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Supplement of

The Eocene–Oligocene Transition in the Paratethys: boreal water ingression and its paleoceanographic implications

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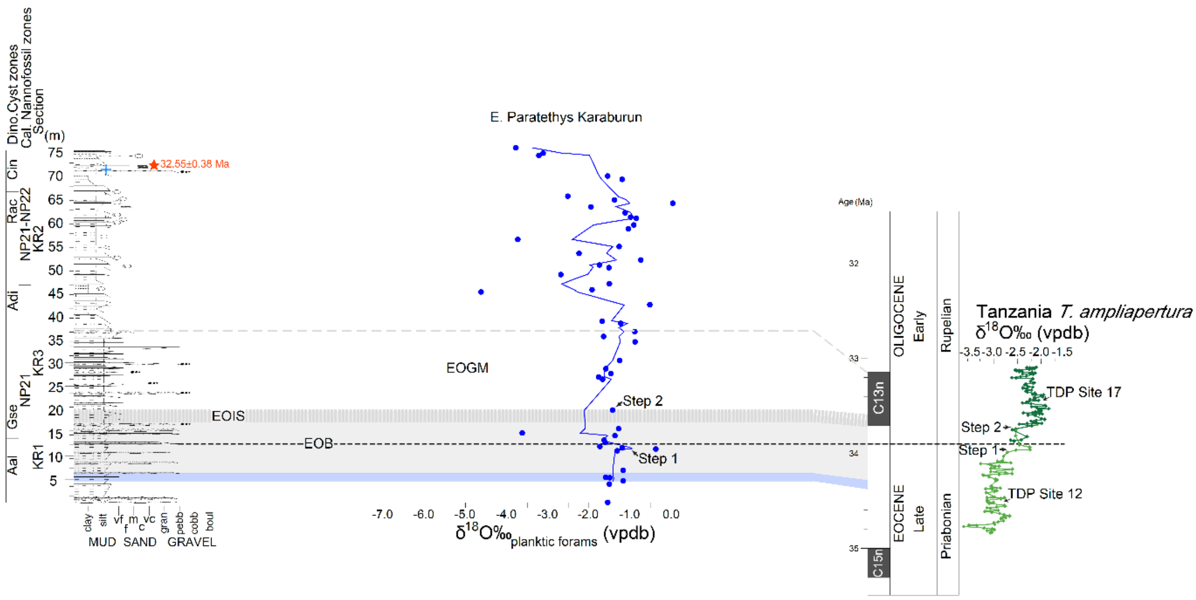

Figure S1 The stratigraphic log (in meters) of the Karaburun composite section including the results of planktic foraminifera $\delta^{18}O$ record (blue dots and line showing three-point running mean), highlighting the chronostratigraphic characteristics of the Eocene-Oligocene Transition (EOT, light gray shading). Apparent correlations were established by aligning the Karaburun data with high-resolution planktic foraminifera $\delta^{18}O$ records from the the African margin of the Indian Ocean (Tanzania Drilling Project sites 12 and 17, Pearson et al., 2008). Key features in the $\delta^{18}O$ records, such as positive and negative shifts and their amplitudes, were used to establish correlations. The EOT characteristics, including the Late Eocene Event (light blue shading), the Earliest Oligocene Oxygen Isotope Step (EOIS) and the Early Oligocene Glacial Maximum (EOGM) were defined by the $\delta^{18}O$ benthic foraminifera record (see Figure 3 in the main manuscript). The Eocene-Oligocene Boundary (EOB) was identified through biostratigraphic analyses (see section 5.1 in the main manuscript). The red star on the log marks the tuff layer, while the blue cross indicates the occurrence of the cold-water dinocyst *Svalbardella cooksoniae*.

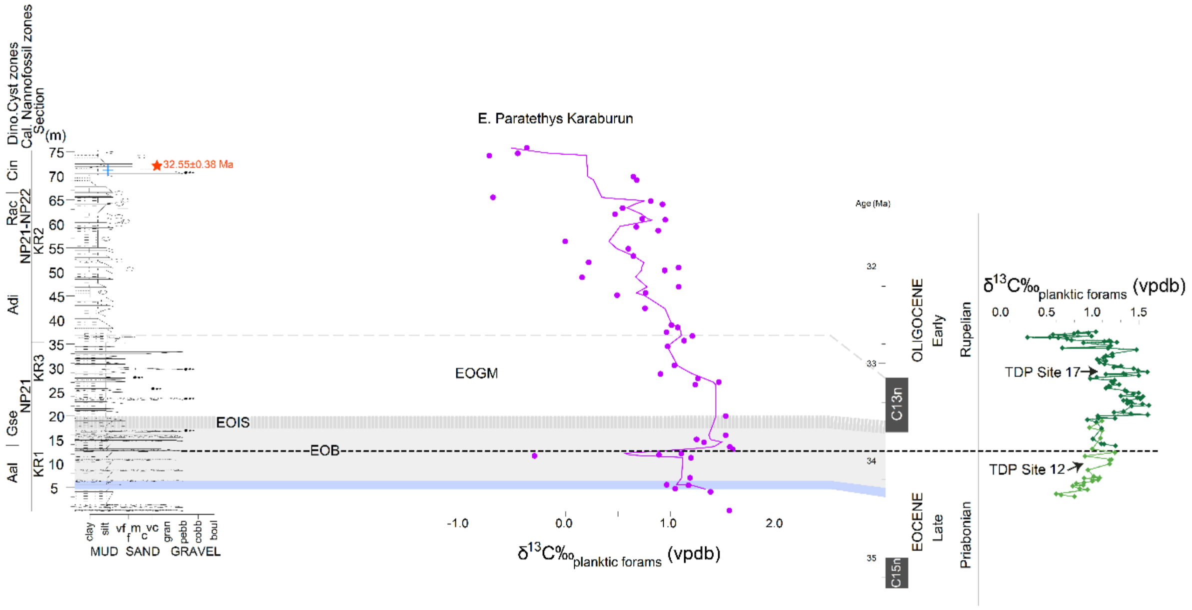

Figure S2 The stratigraphic log (in meters) of the Karaburun composite section including the results of planktic foraminifera $\delta^{13}C$ record (purple dots and line showing three-point running mean), highlighting the chronostratigraphic characteristics of the Eocene-Oligocene Transition (EOT, light gray shading). Apparent correlations were established by aligning the Karaburun data with high-resolution planktic foraminifera $\delta^{13}C$ records from the the African margin of the Indian Ocean (Tanzania Drilling Project sites 12 and 17, Pearson et al., 2008). Key features in the $\delta^{18}O$ records, such as positive and negative shifts and their amplitudes, were used to establish correlations. The EOT characteristics, including the Late Eocene Event (light blue shading), the Earliest Oligocene Oxygen Isotope Step (EOIS) and the Early Oligocene Glacial Maximum (EOGM) were defined by the $\delta^{18}O$ benthic foraminifera record (see Figure 3 in the main manuscript). The Eocene-Oligocene Boundary (EOB) was identified through biostratigraphic analyses (see section 5.1 in the main manuscript). The red star on the log marks the tuff layer, while the blue cross indicates the occurrence of the cold-water dinocyst *Svalbardella cooksoniae*.

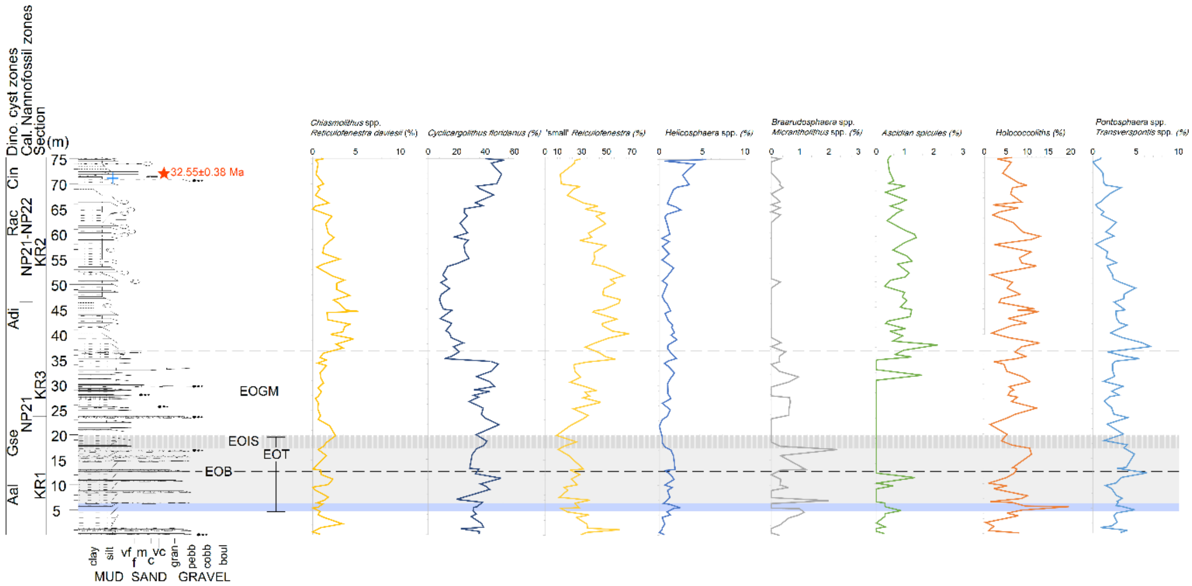

Figure S3 The stratigraphic log (in meters) of the Karaburun composite section including relative abundances (%) of calcareous nannofossil assemblages which are indicative of paleoenvironmental conditions (see section 5.5.1 in the main manuscript). The EOT characteristics, including the Late Eocene Event (light blue shading), the Earliest Oligocene Oxygen Isotope Step (EOIS) and the Early Oligocene Glacial Maximum (EOGM) were defined by the δ^{18}O benthic foraminifera record (see Figure 3 in the main manuscript). The Eocene-Oligocene Boundary (EOB) was identified through biostratigraphic analyses (see section 5.1 in the main manuscript). The red star on the log marks the tuff layer, while the blue cross indicates the occurrence of the cold-water dinocyst *Svalbardella cooksoniae*.

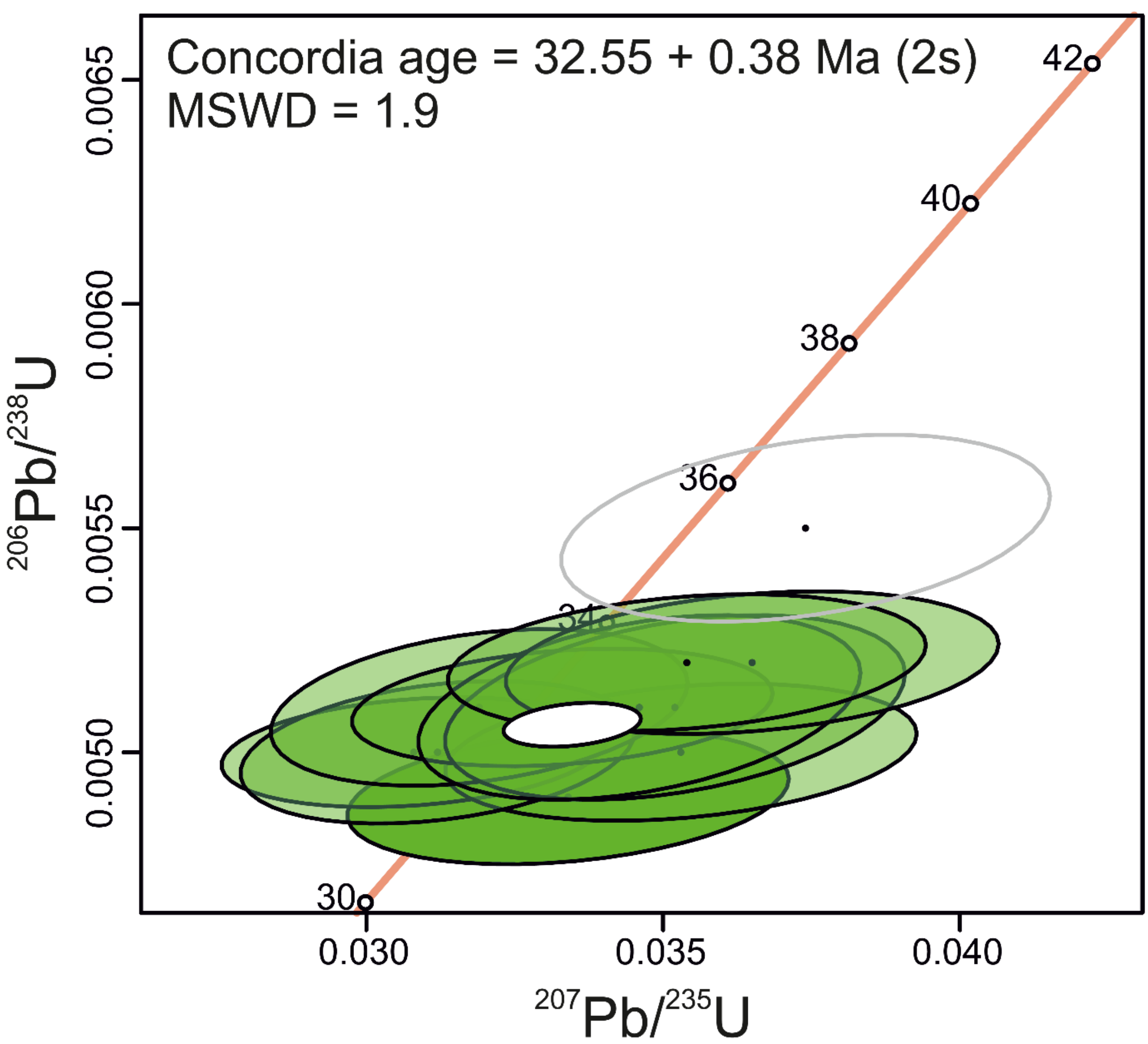

Figure S4 Pb/U Concordia diagram of the 12 single zircon grains screened as concordant, with their 2s uncertainty (green circles). The calculated Concordia age and its 2s uncertainty are also displayed. The outlier that is not included in the Concordia age calculation is shown with an empty circle. The plot and calculations were generated with IsoPlotR. MSWD: Mean Square Weighted Deviation.

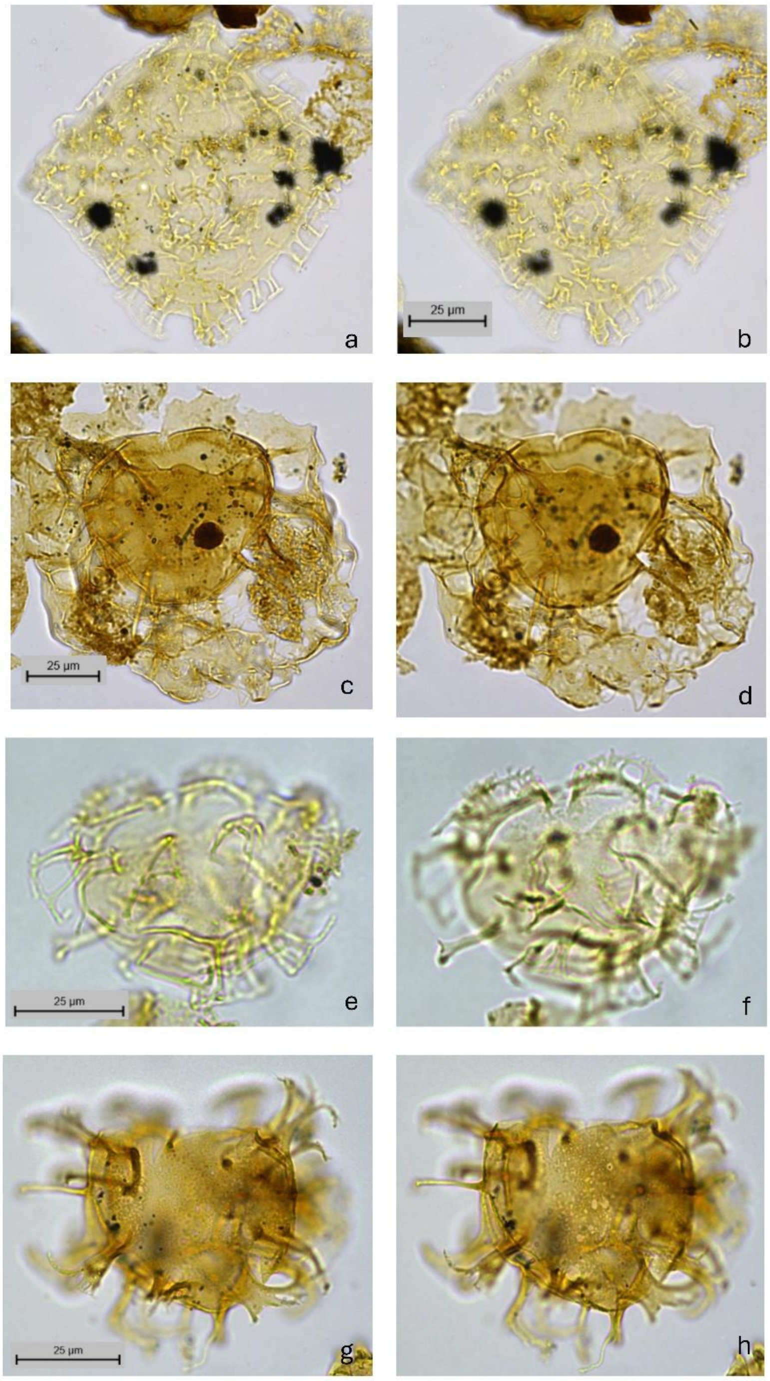

Plate S1 microphotographs of selected dinocyst taxa from the Karaburun sections

a, b. *Charlesdowniea clathrata.* Sample KR22S2Y32, slide 1, EF: C41. a: dorsal view. b. internal ventral view.

c, d. *Glaphyrocysta semitecta.* Sample KR22S2Y14, slide 1, EF: V24-1. c: ventral view. d. internal dorsal view.

e, f. *Hemiplacophora semilunifera*. Sample KR22S1Y1, slide 2. EF: T42-4. e: ventral view. f. internal dorsal view.

g, h. *Licracysta semicirculata*. Sample KR22S2Y45, slide 1. EF: R43-2. g: dorsal view. h. internal ventral view.

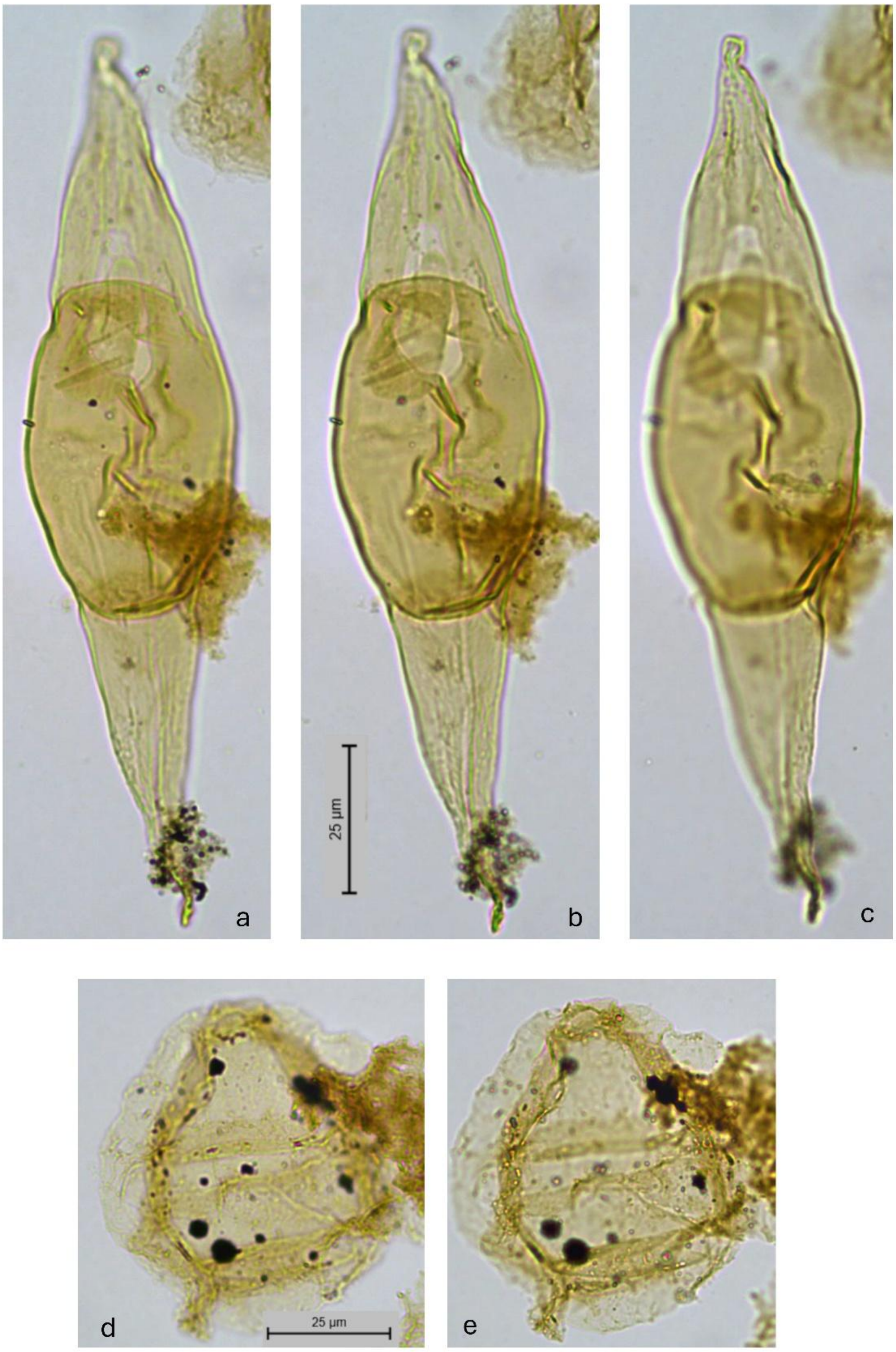

Plate S2 microphotographs of selected dinocyst taxa from the Karaburun sections

a, b, c. *Svalbardella cooksoniae.* Sample KR22S2Y41, slide 2, EF: G17-3. a: dorsal view. b. internal view, mid focus. c: internal ventral view.

d, e. *Ascostomocystis potane*. Sample KR22S2Y8, slide 1. EF: E22-3. d. external view, upper focus. e. internal view, low focus.

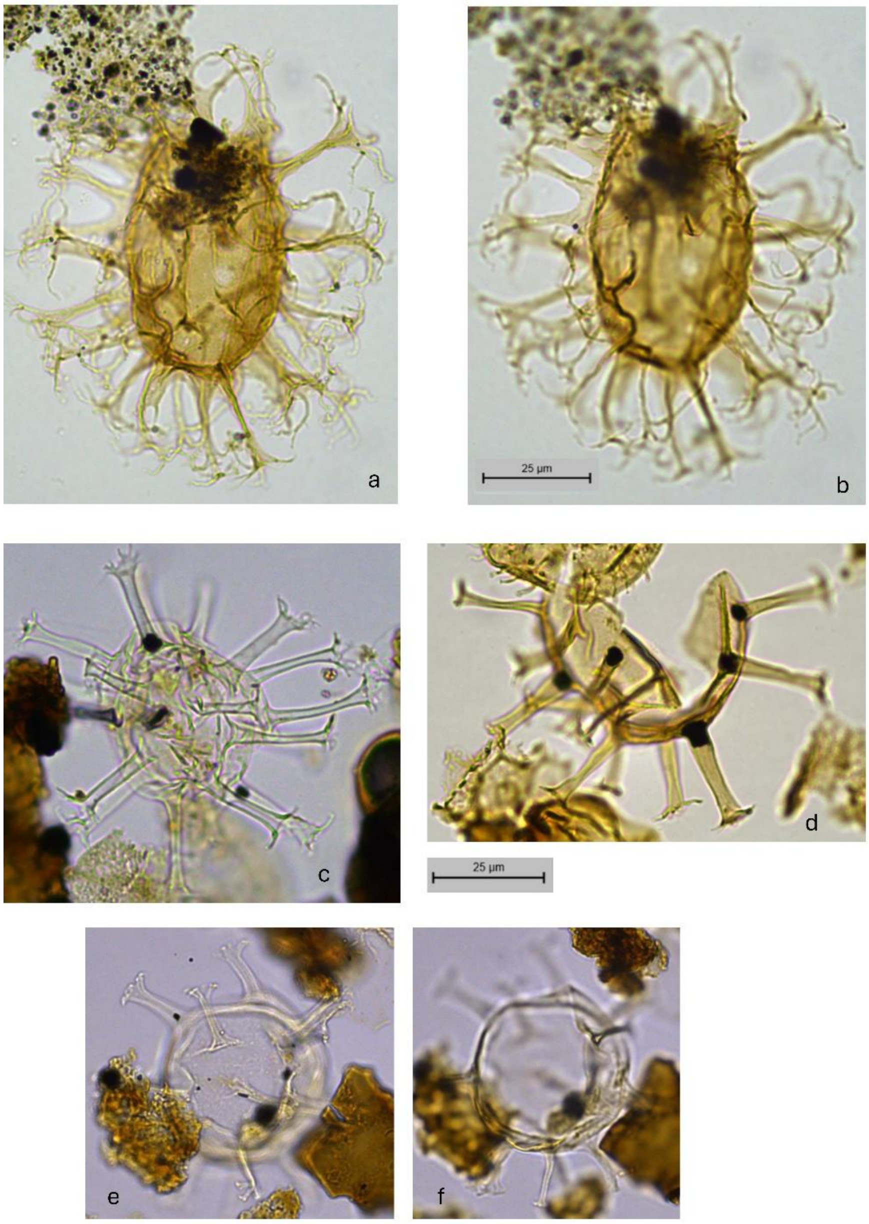

Plate S3 microphotographs of selected dinocyst taxa from the Karaburun sections

a, b. *Distatodinium ellipticum.* KR22S2Y45, slide 1, EF: M42. a: ventral view. b. internal dorsal view.

c. *Homotryblium pallidum*. Sample KR21Y3, slide 1, EF: M25.

d. *Homotryblium aculeatum*. Sample KR22S2Y1, slide 1, EF: D16-3.

e., f. *Homotryblium floripes*. Sample KR2Y31, slide 1, EF: U33-4.

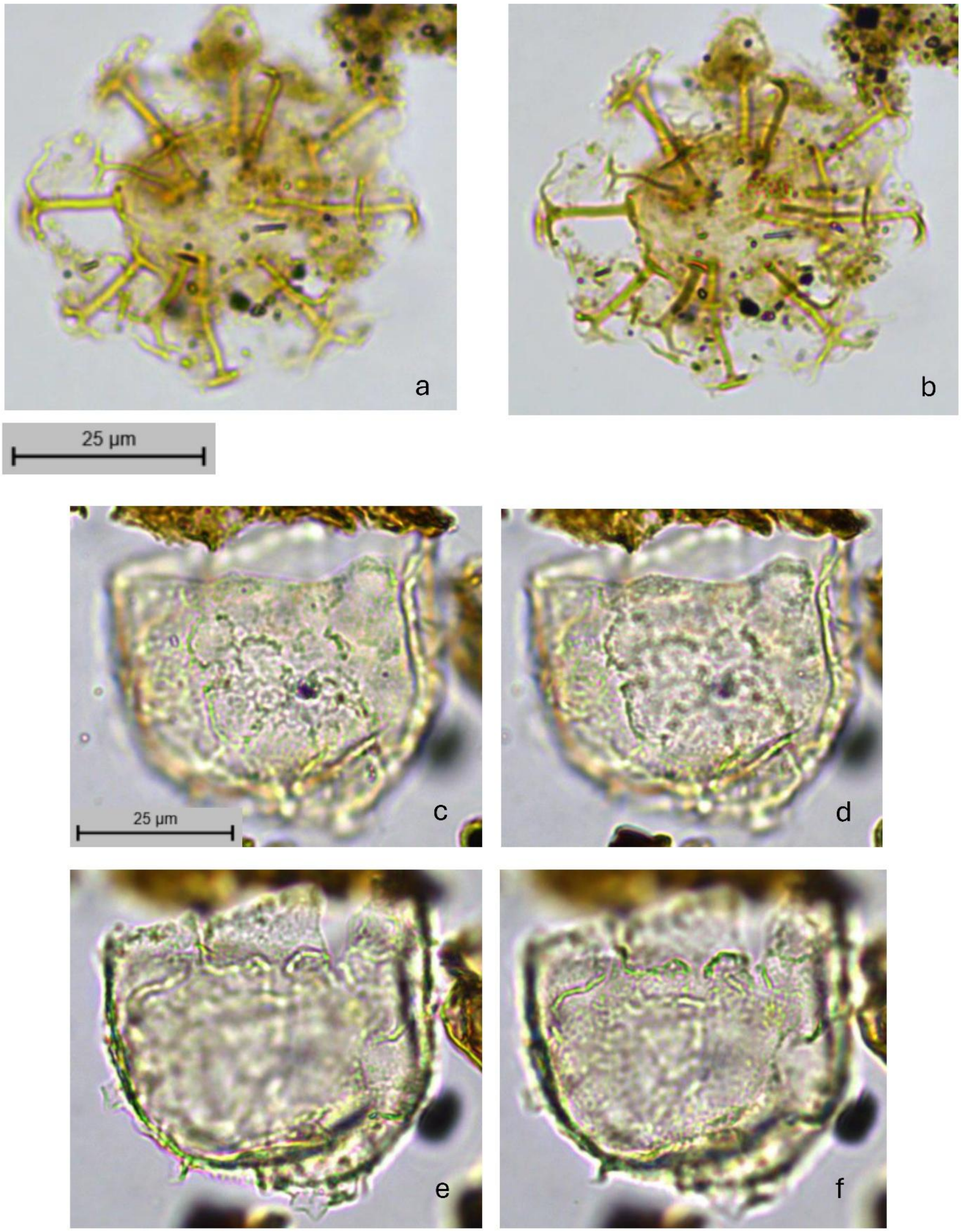

Plate S4 microphotographs of selected dinocyst taxa from the Karaburun sections

a, b. *Reticulatosphaera actinocoronata.* Sample KR22S2Y14, slide 1, EF: O41-1, orientation unknown.

c-f. *Stoveracysta* sp. 1 of Brinkhuis and Biffi 1993. Sample KR3Y15, slide 1, EF: O27-1. c. oblique dorsal view. d. mid focus level 1, e. mid focus level 2. f. oblique internal ventral view.

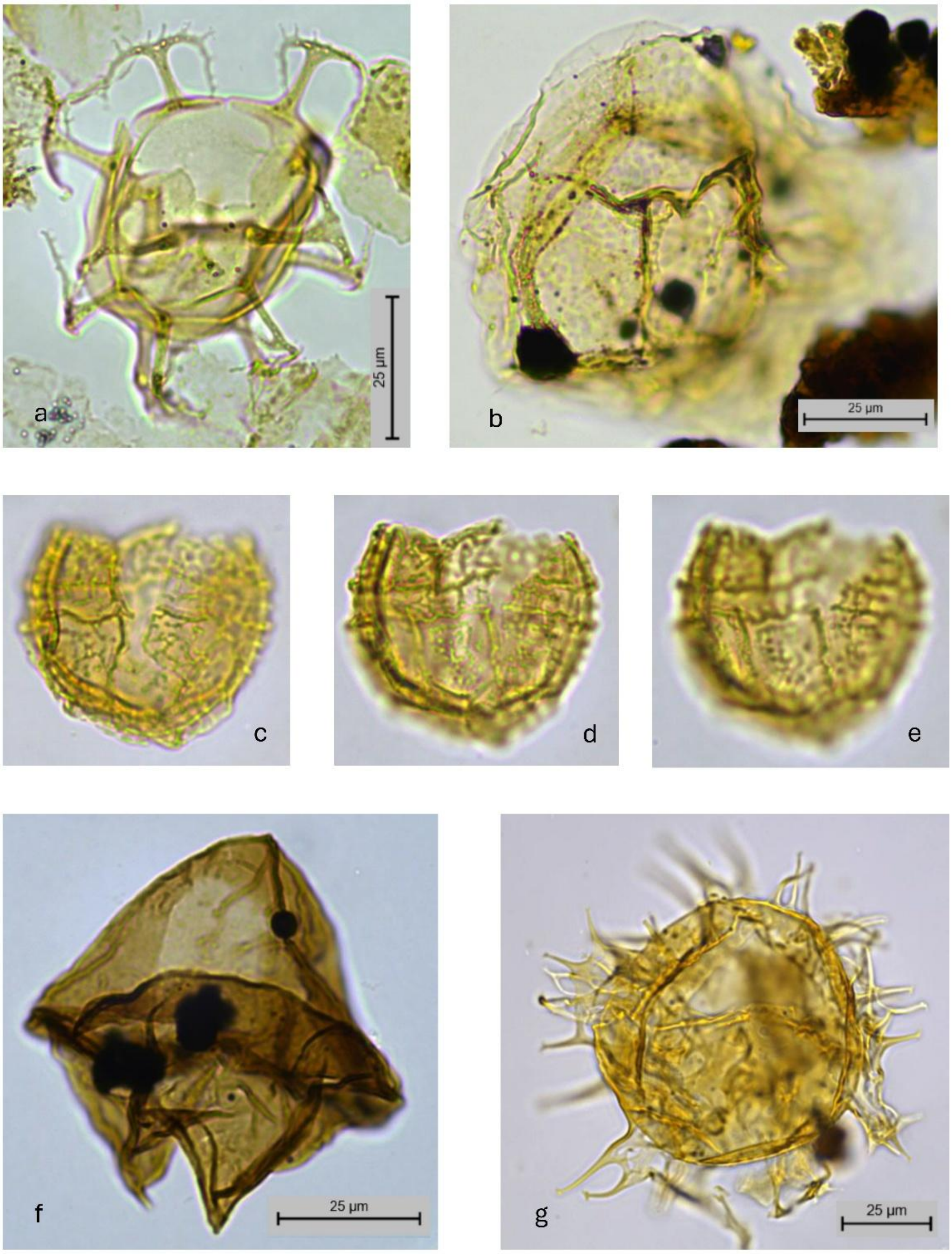

Plate S5 microphotographs of selected dinocyst taxa from the Karaburun sections

a. Enneadocysta pectiniforme. Sample KR22S1Y1, slide 1, EF: M42.

b. Heteraulacacysta porosa. Sample KR3Y30, slide 2, EF: R36

c-e. *Microdinium reticulatum.* Sample KR21Y3, slide 1, EF: M25. c: ventral view. d. internal view, mid focus. e: internal dorsal view.

f. *Lejeunecysta fallax* . Sample KR22S2Y1, slide 1, EF: D34. Oblique dorsal view.

g. *Glaphyrocysta priabonensis*. Sample KR22S1Y8, slide 1, EF: K42-2.

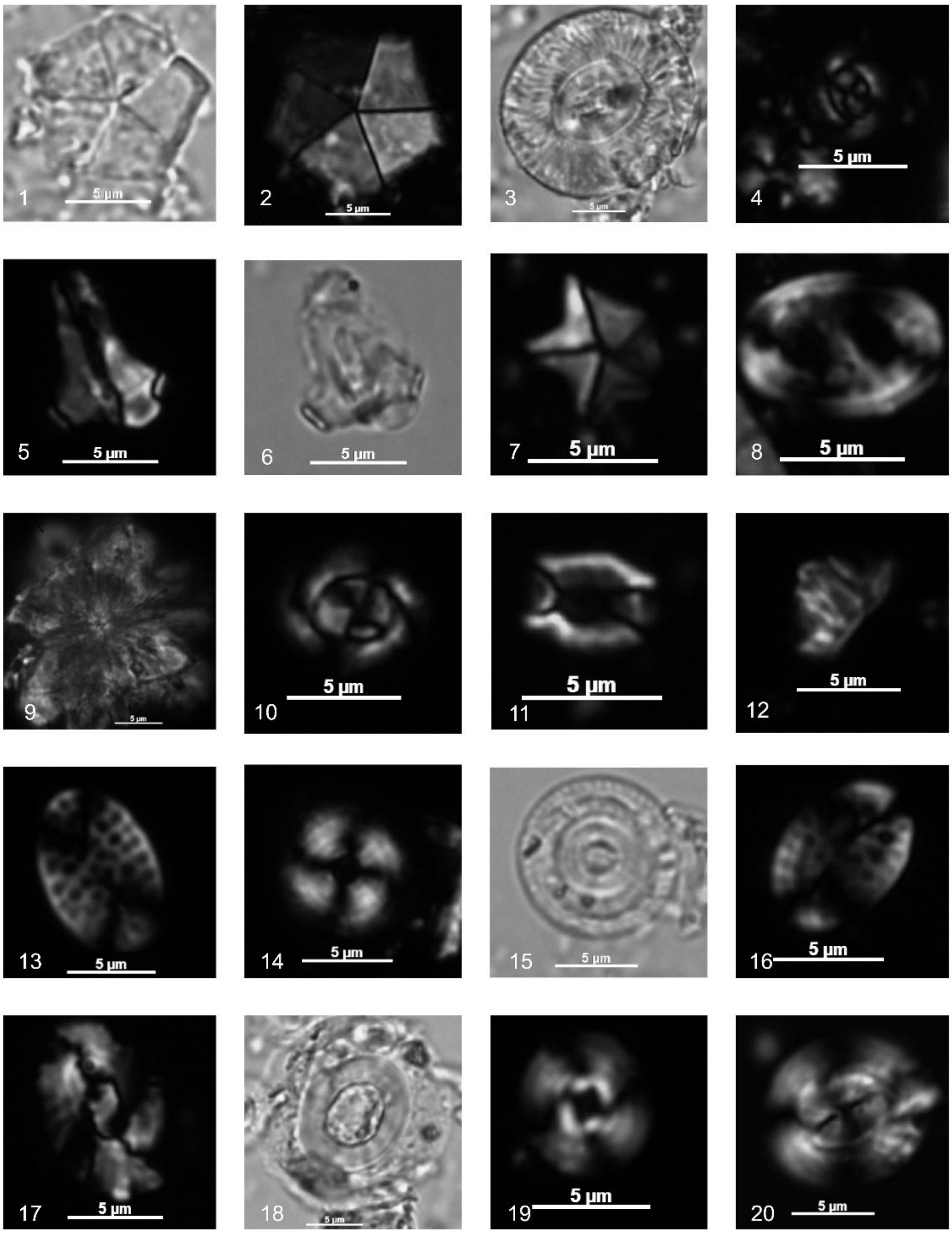

Plate S6 LM (magnification 1250x) microphotographs of selected calcareous nannofossil taxa from the Karaburun sections.

1. *Braarudosphaera bigelowii* . Sample KR3-Y14, parallel light. **2.** *Braarudosphaera bigelowii* . Sample KR3-Y14, crossed nicols. **3**. *Coccolithus eopelagicus*. Sample KR3-Y14, parallel light. **4.** *Clausicoccus subdistichus*, Sample KR3-Y14, crossed nicols. **5.** *Zigrablithus bijugatus*. Sample KR1-N12, crossed nicols . **6.** *Zigrablithus bijugatus*. Sample KR1-N12, parallel light. **7.** *Micrantholithus vesper*. Sample KR3-Y14, crossed nicols. **8.** *Pontosphaera pulcheroides*. Sample KR3-Y14, crossed nicols. **9**. *Ascidian spicules*. Sample KR1-N16, crossed nicols. **10.** *Clausicoccus fenestratus.* Sample KR2-N20, crossed nicols. **11**. *Lanternithus minutus.* Sample KR3-Y14, crossed nicols.**12**. *Orthozygus aureus*. Sample KR1-N16, crossed nicols. **13**. *Pontosphaera multipora*. Sample KR1-N16, crossed nicols. **14.** *Ericsonia formosa*. Sample KR1-N12, crossed nicols. **15**. *Ericsonia formosa*. Sample KR1-N12, parallel light. **16**. *Pontosphaera punctosa*. Sample KR2-N20, crossed nicols. **17.** *Helicosphaera euphratis.* Sample KR2-N20, crossed nicols.**18**. *Reticulofenestra umbilicus.* Sample KR1-N12, parallel light. **19.** *Cyclicargolithus floridanus*. Sample KR1-N12, crossed nicols. **20.** *Dictyococcites bisectus.* Sample KR2-N20, crossed nicols.

Sample	Cordosphaeridium minimum	Corrudinium incompositum	Cribroperidinium guiseppei	Dapsilidinium spp.	Deflandrea phosphoritica cpx	Dinopterygium cladoides	Diphyes colligerum	Distatodinium craterum	Distatodinium ellipticum	Distatodinium paradoxum	Elytrocysta spp.	Enneadocysta pectiniforme cpx	Eocladopyxis spp.	Glaphyrocysta intricata cpx	"Glaphyrocysta priaboniensis"	Glaphyrocysta semitecta	Glaphrocysta sp. A	Guersteinia succincta	Hemiplacophora semilunifera cpx
KR22-2 Y45	2.00	0.00	0.00	4.00	0.00		1.00		0.00			2.00	2.00	0.00					
KR22-2 Y42	3.00	4.50	0.00	3.00	4.50		3.00		7.00	1.00		0.00	3.00	0.00					
KR22-2 Y41	3.00	3.00	0.00	4.50	0.00		0.00		7.50	0.00		0.00	3.00	0.00					
KR22-2 Y40		0.00	0.00		6.00		0.00		0.00		6.00	0.00	6.00	0.00					
KR22-2 Y36	3.00		6.00	3.00	0.00				0.00			0.00	6.00			0.00		0.00	
KR22-2 Y32	0.00		0.00		0.00	0.00	0.00		0.00			0.00	6.00	0.00		0.00			
KR22-2 Y29			4.00		0.00				0.00		4.00	0.00	22.00			0.00	0.00		
KR22-2 Y26		4.00	0.00	2.00	5.00	0.00			2.00		0.00	0.00	6.00			2.00	0.00		
KR22-2 Y23		4.00	0.00		6.00		0.00		1.00			2.00	1.00	0.00		12.00	18.00	0.00	
KR22-2 Y19		0.00	0.00		8.00				0.00			0.00	2.00	0.00		14.00	4.00		
KR22-2 Y16	0.00	0.00	0.00	4.00	8.00	0.00	0.00		0.00			0.00	4.00	0.00		4.00	0.00		
KR22-2 Y14	2.00	8.00	0.00	5.00	0.00	2.00	0.00		0.00		0.00	0.00	0.00			0.00			
KR22-2 Y11	0.00	3.00	3.00	0.00	3.00	0.00			3.00			6.00	9.00			6.00			
KR22-2 Y8	0.00	3.00	3.00		0.00	0.00			3.00			3.00	10.00	0.00		8.00		0.00	
KR22-2 Y5			0.00		0.00		0.00		2.00			2.00	6.00			4.00			0.00
KR22-2 Y1			0.00	2.00	2.00	0.00	1.00		2.00			4.00	8.00	0.00		4.00			2.00
KR-3 Y17			30.00	0.00	4.00		0.00							6.00	1.00				
KR-3 Y16			6.00		4.00		0.00		0.00					2.00					
KR-3 Y15				2.00	6.00									0.00	0.00				
KR-3 Y14					2.50							5.00							
KR-3 Y13					2.50				0.00										
KR-3 Y10			0.00		7.00							0.00				0.00			
KR-3 Y6			2.00	0.00	4.00				0.00						0.00	0.00			
KR-3 Y1					8.00							4.00		0.00		22.00			0.00
KR-1 Y31			0.00	0.00	15.00			0.00	0.50			0.00				0.00			
KR-1 Y30					2.50						5.00	0.00	1.00	4.00		0.00			0.00
KR22-1 Y22					0.00				0.00			0.00	0.00	4.00	2.00	1.00			1.00
KR22-1 Y23			1.00		1.00				0.00	0.00	0.00	0.00	1.50	0.00	0.00	1.00			16.00
KR22-1 Y21					0.00	0.00			0.00			4.00	6.00	0.00	1.00	1.00			4.00
KR22-1 Y20					1.00				1.00			4.00	2.00	0.00	4.00	1.00			18.00
KR22-1 Y19									0.00			2.00	2.00	0.00	4.00	0.00			19.00
KR22-1 Y18					0.00	2.00			2.00	0.00		6.00	10.00	4.00	6.00				45.00
KR22-1 Y17			0.00			4.00			0.00	0.00		4.00	15.00	3.00	28.00				60.00
KR22-1 Y16						8.00			0.00			8.00	8.00	0.00	4.00				32.00
KR22-1 Y15					0.00							3.00	4.00	0.00	1.00				10.00
KR22-1 Y14												4.00	16.00	2.00	0.50				8.00
KR22-1 Y13					2.00				4.00			0.00	10.00	2.00	2.00				16.75
KR22-1 Y12									0.00			3.00	3.00	2.00	9.00				28.50
KR22-1 Y11									3.00			0.00	3.00	9.00	14.00				4.00
KR22-1 Y10									3.00			7.50	0.00	0.00	6.00				32.00
KR22-1 Y9			0.00		0.00	0.00					0.00	5.00		0.00	40.00				45.00
KR22-1 Y8					0.00							4.00	4.00	0.00	16.00				8.00
KR22-1 Y7	0.00		4.00						2.00			4.00	4.00	0.00	26.00				35.00
KR22-1 Y6	0.00					2.00						4.00	4.00	10.00	18.00				12.00
KR22-1 Y5			2.00			4.00			0.00			0.00	0.00	12.00	17.00				13.00
KR22-1 Y4A				2.00					4.00			8.00	0.00	4.00	30.00				10.00
KR22-1 Y4D												0.00	4.00	4.00	16.00				4.00
KR22-1 Y4C				8.00					8.00			12.00	4.00	4.00	6.50				28.00
KR22-1 Y4B												32.00	0.00	0.00	12.00				6.00
KR22-1 Y3												9.45	1.30	1.30	8.25				8.75
KR22-1 Y2	0.00					0.00			0.75			1.50	0.00	0.75	8.30				7.15
KR22-1 Y1	1.00								1.00			9.00	2.00	4.25	5.00				2.00

Sample	Heteraulacacysta spp.	Microdinium reticulatum cpx	Homotryblium floripes/plectilum	Homotryblium aculeatum/pallidum	Hystrichokolpoma spp.	Hystrichokolpoma sp. B&B	Impagidinium spp.	Impletosphaeridium severinii	Lejeunecysta spp.	Lentinia serrata	Lingulodinium spp.	Melitaspaeridium pseudorecurvatum	Nematosphaeropsis labyrinthus
KR22-2 Y45		0.00	0.00	0.00	0.00		0.00		2.00		0.00		
KR22-2 Y42		3.00	3.00	0.00			0.00				0.00		
KR22-2 Y41	0.00	3.00	0.00	0.00			3.00	0.00	0.00		0.00		0.00
KR22-2 Y40		3.00	0.00	3.00			0.00	0.00			0.00		0.00
KR22-2 Y36		9.00	5.00	2.00			2.00	0.00	0.00		0.00		
KR22-2 Y32		0.00	0.50	1.50	0.00	0.00	6.00	0.00	0.00		3.00		0.00
KR22-2 Y29		0.00	4.00	0.00			5.00	4.00			4.00		
KR22-2 Y26	0.00	0.00	2.00	0.00			0.00	4.00	4.00	0.00	8.00		
KR22-2 Y23		0.00	2.00	2.00	0.00		0.00	0.00	1.00	4.00	0.00		
KR22-2 Y19	0.00	0.00	2.00	2.00			4.00	0.00	0.00	0.00	0.00		
KR22-2 Y16	0.00	0.00	4.00	10.00			4.00	0.00		0.00	0.00		
KR22-2 Y14	0.00	0.00	0.00	0.00			10.00	0.00	0.00	4.00	5.00		
KR22-2 Y11	0.00	0.00	0.00	0.00	3.00		9.00	3.00	6.00	0.00	3.00		0.00
KR22-2 Y8	0.00	0.00	9.00	3.00	3.00		3.00	6.00	6.00	6.00	3.00		
KR22-2 Y5			8.00	4.00			3.00	2.00	4.00	3.00	4.00		
KR22-2 Y1			4.00	6.00			0.00	0.00	2.00	6.00	0.00		
KR-3 Y17	4.00		40.00	40.00				4.00		1.00	0.00		
KR-3 Y16			2.50	24.00									
KR-3 Y15			2.00	22.00	4.00			0.00	0.00	0.00	2.00		
KR-3 Y14	5.00		2.50	12.00	2.50								
KR-3 Y13			10.00	60.00						0.00			
KR-3 Y10			5.00	30.00						0.00			
KR-3 Y6			21.00	35.00									
KR-3 Y1	0.00		8.00	8.00	0.00			0.00	4.00	0.00			
KR-1 Y31	0.00	0.00	5.00	45.00					0.00	0.00			
KR-1 Y30	5.00		0.00	10.00					0.00	0.00			
KR22-1 Y22	0.00		0.00	4.00						0.00	0.00		
KR22-1 Y23			0.00	8.00									
KR22-1 Y21	0.00		0.00	28.00				0.00					
KR22-1 Y20			0.00	11.00						0.00			
KR22-1 Y19			0.00	10.00									
KR22-1 Y18	0.00		0.00	2.00									
KR22-1 Y17			0.00	1.00									
KR22-1 Y16	0.00		0.00	8.00									
KR22-1 Y15	10.00		0.00	12.00									
KR22-1 Y14	8.00		0.00	8.00									
KR22-1 Y13	0.00		0.00	6.00									
KR22-1 Y12	0.00		0.00	10.50									
KR22-1 Y11	3.00		0.00	12.00									
KR22-1 Y10	0.00		0.00	11.00									
KR22-1 Y9	0.00		0.00	10.00						5.00			
KR22-1 Y8	0.00		0.00	8.00									
KR22-1 Y7			0.00	8.00									
KR22-1 Y6			0.00	14.00									
KR22-1 Y5			1.00	12.00									
KR22-1 Y4A	0.00		6.00	18.00									
KR22-1 Y4D	0.00		2.00	8.00								r	
KR22-1 Y4C	0.00		1.00	4.00					4.00				
KR22-1 Y4B	0.00		1.00	8.00					0.00	0.00	8.00		
KR22-1 Y3	1.00		4.00	15.35					1.30		0.75		
KR22-1 Y2	0.00		6.00	21.40					0.00				
KR22-1 Y1	1.25		8.00	3.00					1.00	1.00	1.00		

Sample	Operculodinium israelianum cpx	Operculodinium centrocarpum cpx	Operculodinium microtriainum	Operculodinium eisenackii	Operculodinium placitum	Operculodinium cf. hirsutum	Palaeocystodinium golzowense	Pentadinium laticinctum	Phthanoperidinium amoenum	Phthanoperidinium filigranum	Phthanoperidinium comatum	Pyxidinopsis BB (granulaat)	Polysphaeridum spp.	Reticulatosphaera actinocoronata
KR22-2 Y45	2.00	6.00	2.00		2.00		0.00		0.00		4.00	0.00		0.00
KR22-2 Y42	6.00	13.00	3.00		3.00		0.00	0.00	2.00	1.00	3.00	0.00		9.00
KR22-2 Y41	15.00	12.00	1.50		5.00	0.00			0.00	1.00	9.00	0.00		3.00
KR22-2 Y40	15.00	15.00	0.00		3.00	0.00	0.00			0.00	6.00		0.00	5.00
KR22-2 Y36	7.00	21.00	1.00		3.00	0.00				0.00	0.00			0.00
KR22-2 Y32	6.00	27.00	1.50		6.50				6.00	0.00	6.00		0.00	3.00
KR22-2 Y29	1.50	12.00	2.00		0.00		0.00				8.00	0.00		8.00
KR22-2 Y26	6.00	16.00	0.00		0.00						0.00	0.00		0.00
KR22-2 Y23	14.00	6.00	1.00		2.00		0.00		0.00	0.00	4.00	0.00	0.00	0.00
KR22-2 Y19	18.00	8.00	12.50		0.00			2.00			0.00			4.00
KR22-2 Y16	12.00	4.00	4.00		4.00						4.00	0.00		0.00
KR22-2 Y14	13.00	12.00	2.00		2.00	1.00	0.00		0.00		0.00			4.00
KR22-2 Y11	15.00	7.50	6.00		3.00		3.00				2.00			0.00
KR22-2 Y8	16.00	12.00	8.00		0.00		3.00	0.00	0.00	3.00	6.00			6.00
KR22-2 Y5	14.00	6.00	8.00		2.00						2.00	0.00		0.00
KR22-2 Y1	16.00	8.00	3.50		2.00		1.00				4.00	0.00	1.00	2.00
KR-3 Y17	8.00	4.00	12.00	0.00							2.00			0.00
KR-3 Y16	16.00	4.00	22.00		0.00						4.00			
KR-3 Y15	16.00	17.00	15.00		1.00						0.00			
KR-3 Y14	25.00	7.50	30.00		5.00			0.00						
KR-3 Y13	25.00	10.00	5.00		0.00						5.00			
KR-3 Y10	20.00	15.00	15.00		1.00						2.50			0.00
KR-3 Y6	4.00	8.00	8.00		0.00						0.00			
KR-3 Y1	18.00	8.00	6.00		0.00			0.00						
KR-1 Y31	5.00	5.00	7.50	0.00	2.00						2.00			0.00
KR-1 Y30	5.00	25.00	18.00		5.00			0.00						2.50
KR22-1 Y22	40.00	12.00	62.00		0.00						0.00			4.00
KR22-1 Y23	36.00	8.00	17.00		0.00						0.00			4.00
KR22-1 Y21	10.00	2.00	12.00		0.00						4.00			0.00
KR22-1 Y20	4.00	4.00	8.00		0.00									
KR22-1 Y19	8.00	4.00	8.00		0.00						0.00			0.00
KR22-1 Y18	1.00	2.00	10.00		0.00									0.00
KR22-1 Y17	1.00	2.00	8.00		0.00			0.00			0.00			0.00
KR22-1 Y16	2.00	4.00	8.00		0.00	0.00			0.00		0.00		2.00	0.00
KR22-1 Y15	8.00	22.50	8.00		0.00		0.00	0.00						
KR22-1 Y14	14.00	4.00	6.00											
KR22-1 Y13	15.00	6.00	2.00						0.00		4.00			
KR22-1 Y12	9.00	6.00	9.00											
KR22-1 Y11	9.00	11.00	4.00								1.00			
KR22-1 Y10	3.00	12.00	6.00		0.00	0.00								
KR22-1 Y9	6.00	50.00	5.00	5.00	0.00	0.00					0.00		5.00	0.00
KR22-1 Y8	4.00	44.00	4.00	4.00	0.00	0.00					2.00		0.00	
KR22-1 Y7	0.00	9.00	4.00			0.00					0.00			0.00
KR22-1 Y6	4.00	8.00	8.00								8.00			
KR22-1 Y5	8.00	4.00	6.00								8.00			
KR22-1 Y4A	4.00	36.00	20.00			0.00					12.00			
KR22-1 Y4D	6.00	5.00	4.00			0.00					8.00			0.00
KR22-1 Y4C	0.00	5.00	8.00								2.00			
KR22-1 Y4B	2.00	12.00	8.00								1.00			
KR22-1 Y3	10.00	9.50	3.00								9.40			1.30
KR22-1 Y2	4.10	10.00	6.50						0.50		9.75			2.75
KR22-1 Y1	12.00	7.00	5.00						1.00		11.00			1.00

Sample	Reticulatosphaera sp. R	Rottnestia borrussica	Selenopemphix spp.	Senegalinium spp.	Spiniferites ramosus cpx	Spiniferites pseudofurcatus	Stoveracysta sp. 2 B&B93	small skolochorate cysts	Svalbardella spp.	Thalassiphora patula	Thalassiphora pelagica	Environmental signal
KR22-2 Y45	0.00	0.00	2.00	6.00	15.00	4.00		0.00		0.00	0.00	O. Neritic, runoff
KR22-2 Y42	0.00	0.00		3.00	7.50	0.00		0.00				O. Neritic, runoff
KR22-2 Y41		0.00	0.00	0.00	29.00	3.00		0.00	0.00	0.00	1.00	O. Neritic, runoff
KR22-2 Y40				6.00	20.00	0.00		0.00				O. Neritic, runoff
KR22-2 Y36		0.00	0.00	6.00	23.00	0.00		0.00			0.00	O. Neritic, runoff
KR22-2 Y32			3.00		28.00	1.00		0.00			0.00	O. Neritic, runoff
KR22-2 Y29				8.00	40.00	0.00		0.00		1.00	1.00	O. Neritic, runoff
KR22-2 Y26				0.00	30.00			0.00				O. Neritic, runoff
KR22-2 Y23	0.00		0.00		19.00			0.00				O. Neritic, runoff
KR22-2 Y19			0.00		20.00			6.00				O. Neritic, runoff
KR22-2 Y16					30.00	4.00		0.00				O. Neritic, runoff
KR22-2 Y14			0.00		38.00			0.00				O. Neritic, runoff
KR22-2 Y11			0.00		12.00	0.00		0.00			3.00	O. Neritic, runoff
KR22-2 Y8		3.00			23.00	3.00		0.00				O. Neritic, runoff
KR22-2 Y5					21.00	3.00		0.00				O. Neritic, runoff
KR22-2 Y1			2.00	2.00	18.00	2.00		0.00		1.00		O. Neritic, runoff
KR-3 Y17					8.00			0.00		0.00		O. Neritic, runoff
KR-3 Y16					16.00	0.00		0.00			0.00	O. Neritic, runoff
KR-3 Y15					12.00	0.00	0.00	0.00			0.00	O. Neritic, runoff
KR-3 Y14			0.00		7.50		0.00	0.00				O. Neritic, runoff
KR-3 Y13			0.00		10.00			0.00		0.00		O. Neritic, runoff
KR-3 Y10			0.00		5.00	0.00		0.00				O. Neritic, runoff
KR-3 Y6			0.00		12.00			0.00		0.00	0.00	O. Neritic, runoff
KR-3 Y1			0.00		12.00	4.00		0.00		0.00		O. Neritic, runoff
KR-1 Y31				4.00	10.00	0.00		0.00				O. Neritic, runoff
KR-1 Y30			0.00		25.00	2.00		0.00		0.00		O. Neritic, runoff
KR22-1 Y22					6.00	0.00		0.00				O. Neritic, runoff
KR22-1 Y23					4.00			0.00				O. Neritic, runoff
KR22-1 Y21					32.00			0.00				O. Neritic, runoff
KR22-1 Y20					34.00	2.00		0.00				O. Neritic, runoff
KR22-1 Y19					32.00	4.00		0.00		0.00		O. Neritic, runoff
KR22-1 Y18			0.00		30.00	2.00		0.00		0.00		O. Neritic, runoff
KR22-1 Y17				0.00	28.00	3.00		0.00		0.00		O. Neritic, runoff
KR22-1 Y16				2.00	12.00	0.00		0.00				O. Neritic, runoff
KR22-1 Y15					10.00			0.00		0.00		O. Neritic, runoff
KR22-1 Y14					20.00			0.00				O. Neritic, runoff
KR22-1 Y13					32.00			0.00				O. Neritic, runoff
KR22-1 Y12					28.00			0.00				O. Neritic, runoff
KR22-1 Y11					23.50	1.50		0.00				O. Neritic, runoff
KR22-1 Y10					18.00			0.00				O. Neritic, runoff
KR22-1 Y9					7.50			0.00				O. Neritic, runoff
KR22-1 Y8					8.00	0.00		0.00		0.00	0.00	O. Neritic, runoff
KR22-1 Y7					24.00	0.00		0.00				O. Neritic, runoff
KR22-1 Y6					35.00			0.00				O. Neritic, runoff
KR22-1 Y5					24.00			0.00				O. Neritic, runoff
KR22-1 Y4A			4.00		52.00	2.00		0.00				O. Neritic, runoff
KR22-1 Y4D					48.00	0.00		0.00				O. Neritic, runoff
KR22-1 Y4C					24.50			0.00				O. Neritic, runoff
KR22-1 Y4B					22.00	0.00		0.00				O. Neritic, runoff
KR22-1 Y3			0.00		16.25			2.60				O. Neritic, runoff
KR22-1 Y2					16.25	1.30		1.00				O. Neritic, runoff
KR22-1 Y1			1.00	1.00	11.00	1.00	2.00	4.00				O. Neritic, runoff

Sample	% gymnosperms	% terrestrial	% lagoonal DC	%inner neritic DC
KR22-2 Y45	25.64102564	28.20512821	16.04	50.00
KR22-2 Y42	45.11278195	48.72180451	27.75	41.85
KR22-2 Y41	36.92307692	39.38461538	22.94	31.17
KR22-2 Y40	34.38395415	38.68194842	29.13	26.21
KR22-2 Y36	27.43902439	33.84146341	40.00	23.00
KR22-2 Y32	40.63205418	44.69525959	20.91	22.73
KR22-2 Y29	15.54907677	17.88143829	35.69	13.75
KR22-2 Y26	32	34.13333333	21.36	36.89
KR22-2 Y23	34.48275862	37.93103448	20.39	55.34
KR22-2 Y19	54.00843882	54.6835443	16.29	54.75
KR22-2 Y16	47.53820034	48.89643463	34.00	40.00
KR22-2 Y14	58.82352941	60.58823529	13.39	27.68
KR22-2 Y11	20.16806723	22.18487395	19.09	47.30
KR22-2 Y8	9.063444109	12.68882175	30.43	36.65
KR22-2 Y5	14.95016611	17.27574751	24.51	41.18
KR22-2 Y1	20.51282051	23.24786325	35.98	40.59
KR-3 Y17	14.80111008	18.5013876	69.41	41.08
KR-3 Y16	17.79755284	21.3570634	38.39	52.13
KR-3 Y15	19.85111663	22.82878412	31.07	42.72
KR-3 Y14	19.09854851	22.91825821	21.05	59.81
KR-3 Y13	22.77039848	25.04743833	60.78	25.49
KR-3 Y10	29.31691586	31.66226913	44.28	42.79
KR-3 Y6	27.11864407	29.15254237	66.04	28.30
KR-3 Y1	33.2103321	35.42435424	23.53	60.78
KR-1 Y31	33.22259136	34.05315615	65.18	36.16
KR-1 Y30	43.47826087	46.08695652	16.82	33.18
KR22-1 Y22	43.29004329	45.88744589	2.94	80.88
KR22-1 Y23	44.65709729	48.48484848	11.11	75.36
KR22-1 Y21	27.50809061	31.39158576	32.76	34.48
KR22-1 Y20	55.64387917	61.04928458	16.83	44.55
KR22-1 Y19	53.09734513	58.05309735	15.84	50.50
KR22-1 Y18	25.67975831	29.60725076	12.00	56.80
KR22-1 Y17	24.50980392	28.43137255	12.50	66.25
KR22-1 Y16	33.19502075	36.51452282	24.56	54.39
KR22-1 Y15	60.41335453	64.22893482	25.37	38.05
KR22-1 Y14	47.58922981	53.09956168	31.22	41.46
KR22-1 Y13	41.56563907	46.2764115	21.87	43.51
KR22-1 Y12	26.08695652	34.7826087	12.50	53.24
KR22-1 Y11	4.398826979	17.59530792	21.78	44.06
KR22-1 Y10	9.415121255	16.26248217	13.79	49.26
KR22-1 Y9	5.412719892	8.119079838	10.90	52.32
KR22-1 Y8	6.451612903	10.32258065	14.81	31.48
KR22-1 Y7	9.561752988	14.34262948	12.98	61.07
KR22-1 Y6	10.41666667	17.70833333	25.56	43.61
KR22-1 Y5	10.2915952	17.49571184	26.50	54.70
KR22-1 Y4A	3.649635036	11.67883212	22.32	39.29
KR22-1 Y4D	9.958506224	14.93775934	23.68	34.21
KR22-1 Y4C	8.184143223	12.27621483	18.11	52.36
KR22-1 Y4B	7.567567568	11.89189189	10.53	33.33
KR22-1 Y3	2.387843705	10.34732272	30.50	32.71
KR22-1 Y2	4.068190624	20.14722976	41.52	32.27
KR22-1 Y1	26.13159123	33.59776015	32.26	36.23

(blue)	offshore
(yellow)	index taxa
(light green)	lagoonal

Table S1 The Karaburun composite section dinocyst biostratigraphy chart

Table S2 The Karaburun composite section calcareous nannofossil biostratigraphy chart

KARABURUN.DEN

Samples	height (m)	Field of view	Coccolithus pelagicus	Cyclicargolithus floridanus	Pontosphaera spp.	Blackites spinosus	Reticulofenestra spp. (<4u)	Bicolumnus ovatus	Braarudosphaera bigelowii	Clausicoccus spp.	Coccolithus eopelagicus	COCCOSPHERES	Dictyococcites bisectus	Dictyococcites stavensis	Discoaster sp.	Ericsonia formosa	Helicosphaera compacta	Helicosphaera seminulum	Lanternithus minutus	Neococcolithes spp.	Pontosphaera discopora	Pontosphaera multipora	Reticulofenestra daviesi	Reticulofenestra hillae	Reticulofenestra umbilica	Sphenolithus moriformis	Sphenolithus predistentus	Transversopontis spp.	Zygrablithus bijugatus	Campylosphaera dela	Chiasmolithus spp.	Neococcolithes nudus	Pontosphaera japonica	Reticulofenestra clatrata
KR2																																		
KR2-22-N45	75.00	9	18	125	2	6	89			7		1	7	1			11		7						1	2	3	1	13					
KR2-22-N44	74.70	10	30	177	1	2	81			9	1		5	2			1		1						1	3	3	2	9					
KR2-22-N43	74.10	9	35	141		2	76			5			4				3		4						1	2	1		16					
KR2-22-N42	71.90	9	38	133	3		32			5		1	6	1		1	3		1						1	6	2		10					
KR2-22-N40	70.00	7	32	152	1	5	42	1	1	7		2	5	2	1	1	3		2		1				2	4	2	2	23					
KR2-22-N39	69.50	9	45	118	3	4	99		1	7	1	3	2	1		1	4		6				1		2	3	5	1	27					
KR2-22-N38	69.00	8	27	89	6	3	57			11		1	3	1		1	1		6				1		1	2	2	2	10					
KR2-22-N37	67.75	8	32	143	3	6	56			6		2	5	1			3		3						1	4	2		16					
KR2-22-N36	66.20	5	20	107	2	7	102		1	12	1	2	4	1		1	1		5				4		2	3	1	1	23					
KR2-22-N35	65.60	7	18	120	1	4	135			9			6				2						1		1	2			6					
KR2-22-N34	65.00	8	42	82		7	105		1	8		2	9				6		9			2			1	6	2		16					
KR2-22-N33	64.20	5	27	80	3	3	151			12		2	1				1		1				1		1	2			10					
KR2-22-N32	63.60	2	31	87	2	4	131		1	9		2	8	1			1					1	5		1	1	2		6					
KR2-22-N31	62.10	6	15	74	5	4	162			4			6			1	1		4			4	5			3	4		18					
KR2-22.N29	60.20	5	27	92	4	4	117			11			5				2		10			1	6	1	1	3	4		20					
KR2-22-N28	59.40	9	27	60	4	9	123			15		2	8				1		25			2	7		1	4	3	2	17					
KR2-22-N27	58.75	8	39	98	4	9	99	1		19		1	5	1					20				6		1	4	1	1	18					
KR2-22-N26	57.75	5	17	76	1	5	150			11		2	3						3				3		2	2	1		4					
KR2-22-N25	56.30	5	21	91	3	1	139			9		1	2			1	1	1	20				3		1	8	1	3	17					
KR2-22-N24-2	55.10	8	18	92	3	5	130			15		1	1	1					10				10		1	3	4	2	16					
KR2-22-N24-1	54.10	12	35	52	3	4	97			9			2	1			1	1	12			3	3		2	2	5		9					
KR2-2-N23	53.50	4	32	58	5	7	207			14		1	6	1			2	1	23			1	2		3	4	5	1	25	1				
KR2-22-N21	51.75	3	25	36	5	6	225			16		1	2				2		1			2	7		1	4		1	4					
KR2-22-N20	50.95	3	33	39	1	5	159			9		1	13						7			5	11		1		1	1	5					
KR2-22-N19	50.30	6	26	29	2	3	185		1	7		2	8		1	2	1		12			5	8		1	2	2	3	9					
KR2-22-N18	49.10	5	30	49	9	5	154			5		5	9	1				1	7			2	8	1	5	2		5	10					
KR2-22-N17	47.90	7	38	28	2	4	142	1		10			12	1					11			3	12	1	3	2	2	6	14					
KR2-22-N16	47.00	4	31	27	1	3	203			10		2	11						6			1	8		4	1		10	7					
KR2-22-N15	46.30	5	32	28	1	2	195			11		2	3	2			1	1	4			2	9		2	1	1	5	7					
KR2-22-N14	45.00	5	34	33	1	2	147			10		1	3		1	1		2	24			4	10		1	2	1	6	12					
KR2-22-N13	44.75	5	41	54		5	129			12		1	2		1	1	1		6			6	16		1	3	2	6	19					
KR2-22-N12	44.50	4	46	46	1	6	117			12		2	5			1	1		15			4	4		2	1	2	3	23					
KR2-22-N11	43.10	4	25	25	3	1	170			11	1	3	8	1		1			5			1	5		3	1		4	11					
KR2-22-N10	42.20	4	33	53	3	2	150			6		1	5		1		1		17			5	13		1			2	14					
KR2-22-N9	41.75	5	38	55	2	3	164			4		2	2	1	2	2	1		9			7	13		1	2	2	5	14					
KR2-22-N8	40.70	5	38	43	6	1	188			12		3	2			1	1		4				12		1		3	3	7					
KR2-22-N7	40.20	5	13	44	1		200			4		2	1				1		3				6		1			5	2					
KR2-22-N6	39.30	6	18	48	5	5	152			9		1	1			1	3		9			1	14		2	1		3	8					
KR22-22-N5	38.25	5	14	73	5	3	118		1	5	1	3	1		1	2			22			6	8		2		2	6	16					
KR2-22-N4	37.50	7	34	56	9	8	102			23		1	3			1			15			4	11		8	1		8	12					
KR2-22-N3	36.45	4	27	89	1	12	179		1	18		4	5	2		3	1		13				5		4	3	3	6	16					
KR2-22-N2	35.58	7	18	58	3	3	174		1	13		5	1	1			1		23			1	3		3	1		9	10					
KR2-22-N1	35.10	6	15	43	2	3	211		1	21		1	2				1		16			5	6		2	2		13	11					
KR1+KR3																																		
KR3-Y17	35.25	7	33	127	8	6	115		1	17			3			3		1	5				2		3	5	3	1	3					
KR3-Y16	34.25	7	24	125	5	10	71			26		1	5				1	1	7				5		1	7	1	2	7					
KR3-Y15	32.75	6	45	128	8	8	84		1	21	2	1	2			3		2	10				3		2	10			8					
KR3-Y14	31.75	6	26	89	6	4	90	1	3	21		3	5		2	5	3	1	14				3		5	8	1	2	13					
KR3-Y13	30.5	4	26	114	3	8	65		2	26		1	2			2	1	2	23				4		10	9	2	1	11					
KR3-Y12	29.5	10	14	120	10	2	106			18		1	2			2	1	1	13				2	1	1	4	1	1	5					
KR3-Y11	28.85	12	18	83	7	5	126			18			4				1		16				3		2	8	2	1	4					
KR3-Y10	28.5	8	19	114	5	4	103			10		1	6			1		3	11				3	1	2	9	3	2	8					
KR3-Y9	27.75	7	40	87	8	5	117			14			6		1	2	1	2	9				2		7	4	3	2	9					
KR3-Y8	27.4	6	18	92	6	6	95		2	22		1	4			3	1	1	19				1	1	8	7	1		5					
KR3-Y6	26.5	9	25	73	4	6	136		2	17	1		4			1	1		16				2		1	4			3					
KR3-Y3	25.2	7	47	103	7	6	73		2	16		1	3			3	2	2	31	1			2		2	6	2		6					
KR3-Y1	24.90	8	34	102	7	7	114		1	9			3			2	1	2	18				2		3	8	2	1	5		1			
KR1-Y31	23.40	9	29	106	8	6	98			17			10			2	1		7				2		2	5		5	10					
KR1-Y30	22.40	12	48	124	3	10	62			12			8	1		1			1				6		5	10		2	3					
KR-22-N22	19.9	8	56	95		12	31			27	2	2	22	3	2	11	1		9	1		9	8	3	6	14		2	9	2	1	1	1	2
KR1-Y26	18.6	19	40	104	3	5	77			16			12			5			6				5		4	8		1	6					
KR-22-N23	17.75	13	54	106		10	50	1	1	14	1	1	12	2	1	9	1	1	16	3	1	6	4	4	4	9	3	6	5					
KR-22-N21	17.1	6	68	86	10	7	32		4	18	1	1	9	2		4	2	1	21				2		3	5		1	8	1				
KR-22-N20	15.9	5	46	80		11	59	1	1	19		3	7			3	3	2	18			9	5	5	3	5	2	6	9					
KR-22-N19	13.2	8	32	82		9	104		3	26	3	3	6	1		5	2	4	15			10			5			3	7					
KR-22-N18	13	5	57	94	3	12	64		1	20		3	5	1		4		2	14			5	3		3	3		1	5					
KR-22-N17	12.1	11	43	84	8	6	85			6	2	1	9			4	1	3	16			2	3		2	3	1	9	1					
KR-22-N16	11.2	11	23	126	7	1	63		1	9	1		4			3	2	3	12			3	6	2	3	3	2		2		1			
KR-22-N15	10.08	13	52	101	6	8	86	1	1	8	3	3	8	1		11	1	1	3				6		4	10		3						
KR-22-N14	9.58	10	56	115	5	18	52		2	13	1	1	11		1	9	2	3	14					1	1	14			4					
KR-22-N13	8.98	11	58	116	2	8	59			4	1	1	21	3		10	1	1	6			4	1	1	4	5		1	1					
KR-22-N12	7.58	7	65	74	4	15	38			8	1	2	14	2	1	16	1		14			3	5		6	10	1	2	13					
KR-2-N11	7	7	55	59	11	2	126		5	3		2	5			7		3	18				5		4	15		1	5	1				
KR-22-N10	6.4	12	38	67	4	2	51			6	1		3	1		3			1			1	1	1	2	11		1	1					
KR-22-N9	6.2	16	51	105		9	83			5		1	5	3		7	3	1	14			8	4	4	5	9		2	7					
KR-22-N8	5.5	8	40	95		9	92			3		2	2	1		4	3	2	20			8	2		8	4		1	11					
KR-22-N7	5.4	10	48	81	2	8	38		3	7		3	7		2	3	2	2	51		1	4		1	11	6		3	8					
KR-22-N6	4.67	9	56	92	4	11	62		3	6		2	4		2	13		1	18			10	3		6	14	5	3	5					
KR-22-N5	4.07	7	35	91	2	9	114		2	1		1	3		1	3	2		13			5	2		2	10	5	2	2	1				
KR-22-N4A	3.55	8	63	83	1	8	83		2	2	1		7		2	4			23			5	4		14	9	2	1	1					
KR-22-N4C	2.21	14	37	99	4	6	108		1	5	1		12			6						4	11		2	6		1						
KR-22-N4B	1.44	9	35	103	4	6	109			6		1	9	1		7			4			1	3		8	5		2	2	2				
KR-22-N3	1.12	7	26	67		4	205			4		1	1			5			3			1	2		2	5		2	1					
KR-22-N2	0.57	7	14	30	2	2	33			2			7	1		2			1			1				3		1						
KR-22-N1	0.1	9	39	102	3	14	100		1	9		1	6		3	8	1	1	18			7	3		2	3	1	1	6	2				

Samples	Reticulofenestra spp. (3-7)	Dictyococcites scrippsae	Helicosphaera lophota	Holodiscolithus spp.	Micrantholithus spp.	Rhabdosphaera spp.	Reticulofenestra samoduvori	Reticulofenestra spp.	Umbilicosphaera bramlettei	Hayella situliformis	Discoaster adamanteus	Discoaster deflandrei	Reticulofenestra lockeri	Ascidian spicules	Umbilicosphaera spp.	Neochiastozygus distentus	Helicosphaera bramlettii	Chiasmolithus omaruensis	Discoaster nodifer	Isthmolithus recurvus	Holococcoliths spp.	Reworked Paleogene	Triquetrorhabdulus milowii	Cyclicargolithus abisectus >10	Helicosphaera reticulata	Sphenolithus distentus	Pontosphaera plana	Pedinocyclus sp.	Orthozygus aureus	Helicosphaera euphratis	Helicosphera wilcoxonii	Clausicoccus norrisii	Reticulofenestra macmillani	Reticulofenestra oamaruensis	Bramletteius serraculoides	Sphenolithus akropodus	Blackites base	Helicosphaera robinsoniae	Umbilicosphaera protoannulus	Helicosphaera bipuncta	Chiasmolithus altus	Markalius sp.	Helicosphaera recta
KR2																																											
KR2-22-N45	1	1											1				5	3			2									1						1					1		
KR2-22-N44		1			1													1			2									1													
KR2-22-N43	8	1											1				8	1			2									2				1	1	2		2			1		
KR2-22-N42	5	1					1						1				4	1																	1			1					
KR2-22-N40	6	1											1		1		8	3			4																	1			1		
KR2-22-N39		1				2											3	1									1		1								2	3					
KR2-22-N38	6	3												1			1	1														1						2					
KR2-22-N37	3	3					1										1	1			14						3											3					
KR2-22-N36	6	1										1	2				2	1			8											2		1							1		
KR2-22-N35	1	1															3				2										1							1					
KR2-22-N34	4	1															2				12											1						2	2				
KR2-22-N33	4																1	1			6						1				1	2						2			2		
KR2-22-N32	1	3				2							1				1	1			10																	2	1		1		
KR2-22-N31	2	2				2							2				1				8									1							1	1					
KR2-22.N29	7	2				2							1				1				5							1								1	2	2		1			
KR2-22-N28	4	3				1							1																							1	2	1	1		1		
KR2-22-N27	2	5	1									1	2		4		3				3															2					1		
KR2-22-N26	3	8				1							1		1		1				4															1	2	1			1		
KR2-22-N25	10					2									2		1	1			6								1							1	2	1					1
KR2-22-N24-2	4					1							1		1		1				1																1						
KR2-22-N24-1	1														5		1				2						1		1							1	1						
KR2-2-N23	3	2											1		4		4				1								3							2	3	1					
KR2-22-N21	3	3													2		1				2											1									1		
KR2-22-N20	4	1															1				1																1		1				
KR2-22-N19	2	5															2				1													1			1	1	1		1		
KR2-22-N18	2	3															1				6												2					1			1		
KR2-22-N17	1	2							1								1				1												1			1	1	1			1		
KR2-22-N16		1	1										2		1		1											1								1		1					
KR2-22-N15	4	2															1				4															1	1				1		
KR2-22-N14	2	5	1				1										1	1			1																1	1			1		
KR2-22-N13	3	2							2					1							4									2						1	1				1		
KR2-22-N12	3								1								1																	1		1	1				1		
KR2-22-N11		1											2				2				6										1					1							
KR2-22-N10	6																2												1	2		1				2	1	1			1		
KR2-22-N9	4	4					1								1		2				1					1				1	1		1			1	2	1	1				
KR2-22-N8	2	3															3				6									2				1		1	1						
KR2-22-N7	3	1					2						1				2													1								1					
KR2-22-N6		2							1				1				1			1	2						1			2		1		1		1	1						
KR22-22-N5	1	2											1				1													1							1			1			
KR2-22-N4	4	4											3	1			3				2							1															
KR2-22-N3	2				1		1										1													4		2	2			1	3					2	
KR2-22-N2	3						1						2		1		4				4								1	1			1				6			1			
KR2-22-N1	1	2					1						1								4				1					1	1		2				3						
KR1+KR3																																											
KR3-Y17		3					1	4									1																										
KR3-Y16							1	6									1																										
KR3-Y15		1	2				1										2																1										
KR3-Y14		2												5							1											1											
KR3-Y13		2					4	1																																			
KR3-Y12		4					1																							1													
KR3-Y11		4						1									1												1		1												
KR3-Y10		6					2	2				1	1																														
KR3-Y9		2					3			1							1																										
KR3-Y8		13					2																							2													
KR3-Y6		4					1																																				
KR3-Y3							3														1								1														
KR3-Y1		2			1		1													1																							
KR1-Y31		7					2	1																																			
KR1-Y30		3																		1				1																			
KR-22-N22	2																																										
KR1-Y26		5					5										1																										
KR-22-N23																																											
KR-22-N21		7	1	3	3	2																																					
KR-22-N20		4		7		1																																					
KR-22-N19		6			1		4	2																																			
KR-22-N18		7		5				3	1																																		
KR-22-N17		5		4				1	1	1																																	
KR-22-N16		3		1		3		2	2		1	2	2	4																													
KR-22-N15		3						2							7																												
KR-22-N14		6											5	2	1	2																											
KR-22-N13		10					2	1	1								1																										
KR-22-N12		6		1			3	2				2	5			2	3	1	1	2	5																						
KR-2-N11		6		2	2	2		2				1	1								5																						
KR-22-N10		8					1	1					2				1				1	1	1																				
KR-22-N9		5					1	1					2	1							1	1																					
KR-22-N8		9					2	1		1			4	1			3			1	1			3																			
KR-22-N7		6					1	1					1	1							1				1																		
KR-22-N6		3		4	1		2	1					3	3			2			3	3	1				1																	
KR-22-N5		1		1	1								3	1	4		2				1		1	1																			
KR-22-N4A		1						1					2	1	1		1		2		2						1																
KR-22-N4C		3		1			1	2		2			1		1		2							1																			
KR-22-N4B		4					2						1	1			1				1																						
KR-22-N3		1					2			1			1		1		1			1	2																						
KR-22-N2																																											
KR-22-N1		1		3			3		1					1							1	1						1															

KR2-22						Isotopic Ratios + measurement Uncertainty (2s)									Ages uncorrected for common lead + measurement Uncertainty (2s)											
						Data for Tera-Wasserburg plot				Data for Wetherill plot																
Sample	Is rejected ?	% common lead (f206c)	206Pb (mV)	U (ppm)	U/Th	238U/206Pb	238U/206Pb Uncertainty (% 2s)	207Pb/206Pb	207Pb/206Pb Uncertainty (% 2s)	207Pb/235U	207Pb/235U Uncertainty (% 2s)	206Pb/238U	206Pb/238U Uncertainty (% 2s)	ρ	Age 206Pb/238U	Age 206Pb/238U measurement Uncertainty (2s)	Age 207Pb/235U	Age 207Pb/235U measurement Uncertainty (2s)	Age 207Pb/206Pb	Age 207Pb/206Pb measurement Uncertainty (2s)	Discordance 206Pb/238U vs 207Pb/235U (%)	Discordance 206Pb/238U vs 207Pb/206Pb (%)	Distance to Concordia	Best age (Concordia)	Best age measurement Uncertainty (2S)	Best age Systematic Uncertainty (2S)
ZC28	0	0.47	660	978.28	0.33	203.31	2.5	0.0493	8.7	0.0334	9.1	0.0049	2.5	0.272	31.6	0.8	33.4	3.0	161.2	70.3	5.2	80.4	5.5	31.6	0.8	0.8
ZC37	0	1.12	1276	1608.82	0.33	200.97	2.0	0.0449	8.4	0.0308	8.6	0.0050	2.0	0.233	32.0	0.6	30.8	2.6	0.0	50.9	-3.9	151.1	-3.9	32.0	0.6	0.7
ZC27	0	0.35	1645	2003.42	0.12	199.81	2.5	0.0511	8.9	0.0353	9.2	0.0050	2.5	0.271	32.2	0.8	35.2	3.2	246.2	39.6	8.6	86.9	9.2	32.2	0.8	0.9
ZC7	0	0.90	1266	1564.49	0.31	198.87	2.6	0.0450	8.3	0.0312	8.7	0.0050	2.6	0.295	32.3	0.8	31.2	2.7	0.0	54.3	-3.6	159.2	-3.6	32.3	0.8	0.9
ZC6	0	0.84	1074	1329.80	0.37	198.01	2.8	0.0458	8.5	0.0319	9.0	0.0051	2.8	0.311	32.5	0.9	31.9	2.8	0.0	86.2	-1.9	361.3	-1.9	32.5	0.9	1.0
ZC11	0	0.48	1462	1826.41	0.19	197.87	2.1	0.0478	8.4	0.0333	8.7	0.0051	2.1	0.238	32.5	0.7	33.3	2.8	88.9	291.3	2.3	63.4	2.4	32.5	0.7	0.7
ZC10	0	0.31	1335	1649.41	0.27	197.25	3.3	0.0503	8.4	0.0352	9.0	0.0051	3.3	0.364	32.6	1.1	35.1	3.1	208.6	48.0	7.1	84.4	7.5	32.6	1.1	1.1
ZC38	0	0.58	2156	2626.23	0.26	195.32	3.3	0.0491	8.1	0.0346	8.8	0.0051	3.3	0.373	32.9	1.1	34.6	3.0	151.8	77.9	4.8	78.3	5.0	32.9	1.1	1.1
ZC33	0	0.20	841	1131.86	0.38	194.07	2.5	0.0514	9.0	0.0365	9.3	0.0052	2.5	0.264	33.1	0.8	36.4	3.3	259.5	39.0	9.1	87.2	9.7	33.1	0.8	0.9
ZC32	0	0.35	790	1017.53	0.37	193.39	2.4	0.0496	9.0	0.0354	9.3	0.0052	2.4	0.254	33.2	0.8	35.3	3.2	176.9	67.6	5.8	81.2	6.1	33.2	0.8	0.9
ZC18	0	0.23	1202	1477.13	0.32	183.01	3.1	0.0496	8.4	0.0374	9.0	0.0055	3.1	0.342	35.1	1.1	37.2	3.3	175.7	70.5	5.7	80.0	6.0	35.1	1.1	1.1
ZC25	0	1.10	1607	1186.51	0.38	121.36	6.3	0.0493	8.4	0.0559	10.5	0.0082	6.3	0.604	52.9	3.3	55.3	5.6	159.5	212.8	4.3	66.8	4.6	52.9	3.3	3.4
ZC1	0	1.22	1062	797.29	0.54	186.21	3.0	0.0789	14.0	0.0584	14.4	0.0054	3.0	0.211	34.5	1.0	57.7	8.0	1169.7	12.5	40.1	97.0	53.2	Discordant	Discordant	Discordant
ZC2	0	3.91	268	353.58	0.26	200.55	3.6	0.0202	10.9	0.0139	11.5	0.0050	3.6	0.311	32.1	1.1	14.0	1.6	0.0	2.7	-129.0	101.2	-68.6	Discordant	Discordant	Discordant
ZC4	0	2.53	410	536.36	0.34	191.35	3.0	0.0317	9.3	0.0228	9.7	0.0052	3.0	0.304	33.6	1.0	22.9	2.2	0.0	6.5	-46.7	103.4	-36.5	Discordant	Discordant	Discordant
ZC5	0	4.25	386	510.65	0.23	203.54	3.6	0.0178	10.0	0.0120	10.7	0.0049	3.6	0.338	31.6	1.1	12.1	1.3	0.0	2.0	-160.1	101.0	-72.9	Discordant	Discordant	Discordant
ZC8	0	3.97	354	436.71	0.35	190.91	3.7	0.0209	9.7	0.0151	10.4	0.0052	3.7	0.352	33.7	1.2	15.2	1.6	0.0	2.7	-121.6	101.4	-63.6	Discordant	Discordant	Discordant
ZC9	0	2.00	1009	1239.66	0.30	197.20	3.4	0.0370	9.5	0.0258	10.0	0.0051	3.4	0.339	32.6	1.1	25.9	2.6	0.0	11.3	-25.8	105.8	-22.4	Discordant	Discordant	Discordant
ZC12	0	1.24	1465	1753.64	0.18	199.93	2.1	0.0424	8.5	0.0292	8.8	0.0050	2.1	0.235	32.2	0.7	29.2	2.5	0.0	24.3	-10.0	115.7	-9.6	Discordant	Discordant	Discordant
ZC14	0	0.95	1171	1213.78	0.32	198.20	2.3	0.0645	10.1	0.0448	10.4	0.0050	2.3	0.220	32.4	0.7	44.5	4.5	756.3	12.7	27.1	95.7	32.6	Discordant	Discordant	Discordant
ZC15	0	1.73	1039	1238.21	0.35	198.07	2.4	0.0380	8.6	0.0264	8.9	0.0050	2.4	0.271	32.5	0.8	26.5	2.3	0.0	11.7	-22.5	106.7	-20.2	Discordant	Discordant	Discordant
ZC16	0	3.76	1270	1531.88	0.22	204.46	2.2	0.0199	8.9	0.0134	9.1	0.0049	2.2	0.238	31.5	0.7	13.5	1.2	0.0	2.1	-132.7	101.2	-75.4	Discordant	Discordant	Discordant
ZC17	0	2.16	820	569.74	0.25	189.84	4.0	0.0841	20.8	0.0611	21.2	0.0053	4.0	0.190	33.9	1.4	60.2	12.4	1294.6	16.6	43.7	97.4	59.6	Discordant	Discordant	Discordant
ZC20	0	6.11	12185	1656.29	0.22	148.02	45.5	0.2978	60.9	0.2773	76.0	0.0068	45.5	0.598	43.4	19.7	248.5	169.1	3458.3	32.8	82.5	98.7	221.2	Discordant	Discordant	Discordant
ZC21	0	2.52	1004	1157.00	0.19	203.08	3.5	0.0321	9.4	0.0218	10.1	0.0049	3.5	0.344	31.7	1.1	21.9	2.2	0.0	6.5	-44.5	103.3	-34.6	Discordant	Discordant	Discordant
ZC22	0	2.80	958	1216.71	0.46	204.92	2.3	0.0303	8.8	0.0204	9.1	0.0049	2.3	0.247	31.4	0.7	20.5	1.8	0.0	5.1	-53.4	102.8	-41.4	Discordant	Discordant	Discordant
ZC23	0	0.98	1235	1055.56	0.46	198.68	4.4	0.0724	15.3	0.0502	15.9	0.0050	4.4	0.276	32.4	1.4	49.7	7.7	995.9	14.8	34.9	96.8	44.9	Discordant	Discordant	Discordant
ZC26	0	1.20	961	1233.65	0.38	202.03	2.4	0.0434	8.9	0.0296	9.2	0.0049	2.4	0.262	31.8	0.8	29.6	2.7	0.0	31.9	-7.6	121.4	-7.3	Discordant	Discordant	Discordant
ZC29	0	0.40	1504	1718.47	0.26	197.34	2.8	0.0540	8.7	0.0377	9.1	0.0051	2.8	0.305	32.6	0.9	37.6	3.4	371.9	23.5	13.4	91.2	14.8	Discordant	Discordant	Discordant
ZC31	0	2.07	808	1108.78	0.52	200.01	2.5	0.0361	9.0	0.0249	9.4	0.0050	2.5	0.271	32.2	0.8	25.0	2.3	0.0	9.6	-28.8	105.2	-25.0	Discordant	Discordant	Discordant
ZC34	0	0.11	1952	2531.41	0.31	205.99	1.6	0.0527	8.4	0.0353	8.5	0.0049	1.6	0.191	31.2	0.5	35.2	2.9	316.9	25.9	11.4	90.2	12.3	Discordant	Discordant	Discordant
ZC35	0	1.42	3390	2131.62	0.11	185.83	3.8	0.0871	10.7	0.0646	11.4	0.0054	3.8	0.337	34.6	1.3	63.5	7.0	1360.8	8.4	45.5	97.5	65.0	Discordant	Discordant	Discordant
ZC36	0	3.36	726	959.32	0.43	204.82	2.2	0.0238	9.0	0.0160	9.3	0.0049	2.2	0.233	31.4	0.7	16.1	1.5	0.0	3.0	-94.6	101.6	-62.2	Discordant	Discordant	Discordant
ZC39	0	2.15	1771	2323.64	0.36	205.38	1.6	0.0341	8.1	0.0229	8.2	0.0049	1.6	0.189	31.3	0.5	23.0	1.9	0.0	6.7	-36.2	104.0	-30.8	Discordant	Discordant	Discordant
ZC40	0	0.20	1906	2431.93	0.29	201.99	1.5	0.0521	8.3	0.0356	8.4	0.0050	1.5	0.174	31.8	0.5	35.5	2.9	290.2	29.5	10.3	89.0	11.1	Discordant	Discordant	Discordant

Table S3 U-Pb data for the 35 analyzed zircon grains

Sample	Depth	d13-C	d13-C corr	Std error45	d18-O	d18-O corr	Std error46
KR1-Y1	0.1	0.635	0.595	0.007	-0.571	-0.302	0.052
KR1-Y3	1.12	0.787	0.755	0.017	-0.362	-0.150	0.029
KR1-Y4B	1.44	1.433	1.401	0.014	-1.062	-0.850	0.050
KR1-Y4A	3.55	1.565	1.533	0.017	-0.777	-0.565	0.020
KR1-Y6	4.67	1.374	1.334	0.013	-1.125	-0.856	0.059
KR1-Y8	5.5	0.662	0.622	0.006	-0.424	-0.155	0.039
KR1-Y9	6.2	2.197	2.157	0.011	-2.479	-2.210	0.043
KR1-Y10	6.4	0.970	0.930	0.017	-1.358	-1.089	0.036
KR1-Y11	7	1.052	1.020	0.014	-0.538	-0.326	0.058
KR1-Y12	7.58	0.976	0.936	0.016	-1.607	-1.338	0.071
KR1-Y13	8.98	1.111	1.071	0.015	-0.980	-0.711	0.038
KR1-Y14	9.58	1.169	1.129	0.014	-1.796	-1.527	0.025
KR1-Y15	10.08	1.013	0.973	0.024	-1.315	-1.046	0.053
KR1-Y32	11.20	0.991	0.780	0.001	-0.175	-0.081	0.015
KR1-Y16 (15)	11.20	1.211	1.174	0.014	-1.065	-0.858	0.030
KR1-Y33	11.40	0.987	0.776	0.011	-0.146	-0.052	0.053
KR1-Y34	11.60	0.815	0.557	0.006	-0.225	-0.223	0.012
KR1-Y35	11.80	1.291	1.080	0.007	-0.292	-0.198	0.009
KR1-Y36	12.00	1.269	1.058	0.006	-0.499	-0.405	0.011
KR1-Y37	12.20	2.314	2.056	0.005	-2.155	-2.153	0.014
KR1-Y38	12.40	1.375	1.164	0.010	-0.929	-0.835	0.007
KR1-Y19 (17)	13.10	0.949	0.912	0.010	-0.995	-0.788	0.032
KR1-Y40	13.20	0.219	0.007	0.303	-9.585	-9.491	0.097
KR1-Y41	13.45	1.756	1.545	0.010	-2.348	-2.254	0.013
KR1-Y42	13.70	1.685	1.474	0.007	-3.336	-3.242	0.018
KR1-Y46	15.00	1.684	1.473	0.015	-2.289		0.034
KR1-Y20	15.9	1.322	1.290	0.026	-1.426	-1.214	0.031
KR1-Y21	17.25	1.342	1.180	0.010	-1.465	-1.416	0.006
KR1-Y24	17.50	1.421	1.210	0.008	0.028	0.123	0.026
KR1-Y23	17.75	1.292	1.260	0.013	-0.586	-0.374	0.048
KR1-Y25	18.00	0.981	0.770	0.011	0.165	0.260	0.034
KR1-Y27	19.60	1.104	0.893	0.012	0.873	0.968	0.016
KR1-Y28	20.50	1.786	1.575	0.007	-0.688	-0.594	0.012
KR1-Y30	22.00	1.949	1.738	0.011	-2.411	-2.317	0.045
KR1-Y31	23.20	1.986	1.775	0.014	-0.660	-0.566	0.020
KR3-Y1	23.90	1.352	1.141	0.004	-0.636	-0.542	0.011
KR3-Y2	24.60	0.971	0.760	0.003	-0.138	-0.044	0.012
KR3-Y3	25.20	0.907	0.649	0.006	-0.126	-0.124	0.013
KR3-Y5	25.95	0.906	0.648	0.006	-0.304	-0.302	0.010
KR3-Y6	26.50	0.873	0.615	0.008	-0.155	-0.153	0.009
KR3-Y7	27.00	0.759	0.501	0.005	-0.202	-0.200	0.020
KR3-Y8	27.40	0.829	0.571	0.004	-0.119	-0.117	0.030
KR3-Y9	27.80	0.821	0.563	0.017	-0.032	-0.030	0.019
KR3-Y10	28.50	0.796	0.538	0.006	-0.051	-0.049	0.009
KR3-Y11	28.80	0.798	0.540	0.006	-0.113	-0.111	0.008
KR3-Y12	29.50	0.934	0.772	0.005	-0.073	-0.024	0.020
KR3-Y12	29.50	0.886	0.676	0.006	-0.139	-0.065	0.008
KR3-Y13	30.50	0.924	0.762	0.003	-0.315	-0.266	0.004
KR3-Y14	31.50	0.865	0.703	0.006	-0.101	-0.052	0.008
KR3-Y15	32.60	0.971	0.809	0.007	-0.313	-0.264	0.018
KR3-Y16	34.00	0.712	0.550	0.004	-0.005	0.044	0.015
KR3-Y17	34.50	0.636	0.474	0.005	-0.120	-0.071	0.008
KR2-Y1	35.15	0.469	0.369	0.008	0.285	0.413	0.032
KR2-Y2	35.75	0.982	0.820	0.007	0.163	0.212	0.013
KR2-Y3	36.75	0.184	0.022	0.008	0.508	0.557	0.008
KR2-Y3	37.50	0.898	0.736	0.004	-1.552	-1.503	0.009
KR2-Y5	38.50	0.240	0.078	0.012	0.153	0.202	0.009
KR2-Y6	39.50	1.111	0.949	0.014	-0.769	-0.720	0.015
KR2-Y7	40.25	0.733	0.571	0.003	-1.615	-1.566	0.015
KR2-Y8	41.00	0.745	0.583	0.010	-1.373	-1.324	0.012
KR2-Y10	42.45	0.721	0.559	0.008	0.412	0.461	0.005
KR2-Y13	45.20	0.509	0.347	0.012	-1.575	-1.526	0.017
KR2-Y16	47.00	1.719	1.509	0.006	-0.853	-0.779	0.032
KR2-Y17	47.75	0.297	0.135	0.005	0.354	0.403	0.014
KR2-Y18	49.00	0.403	0.241	0.004	-0.714	-0.665	0.010
KR2-Y19	50.45	0.844	0.682	0.011	-0.262	-0.213	0.022
KR2-Y20	51.00	0.264	0.102	0.002	-0.336	-0.287	0.008
KR2-Y21	51.75	0.491	0.329	0.010	-0.895	-0.846	0.010
KR2-Y22	52.10	1.131	0.969	0.008	-0.061	-0.012	0.023
KR2-Y23	53.50	0.758	0.596	0.005	-0.801	-0.752	0.007
KR2-Y24	54.40	1.278	1.061	0.015	-0.393	-0.322	0.019
KR2-Y26	58.00	0.478	0.261	0.009	0.324	0.395	0.010
KR2-Y28	59.60	0.548	0.360	0.006	0.222	0.358	0.010
KR2-Y29	60.50	0.226	0.186	0.027	0.112	0.381	0.064
KR2-Y31	62.25	0.507	0.290	0.006	0.258	0.329	0.011
KR2-Y32	63.50	0.683	0.495	0.007	0.189	0.325	0.011
KR2-Y35	65.75	-0.560	-0.722	0.003	-1.654	-1.605	0.019
KR2-Y36	66.10	0.279	-0.039	0.009	0.199	0.548	0.022
KR2-Y38	69.00	0.332	0.170	0.001	0.434	0.483	0.014
KR2-Y39	69.40	0.719	0.557	0.004	-0.020	0.029	0.011
KR2-Y40	70.10	0.917	0.755	0.009	-0.599	-0.550	0.044
KR2-Y44	74.50	-0.564	-0.726	0.005	-2.415	-2.366	0.006
KR2-Y45	75.00	0.055	-0.107	0.005	-1.067	-1.018	0.015
KR2-Y46	75.40	0.493	0.331	0.008	-2.038	-1.989	0.009
KR2-Y47	75.60	0.463	0.301	0.003	0.512	0.561	0.017

Table S4 $\delta^{18}O$ and $\delta^{13}C$ values (‰ VPDB) of benthic foraminifera from Karaburun sections

Sample	Depth	d13-C	d13-C corr	Std error45	d18-O	d18-O corr	Std error46
KR1-Y1	0.10	1.601	1.561	0.010	-1.813	-1.544	0.044
KR1-Y5	4.07	1.421	1.381	0.006	-1.773	-1.504	0.045
KR1-Y6	4.67	1.084	1.044	0.009	-1.442	-1.173	0.032
KR1-Y7	5.40	1.213	1.173	0.011	-1.773	-1.504	0.058
KR1-Y8	5.50	1.004	0.964	0.029	-1.865	-1.596	0.041
KR1-Y11	7.00	1.226	1.186	0.021	-1.437	-1.168	0.038
KR1-Y16	11.20	1.232	1.195	0.014	-1.527	-1.320	0.039
KR1-Y34	11.60	-0.090	-0.294	0.009	-0.485	-0.377	0.037
KR1-Y35	11.80	1.097	0.893	0.015	-1.298	-1.190	0.032
KR1-Y17	12.10	1.132	1.100	0.016	-1.954	-1.742	0.048
KR1-Y18 (28	13.00	1.626	1.589	0.024	-1.817	-1.610	0.035
KR1-Y41	13.45	1.767	1.563	0.007	-1.742	-1.634	0.011
KR1-Y45	14.45	1.510	1.322	0.008	-1.507	-1.371	0.012
KR1-Y46	15.00	1.452	1.248	0.006	-3.731	-3.623	0.017
KR1-Y20	15.90	1.560	1.523	0.018	-1.487	-1.280	0.043
KR1-Y22	19.90	1.564	1.524	0.021	-1.696	-1.427	0.087
KR3-Y6	26.50	1.452	1.235	0.011	-1.739	-1.668	0.016
KR3-Y7	27.00	1.674	1.457	0.003	-1.847	-1.776	0.020
KR3-Y9	27.80	1.466	1.262	0.011	-1.574	-1.466	0.009
KR3-Y11	28.80	1.108	0.904	0.013	-1.697	-1.589	0.033
KR3-Y13	30.50	1.240	1.036	0.006	-1.366	-1.258	0.018
KR3-Y17	34.50	1.188	0.971	0.009	-0.955	-0.884	0.012
KR2-Y2	35.75	1.365	1.128	0.011	-1.678	-1.651	0.043
KR2-Y3	36.75	1.447	1.210	0.003	-0.920	-0.893	0.011
K23-Y3*	37.50	1.201	0.964	0.006	-1.748		0.038
KR2-Y5	38.50	1.273	1.071	0.019	-1.366	-1.231	0.022
KR2-Y14	39	1.048	1.008	0.029	-1.952	-1.683	0.061
KR2-Y10	42.45	0.961	0.759	0.010	-0.661	-0.526	0.015
KR2-Y13	45.20	0.693	0.491	0.005	-4.756	-4.621	0.007
KR2-Y15	45.70	0.965	0.763	0.020	-2.058	-1.923	0.019
KR2-Y16	47.00	1.278	1.076	0.007	-1.644	-1.509	0.017
KR2-Y18	49.00	0.360	0.158	0.003	-2.816	-2.681	0.022
KR2-Y19	50.45	1.147	0.945	0.007	-1.648	-1.513	0.017
KR2-Y20	51.00	1.276	1.074	0.015	-1.883	-1.748	0.009
KR2-Y22	52.10	0.420	0.218	0.011	-0.886	-0.751	0.020
KR2-Y23	53.50	0.849	0.647	0.010	-2.376	-2.241	0.010
KR2-Y29	55.00	0.638	0.598	0.018	-1.540	-1.271	0.064
KR2-Y25	56.50	0.197	-0.005	0.021	-3.861	-3.726	0.038
KR2-Y27	58.80	1.084	0.882	0.009	-1.179	-1.044	0.009
KR2-Y28	59.60	0.876	0.674	0.011	-1.047	-0.912	0.009
KR2-Y36	61.00	0.981	0.949	0.015	-1.067	-0.855	0.026
KR2-Y30	61.20	0.935	0.733	0.005	-1.123	-0.988	0.007
KR2-Y31	62.25	0.691	0.474	0.015	-1.196	-1.125	0.022
KR2-Y32	63.50	0.748	0.546	0.004	-2.080	-1.945	0.006
KR2-Y33	64.25	1.125	0.923	0.009	-0.100	0.035	0.021
KR2-Y34	65.00	1.012	0.810	0.010	-1.513	-1.378	0.018
KR2-Y35	65.75	-0.488	-0.690	0.007	-2.656	-2.521	0.014
KR2-Y39	69.40	0.882	0.680	0.007	-1.331	-1.196	0.024
KR2-Y40	70.10	0.850	0.648	0.009	-1.687	-1.552	0.011
KR2-Y44	74.50	-0.523	-0.725	0.001	-3.351	-3.216	0.009
KR2-Y45	75.00	-0.252	-0.454	0.005	-3.258	-3.123	0.006

Table S5 $\delta^{18}O$ and $\delta^{13}C$ values (‰ VPDB) of planktic foraminifera from Karaburun sections