
461 Zealand, evidenced from multi-channel seismic data. *Marine and Petroleum Geology*.
462 28(10):1915-1931.
- 463 Davey FJ, Hampton M, Childs J, Fisher MA, Lewis KB, Pettinga JR. 1986. Structure of a growing
464 accretionary prism, Hikurangi margin, New Zealand. *Geology*. 14:663-666.
- 465 Delteil J, Morgans HEG, Raine JI, Field BD, Cutten HNC. 1996. Early Miocene thin-skinned tectonics
466 and wrench faulting in the Pongaroa district, Hikurangi margin, North Island, New Zealand.
467 *New Zealand Journal of Geology and Geophysics*. 39 :271–282.
- 468 Dutilleul J, Bourlange S, Géraud Y, Reuschlé T. 2021 (this volume). Porosity and permeability
469 evolution in the Tuaheni Landslide Complex at Hikurangi margin from IODP sites U1517 and
470 1519. In Strachan LJ, Bailleul J, Bland KJ, Orpin AR, McArthur AD (Eds); *Understanding
471 sedimentary systems and processes of the Hikurangi Subduction Margin - from trench to back-
472 arc (Volume 1); New Zealand Journal of Geology and Geophysics Special Issue.*
473 <https://doi.org/10.1080/00288306.2021.1990088>.
- 474 Erdman CF, Kelsey HM. 1992. Pliocene and Pleistocene stratigraphy and tectonics, Ohara
475 depression and Wakarara range, North Island, New Zealand. *New Zealand Journal of Geology
476 and Geophysics*. 35:177–192.
- 477 Faure K, Greinert J, Von Deimling JS, McGinnis DF, Kipfer R, Linke P. 2010. Methane seepage along
478 the Hikurangi Margin of New Zealand: geochemical and physical data from the water column,
479 sea surface and atmosphere. *Marine Geology*. 272:170-188.
- 480 Fernandez D, Bowen MM, Sutton PJH. 2018. Variability, coherence and forcing mechanisms in the
481 New Zealand ocean boundary currents. *Progress in Oceanography*. 165:168–188.
- 482 Field BD, Uruski CI, Beu AG, Browne GH, Crampton JS, Funnell R, Killups S, Laird MG, Mazengarb,

- 483 C, Morgans HEG, Rait GJ, Smale D, Strong CP. 1997. Cretaceous–Cenozoic geology and
484 petroleum systems of the East Coast region, New Zealand. New Zealand Institute of Geological
485 and Nuclear Sciences Monograph. 19:301 p.
- 486 Field BD. 2005. Cyclicity in turbidites of the Miocene Whakataki Formation, Castlepoint, North
487 Island, and implications for hydrocarbon reservoir modelling. New Zealand Journal of Geology
488 and Geophysics. 48:135-146.
- 489 Greinert J, Lewis KB, Bialas J, Pecher IA, Rowden A, Bowden DA, Debatist M, Linke P. 2010.
490 Methane seepage along the Hikurangi Margin, New Zealand: Overview of studies in 2006 and
491 2007 and new evidence from visual, bathymetric and hydroacoustic investigations. Marine
492 Geology. 272:6-25.
- 493 Griffin, B, Bland KJ, Morgans HEG, Strogon DP. 2021 (this volume). A multifaceted study of the
494 offshore Titihaoa-1 drillhole and a Neogene accretionary slope basin, Hikurangi subduction
495 margin. In Strachan LJ, Bailleul J, Bland KJ, Orpin AR, McArthur AD, (Eds); Understanding
496 sedimentary systems and processes of the Hikurangi Subduction Margin - from trench to back-
497 arc (Volume 1); New Zealand Journal of Geology and Geophysics Special Issue.
498 <https://doi.org/10.1080/00288306.2021.1932527>.
- 499 Harmsen FJ. 1985. Lithostratigraphy of Pliocene strata, central and southern Hawke's Bay, New
500 Zealand. New Zealand Journal of Geology and Geophysics. 28(3):413–433.
- 501 Hillman JIT, Crutchley GJ, Kroeger KF. 2020. Investigating the role of faults in fluid migration and
502 gas hydrate formation along the southern Hikurangi Margin, New Zealand. Marine Geophysical
503 Research. 41(1): article 8. <https://doi.org/10.1007/s11001-020-09400-2>.
- 504 Hollis CJ, Manzano-Kareah K, Crampton C, Field B, Funnel R, Morgans H, Rogers K. 2005. Source
505 rock potential of the East Coast Basin (central and northern regions). Institute of Geological
506 and Nuclear Sciences Client Report. 118:156 p.
- 507 Jiao R, Seward D, Little TA, Kohn BP. 2014. Thermal history and exhumation of basement rocks
508 from Mesozoic to Cenozoic subduction cycles, central North Island, New Zealand. Tectonics.
509 33:1920–1935.
- 510 Joanne C, Collot J-Y, Lamarche G, Migeon S. 2010. Continental slope reconstruction after a giant
511 mass failure, the example of the Matakaoa Margin, New Zealand. Marine Geology. 268(1-

- 512 4):67-84. <https://doi.org/10.1016/j.margeo.2009.10.013>.
- 513 Joanne C, Lamarche G, Collot J-Y. 2013. Dynamic of giant mass transport in deep submarine
514 environments: the Matakaoa Debris Flow, New Zealand. *Basin Research*. 25(4):491-488.
515 <https://doi.org/10.1111/bre.12006>.
- 516 Haywick DW, Lowe DA, Beu AG, Henderson RA, Carter RM. 1991. Pliocene-Pleistocene
517 (Nukumaruan) lithostratigraphy of the Tangoio block, and origin of sedimentary cyclicity,
518 central Hawke's Bay, New Zealand. *New Zealand Journal of Geology and Geophysics*. 34:213–
519 225.
- 520 Katz H. 1981. Probable gas hydrate in continental slope east of the North Island, New Zealand.
521 *Journal of Petroleum Geology*. 3 :315-324.
- 522 Kear D. 2004. Reassessment of Neogene tectonism and volcanism in North Island, New Zealand.
523 *New Zealand Journal of Geology and Geophysics*. 47(3):361-374.
524 <https://doi.org/10.1080/00288306.2004.9515062>.
- 525 Kiel S, Birgel D, Campbell K.A, Crampton JS, Schioler P, Eckmann J. 2013. Cretaceous methane-
526 seep deposits from New Zealand and their fauna. *Palaeogeography Palaeoclimatology*
527 *Palaeoecology*. 390:17-34.
- 528 Kingma JT. 1971. *Geology of the Te Aute subdivision*. Lower Hutt: New Zealand Geological Survey,
529 Department of Scientific Industrial Research. New Zealand Geological Survey bulletin. 70.
- 530 Kroeger KF, Plaza-Faverola A, Barnes PM, Pecher IA. 2015. Thermal evolution of the New Zealand
531 Hikurangi subduction margin: Impact on natural gas generation and methane hydrate
532 formation – A model study. *Marine and Petroleum Geology*. 63:97-114.
- 533 Kroeger KF, Crutchley GJ, Kellett R, Barnes PM. 2019. A 3-D model of gas generation, migration,
534 and gas hydrate formation at a young convergent margin (Hikurangi margin, New Zealand).
535 *Geochemistry Geophysics Geosystems*. 20:5126-5147.
536 <https://doi.org/10.1029/2019GC008275>.
- 537 Lamarche G, Joanne C, Collot J-Y. 2008. Successive, large mass-transport deposits in the south
538 Kermadec fore-arc basin, New Zealand: The Matakaoa Submarine Instability Complex.
539 *Geochemistry Geophysics Geosystems*. 9(4): 30 p. <https://doi.org/10.1029/2007GC001843>.
- 540 Ledésert B, Buret C, Chanier F, Fèrrière J, Recourt P. 2003. Tubular structures of northern

- 541 Wairarapa (New Zealand) as possible examples of ancient fluid expulsion in an accretionary
542 prism: evidence from field and petrographical observations. Geological Society of London
543 Special Publication. 216: 95–107.
- 544 Lee JM, Begg JG, (compilers) 2002. Geology of the Wairarapa area. Institute of Geological &
545 Nuclear Sciences 1:250 000 geological map 11. Lower Hutt, GNS Science. 66 p. + 1 folded map.
- 546 Lee JM, Bland KJ, Townsend DB, Kamp PJJ, (compilers). 2011. Geology of the Hawke's Bay area.
547 Lower Hutt: Institute of Geological & Nuclear Sciences. Institute of Geological & Nuclear
548 Sciences 1:250 000 geological map 8. 93 p. + 1 folded map.
- 549 Leonard GS, Begg JG, Wilson CJN, (compilers). 2010. Geology of the Rotorua area: scale 1:250,000.
550 Lower Hutt: GNS Science. Institute of Geological & Nuclear Sciences 1:250,000 geological map
551 5. 102 p. + 1 folded map.
- 552 Lewis KB. 1994. The 1500-km-long Hikurangi Channel: trench-axis channel that escapes its trench,
553 crosses a plateau, and feeds a fan drift. *Geo-Marine Letters*. 14:19–28.
- 554 Lewis KB. 1980. Quaternary sedimentation of the Hikurangi oblique subduction and transform
555 margin. In Ballance PF, Reading HG (Eds.); *Sedimentation in Oblique-slip Mobile Zones*;
556 International Association of Sedimentologists Special Publication. 4:171–189.
- 557 Lewis KB; Pettinga, JR. 1993. The emerging, imbricate frontal wedge of the Hikurangi margin. In
558 Ballance PF (Ed.); *South Pacific Sedimentary Basins; Sedimentary Basins of the World*. 2:225-
559 250.
- 560 Lewis KB, Marshall BA. 1996. Seep faunas and other indicators of methane rich dewatering on
561 New Zealand convergent margin. *New Zealand Journal of Geology and Geophysics*. 39:181–
562 200.
- 563 Lewis KB, Collot JY, Lallemand SE. 1998. The dammed Hikurangi Trough: a channel-fed trench
564 blocked by subducting seamounts and their wake avalanches (New Zealand-France GeodyNZ
565 Project). *Basin Research*. 10:441–468.
- 566 Lewis KB, Barnes PM. 1999. Kaikoura Canyon, New Zealand: active conduit from near-shore
567 sediment zones to trench-axis channel. *Marine Geology*. 162:39–69.
- 568 Lewis KB, Barnes PM, Collot JY, Mercier de Lépinay B, Delteil J, TEAM GeodyNZ. 1999. Central
569 Hikurangi GeodyNZ swath maps: depths, texture and geological interpretation. NIWA Chart

- 570 Miscellaneous Series. 77. National Institute of Water and Atmospheric Research, Wellington.
- 571 Lewis KB, Pantin HM. 2002. Channel-axis, overbank and drift sediment waves in the southern
572 Hikurangi Trough, New Zealand. *Marine Geology*. 192(1-3):123–151.
- 573 Lillie AR. 1953. The geology of the Dannevirke subdivision. Lower Hutt: New Zealand Geological
574 Survey. *New Zealand Geological Survey Bulletin*. 46:156 p.
- 575 Malié P, Bailleul J, Chanier F, Toullec R, Mahieux G, Caron V, Field B, Ferreiro Mählmann R, Potel
576 S. 2017. Spatial distribution and tectonic framework of fossil tubular concretions as onshore
577 analogues of cold seep plumbing systems, North Island of New Zealand. *Earth Science Bulletin*
578 (*Bulletin de la Société Géologique de France*). 188(4):24 p.
- 579 Malié P, Bailleul J, Chanier F, Ferreiro Mählmann R, Toullec R, Mahieux G, Potel S. 2022. Fossil
580 thermogenic hydrocarbon migration within the plumbing system of paleo-cold seeps in the
581 Hikurangi subduction wedge (North Island, New Zealand). *Marine and Petroleum Geology*.
582 <https://doi.org/10.1016/j.marpetgeo.2022.105593>.
- 583 Marden M, Holt K, Ryan M, Carrasco J, Marsaglia K, Kirby M, Palmer A. 2021 (this volume).
584 Stratigraphy and vegetation signals from an upland, landslide-dammed, paleolake during the
585 last Glacial-Interglacial Transition, Waipaoa Sedimentary System, Hikurangi Margin, eastern
586 North Island, New Zealand. In Strachan LJ, Bailleul J, Bland KJ, Orpin AR, McArthur AD (Eds);
587 Understanding sedimentary systems and processes of the Hikurangi Subduction Margin - from
588 trench to back-arc (Volume 1); *New Zealand Journal of Geology and Geophysics Special Issue*.
589 <https://doi.org/10.1080/00288306.2021.1947327>.
- 590 Mazengarb C, Speden IG, (compilers). 2000. Geology of the Raukumara area. Institute of
591 Geological & Nuclear Sciences 1:250 000 geological map 6. Lower Hutt, GNS Science. 60 p. + 1
592 map.
- 593 McArthur AD, McCaffrey WD. 2019. Sedimentary architecture of detached deep-marine canyons:
594 Examples from the East Coast Basin of New Zealand. *Sedimentology*. 66:1067–1101.
- 595 McArthur AD, Claussmann B, Bailleul J, Clare A, McCaffrey WD. 2019. Variation in syn-subduction
596 sedimentation patterns from inner to outer portions of deep-water fold and thrust belts:
597 examples from the Hikurangi subduction margin of New Zealand. In Hammerstein JA, DiCuia
598 R, Cottam MA, Zamora G, Butler RWH (Eds); *Fold and Thrust Belts: Structural Style, Evolution*

- 599 and Exploration; Geological Society of London, Special Publications. 490:285-310.
600 <https://doi.org/10.1144/SP490-2018-95>.
- 601 McArthur AD, Tek DE. 2021. Controls on the origin and evolution of deep-ocean trench-axial
602 channels. *Geology*. <https://doi.org/10.1130/G48612.1>.
- 603 McArthur AD, Bailleul J, Mahieux G, Clausmann B, Wunderlich A, McCaffrey WD. 2021a.
604 Deformation-sedimentation feedback and the development of anomalously thick
605 aggradational turbidite lobes: outcrop and subsurface examples from the Hikurangi Margin,
606 New Zealand. *Journal of Sedimentary Research*. <https://doi.org/10.2110/jsr.2020.013>.
- 607 McArthur AD, Bailleul J, Chanier F, Clare A, McCaffrey WD. 2021b (this volume). Lateral and
608 longitudinal fill variation within trench-slope basins: examples from the Neogene Akitio and
609 Tawhero Basins, Hikurangi Margin, New Zealand. In Strachan LJ, Bailleul J, Bland KJ, Orpin AR,
610 McArthur AD (Eds); *Understanding sedimentary systems and processes of the Hikurangi
611 Subduction Margin - from trench to back-arc (Volume 1)*; New Zealand Journal of Geology and
612 Geophysics Special Issue. <https://doi.org/10.1080/00288306.2021.1977343>.
- 613 Mitchell J, Mackay KA, Neil HL, Mackay EJ, Pallentin A, Notman P. 2012. Undersea New Zealand,
614 1:5,000,000.
- 615 Mortimer N, Scott JM. 2020. Volcanoes of Zealandia and the Southwest Pacific. *New Zealand
616 Journal of Geology and Geophysics*. 63(4):371–377.
617 <https://doi.org/10.1080/00288306.2020.1713824>.
- 618 Mountjoy JJ, Barnes PM, Pettinga JR. 2009. Morphostructure and evolution of submarine canyons
619 across an active margin: Cook Strait sector of the Hikurangi Margin, New Zealand. *Marine
620 Geology*. 260(1-4): 45-68.
- 621 Mouslopoulou V, Nicol A, Little TA, Walsh JJ. 2007. Terminations of large strike-slip faults: an
622 alternative model from New Zealand. In: Cunningham WD, Mann P, editors. London:
623 Geological Society of London. *Tectonics of strike-slip restraining and releasing bends*.
624 Geological Society special publication. 290: 387–415.
- 625 Nelson CS, Winefield PR, Hood SD, Caron V, Pallentin A, Kamp PJJ. 2003. Pliocene Te Aute
626 limestones, New Zealand: expanding concepts for cool-water shelf carbonates. *New Zealand
627 Journal of Geology and Geophysics*. 46: 407–424.

- 628 Nicol A, Mazengarb C, Chanier F, Rait G, Uruski C, Wallace L. 2007. Tectonic evolution of the active
629 Hikurangi subduction margin, New Zealand, since the Oligocene. *Tectonics*. 26(4): 24 p.
630 <https://doi.org/10.1029/2006TC002090>.
- 631 Ninis D, Little T, Litchfield N, Wang N, Jacobs K, Henderson CM. 2021 (this volume). Pleistocene
632 marine terraces of the Wellington south coast – their distribution across multiple active faults
633 at the southern Hikurangi subduction margin, Aotearoa New Zealand. In Strachan LJ, Bailleul J,
634 Bland KJ, Orpin AR, McArthur AD (Eds); *Understanding sedimentary systems and processes of
635 the Hikurangi Subduction Margin - from trench to back-arc (Volume 1)*; *New Zealand Journal
636 of Geology and Geophysics Special Issue*. <https://doi.org/10.1080/00288306.2021.2011329>.
- 637 Neef G. 1992. Turbidite deposition in five Miocene, bathyal formations along an active plate
638 margin, North Island, New Zealand: with notes on styles of deposition at the margins of east
639 coast bathyal basins. *Sedimentary Geology*. 78: 111–136.
- 640 Neef G. 1999. Neogene development of the onland part of the forearc in the northern Wairarapa,
641 North Island, New Zealand: a synthesis. *New Zealand Journal of Geology and Geophysics*.
642 42:113-115. <https://doi.org/10.1080/00288306.1999.9514835>.
- 643 Nyman SL, Nelson CS, Campbell KA. 2010. Miocene tubular concretions in East Coast Basin, New
644 Zealand: analogue for the subsurface plumbing of cold seeps. *Marine Geology*. 272(1–4):319–336.
- 645 Orpin AR, Alexander C, Kuehl S, Carter L, Walsh JP. 2006. Temporal and spatial complexity in post-
646 glacial sedimentation on the tectonically-active, Poverty Bay continental margin of New
647 Zealand. *Continental Shelf Research*. 26:2205-2224.
- 648 Paquet F, Proust JN, Barnes PM, Pettinga J. 2009. Inner forearc sequence architecture in response
649 to climate and tectonic forcing since 150 Ka: Hawke's Bay, New Zealand. *Journal of
650 Sedimentary Research*. 79:97–124.
- 651 Pecher IA, Henrys SA, Wood WT, Kukowski N, Crutchley GJ, Forhmann M. 2010. Focused fluid flow
652 on the Hikurangi Margin, New Zealand - Evidence from possible local upwarping of the base of
653 gas hydrate stability. *Marine Geology*. 272(1-4):99-113.
654 <https://doi.org/10.1016/j.margeo.2009.10.006>.
- 655 Pecher IA, Barnes PM, LeVay LJ, and the Expedition 372A Scientists. 2019. Creeping gas hydrate
656 slides. *Proceedings of the International Ocean Discovery Program, 372A*; College Station, TX
657 (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.372A.2019>.

- 658 Pedley KL, Barnes PM, Pettinga JR, Lewis KB. 2010. Seafloor structural geomorphic evolution of
659 the accretionary frontal wedge in response to seamount subduction, poverty indentation, New
660 Zealand. *Marine Geology*. 270(1–4):119–138. <https://doi.org/10.1016/j.margeo.2009.11.006>.
- 661 Pettinga JR. 1982. Upper Cenozoic structural history, coastal Southern Hawke’s Bay, New Zealand.
662 *New Zealand Journal of Geology and Geophysics*. 25(2):149–191.
663 <https://doi.org/10.1080/00288306.1982.10421407>.
- 664 Pettinga JR. 2003. Mud volcano eruption within the emergent accretionary Hikurangi margin,
665 southern Hawke’s Bay, New Zealand. *New Zealand Journal of Geology and Geophysics*.
666 46:107–121.
- 667 Pittari A, Prentice ML, McLeod OE, Yousef Zadeh E, Kamp PJJ, Danišik M, Vincent KA. 2021.
668 Inception of the modern North Island (New Zealand) volcanic setting: spatio-temporal patterns
669 of volcanism between 3.0 to 0.9 Ma. *New Zealand Journal of Geology and Geophysics*.
670 64(2/3):250–272. <https://doi.org/10.1080/00288306.2021.1915343>.
- 671 Plaza-Faverola A, Klaeschen D, Barnes PM, Pecher IA, Henrys S, Mountjoy J. 2012. Evolution of
672 fluid expulsion and concentrated hydrate zones across the southern Hikurangi subduction
673 margin, New Zealand: An analysis from depth migrated seismic data. *Geochemistry Geophysics
674 Geosystems*. 13(8):22 p.
- 675 Pouderoux H, Proust JN, Lamarche G. 2012a. Building an 18 000-year-long paleo-earthquake
676 record from the detailed deep-sea turbidite characterization in Poverty Bay, New Zealand.
677 *Natural Hazards and Earth System Sciences*. 12(6):2077-2101.
- 678 Pouderoux H, Proust JN, Lamarche G., Orpin A, Neil H. 2012b. Postglacial (after 18 ka) deep-sea
679 sedimentation along the Hikurangi subduction margin (New Zealand): Characterisation, timing
680 and origin of turbidites. *Marine Geology*. 295:51-76.
- 681 Pouderoux H, Proust JN, Lamarche G. 2014. Submarine paleoseismology of the northern
682 Hikurangi subduction margin of New Zealand as deduced from turbidite record since 16ka.
683 *Quaternary Science Reviews*. 84:116-131.
- 684 Rait G.J, Chanier F, Waters DW. 1991. Landward and seaward directed thrusting accompanying
685 the onset of subduction beneath New Zealand. *Geology*. 19:230-233.
- 686 Reid CM. 1998. Stratigraphy, paleontology, and tectonics of lower Miocene rocks in the

- 687 Waipatiki/Mangatuna area, southern Hawke's Bay, New Zealand. *New Zealand Journal of*
688 *Geology and Geophysics*. 41:115–131.
- 689 Spörli KB. 1980. New Zealand and oblique-slip margins: tectonic development up to and during
690 the Cainozoic. In Ballance PF, Reading HG (Eds.); *Sedimentation in Oblique-slip Mobile Zones;*
691 *International Association of Sedimentologists Special Publication*. 4:147-170.
- 692 Spörli KB. 1987. Development of the New Zealand micro-continent. In Monger JWH, Francheteau
693 J. (Eds.); *Circum Pacific Orogenic Belts and Evolution of the Pacific Ocean Basin;* American
694 *Geophysical Union Geodynamics Series*. 18:115–132.
- 695 Stagpoole VM, Miller CA, Caratori Tontini F, Brakenrig T, Macdonald N. 2021. A two million-year
696 history of rifting and caldera volcanism imprinted in new gravity anomaly compilation of the
697 Taupo Volcanic Zone, New Zealand. *New Zealand Journal of Geology and Geophysics*.
698 64(2/3):358–371. <https://doi.org/10.1080/00288306.2020.1848882>.
- 699 Strogon DP, Kellett R, Bland KJ, Viskovic GPD, compilers. 2018. Atlas of Petroleum Prospectivity,
700 Northeast Province (Raukumara, East Coast, and Pegasus basins): ArcGIS geodatabase,
701 illustrated seismic transects and technical report. GNS Science Data Series 23d. 1 ArcGIS
702 geodatabase, 4 ArcGIS projects, 12 illustrated seismic transects, 1 technical report.
703 <https://data.gns.cri.nz/pbe/>
- 704 Sutherland R, Stagpoole V, Uruski C, Kennedy C, Bassett D, Henrys S, Scherwath M, Kopp H, Field
705 B, Toulmin S, Barker D, Bannister S, Davey F, Stern T, Flueh ER.. 2009. Reactivation of tectonics,
706 crustal underplating, and uplift after 60 Myr of passive subsidence, Raukumara Basin,
707 Hikurangi-Kermadec fore arc, New Zealand: Implications for global growth and recycling of
708 continents. *Tectonics* 28: TC5017. 23 p. <https://doi.org/10.1029/2008TC002356>.
- 709 Sykes R, Zink K-G, Rogers KM, Phillips A, Ventura GT. 2012. New and updated geochemical
710 databases for New Zealand petroleum samples, with assessments of genetic oil families,
711 source age, facies and maturity. Ministry of Economic Development New Zealand Unpublished
712 Petroleum Report PR4513. 763 p.
713 [https://data.gns.cri.nz/pbe/index.html?content=/mapservice/Content/outputs/Geochem/Re](https://data.gns.cri.nz/pbe/index.html?content=/mapservice/Content/outputs/Geochem/Report/navigation/index.html)
714 [port/navigation/index.html](https://data.gns.cri.nz/pbe/index.html?content=/mapservice/Content/outputs/Geochem/Report/navigation/index.html)
- 715 Tek DE, McArthur AD, Poyatos-Moré M, Colombera L, Patacci M, Craven B, McCaffrey WD. 2021a.

- 716 Relating seafloor geomorphology to subsurface architecture: how mass-transport deposits and
717 knickpoint-zones build the stratigraphy of the deep-water Hikurangi channel. *Sedimentology*.
718 Accepted.
- 719 Tek DE, McArthur AD, Poyatos-Moré M, Colombera L, Allen C, Patacci M, McCaffrey WD. 2021b
720 (this volume). Controls on the architectural evolution of deep-water channel overbank
721 sediment wave fields: insights from the Hikurangi Channel, offshore New Zealand. In Strachan
722 LJ, Bailleul J, Bland KJ, Orpin AR, McArthur AD (Eds); *Understanding sedimentary systems and
723 processes of the Hikurangi Subduction Margin - from trench to back-arc (Volume 1)*; New
724 Zealand Journal of Geology and Geophysics Special Issue.
725 <https://doi.org/10.1080/00288306.2021.1978509>.
- 726 Van der Lingen GJ, Pettinga JG. 1980. The Makara basin: a Miocene slope basin along the New
727 Zealand sector of the Australian–Pacific obliquely convergent plate boundary. In Ballance PF,
728 Reading HG (Eds.); *Sedimentation in Oblique slip Mobile Zones*; International Association of
729 Sedimentologists Special Publication. 4:191-215.
- 730 Van Der Lingen GJ. 1982. Development of the North Island subduction system, New Zealand. In
731 Leggett JK (Ed.); *Trench-forearc geology*; Geological Society of London Special Publication.
732 10:259–274.
- 733 Wallace LM, Saffer DM, Barnes PM, Pecher IA, Petronotis KE, LeVay LJ, and the Expedition
734 372/375 scientists. 2019. Hikurangi subduction margin coring, logging, and observatories.
735 *Proceedings of the International Ocean Discovery Program, 372B/375*; College Station, TX
736 (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.372B375.2019>.
- 737 Watson, SJ, Mountjoy JJ, Barnes PM, Crutchley GJ, Lamarche G, Higgs B, Hillman J, Orpin AR,
738 Micallef A, Neil H, Mitchell J, Pallentin A, Kane T, Woelz S, Bowden D, Rowden AA, Pecher IA.
739 2020a. Focused fluid seepage related to variations in accretionary wedge structure, Hikurangi
740 margin, New Zealand. *Geology*. 48 (1), 56-61.
- 741 Watson SJ, Mountjoy JJ, Crutchley GJ. 2020b. Tectonic and geomorphic controls on the
742 distribution of submarine landslides across active and passive margins, eastern New Zealand.
743 In Georgiopoulou A, Amy LA, Benetti S, Chaytor JD, Clare MA, Gamboa D, Haughton PDW,
744 Moernaut J, Mountjoy JJ (Eds.); *Subaqueous mass movements and their consequences:*

- 745 advances in process understanding, monitoring and hazard assessments; Geological Society of
746 London Special Publications. 500:477–494.
- 747 Wilson CJN, Houghton BF, McWilliams MO, Lanphere MA, Weaver SD, Briggs RM. 1995. Volcanic
748 and structural evolution of Taupo Volcanic Zone, New Zealand: a review. Journal of
749 Volcanology and Geothermal Research. 68(1–3):1–28. [https://doi.org/10.1016/0377-](https://doi.org/10.1016/0377-0273(95)00006-G)
750 [0273\(95\)00006-G](https://doi.org/10.1016/0377-0273(95)00006-G).

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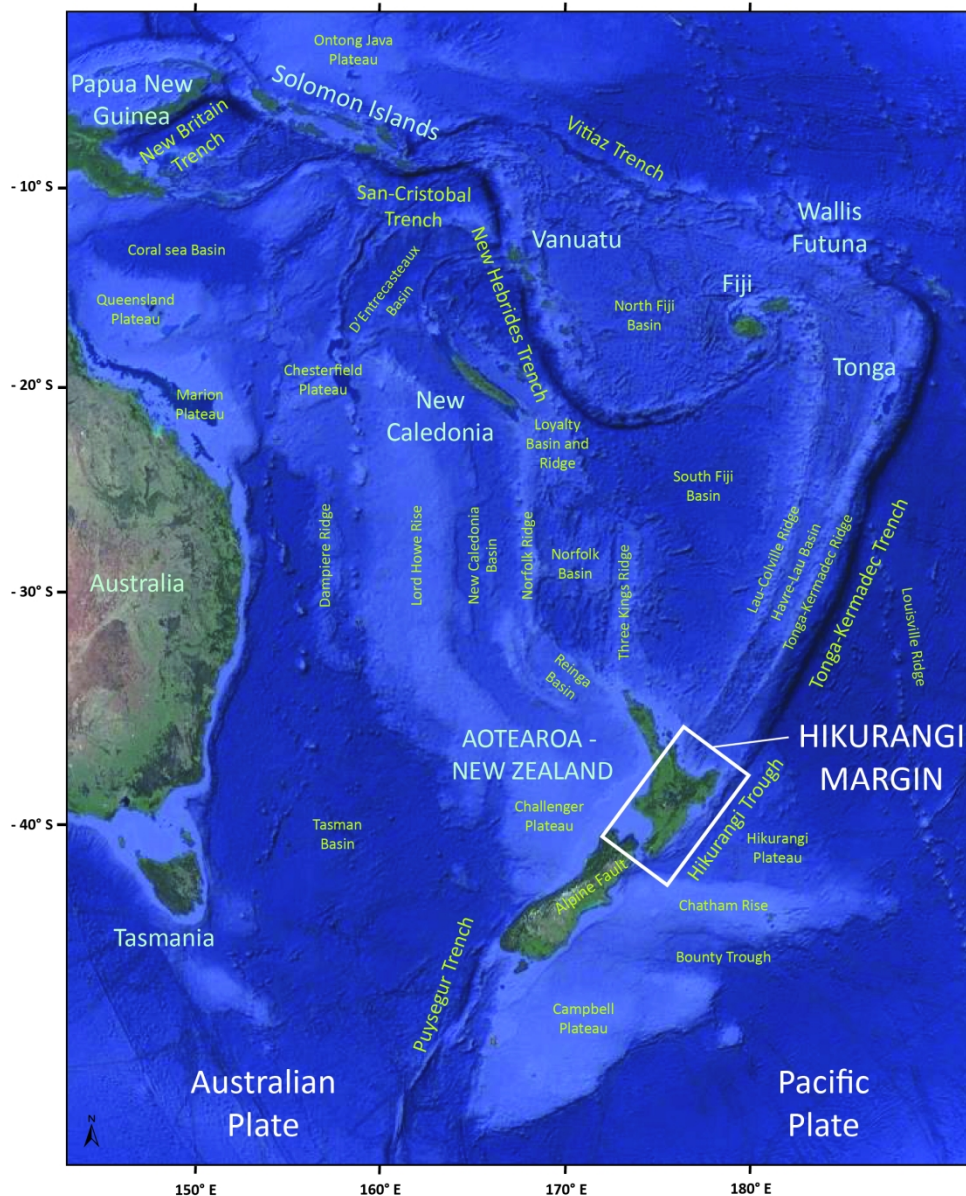


Figure 1. New Zealand and the Hikurangi Subduction Margin (HSM) in the South-West Pacific. Background map from Google Earth Pro V 7.3.4.8248 (July 16, 2021), -31.38°S, 163.61°E, Eye altitude 7211 km, February 15, 2022).

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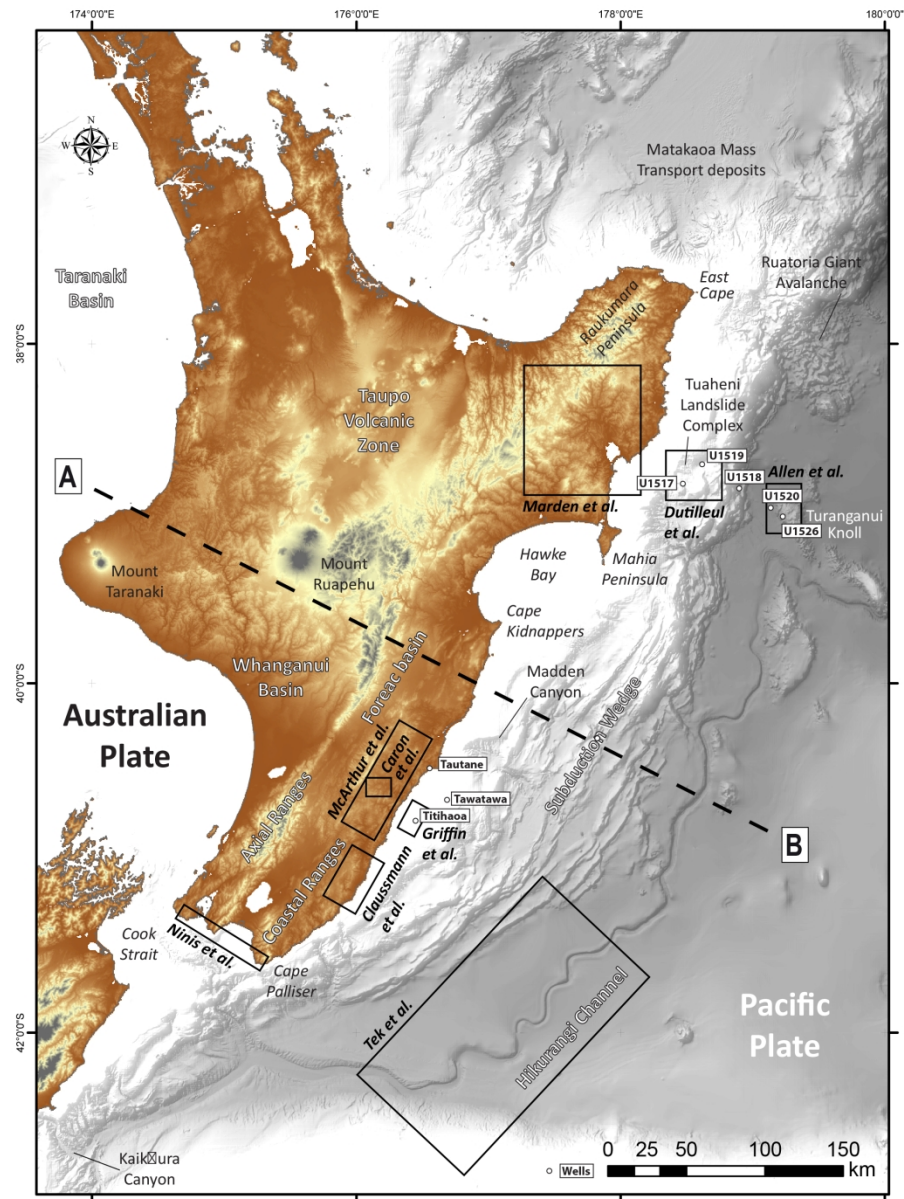


Figure 2. Bathymetric and topographic map of North Island, New Zealand showing: 1) The main morpho-structural and morpho-sedimentary elements of the HSM; 2) The study areas of the papers contained within this special issue, and 3) The location of the geological cross-section of Figure 3. Mapping data come from the 250 m resolution gridded bathymetric data set 2016 from NIWA (Mitchell et al., 2012).

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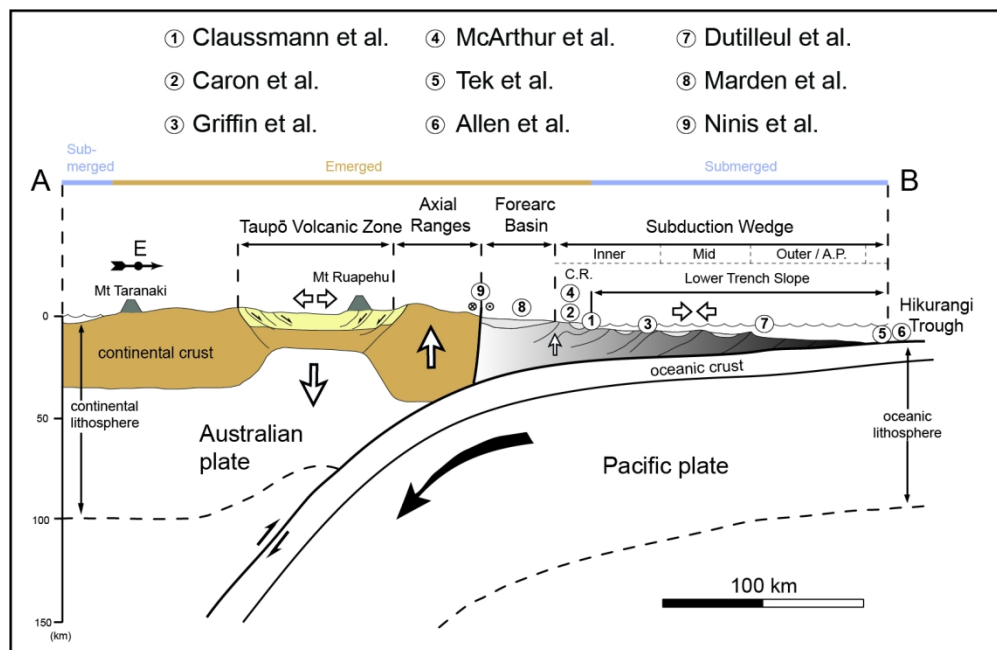


Figure 3. Schematic cross-section of the Hikurangi subduction margin showing: 1) The main subduction-related morpho-structural features; and 2) The relative distribution across the margin of the studies published within the special issue. Modified from Chanier et al. (1999) by Bailleul et al. (2007) and Claussmann et al. (2021, this volume). Subdivisions of the subduction wedge follows McArthur et al. (2019). C.R. – Coastal Ranges, corresponding roughly to the trench-slope break of the margin; A.P. – Accretionary prism and protothrust zone (Barnes et al., 2018).

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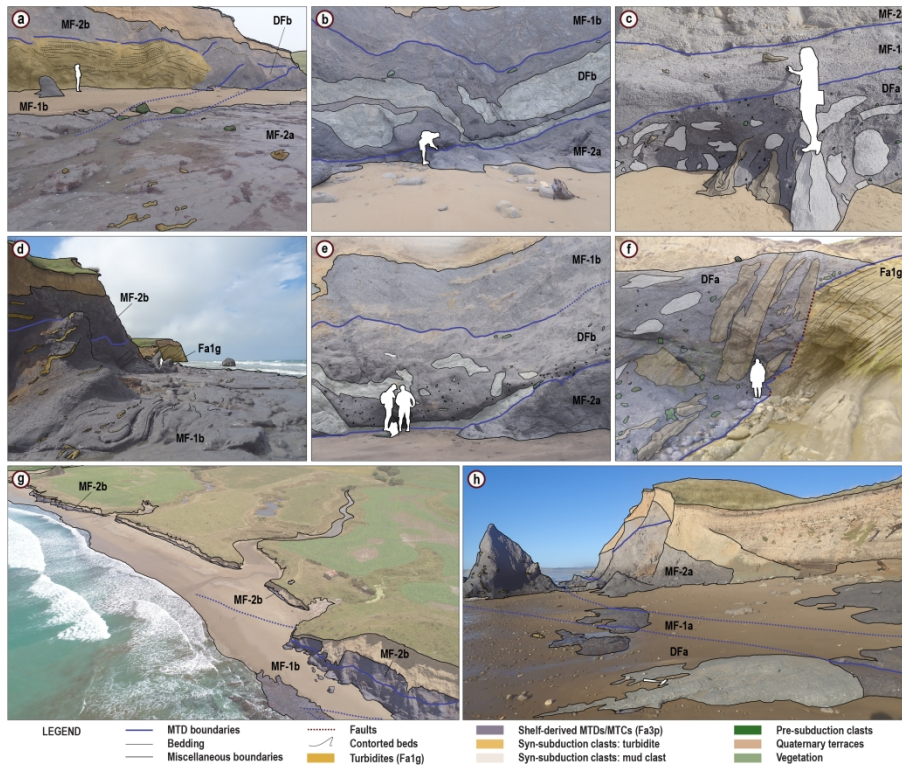


Figure 4. This figure, from Claussmann et al. (this volume), shows impressive coastal exposures of Middle Miocene shelf-derived MTDs infilling syn-subduction intra-slope basins (image provided courtesy of Claussmann et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1918729).

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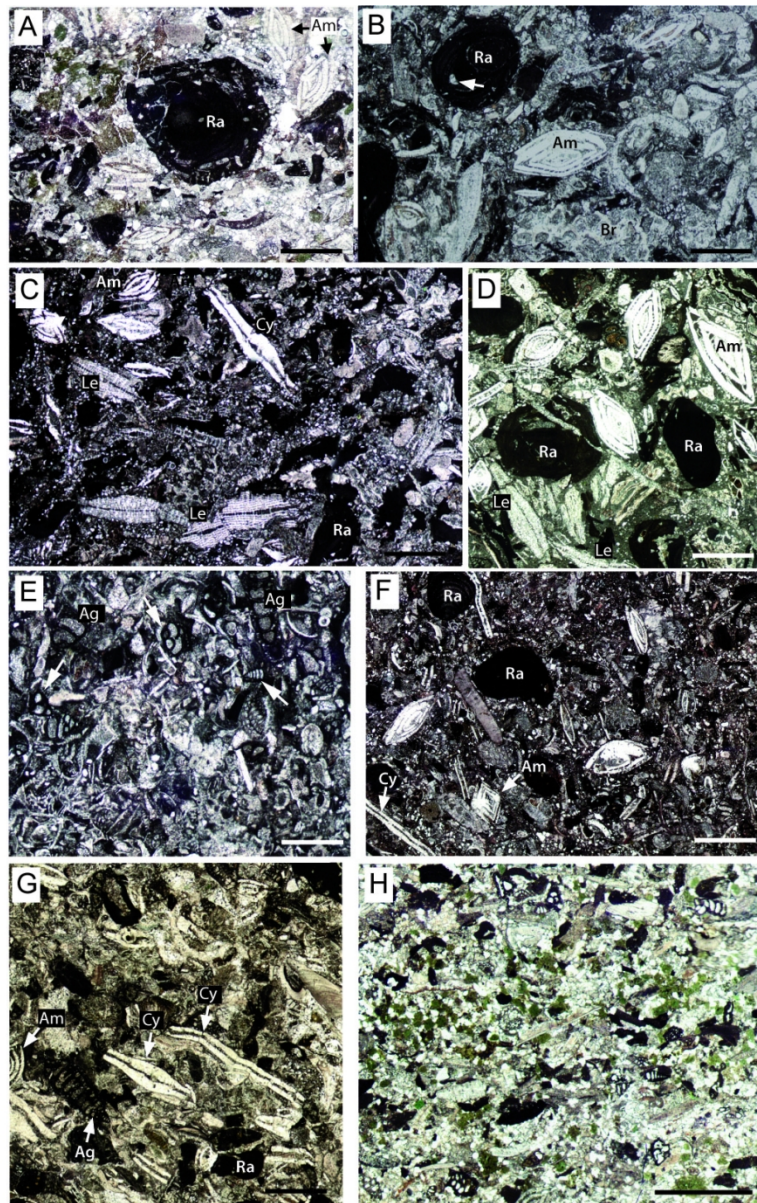


Figure 5. This figure, from Caron et al. (this volume), outlines the high diversity of microfacies that can be found in the Early Miocene limestones of the Coastal Ranges, pointing out contrasted and tectonically-controlled shallow water depositional settings on top of the early Hikurangi subduction wedge (image provided courtesy of Caron et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1960865).

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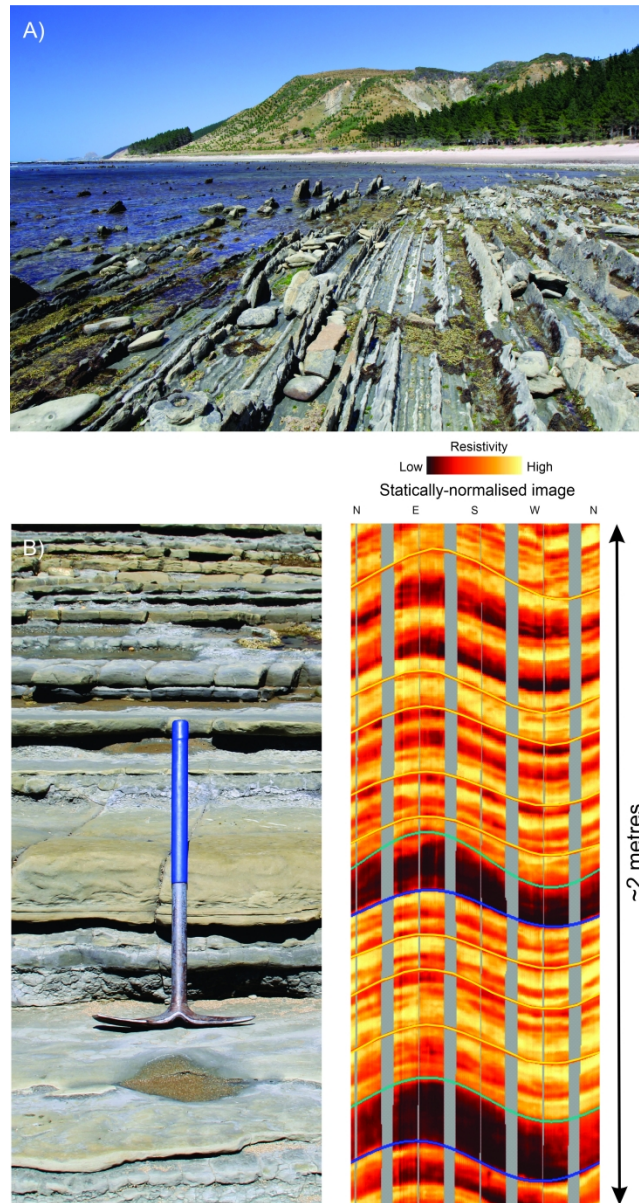


Figure 6. This figure, from Griffin et al. (this volume), illustrates comparisons between spectacular outcropping thin-bedded Miocene turbidites along the central Wairarapa coastline, and similar strata that were imaged by a FMI[™] resistivity image-log within the nearby, offshore Titihaoa-1 drillhole. Such rocks and sedimentary lithofacies are widespread within trench-slope basins in the HSM (image provided courtesy of Griffin et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1932527).

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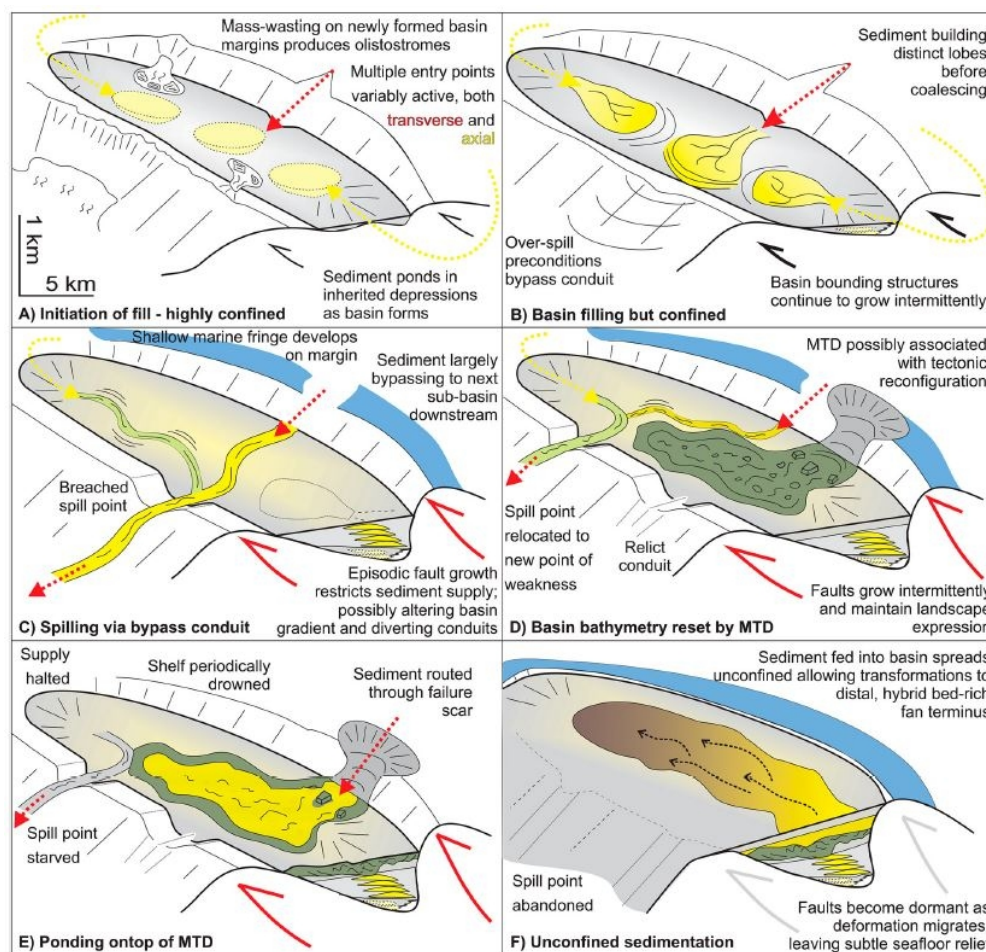


Figure 7. This figure, from McArthur et al. (this volume), is a schematic reconstruction of the evolution of a trench-slope basin based on a detailed sedimentological analysis and systematic mapping of a Miocene field analogue outcropping within the Coastal Ranges (image provided courtesy of McArthur et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1977343).

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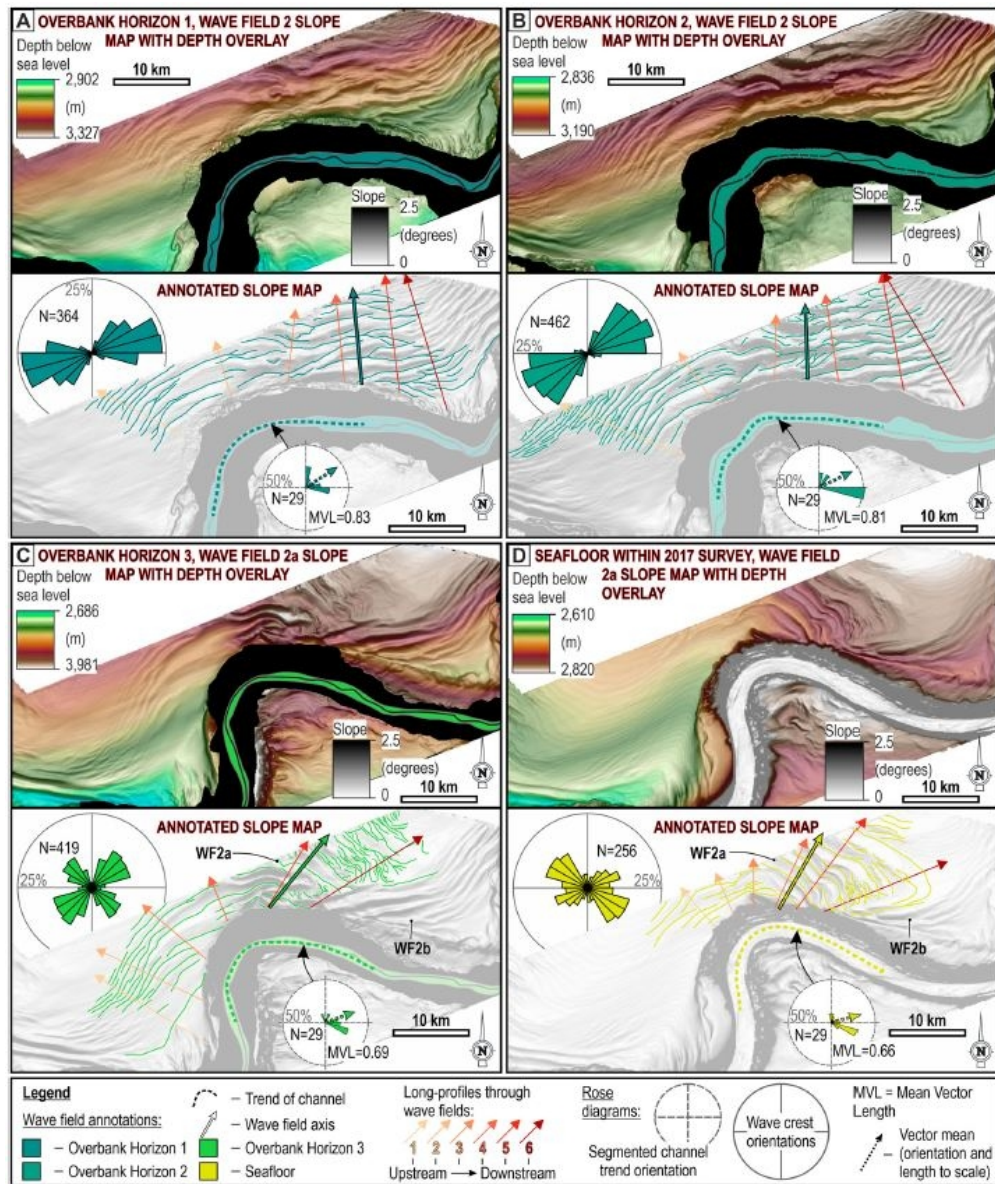


Figure 8. This figure, from Tek et al. (this volume), displays several maps showing the seafloor expression of an overbank sediment wave field for a part of the deep-water Hikurangi Channel covered by 3D seismic data (image provided courtesy of Tek et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1978509).

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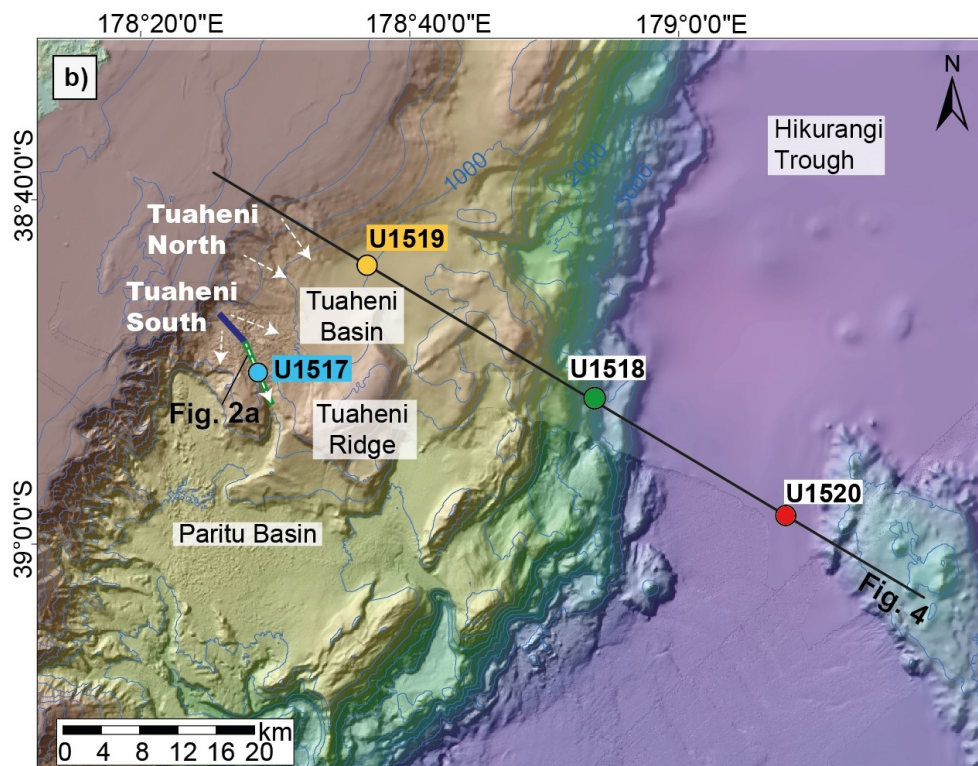


Figure 9. This figure, from Dutilleul et al. (this volume), locates IODP sites of Expeditions 372/375 and the Tuaheni submarine landslide Complex on a bathymetric map of the northern part of the HSM (image provided courtesy of Dutilleul et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1990088).

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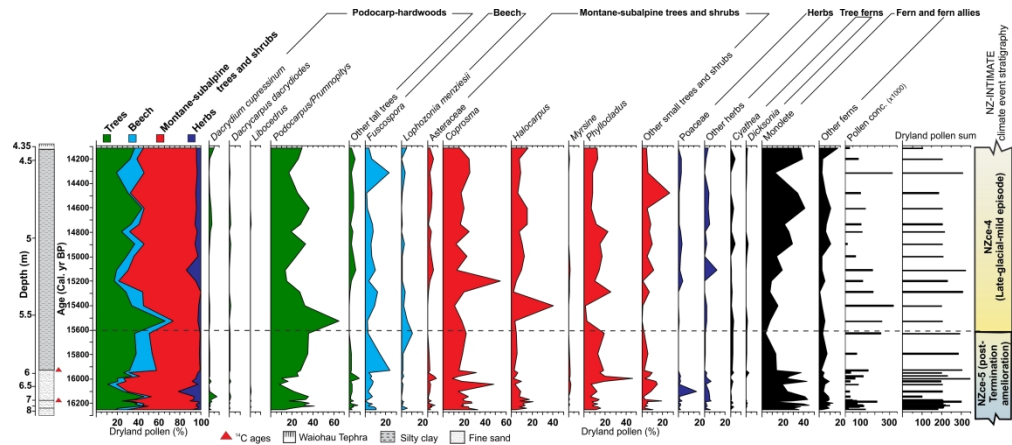


Figure 10. This figure, from Marden et al. (this volume), corresponds to the pollen spectra identified from a Late Pleistocene upland paleolake recently discovered onshore the HSM (image provided courtesy of Marden et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.1947327).

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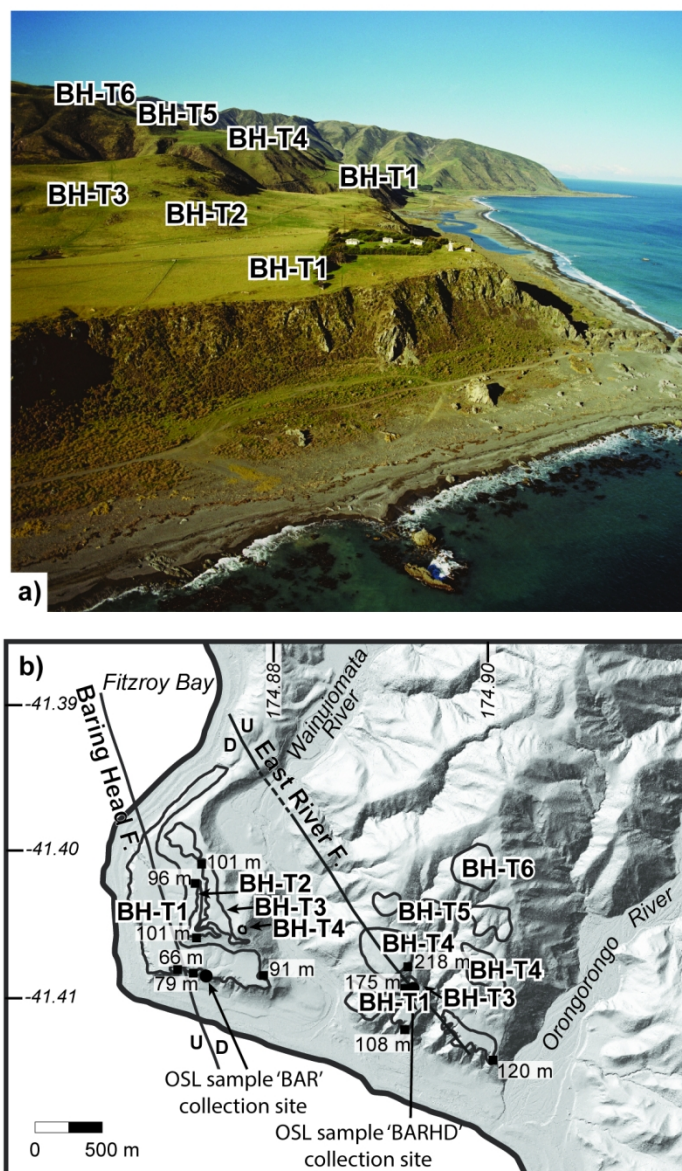


Figure 11. This figure, from Ninis et al. (this volume), shows spectacular flights of Late Pleistocene wave-cut marine terraces along North Island's southern coastline, products of ongoing subduction and upper-plate faulting within the HSM (image provided courtesy of Ninis et al. and with permission from the Royal Society of New Zealand. doi:10.1080/00288306.2021.2011329).

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HIKURANGI SUBDUCTION MARGIN	Stratigraphic Architectures	Dynamics of Sedimentary Systems	Mass-Transport Deposits	Paleogeography / Paleoenvironments / paleoclimates / paleovegetation	Interplays between Tectonics and Sedimentation	Slow-slip Events / Neotectonics / Marine Terraces	Diagenesis / Petrophysics	Gaz Hydrates	IODP Expeditions 372A and 375
Onshore	Caron et al. Marden et al. McArthur et al.	Caron et al. Claussmann et al. Marden et al.	Claussmann et al. McArthur et al.	Caron et al. Claussmann et al. Marden et al.	Caron et al. Claussmann et al. McArthur et al. Ninis et al.	Ninis et al.			
Offshore	Griffin at al. McArthur et al. Tek et al.	Tek et al.	Dutilleul et al.	Griffin at al.	Griffin at al.	Allen et al.	Allen et al. Dutilleul et al.	Dutilleul et al.	Allen et al. Dutilleul et al.

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