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Supplement of

Organic-carbon-rich sediments: benthic foraminifera as bio-indicators of depositional environments

Elena Lo Giudice Cappelli et al.

Correspondence to: Elena Lo Giudice Cappelli (elena.logiudice.cappelli@gmail.com)

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Figure S1. Shetland soil maps. Map on the left shows soil types in Shetland, map on the right illustrates TOC content in Shetland's soils.

Figure S2. SEM micrographs of benthic foraminifera in six voes on Shetland's west coast; scale bar = 100 mm; identification after Austin (1991) and references therein. 1 *Ammonia batavus*. 2 *Ammonia* sp. 3 *Ammoscalaria runiana*. 4 *Bolivina pseudoplicata*. 5 *Bolivina skagerrakensis*. 6 *Bolivinellina pseudopunctata*. 7 *Buccella frigida*. 8 *Buccella tenerrima*. 9 *Bulimina elongata*. 10 *Bulimina marginata*. 11 *Buliminella elegantissima*. 12 *Cassidulina laevigata*. 13 *Cassidulina obtusa*. 14 *Cibicides lobatulus*. 15 *C. lobatulus*, deformed. 16 *Connemarella rudis*. 17 *Discanomalina* sp. 18 *Eggerelloides scaber*. 19 *Elphidium aculeatum*. 20 *Elphidium albiumbelicatum*. 21 *Elphidium crispum*. 22 *Elphidium excavatum* (subsp. *clavatum*). 23 *Elphidium excavatum* (subsp. *selseyense*). 24 *Elphidium gerthi*. 25 *Elphidium incertum*. 26 *Elphidium margaritaceum*. 27 *Elphidium* sp. 28 *Elphidium williamsoni*. 29 *Epistominella vitrea* (*Eilohedra vitrea*). 30 *Oolina hexagona* (*Favulina hexagona*). 31 *Oolina melo* (*Favulina melo*). 32 *Fissurina* sp. 33 *Haplophragmoides* sp. 34 *Haynesina germanica*. 35 *Hyalina balthica*. 36 *Glandulina* sp. 37 *Lagena setigera*. 38 *Lagena* sp. 39 *Lagena striata*. 40 *Miliolinella subrotunda*. 41 *Nonion* sp. 42 *Nonion* sp. 43 *Nonionoides turgidus*. 44 *Oolina williamsoni* (*Homalohedra williamsoni*). 45 *Patellina corrugata*. 46 *Planorbulina distoma*. 47 *Quinqueloculina bicornis* (*Adelosina bicornis*). 48 *Quinqueloculina seminula*. 49 *Reophax fusiformis*. 50 *Quinqueloculina* sp. 51 *Rosalina anomala*. 52 *Rosalina* sp. 53 *Spirillina vivipara*. 54 *Spiroloculina rotunda*. 55 *Spiroplectinella wrightii*. 56 *Stainforthia fusiformis*. 57 *Subanomalina pauperata*. 58 *Textularia earlandi*. 59 *Trochammina* sp. 60 Indetermined. 61 Indetermined. 62 Indetermined. 63 Indetermined. 64 Etched *Ammonia* sp.

Figure S3. Trends between particle size and organic matter and carbon content.

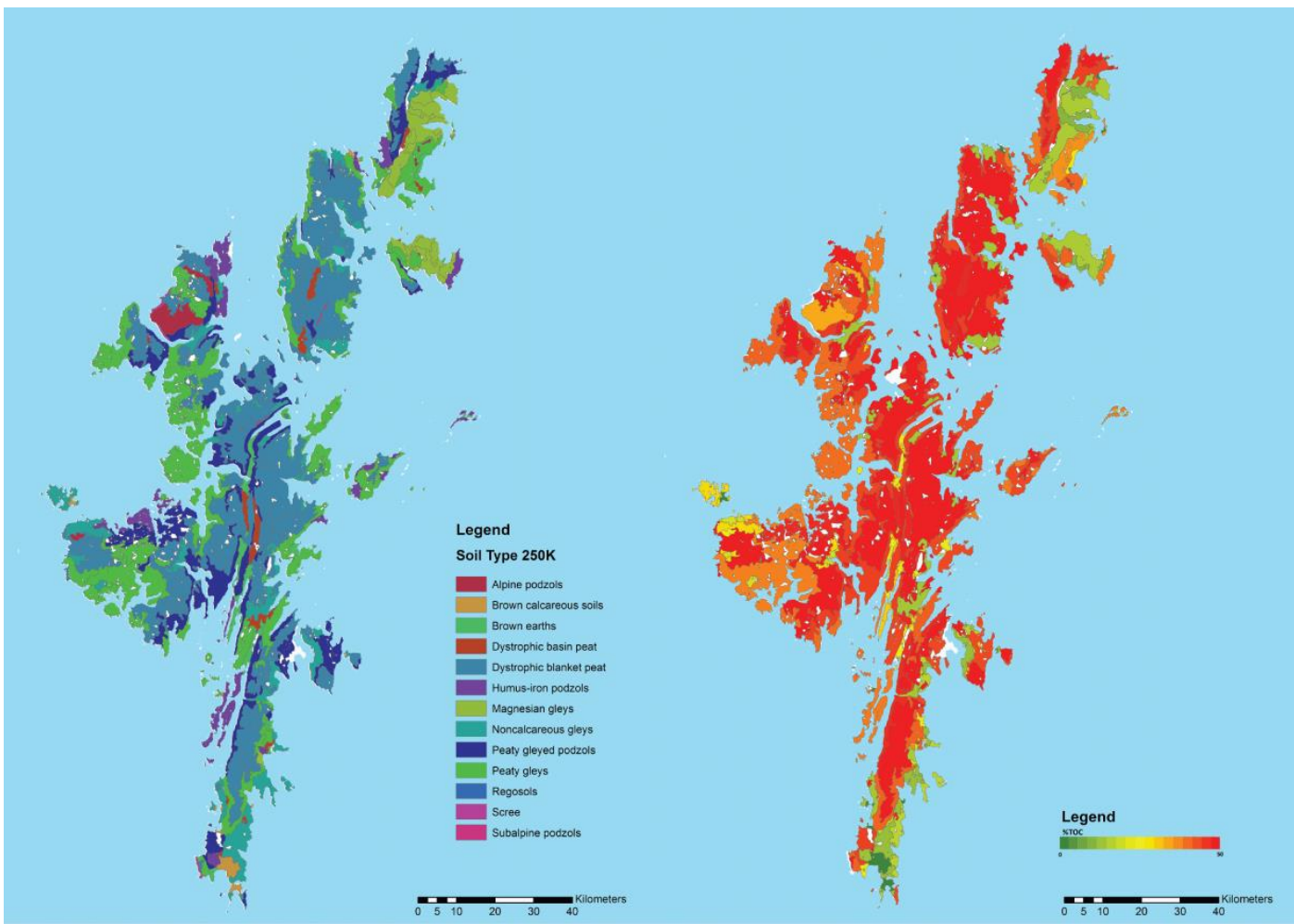


Figure S1

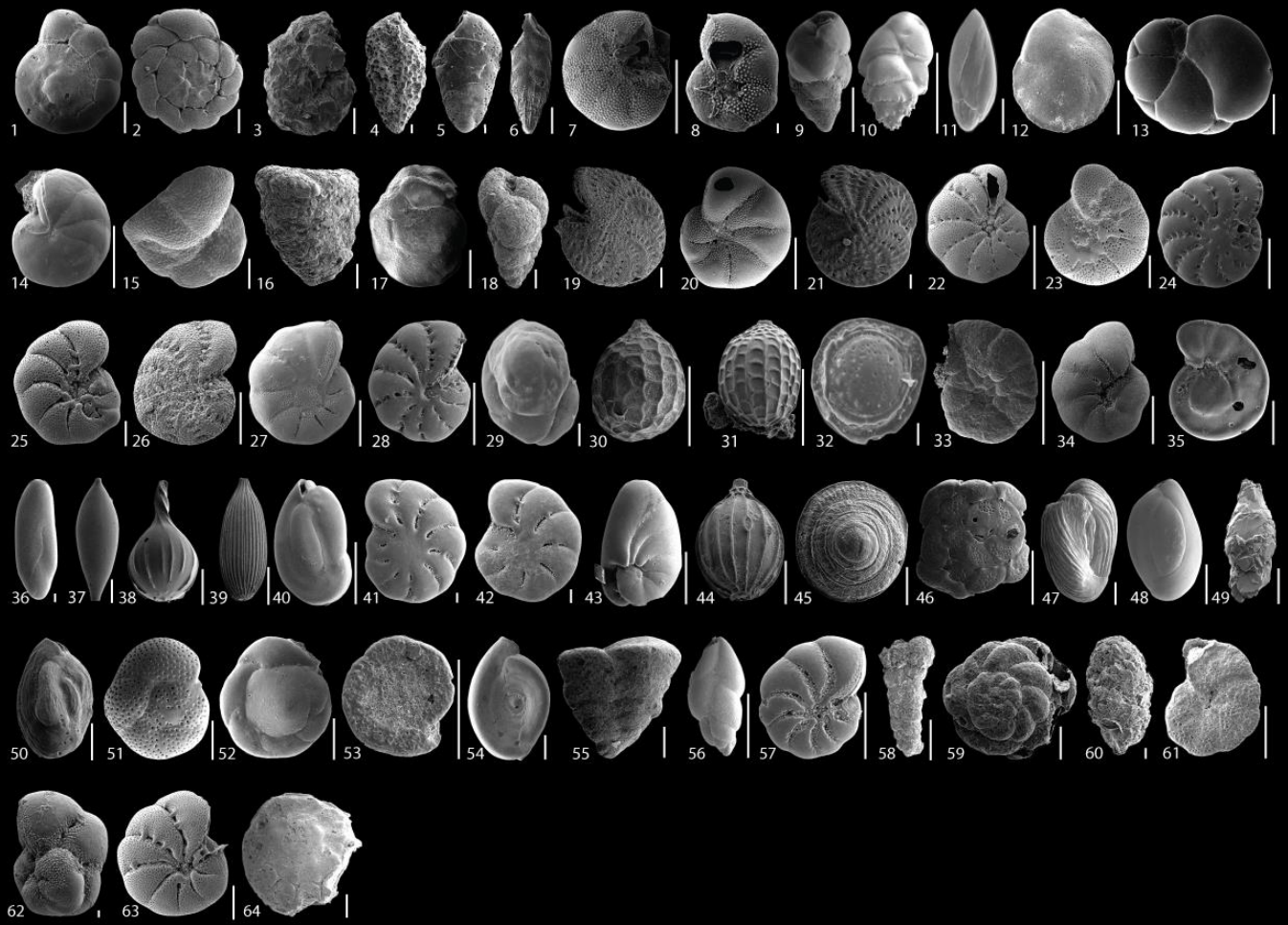


Figure S2

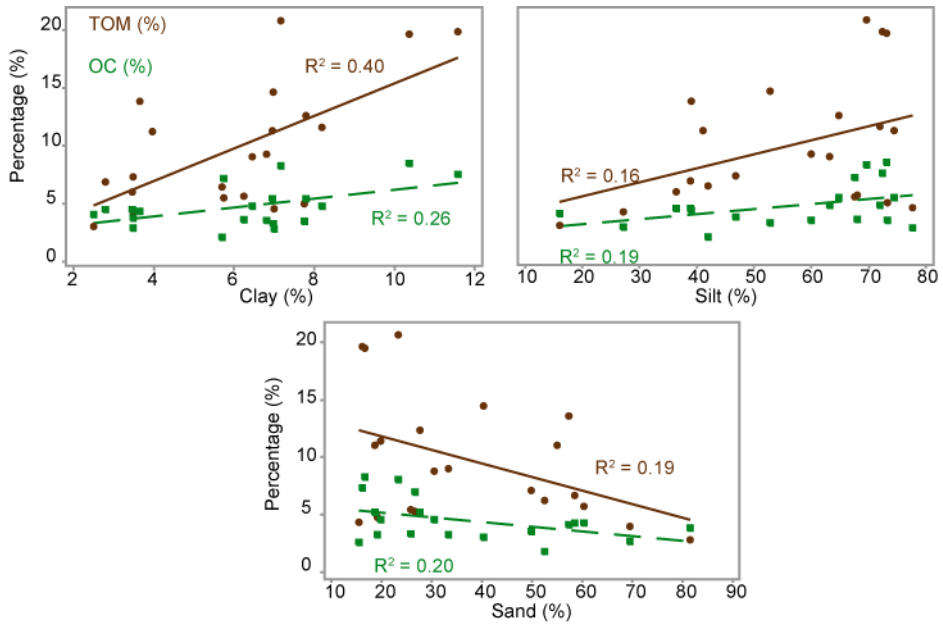


Figure S3

Supplementary Table 1. Benthic foraminifera relative abundance data

Sample ID	<i>Ammonia</i> spp.	<i>Ammoscalaria</i> <i>runiano</i>	<i>Bolivina</i> <i>skagarakensis</i>	<i>Bolivina</i> <i>spathulata</i>	<i>Bolivina</i> <i>pseudoplicata</i>	<i>Bolivina</i> <i>pseudopunctata</i>	<i>Bolivina</i> <i>variabilis</i>	<i>Buccella</i> <i>frigida</i>	<i>Buccella</i> <i>tenerrima</i>
MD15-01A	0.2	0.0	0.0	0.0	0.5	1.1	2.9	0.2	0.2
MD15-01B	0.2	0.0	0.0	0.0	0.8	1.3	2.7	0.5	0.0
MD15-02	0.0	0.0	0.0	0.3	1.2	3.1	1.9	0.2	0.0
MD15-03	0.2	0.0	0.3	0.8	1.2	2.5	2.1	1.5	0.5
MD15-04	0.3	0.0	0.2	0.9	0.9	2.3	1.1	2.9	0.6
MD15-05A	0.0	0.0	0.1	1.5	0.0	1.2	1.3	0.1	0.4
MD15-05B	0.0	0.0	0.6	2.4	0.5	1.2	1.2	0.0	0.2
MD15-06	4.8	0.0	0.0	0.0	1.3	0.5	0.3	0.2	0.5
MD15-07	6.5	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0
MD15-08	3.0	0.0	0.2	0.0	0.0	1.3	0.6	0.0	0.0
MD15-09	5.4	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.0
MD15-10	0.9	0.0	0.5	0.3	0.9	1.4	0.6	0.3	0.0
MD15-11	0.0	0.0	0.5	0.0	0.0	1.4	2.0	0.0	0.2
MD15-12	8.5	0.0	0.6	0.1	0.3	2.0	1.7	0.0	0.1
MD15-13	3.0	0.0	1.6	0.0	0.0	1.9	1.1	1.0	0.0
MD15-14	12.6	0.9	4.1	0.0	0.0	1.5	3.7	0.0	0.3
MD15-15	1.0	0.0	0.8	0.0	0.3	2.6	3.1	0.0	0.5
MD15-16	5.7	0.0	2.6	0.0	0.2	2.9	2.0	0.0	0.0
MD15-17	2.2	0.0	1.8	0.0	0.7	1.2	1.4	0.0	0.1
MD15-18	6.1	0.0	0.0	0.0	0.0	4.3	1.1	2.5	0.1
MD15-19	10.2	0.0	0.1	1.6	0.1	1.2	1.2	4.1	0.3
MD15-20	0.0	0.0	0.1	2.0	0.0	0.8	0.1	0.3	0.0
MD15-21	0.3	0.0	0.1	2.0	0.3	0.8	0.8	0.1	1.0

Bulimina elongata	Bulimina gibba	Bulimina marginata	Buliminella elegantissima	Cassidulina laevigata	Cassidulina obtusa	Cibicides spp.	Cornuspira sp.	Eggerelloides scaber	Elphidium aculeatum
0.3	0.0	0.5	2.1	0.0	1.1	14.5	0.0	22.0	0.2
0.0	0.0	0.6	2.1	0.2	0.9	15.0	0.0	19.9	0.2
0.0	0.0	0.7	0.3	0.0	1.2	47.6	0.2	10.6	0.0
0.2	0.0	1.2	0.7	0.5	2.3	53.7	0.0	3.3	0.0
0.0	0.0	0.9	0.3	0.3	3.4	48.9	0.0	5.2	0.0
0.1	0.0	0.3	0.0	1.3	3.7	57.6	0.0	2.1	0.1
0.0	0.0	0.6	0.0	1.1	5.3	56.7	0.0	2.1	0.2
1.2	0.0	0.5	4.6	0.0	0.2	2.0	0.0	25.5	0.3
0.0	0.0	0.8	4.8	0.0	0.3	5.5	0.0	27.7	0.8
1.6	0.0	1.7	11.4	0.0	0.3	2.0	0.0	29.7	0.0
0.0	0.2	0.9	8.8	0.0	0.5	1.9	0.2	19.7	0.6
0.0	0.0	3.8	1.9	0.0	1.6	8.3	0.0	43.0	0.0
0.5	0.0	14.8	0.8	0.0	1.4	10.9	0.0	31.9	0.0
0.7	0.0	8.6	0.7	0.1	0.6	13.7	0.0	22.9	0.1
0.9	0.0	5.6	12.6	0.3	1.6	14.2	0.0	11.7	0.3
1.5	0.0	4.1	4.6	0.4	1.9	26.1	0.0	10.0	0.0
0.0	0.0	2.8	2.0	0.0	1.8	30.1	0.0	12.9	0.0
0.6	0.0	8.5	0.9	0.0	0.9	7.6	0.0	26.4	0.0
0.0	0.0	1.2	0.1	0.0	0.7	70.1	0.0	2.8	0.0
0.0	0.0	0.9	11.5	0.0	0.5	24.4	0.0	9.5	0.3
0.0	0.3	2.1	1.8	0.3	4.2	29.6	0.0	8.8	0.0
0.0	0.0	0.4	0.1	0.0	2.4	68.7	0.0	0.4	0.0
0.1	0.0	1.4	0.3	0.4	3.9	56.8	0.1	1.9	0.0

Elphidium albumbelicatum	Elphidium crispum	Elphidium gerthi	Elphidium incertum	Elphidium margaritaceum	Elphidium excavatum	Elphidium sp.	Elphidium williamsoni	Epistominella vitrea	Fissurina spp.
0.0	0.0	10.7	0.2	20.1	7.8	0.0	0.3	0.5	0.6
0.2	0.0	10.7	1.3	24.3	2.1	0.6	0.2	0.0	0.2
0.3	0.2	5.4	0.0	3.1	1.9	0.0	0.2	0.3	0.2
0.0	0.0	10.5	0.2	0.8	1.2	0.2	0.0	0.5	0.3
0.0	0.2	13.9	0.3	0.2	0.0	0.9	0.2	0.0	1.1
0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.1	0.0	0.4
0.0	0.6	0.2	0.0	0.0	0.5	0.0	0.5	0.0	0.8
3.0	0.2	15.6	1.5	6.1	15.3	0.0	1.8	0.0	0.2
1.1	0.3	11.7	1.4	7.6	21.5	0.0	0.7	0.0	0.0
0.9	0.2	7.5	0.3	1.4	22.4	1.1	0.5	1.3	0.2
2.1	0.0	9.8	0.2	10.1	25.6	1.1	2.4	0.9	0.2
0.9	0.0	4.7	0.2	1.3	5.2	0.0	0.5	0.3	0.6
0.2	0.0	4.4	0.2	1.8	0.8	0.0	0.0	0.3	0.0
0.0	0.0	2.2	0.0	0.9	2.4	0.4	0.0	0.9	0.6
0.0	0.0	9.3	0.0	4.0	10.0	0.4	2.3	0.3	0.1
0.0	0.1	8.2	0.1	0.9	4.3	0.1	0.4	0.6	0.0
0.0	0.2	7.0	1.5	5.1	5.6	0.3	2.0	0.7	0.8
0.3	0.0	5.0	0.5	1.2	5.1	0.0	0.3	1.2	0.5
0.0	1.7	1.4	0.0	0.8	1.5	0.1	0.0	0.6	1.1
0.0	0.3	7.6	0.5	9.0	9.2	0.0	0.3	0.0	0.3
0.1	0.1	8.3	0.7	3.4	9.2	0.0	0.0	0.3	0.1
0.0	0.4	1.2	0.1	0.9	1.2	0.0	0.0	0.1	0.0
0.1	2.4	1.9	0.1	1.0	2.9	0.0	0.1	0.1	0.3

Connemarella rudis	Globobulimina affinis	Haplophragmoides sp.	Haynesina germanica	Hyalina balthica	Lagena clavata	Lagena semistriata	Lagena setigera	Lamarckina heliotidea	Miliolinella subrotunda
0.0	0.0	2.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	1.9	1.7	0.0	0.2	0.0	0.0	0.0	0.2
0.0	0.0	1.2	0.2	0.0	0.2	0.2	0.0	0.0	0.3
0.0	0.3	2.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.9	0.5	0.0	0.0	0.2	0.0	0.0	0.0
0.0	0.0	1.6	0.1	0.0	0.0	0.0	0.0	0.0	2.2
0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	1.4
0.0	0.0	0.3	5.8	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.3	2.1	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.2	1.7	0.0	0.3	0.0	0.0	0.0	0.0
0.0	0.0	0.0	2.1	0.0	0.0	0.2	0.0	0.0	0.0
0.0	0.0	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0
0.0	0.2	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.0
0.0	1.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
0.0	0.7	0.9	2.0	0.0	0.0	0.0	0.1	0.0	0.0
0.0	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
0.0	0.0	2.9	0.8	0.0	0.0	0.0	0.0	0.0	0.2
0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.0	0.0
0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4
0.0	0.0	0.1	1.3	0.0	0.0	0.1	0.0	0.0	0.0
0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.1	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
0.0	0.0	0.1	0.0	0.0	0.1	0.4	0.0	0.0	0.8

Nonion depressulum	Nonion porporatum	Nonionella turgida	Oolina hexagona	Oolina melo	Oolina sp.	Oolina squamosa	Oolina williamsoni	Discanomalina sp.	Patellina corrugata	Planorbulina distoma
0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.5	0.0
0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.5	0.0
0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.9	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.5	0.0
0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3
0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.8	0.3
0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	1.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
0.0	0.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.0
0.0	1.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.9	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0
0.0	0.3	0.3	0.1	0.0	0.0	0.0	0.4	0.0	0.1	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1

Quinqueloculina bicornis	Quinqueloculina seminula	Quinqueloculina sp.	Reophax fusiformis	Reophax scotii	Rosalina anomala	Rosalina sp.	Spirillina vivipara	Spiroloculina rotunda
0.3	0.2	0.0		0.3	0.0	3.8	0.0	0.0
0.0	0.2	0.0		0.2	0.0	3.2	0.0	0.0
0.0	1.6	0.0		0.0	0.2	6.6	0.0	0.0
0.0	0.0	0.0		0.0	0.0	5.4	0.0	0.0
0.2	1.2	0.0		0.0	0.3	4.7	0.0	0.0
0.1	1.3	0.0		0.0	3.6	9.7	0.0	0.7
0.3	2.4	0.0		0.0	2.7	10.4	0.0	0.2
0.0	0.2	0.2		3.1	0.0	0.0	0.0	0.0
0.0	0.0	0.3		2.8	0.0	0.7	0.0	0.0
0.0	0.0	0.0		1.4	0.0	0.2	0.0	0.0
0.0	0.0	0.0		0.2	0.0	0.2	0.0	0.0
0.0	0.2	1.4		5.0	0.0	1.4	0.0	0.0
0.0	0.0	0.0		0.0	0.0	0.5	0.0	0.0
0.0	0.3	0.0		0.3	0.0	0.3	0.0	0.0
0.0	0.0	0.1	0.3	1.9	0.0	0.3	0.0	0.0
0.0	0.0	0.0	0.6	0.3	0.1	1.8	0.0	0.0
			0.0					
0.0	0.0	0.0		0.2	0.0	0.8	0.0	0.0
0.0	0.0	0.0	0.5	0.3	0.0	0.2	0.0	0.0
0.1	1.1	0.1		0.0	0.0	1.1	0.0	0.0
0.0	0.0	0.0		1.1	0.0	2.3	0.0	0.0
0.0	0.3	0.0		0.0	0.0	4.5	0.0	0.0
0.0	1.2	0.3		0.3	1.4	14.7	0.0	0.1
0.0	0.8	0.3		0.0	2.4	11.3	0.1	0.1

Spiroplectinella wrightii	Stainforthia fusiformis	Textularia earlandi	Trifarina angulosa	Trochammina sp.	Indetermined	N of species
0.0	3.0	0.5	0.0	1.1	0.0	32
0.0	4.4	0.5	0.0	1.4	1.6	34
0.2	3.8	0.2	0.0	2.3	1.9	36
1.0	4.6	0.0	0.0	1.0	0.0	31
1.4	2.9	0.0	0.0	1.5	0.0	35
3.4	0.7	0.0	0.1	1.8	1.9	33
3.9	1.5	0.0	0.0	0.6	0.0	34
0.0	1.3	1.2	0.0	1.8	0.7	31
0.0	0.0	0.0	0.0	1.5	0.6	25
0.0	6.3	0.0	0.0	1.1	0.2	30
0.0	1.6	0.0	0.0	0.8	2.2	31
0.0	11.3	0.3	0.0	1.4	0.0	32
0.0	23.1	1.1	0.0	0.9	1.2	27
0.4	26.0	1.0	0.0	1.0	0.0	35
0.1	7.3	0.7	0.0	0.9	0.0	35
0.6	8.2	0.3	0.0	0.3	0.0	34
0.7	8.2	0.3	0.2	1.1	2.3	33
0.3	23.1	0.6	0.0	0.2	0.3	33
1.0	4.8	0.0	0.0	0.7	0.0	28
0.0	4.0	0.3	0.0	0.6	0.1	31
0.0	4.3	0.5	0.3	0.4	0.0	37
1.1	0.5	0.0	0.1	0.1	0.0	29
1.9	1.4	0.0	0.1	0.1	0.1	43