Characterization of recent deep-sea debrites in the Eastern Mediterranean based on foraminiferal taphonomy

Oded Katz[1*], Leeron Ashkenazi[1,2], Shani Sultan-Levi[1], Sigal Abramovich[2], Ahuva Almogi-Labin[1], Orit Hyams-Kaphzan[1]

1. Geological Survey of Israel, 32 Yesha'ayahu Leibowitz, Jerusalem 9692100, Israel
2. Department of Geological and Environmental Science, Ben Gurion University of the Negev, Beer-Sheva 8410501, Israel

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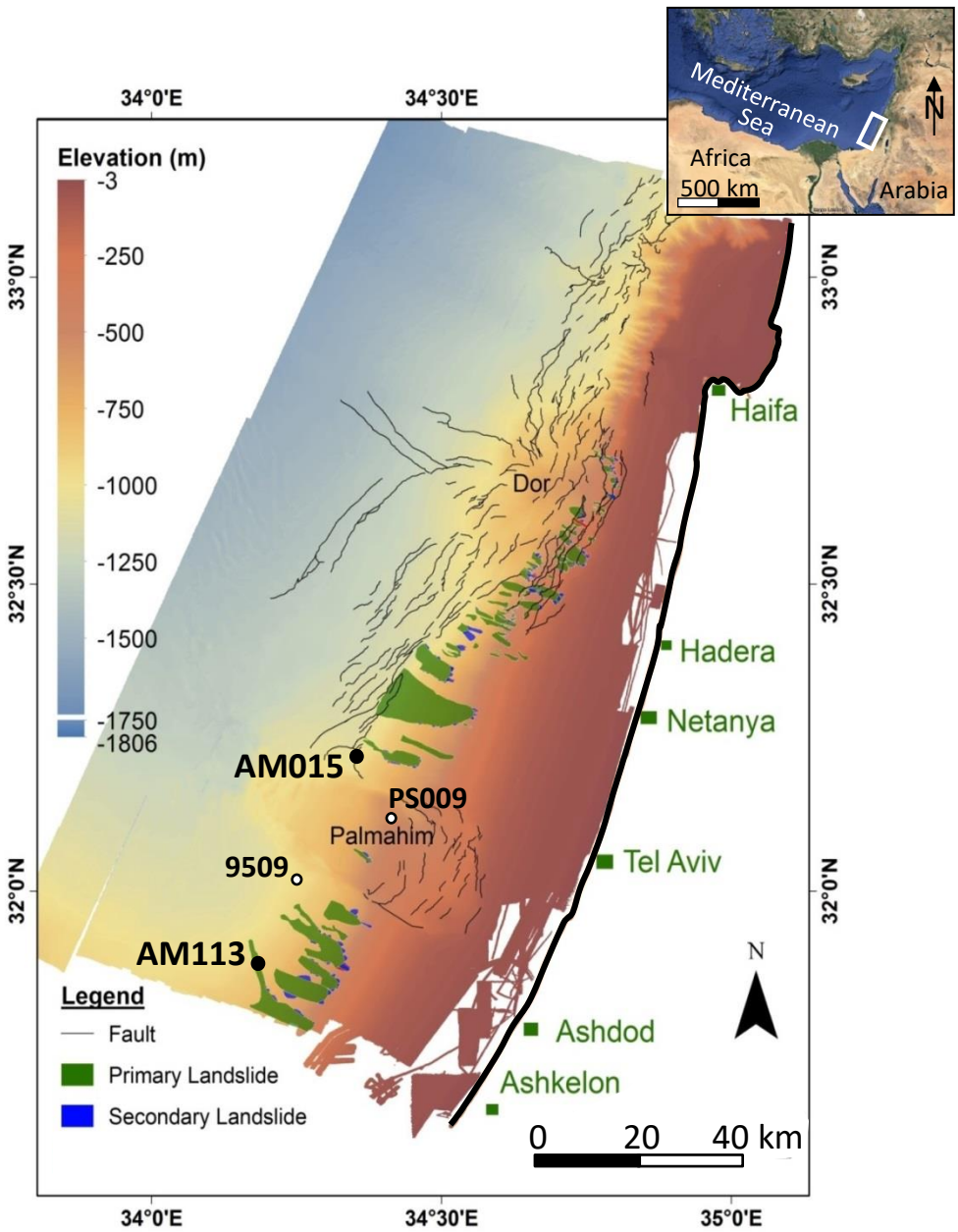
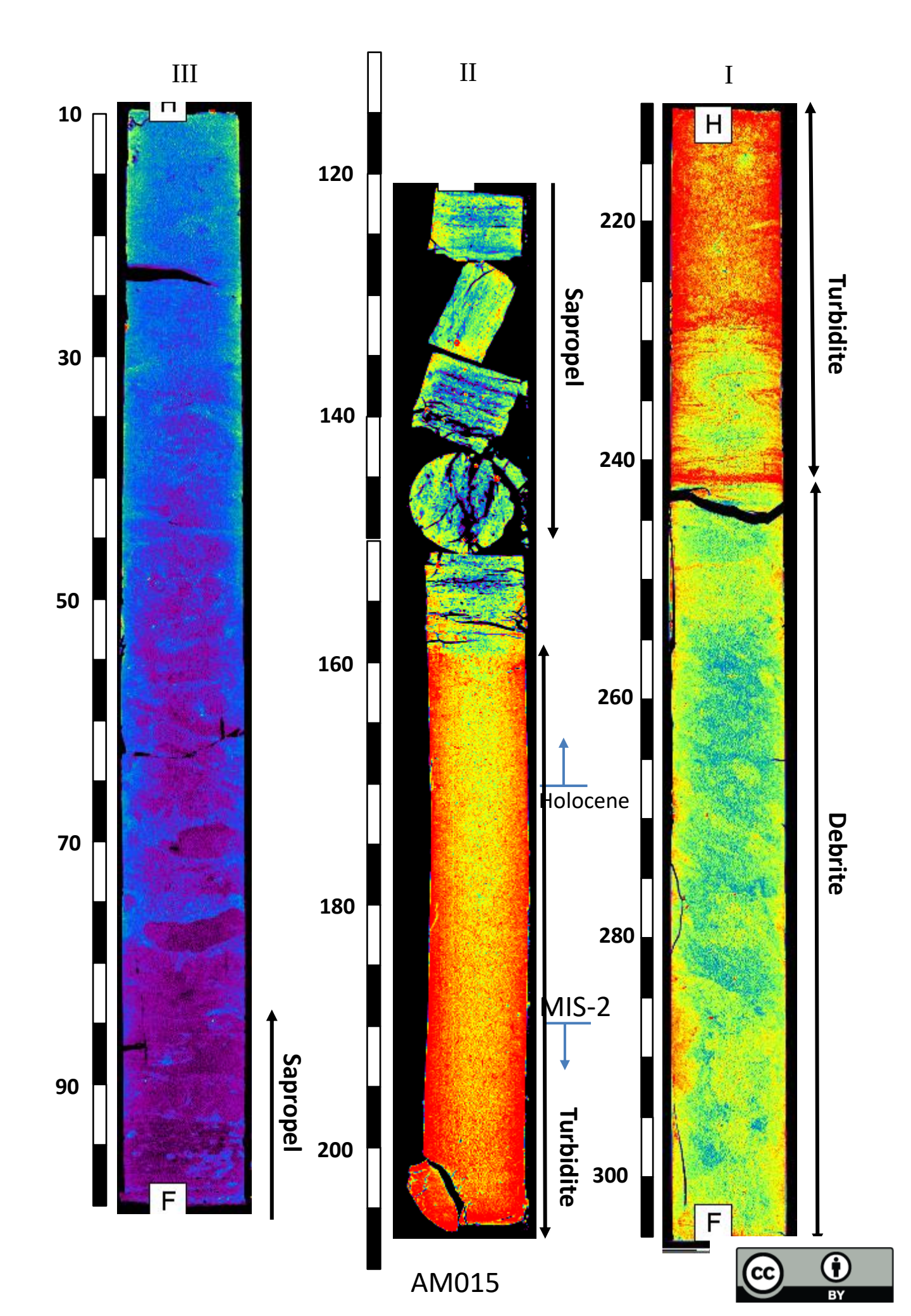
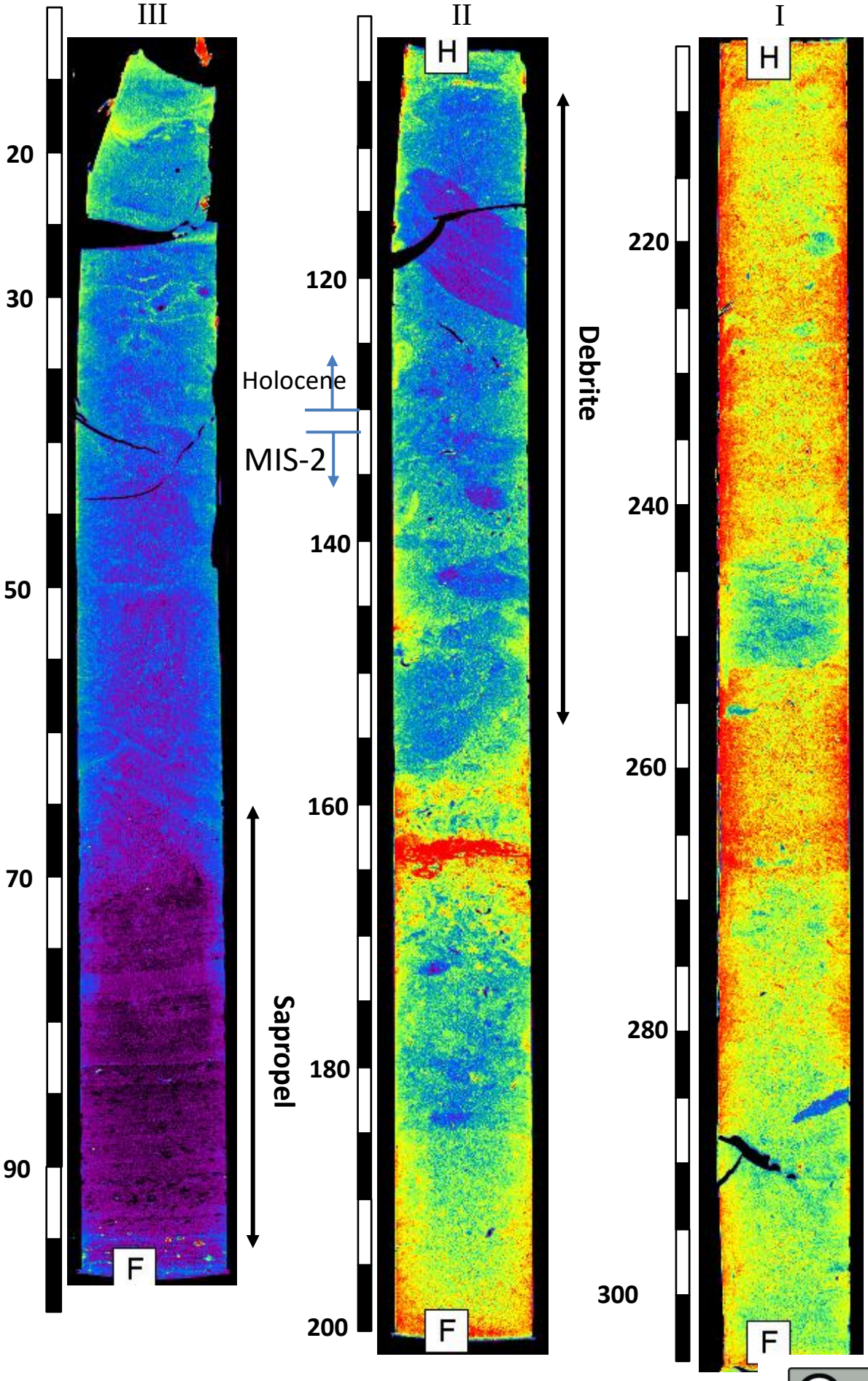
Objectives of the work:

It is hypothesized that submarine transport of sediments down a continental slope induce physical disintegration of pristine (non-broken) foraminifera shells, and thus mass transport deposits should include a significant percentage of fragmented shells. To validate this hypothesis, we studied two gravity-cores from the Eastern-Mediterranean continental slope, offshore Israel




III
II
I
10
30
50
70
90
120
140
160
180
200
220
240
260
280
300
H
F
F
Saprope
Saprope
Turbidite
Turbidite
Debrite
Holocene
MIS-2
AM015


III
II
I
H
H
F
F
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20
30
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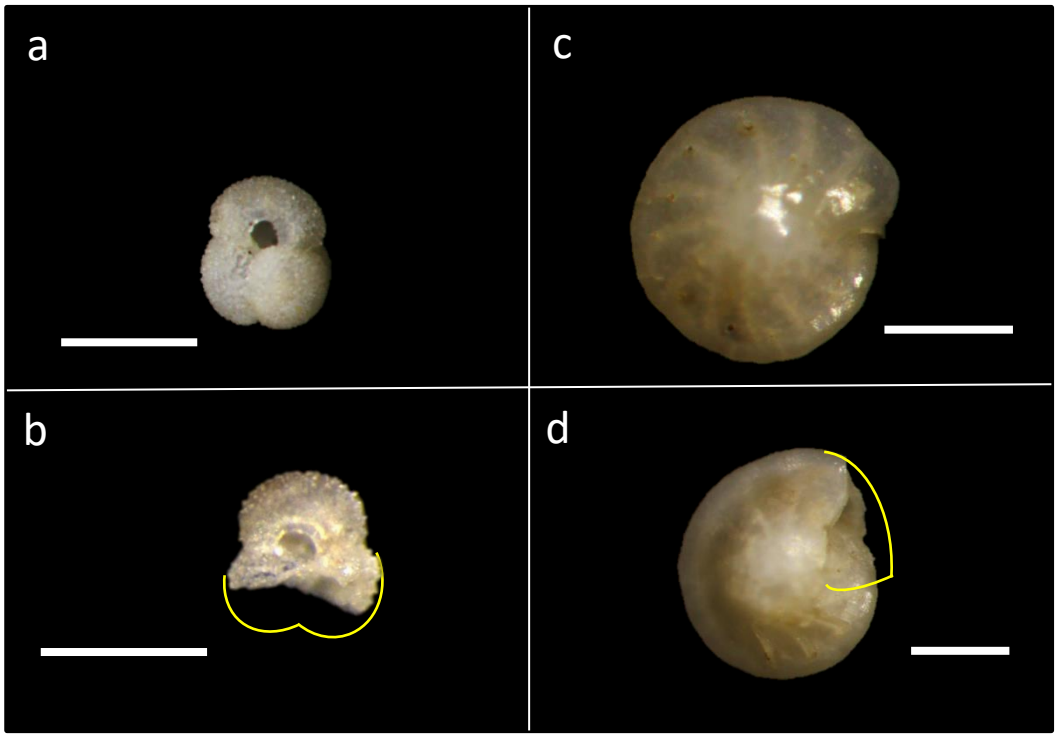
70
90
120
140
160
180
200
220
240
260
280
300
Holocene
MIS-2
Debrite
Sapropel
AM113

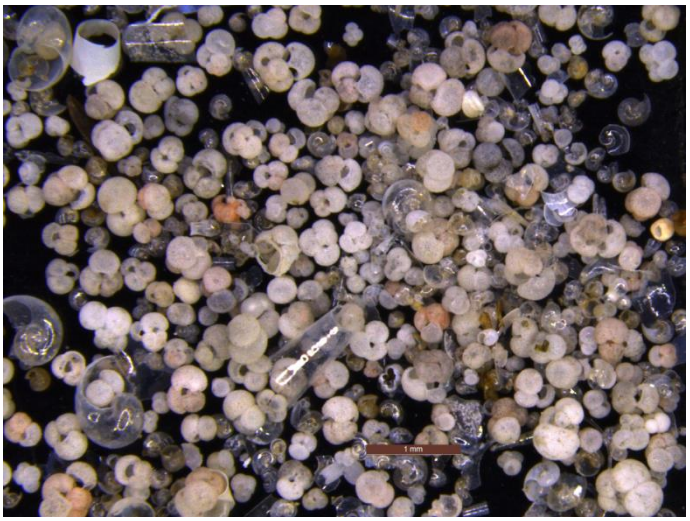
Disintegration states:

For the purpose of the current analysis we define two consecutive disintegration states regarding the foraminifera shell: (1) a fragmented shell where >50% of the shell is preserved, and (2) a crushed shell where less than 50% of the pristine form is preserved


a
c
b
d

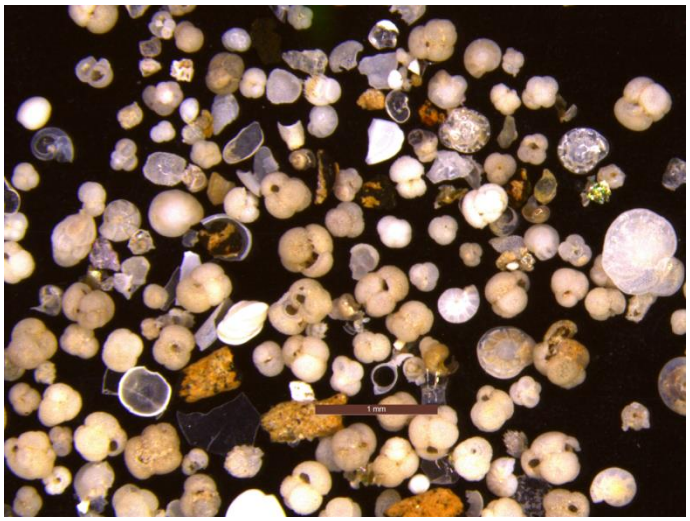
Crushing grades:

Grade 1: the amount of crushed shells in the residual material is negligible (less than ~10%) relative to the non-foraminiferal material (e.g. pteropods, ostracods, echinoderm fragments, terrigenous grains) (Fig. 4a-b). It means that almost all foraminiferal shells in the original sample were pristine or fragmented and they were previously picked from the sample to estimate the fragmentation percentage. Grade 3: the amount of crushed foraminiferal shells in the residual sample relative to the non-foraminiferal material is significant (more than ~50%; Fig. 4e-f). It means that a significant number of specimens in the original sample were crushed. 'Grade 2' is defined by the presence of a noticeable (~10% - 50%) amount of crushed foraminiferal shells in the residual sample relative to the non-foraminiferal material (Fig. 4c-d).

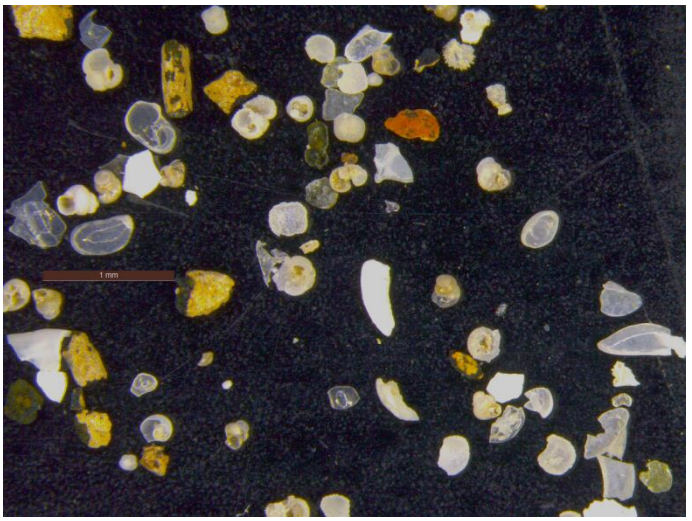


A

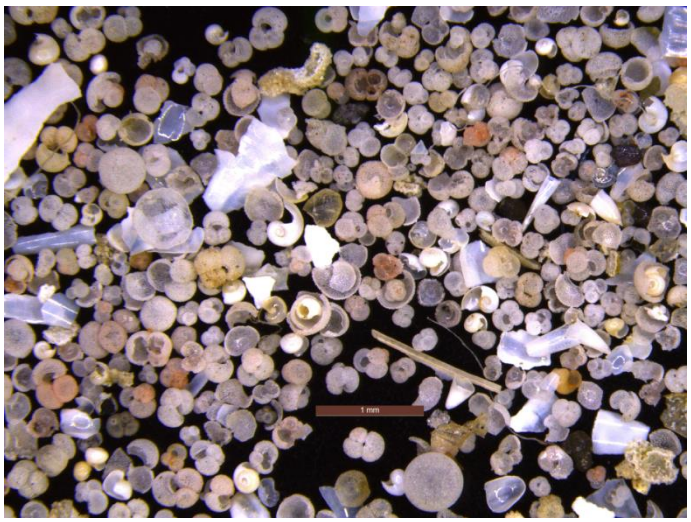
B



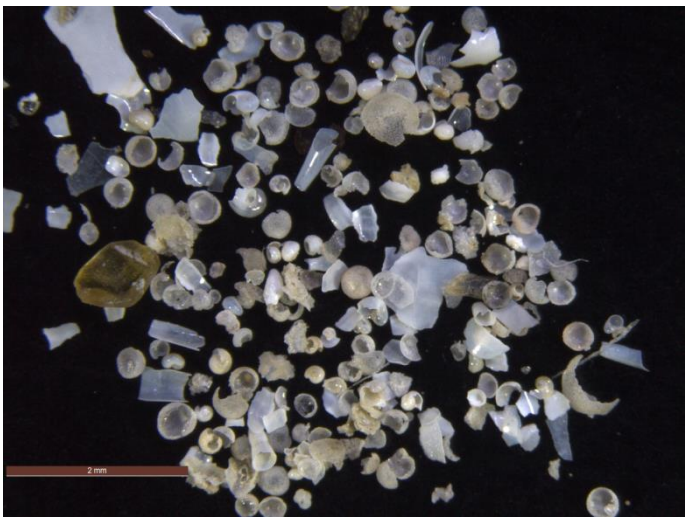
C



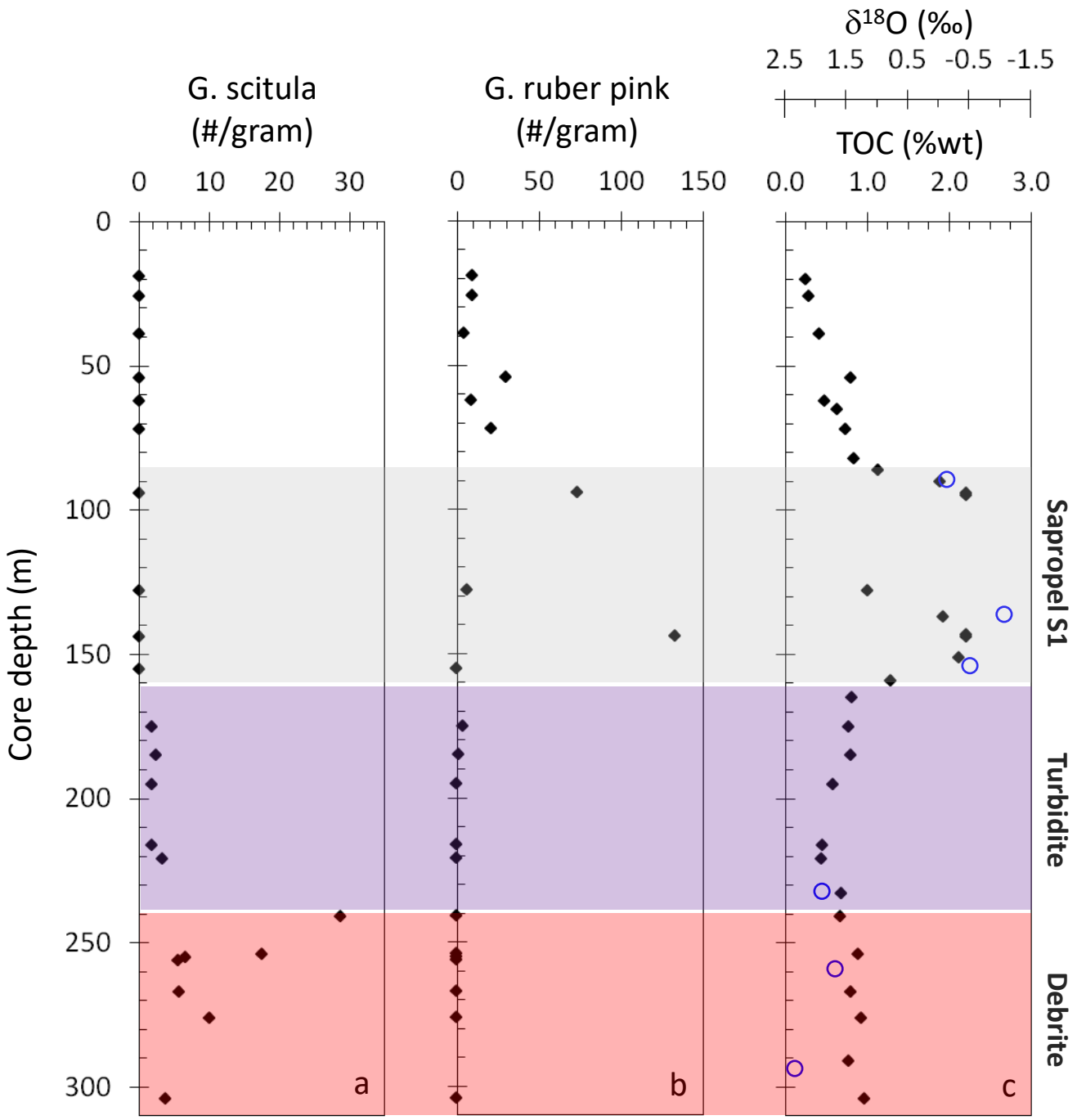
D



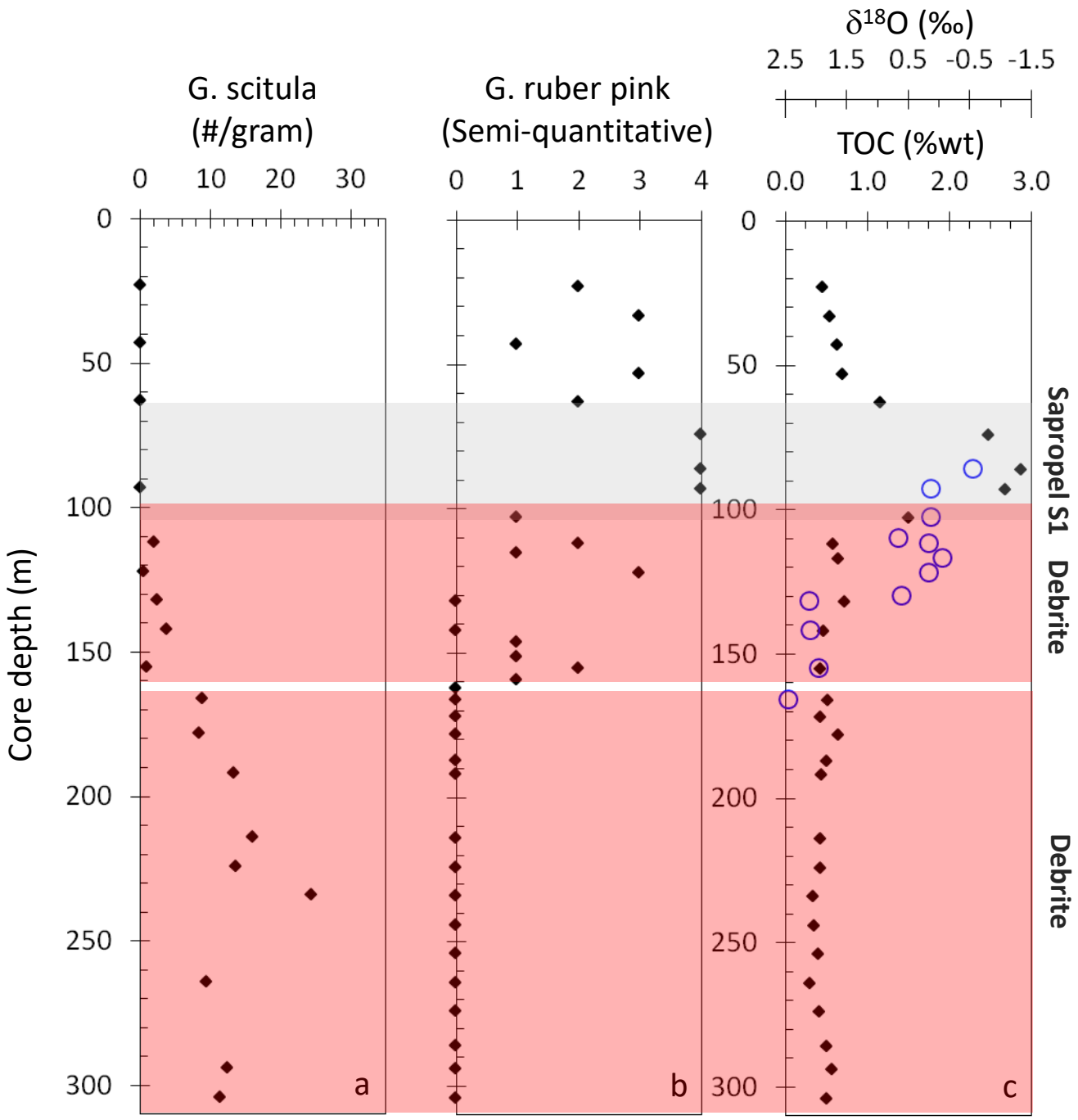
E



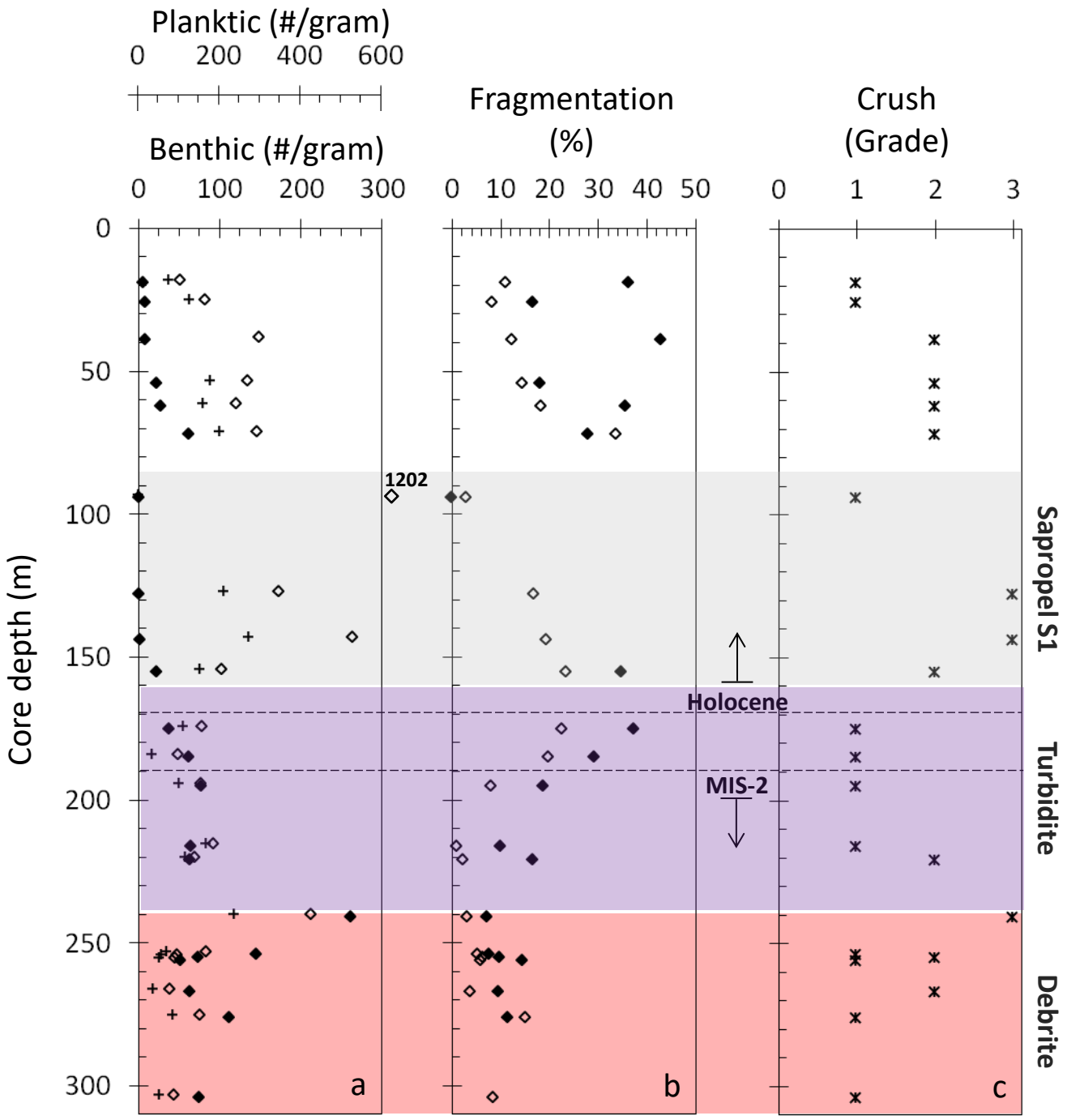
F


δ18O (‰)
2.5 1.5 0.5 -0.5 -1.5
G. scitula (#/gram)
0 10 20 30
G. ruber pink (#/gram)
0 50 100 150
TOC (%wt)
0.0 1.0 2.0 3.0
Core depth (m)
0
50
100
150
200
250
300
a
b
c
Sapropel S1
Turbidite
Debrite

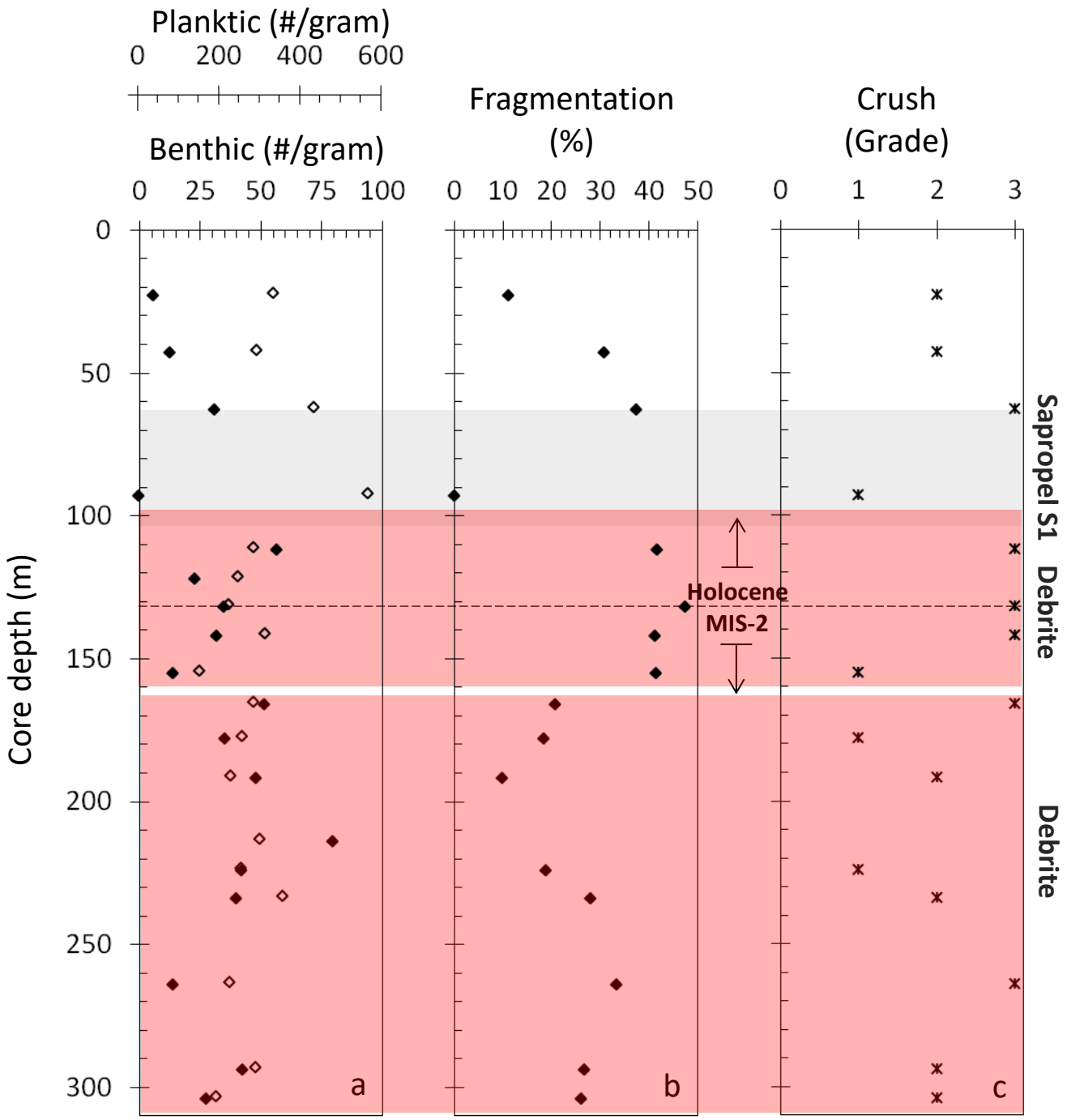
AM015


δ18O (‰)
2.5 1.5 0.5 -0.5 -1.5
G. scitula
(#/gram)
0 10 20 30
G. ruber pink
(Semi-quantitative)
0 1 2 3 4
TOC (%wt)
0.0 1.0 2.0 3.0
Core depth (m)
0
50
100
150
200
250
300
a
b
c
Sapropel S1
Debrite
Debrite

AM113


Planktic (#/gram)
0 200 400 600
Benthic (#/gram)
0 100 200 300
Fragmentation (%)
0 10 20 30 40 50
Crush (Grade)
0 1 2 3
Core depth (m)
0 50 100 150 200 250 300
1202
Holocene
MIS-2
Sapropel S1
Turbidite
Debrite
a
b
c

AM015


Planktic (#/gram)
0 200 400 600
Benthic (#/gram)
0 25 50 75 100
Fragmentation (%)
0 10 20 30 40 50
Crush (Grade)
0 1 2 3
Core depth (m)
0 50 100 150 200 250 300
Holocene
MIS-2
Sapropel S1
Debrite
Debrite
a
b
c

AM113

Summary:
We found a noticeable increase in benthic and planktic foraminiferal shells fragmentation through the last deglaciation and up to the base of S1. This strongly-fragmented sequence is located in the debrite of AM113 but is overlaying AM015. Accordingly, we suggest two possible mechanisms for the increased fragmentation of foraminiferal shells in both cores: Sediment transport and turbulence related to submarine mass-transport events, or geochemical changes in the lower water column properties at the transition from MIS-2 to the Holocene.