

1 **Supplement of**

2 **Salinity changes and anoxia resulting from enhanced runoff**
3 **during the late Permian global warming and mass extinction**
4 **event**
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15 *= samples taken from laminated siltstones, others from bioturbated intervals, Height is relative distance to the
16 formation boundary,

17 **TABLE S1.** Palynofacies percentages, spore/pollen (relative to total terrestrial palynomorphs)
 18 and relative abundance of bisaccate fragments (relative to total terrestrial palynomorphs)

Sample	Height (m)	AOM	phytoclats	wood	charcoal	pollen	spores	aquatic	other	spore/pollen	Bisac. fragments
09.8.31 q*	4.28	63.1	31.9	0.3	0.0	4.1	0.3	0.3	0.0	33.5	58.8
09.8.31 m*	3.78	90.0	4.7	0.7	1.3	2.0	1.0	0.0	0.3	42.6	54.2
09.8.31 g*	3.18	84.6	6.3	0.9	1.4	2.6	2.9	1.4	0.0	47.6	44.0
09.8.31 c*	2.78	92.6	4.3	0.0	0.0	2.4	0.8	0.0	0.0	28.0	44.3
09.8.29 bk*	2.51	3.5	84.7	0.6	5.3	2.1	1.8	1.8	0.3	60.0	49.4
09.8.29 bo*	2.11	82.7	9.7	0.3	0.3	2.3	2.6	2.0	0.3	30.2	54.4
09.8.29 bs*	1.71	22.7	43.6	2.5	6.1	2.8	8.8	13.5	0.0	53.8	47.3
09.8.29 bx*	1.21	74.2	12.0	0.9	1.7	7.2	0.9	2.9	0.3	8.0	43.3
09-8-30 a*	0.74	47.9	28.6	1.5	2.6	9.7	2.6	6.5	0.6	34.7	67.9
09-8-30 b*	0.69	68.4	17.7	5.1	0.0	7.2	0.3	0.8	0.5	16.5	69.2
09-8-30 c*	0.58	9.6	61.0	5.9	6.0	4.4	5.0	7.8	0.3	58.6	38.3
09-8-30 d*	0.42	62.9	16.5	0.3	1.7	13.1	3.6	1.2	0.6	17.1	75.4
09-8-30 e	0.30	3.7	86.5	1.1	2.0	1.1	3.1	1.4	0.9	78.2	18.5
09-8-30 f*	0.24	83.6	4.9	0.0	0.6	7.9	1.9	1.3	0.0	19.0	64.0
09-8-30 h	0.14	2.4	79.1	0.0	6.3	2.1	4.6	5.5	0.0	70.1	22.2
09-8-30 i*	0.06	71.0	11.7	0.3	1.0	11.0	2.4	1.8	0.9	36.7	61.9
09-8-30 k	-0.04	7.2	79.1	0.9	1.8	0.3	9.4	1.3	0.0	89.4	2.3
09-8-30 l*	-0.07	74.2	15.7	0.0	1.9	5.0	2.8	0.0	0.3	50.0	55.0
09-8-30 m	-0.10	2.3	74.7	0.0	1.9	0.9	18.5	0.0	1.7	86.2	8.3
09-8-30 n*	-0.15	82.3	7.2	0.0	1.0	6.7	2.1	0.3	0.3	37.3	67.3
09-8-30 o	-0.22	0.8	64.3	2.0	0.9	2.2	28.4	1.4	0.0	90.4	5.7
09-8-30 p*	-0.28	41.4	25.9	0.6	1.1	21.5	9.1	0.3	0.3	45.0	56.0
09-8-30 q	-0.34	2.8	82.8	0.3	3.6	0.6	8.4	0.9	0.6	90.2	2.8
09-8-30 r	-0.42	2.1	52.5	0.9	2.1	7.2	34.7	0.0	0.6	66.7	23.9
09-8-30 s	-0.52	1.7	44.5	2.0	10.7	10.9	27.6	0.9	1.7	91.4	1.7
09-8-30 t	-0.62	3.2	75.3	0.6	7.4	0.3	11.7	1.5	0.0	92.4	2.0
09-8-30 u	-0.72	1.8	61.5	0.3	3.5	1.2	30.8	0.3	0.6	93.3	2.3
09-8-30 v	-0.82	8.5	68.2	5.0	3.5	3.1	10.4	1.3	0.0	73.8	4.2
09-8-30 w	-0.92	0.6	83.9	1.4	4.1	2.2	5.3	2.0	0.6	75.0	7.9
09-8-30 x	-1.02	2.7	83.9	1.5	7.5	1.5	2.4	0.3	0.0	63.0	9.7
09-8-30 y	-1.12	1.9	79.6	3.4	5.6	4.0	2.4	2.4	0.8	32.0	40.9
09-8-30 z	-1.22	0.6	74.3	1.8	19.6	0.6	1.8	1.2	0.0	40.6	25.4
09.8.30 ac	-1.52	0.0	93.9	0.6	1.0	3.5	1.0	0.0	0.0	2.8	34.7
09.8.30 am	-2.52	3.5	65.4	1.9	12.3	4.4	12.3	0.3	0.0	1.8	28.8
09.8.30 ax	-3.62	1.2	70.7	0.3	9.3	5.2	12.7	0.6	0.0	6.7	42.2
09.8.30 cg	-4.52	0.0	73.9	2.5	9.1	4.4	9.9	0.0	0.3	2.5	46.2

19 **TABLE S2.** Relative abundance of aquatic palynomorphs. The division of the acritarchs into
 20 groups is based on the classifications system proposed by (Lei et al., 2013).

Sample	Height (m)	sed (g)	aquatic conc. (gr. *10 ³ /gram)	V. cylindricum	V. trispinosum	V. laidii	M pentagonale	M. breve	Leiospheres	Cymatiosphaera	Tasmanites	Others
09.8.31 q*	4.28	5.7	8.4	0.0	0.0	0.0	0.0	25.0	75.0	0.0	0.0	0.0
09.8.31 m*	3.78	5.9	0.3	0.0	0.0	0.0	0.0	35.5	64.5	0.0	0.0	0.0
09.8.31 g*	3.18	4.9	4.7	0.0	0.0	0.0	0.0	70.1	29.9	0.0	0.0	0.0
09.8.31 c*	2.78	5.5	7.5	0.0	0.0	0.0	0.0	55.9	41.2	0.0	0.0	2.9
09.8.29 bk*	2.51	5.4	0.7	0.0	0.0	0.0	1.0	90.2	5.9	0.0	0.0	2.9
09.8.29 bo*	2.11	4.9	0.5	0.0	0.0	0.0	0.0	84.5	14.6	0.0	0.0	1.0
09.8.29 bs*	1.71	5.9	1.9	0.0	0.0	0.0	0.0	96.7	3.3	0.0	0.0	0.0
09.8.29 bx*	1.21	4.8	5.7	0.0	0.0	0.0	0.0	73.9	26.1	0.0	0.0	0.0
09-8-30 a*	0.74	4.8	0.8	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
09-8-30 b*	0.69	4.6	0.4	0.0	0.0	0.0	0.0	84.3	14.8	0.0	0.0	0.9
09-8-30 c*	0.58	5.4	0.3	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
09-8-30 d*	0.42	4.2	0.9	0.0	0.0	0.0	0.0	95.2	4.8	0.0	0.0	0.0
09-8-30 e	0.30	4.6	0.0	0.0	0.0	2.3	0.0	97.7	0.0	0.0	0.0	0.0
09-8-30 f*	0.24	5.3	3.0	0.0	0.0	0.0	0.0	25.7	71.6	2.8	0.0	0.0
09-8-30 h	0.14	4.4	0.5	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
09-8-30 i*	0.06	5.7	1.8	0.0	0.0	0.0	0.9	96.5	2.6	0.0	0.0	0.0
09-8-30 k	-0.04	4.8	0.1	0.0	0.0	1.9	0.0	90.6	3.8	1.9	0.0	1.9
09-8-30 l*	-0.07	5.2	0.1	0.0	0.0	0.0	6.7	46.7	40.0	0.0	6.7	0.0
09-8-30 m	-0.10	4.8	0.0	0.0	4.8	0.0	0.0	71.4	23.8	0.0	0.0	0.0
09-8-30 n*	-0.15	4.5	0.2	0.0	0.0	0.0	0.0	90.3	8.1	1.6	0.0	0.0
09-8-30 o	-0.22	4.8	0.4	0.0	0.0	0.0	0.0	93.4	6.6	0.0	0.0	0.0
09-8-30 p*	-0.28	4.4	0.0	0.0	0.0	0.0	0.0	40.0	30.0	30.0	0.0	0.0
09-8-30 q	-0.34	4.6	0.0	0.0	0.0	7.7	7.7	76.9	7.7	0.0	0.0	0.0
09-8-30 r	-0.42	4.6	0.0	0.0	0.0	0.0	14.3	57.1	28.6	0.0	0.0	0.0
09-8-30 s	-0.52	6.0	0.3	2.6	0.0	1.3	3.9	90.8	1.3	0.0	0.0	0.0
09-8-30 t	-0.62	4.4	0.1	0.0	0.0	7.7	53.8	35.9	0.0	0.0	0.0	2.6
09-8-30 u	-0.72	4.3	0.2	0.0	0.0	0.0	5.9	79.4	11.8	2.9	0.0	0.0
09-8-30 v	-0.82	4.8	0.8	0.0	6.3	0.0	0.0	92.1	1.6	0.0	0.0	0.0
09-8-30 w	-0.92	5.7	1.0	0.0	0.0	5.4	13.5	81.1	0.0	0.0	0.0	0.0
09-8-30 x	-1.02	4.4	0.7	0.0	0.0	10.4	9.4	79.2	0.9	0.0	0.0	0.0
09-8-30 y	-1.12	4.2	1.0	0.0	0.0	11.5	7.7	78.8	0.0	1.9	0.0	0.0
09-8-30 z	-1.22	4.5	1.5	0.0	0.0	2.9	1.7	94.8	0.6	0.0	0.0	0.0
09.8.30 ac	-1.52	5.1	0.6	0.0	11.4	0.0	0.0	72.7	6.8	6.8	0.0	2.3
09.8.30 am	-2.52	4.8	1.2	0.0	0.0	0.0	0.0	98.8	1.2	0.0	0.0	0.0
09.8.30 ax	-3.62	5.3	1.2	0.0	0.0	0.0	0.6	95.0	0.6	0.0	0.0	3.7
09.8.30 cg	-4.52	4.9	0.3	0.0	0.0	0.0	0.0	96.8	3.2	0.0	0.0	0.0

21 **TABLE S3.** Average body size and process length of acritarch belonging to the group *M. breve*

Sample	Height (m)	#	Body size (μm)			Process length (μm)			p.l./b.s.	
			Min-Max	Aver.	σ	Min-Max	Aver.	σ	Aver.	σ
09.8.31 q*	4.28	26	12.3-18.3	14.7	1.7	1.1-9.5	4.5	2.0	0.30	0.12
09.8.31 m*	3.78	27	12.6-17.8	14.8	1.4	1.7-9.9	4.8	1.8	0.33	0.11
09.8.31 g*	3.18	30	11.0-20.8	16.0	2.4	2.5-9.9	6.2	1.7	0.40	0.13
09.8.31 c*	2.78	30	13.8-18.6	16.1	1.3	2.8-9.6	5.8	1.5	0.36	0.09
09.8.29 bk*	2.51	23	12.7-19.7	15.4	1.7	2.6-7.8	4.9	1.2	0.32	0.08
09.8.29 bo*	2.11	32	11.5-20.3	16.7	2.0	2.3-8.1	4.3	1.2	0.26	0.07
09.8.29 bs*	1.71	21	13.0-17.3	15.1	1.4	4.2-11.4	7.5	1.6	0.50	0.09
09.8.29 bx*	1.21	20	10.9-16.3	13.8	1.3	1.9-8.0	4.4	1.5	0.32	0.10
09-8-30 a*	0.74	22	15.9-23.5	19.0	1.7	2.6-10.7	5.3	1.7	0.28	0.08
09-8-30 b*	0.69	31	14.4-20.9	17.5	1.6	2.8-10.0	5.8	1.7	0.34	0.10
09-8-30 c*	0.58	27	15.1-21.3	17.7	1.4	3.8-13.0	6.9	1.9	0.40	0.12
09-8-30 d*	0.42	31	12.3-20.0	17.4	1.7	2.5-10.5	6.2	1.7	0.36	0.10
09-8-30 e	0.30	23	13.5-22.7	16.8	2.2	2.0-9.9	5.3	1.7	0.32	0.12
09-8-30 f*	0.24	23	14.6-20.3	17.3	1.4	2.8-11.3	6.8	2.0	0.39	0.11
09-8-30 h	0.14	27	13.8-18.1	15.8	1.1	2.9-13.8	7.5	2.4	0.47	0.14
09-8-30 i*	0.06	30	15.7-20.5	18.3	1.5	3.3-9.1	6.1	1.3	0.34	0.06
09-8-30 k	-0.04	30	13.0-21.9	16.0	2.0	2.7-9.5	6.1	1.3	0.39	0.09
09-8-30 l*	-0.07	12	13.0-18.3	15.5	1.6	3.1-10.8	6.7	1.9	0.43	0.11
09-8-30 m	-0.10	22	11.5-18.6	14.8	1.7	3.8-14.7	7.2	2.1	0.50	0.17
09-8-30 n*	-0.15	20	14.1-19.5	16.9	1.5	2.3-8.9	5.4	1.4	0.32	0.09
09-8-30 o	-0.22	26	11.5-16.5	14.0	1.3	2.0-8.3	5.4	1.0	0.39	0.07
09-8-30 p*	-0.28	4	17.4-20.3	18.5	1.3	2.9-8.0	5.2	1.7	0.28	0.10
09-8-30 q	-0.34	20	10.6-18.9	14.6	2.1	2.8-9.2	5.8	1.5	0.40	0.11
09-8-30 r	-0.42	9	14.0-21.3	17.8	2.5	5.1-10.6	7.2	1.3	0.41	0.07
09-8-30 s	-0.52	31	12.3-19.3	16.2	2.0	2.7-10.3	6.4	1.5	0.40	0.11
09-8-30 t	-0.62	9	11.9-18.5	15.0	2.6	3.8-10.4	7.6	1.8	0.52	0.15
09-8-30 u	-0.72	16	14.0-19.0	15.5	1.5	4.8-12.7	7.4	1.9	0.48	0.10
09-8-30 v	-0.82	23	12.5-20.9	14.8	1.9	3.3-12.7	7.5	1.7	0.51	0.10
09-8-30 w	-0.92	33	11.2-16.9	13.8	1.5	4.8-12.9	8.0	1.6	0.59	0.11
09-8-30 x	-1.02	20	12.9-17.0	14.7	1.2	5.3-12.2	8.7	1.7	0.60	0.13
09-8-30 y	-1.12	24	12.0-17.2	14.2	1.5	3.9-11.2	7.7	1.6	0.54	0.10
09-8-30 z	-1.22	30	10.8-16.1	13.4	1.3	5.0-11.8	8.4	1.5	0.63	0.11
09.8.30 ac	-1.52	25	10.6-22.5	16.4	3.2	3.0-16.3	10.0	2.3	0.63	0.15
09.8.30 am	-2.52	21	13.3-24.5	19.1	3.0	5.7-20.7	11.5	3.4	0.60	0.14
09.8.30 ax	-3.62	29	12.1-20.1	15.3	1.7	3.6-14.0	8.5	2.2	0.56	0.12
09.8.30 cg	-4.52	21	12.7-21.1	17.1	2.1	4.6-13.6	7.7	1.7	0.46	0.08

22 # = number of specimens measured, Aver. = average, p.l. = process length, b.s. = body size, σ = standard deviation.