Figure AF1. **A**. Image scan of Section 317-U1351B-12H-1W shows varied texture and a more lithified interval at 115–120 cm. The sampled interval is indicated by a red arrow. **B.** Whole thin section image of limestone from interval 115–116 cm shows distribution of interparticle porosity in the sample. Large white areas are apparent loss of sample during sample preparation.

Figure AF2. Thin section micrographs of Sample 317-U1351B-12H-1W, 115–116 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this limestone sample to be composed of forams and undifferentiated bioclasts with substantial interparticle and intraparticle porosity. **C, D.** Close-up images showing areas of glauconite fill as well as fine-grained bladed carbonate cement growth on outside of foraminifer.

Figure AF3. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1351B-12H-1W, 115–116 cm, showing elemental distribution of selected elements. An area of glauconite fill is shown by presence of Mg, Fe, and Si in the upper left hand corner.

Figure AF4. **A**. Image scan of Section 317-U1351B-19X-CC. The sampled interval is indicated by a red arrow. Note the nodules at 17–21 cm and 23–28 cm. **B.** Whole thin section image of Sample 317-U1351B-19X-CC, 25 cm. Blue-dyed epoxy indicates distribution of porosity in the sample. Moldic porosity is present as well as incomplete dissolution in some areas.

Figure AF5. Thin section micrographs of Sample 317-U1351B-19X-CC, 25 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this limestone (packed biomicrite) to be composed of macrofossil fragments (barnacle and gastropod), undifferentiated bioclasts, and isolated foraminifer with interparticle spaces filled mainly with matrix. **C, D.** Close-up images showing micritic matrix and fine carbonate cement in foraminifer chamber.

Figure AF6. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1351B-19X-CC, 25 cm, showing elemental distribution of selected elements. Note clay material in the chambers of the foram on the left as indicated by the maps C, D, F, and H.

Figure AF7. **A**. Image scan of Section 317-U1351B-22X-CC. The sampled interval is indicated by a red arrow. Note the more lithified intervals at 10–14 cm and 19–23 cm. **B.** Scan of Sample 317-U1351B-22X-CC, 10–12 cm, thin section. Blue-dyed epoxy indicates low porosity with the exception of linear fracture feature that was likely caused by sample preparation. Darker areas show evidence of burrowing.

Figure AF8. Thin section micrographs of Sample 317-U1351B-22X-CC, 10–12 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this sandy marlstone has uniform grain size. There are a limited number of bioclastic particles in the form of isolated foraminifers. **C.** Close-up image showing finely crystalline interparticle carbonate cement.

Figure AF9. SEM micrograph and EDS elemental maps of Sample 317-U1351B-22X-CC, 10–12 cm, showing the siliciclastic grains floating in calcite cement. Note the mica packet on the left side with

pyrite grains interspersed in the layers.

Figure AF10. **A**. Image scan of Section 317-U1351B-44X-1W. The sampled interval is indicated by a red arrow. Note the isolated lithified intervals at 0–6 cm and 66–69 cm. **B.** Scan of Sample 317-U1351B-44X-1W, 3–8 cm, thin section. The blue-dyed epoxy indicates that there is a lack of macro porosity within the sample. A small amount of burrowing can be found in the upper portion of the thin section.

Figure AF11. Thin section micrographs of Sample 317-U1351B-44X-1W, 3–8 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images of this sandy marlstone show moderately uniform siliciclastic grain size as well as isolated bioclast fragments. **C, D.** Close-up image showing crystalline carbonate cement surrounding sand grains. Note the foraminifer and mica grain with first order blue color on the left side.

Figure AF12. SEM micrograph and EDS elemental maps of Sample 317-U1351B-44X-1W, 3–8 cm, showing the distribution of calcite cement in the grain supported sandstone. Sand grains are mainly a mixture of quartz and feldspar grains.

Figure AF13. **A**. Image scan of Section 317-U1351B-46X-CC. The sampled interval is indicated by a red arrow. The core is limited to two distinct fragments. **B.** Scan of Sample 317-U1351B-46X-CC, 1–5, cm, thin section. Blue-dyed epoxy indicates a lack of macro-porosity within the sample. Large fractures are noted in the bottom half of the sample.

Figure AF14. Thin section micrographs of Sample 317-U1351B-46X-CC, 1–5 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images showing this marlstone has moderately uniform siliciclastic grain size. First order red and blue of mica grains are visible in the crossed nicols image on the right. **C, D.** Close-up image showing crystalline carbonate cement present between grains and scattered bioclast fragments and mica grains.

Figure AF15. SEM micrograph and EDS elemental maps of Sample 317-U1351B-46X-CC, 1–5 cm, showing the distribution of calcite cement in the grain supported fabric of the marlstone.

Figure AF16. **A**. Image scan of Section 317-U1351B-96X-CC. The sampled interval is indicated by a red arrow. Note lithified interval from 0 to 12 cm. **B.** Scan of Sample 317-U1351B-96X-CC, 5–8 cm, thin section. The blue-dyed epoxy indicates distribution of macro porosity in the sample. Note the wide range of pore sizes and shapes.

Figure AF17. Thin section micrographs of Sample 317-U1351B-96X-CC, 5–8 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this limestone (packed biomicrite) contains large amounts of bioclastic grains. **C, D.** Close-up image showing well-formed crystalline carbonate cement.

Figure AF18. (**A**) Back scattered electron micrograph and EDS elemental maps (**B–F**) of Sample 317-

U1351B-96X-CC, 5–8 cm, showing the sample is made primarily of calcium carbonate with clay or silt in the pore space.

Figure AF19. **A**. Image scan of Section 317-U1351B-98X-CC. The sampled interval is indicated by a red arrow. **B.** Scan of Sample 317-U1351B-98X-CC, 30–34 cm, thin section. Blue-dyed epoxy indicates distribution of minor macro porosity in the sample. Multiple foraminifers are visible.

Figure AF20. Thin section micrographs of Sample 317-U1351B-98X-CC, 5–8 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this sandy marlstone has uniform grain size. **C, D.** Close-up images showing carbonate cement between grains and lining the interior of the miliolid on the right side of the image.

Figure AF21. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1351B-98X-CC, 5–8 cm, showing the calcium carbonate cement between the sand grains which are primarily quartz and feldspars.

Figure AF22. **A**. Image scan of Section 317-U1351B-100X-3. The sampled interval is indicated by a red arrow. Note the isolated lithified intervals at 14–18 cm and 69–71 cm. **B.** Scan of Sample 317-U1351B-100X-3, 15–17 cm, thin section. Blue-dyed epoxy shows area of moldic porosity in the form of a gastropod.

Figure AF23. Thin section micrographs of Sample 317-U1351B-100X-3, 15–17 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone contains significant amounts of bioclast fragments. Note miliolid with intraparticle carbonate cement. **C, D.** Close-up images showing carbonate cement between grains and lining the interior of the miliolid on the right side of the image.

Figure AF24. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1351B-100X-3, 15–17 cm. Note the calcium map that highlights the calcium carbonate cement between the sand grains.

Figure AF25. **A**. Image scan of Section 317-U1351B-102X-CC with sampled interval indicated by a red arrow. Note the lithified interval from 3 to 8 cm. **B.** Scan of Sample 317-U1351B-102X-CC, 4–8 cm, thin section. Blue-dyed epoxy shows limited areas of macro porosity. Note the burrowing in the upper half of the slide.

Figure AF26. Thin section micrographs of Sample 317-U1351B-102X-CC, 4–8 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images reveal the sample to be a marlstone with moderately uniform siliciclastic grains. Note the abundance of mica identified by first order red color in the image on the right. **C, D.** Close-up image shows the fine-grained nature of the carbonate cement between the sand grains and the presence of mica.

Figure AF27. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-

U1351B-102X-CC, 4–8 cm, showing the calcium carbonate cement and packing order of the quartz and feldspar grains. Note the high contrast particles located at the top and right of the BSE image are largely pyrite grains.

Figure AF28. **A**. Image scan of Section 317-U1351B-111X-1 with sampled interval indicated by a red arrow. Note the lithified interval from 0 to 11 cm. **B.** Scan of Sample 317-U1351B-111X-1, 4–7 cm, thin section. Blue-dyed epoxy shows evidence of burrowing and subtle laminar porosity.

Figure AF29. Thin section micrographs of Sample 317-U1351B-111X-1, 4–7 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone contains a mixture of sand grains as well as lithic and bioclastic fragments. Note the abundance of mica identified by first order red, blue color in the image on the right. **C, D.** Close-up image shows the fine-grained nature of the carbonate cement between the sand grains as well as the presence of mica, quartz, and feldspar.

Figure AF30. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1351B-111X-1, 4–7 cm, showing the calcium carbonate cement and mixture of foraminifer, mica, feldspar, and quartz grains. Note the echinoid spine fragment in the bottom right corner.

Figure AF31. **A**. Image scan of Section 317-U1351B-113X-2 with sampled interval indicated by a red arrow. Note the lithified intervals at 9–13 cm, 44–53 cm, and 129–134 cm. **B.** Scan of Sample 317-U1351B-113X-2, 131–135 cm, thin section. Blue-dyed epoxy shows apparent crack in the sample. Darkened areas are evidence of burrowing

Figure AF32. Thin section micrographs of Sample 317-U1351B-113X-2, 131–135 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone contains mica which appears as bright first order blue in the image on the right **C, D.** Close-up image shows the carbonate cement between the sand grains and the presence of several grains with high order yellow and blue color in cross-polarized light.

Figure AF33. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1351B-113X-2, 131–135 cm, showing quartz and feldspar grains floating in a calcium carbonate cement.

Figure AF34. **A**. Image scan of Section 317-U1352B-2H-2W with sampled interval indicated by a red arrow. Note the isolated lithified interval at 30–34 cm. **B.** Scan of Sample 317-U1352B-2H-2W, 30–34 cm, thin section. The sample shows significant evidence of burrowing throughout.

Figure AF35. Thin section micrographs of Sample 317-U1352B-2H-2W, 30–34 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone contains a variable distribution of sand grains possibly owing to bioturbation. **C, D.** Close-up images showing bright first order red and orange colors of mica. The sample is cemented by microcrystalline carbonate.

Figure AF36. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352B-2H-2W, 30–34 cm. The maps of magnesium and calcium shown in C and E demonstrate the dolomitic nature of the cement.

Figure AF37. **A**. Image scan of Section 317-U1352B-42X-5W with sampled interval indicated by a red arrow. Note the lithified intervals at 4–11 cm, 14–17 cm, and 20–23 cm. **B.** Scan of Sample 317-U1352B-42X-5W, 5 cm, thin section. Blue dyed epoxy preparation indicates large amounts of macro porosity including intraparticle porosity of a foraminifer.

Figure AF38. Thin section micrographs of Sample 317-U1352B-42X-5W, 5 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show a more consolidated portion of this limestone where porosity is mainly in the bioclast fragments. **C, D.** The close-up image shows fine-grained interstitial carbonate, micrite, and cement.

Figure AF39. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352B-42X-5W, 5 cm. The BSE image clearly shows equant carbonate crystals growing on the interior walls of the foraminifer. Map E reveals the calcite nature of the bioclast and cement.

Figure AF40. **A**. Image scan of Section 317-U1352B-52X-7W with sampled interval indicated by a red arrow. Note the lithified interval at 3–6 cm. **B.** Scan of Sample 317-U1352B-52X-7W, 3–6 cm, thin section. Blue dyed epoxy preparation shows moderate amounts of macro scale porosity.

Figure AF41. Thin section micrographs of Sample 317-U1352B-52X-7W, 3–6 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images of this limestone show dissolution of bioclast grains. In particular, the miliolid in the bottom left of the images. **C, D.** Close-up image showing carbonate cement surrounding grains as well as in the interior of the bioclast.

Figure AF42. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352B-52X-7W, 3–6 cm. The magnesium map (C) shows distribution of dolomite rhombs within the sample. This could possibly be recrystallized from the dissolution of magnesium enriched miliolid structure.

Figure AF43. **A**. Image scan of Section 317-U1352C-2R-1W with sampled interval indicated by a red arrow. The entire length of the core appears to be lithified. **B.** Scan of Sample 317-U1352C-2R-1W, 12 cm, thin section. Blue dyed epoxy preparation shows large amounts of varied size and shape macro porosity.

Figure AF44. Thin section micrographs of Sample 317-U1352C-2R-1W, 12 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show both interparticle and intraparticle porosity within this marlstone. **C, D.** Close-up image showing areas of carbonate cement within bioclasts.

Figure AF45. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352C-2R-1W, 12 cm. The calcium map (E) shows the calcite nature of the cement and bioclast.

Figure AF46. **A**. Image scan of Section 317-U1352C-3R-1W with sampled interval indicated by a red arrow. The entire length of the core appears to be lithified. **B.** Scan of Sample 317-U1352C-3R-1W, 68 cm, thin section. Blue dyed epoxy preparation shows varied size and shape macro porosity as well as minor burrowing.

Figure AF47. Thin section micrographs of Sample 317-U1352C-3R-1W, 68 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show a marlstone with uniform sand and bioclast grain sizes and fine-grained micrite and/or carbonate cement. **C.** Close-up image showing areas of microcrystalline carbonate cement.

Figure AF48. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352C-3R-1W, 68 cm. The calcium map (E) shows the calcite nature of the cement and bioclast.

Figure AF49. **A**. Image scan of Section 317-U1352C-9R-1W with sampled interval indicated by a red arrow. Note the lithified intervals at 0–14 cm, 74–79 cm, and 80–85 cm. **B.** Scan of Sample 317-U1352C-9R-1W, 0 cm, thin section. Blue dyed epoxy preparation shows limited amounts of macro porosity as well as significant burrowing.

Figure AF50. Thin section micrographs of Sample 317-U1352C-9R-1W, 0 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images indicate that this marlstone has moderately uniform sand grains. **C, D.** Close-up image of sand grains loosely packed in microcrystalline carbonate cement.

Figure AF51. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352C-9R-1W, 0 cm. The calcium map (E) shows the calcite nature of the cement.

Figure AF52. **A**. Image scan of Section 317-U1352C-10R-1W with sampled interval indicated by a red arrow. The section is lithified in almost its entire length from 0 to 54 cm. **B.** Scan of Sample 317-U1352C-10R-1W, 50 cm, thin section. Blue dyed epoxy preparation shows fine porosity and extensive burrowing.

Figure AF53. Thin section micrographs of Sample 317-U1352C-10R-1W, 50 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show extensive burrowing within this marlstone. **C, D.** Close-up image of mica, quartz, and feldspar grains with fine-grained carbonate.

Figure AF54. (**A**) Back scattered electron micrograph and (**B–F**) EDS elemental maps of Sample 317-U1352C-10R-1W, 50 cm. The magnesium and calcium maps (C, E) document dolomite rhombs uniformly distributed across the field of view.

Figure AF55. **A**. Image scan of Section 317-U1352C-14R-1W with sampled interval indicated by a red arrow. The section appears to be lithified almost its entire length. **B.** Scan of Sample 317-U1352C-14R-1W, 100 cm, thin section. The sample is extensively burrowed and fractured into 4 sections.

Figure AF56. Thin section micrographs of Sample 317-U1352C-14R-1W, 100 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show a marlstone with extensive burrowing. **C.** Close-up image showing bioclast fragments within a burrowed section of the stone.

Figure AF57. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-14R-1W, 100 cm, showing elemental distribution of selected elements. The maps show distribution of mica and clay material around two bioclast fragments. The calcium map (E) shows bladed crystals of calcite forming within the pores of the bioclast.

Figure AF58. **A**. Image scan of Section 317-U1352C-15R-1W with sampled interval indicated by a red arrow. The section appears to be lithified almost its entire length. **B.** Scan of Sample 317-U1352C-15R-1W, 131 cm, thin section.

Figure AF59. Thin section micrographs of Sample 317-U1352C-15R-1W, 131 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone has uniform grain size and moderate amounts of interparticle porosity. **C.** Close-up image showing the microcrystalline carbonate cement.

Figure AF60. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-15R-1W, 131 cm, showing elemental distribution of selected elements. The magnesium map (C) shows likely presence of fine-grained dolomite rhombs. The calcium map (E) gives an indication of calcite cementation as well as calcium-rich bioclast fragments.

Figure AF61. **A**. Image scan of Section 317-U1352C-18R-1W with sampled interval indicated by a red arrow. The section appears to be lithified almost its entire length. **B.** Scan of Sample 317-U1352C-18R-1W, 19 cm, thin section.

Figure AF62. Thin section micrographs of Sample 317-U1352C-18R-1W, 19 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone has uniform grain size and very minor amounts of interparticle porosity. **C.** Close-up image showing bioclast fragments.

Figure AF63. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-18R-1W, 19 cm, showing elemental distribution of selected elements. The calcium map (E) gives an indication of calcite cementation.

Figure AF64. **A**. Image scan of Section 317-U1352C-21R-2W with sampled interval indicated by a red arrow. The section appears to be lithified its entire length. **B.** Scan of Sample 317-U1352C-21R-2W, 38 cm, thin section. Blue-dyed epoxy gives an indication of the amount of porosity.

Figure AF65. Thin section micrographs of Sample 317-U1352C-21R-2W, 38 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone has uniform grain size and indications of moldic porosity. **C.** Close-up image showing the calcite cement filling interparticle space.

Figure AF66. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-21R-2W, 38 cm, showing elemental distribution of selected elements. The magnesium map (C) shows presence of fine-grained dolomite rhombs. The calcium map (E) gives an indication of calcite cementation in between siliciclastic grains as well as calcium-rich bioclast fragments.

Figure AF67. **A**. Image scan of Section 317-U1352C-22R-2W with sampled interval indicated by a red arrow. The core appears to be lithified its entire length. **B.** Scan of Sample 317-U1352C-22R-2W, 33 cm, thin section.

Figure AF68. Thin section micrographs of Sample 317-U1352C-22R-2W, 33 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone is composed of bioclastic fragments and fine-grained siliclastic material. **C.** Close-up image showing the microcrystalline carbonate cement.

Figure AF69. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-22R-2W, 33 cm, showing elemental distribution of selected elements. The calcium map (E) gives an indication of calcite cementation surrounding siliciclastic grains.

Figure AF70. **A**. Image scan of Section 317-U1352C-25R-CC with sampled interval indicated by a red arrow. The core appears to be lithified most of its length. **B.** Scan of Sample 317-U1352C-25R-CC, 0 cm, thin section. The sample shows evidence of burrowing. The blue-dyed epoxy shows fine porosity as well as large cracks in the sample.

Figure AF71. Thin section micrographs of Sample 317-U1352C-25R-CC, 0 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone is made up of fine-grained material with limited interparticle porosity. **C.** Close-up image showing calcite cement surrounding a foraminifer and shattered siliciclastic grains.

Figure AF72. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1352C-25R-CC, 0 cm showing elemental distribution of selected elements. The calcium map (E) gives an indication of the fine-grained calcite cementation.

Figure AF73. **A**. Image scan of Section 317-U1353B-88X-1W with sampled interval indicated by a red arrow. Note the nodules between 48 and 58 cm. **B.** Scan of Sample 317-U1353B-88X-1W, 55–58 cm, thin section. The sample contains large mollusk fragments that exhibit moldic porosity. There is also evidence of bioturbation.

Figure AF74. Thin section micrographs of Sample 317-U1353B-88X-1W, 55–58 cm. Left-side images

are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this sandy marlstone is comprised of well-sorted grains surrounded by calcite cement. **C.** Close-up image showing the grains floating in the calcite cement.

Figure AF75. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1353B-88X-1W, 55–58 cm, showing elemental distribution of selected elements. The magnesium and calcium maps (C and E) show that calcite cement is slightly enriched in magnesium.

Figure AF76. **A**. Image scan of Section 317-U1353B-92X-CC with sampled interval indicated by a red arrow. Note the nodules between 0 and 12 cm. **B.** Scan of Sample 317-U1353B-92X-CC, 8–12 cm, thin section shows evidence of burrowing.

Figure AF77. Thin section micrographs of Sample 317-U1353B-92X-CC, 8–12 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this sandy marlstone is comprised of well sorted grains surrounded by calcite cement. **C.** Close-up image showing the grains floating in the calcite cement.

Figure AF78. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1353B-92X-CC, 8–12 cm, showing elemental distribution of selected elements. The magnesium and calcium maps (C and E) show that calcite cement is slightly enriched in magnesium.

Figure AF79. **A**. Image scan of Section 317-U1354A-15H-CC is not available. **B.** Scan of Sample 317-U1354A-15H-CC, 0 cm, thin section shows evidence of extensive burrowing, as well as bored hardground.

Figure AF80. Thin section micrographs of Sample 317-U1354A-15H-CC, 0 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone to be very fine grained. **C.** Close-up image showing the fine-grained nature.

Figure AF81. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1354A-15H-CC, 0 cm, showing elemental distribution of selected elements. The magnesium and calcium maps (C and E) show that the calcium based cement is significantly enriched in magnesium. This has been identified as dolomite via XRD.

Figure AF82. **A**. Image scan of Section 317-U1354B-13H-2W with sampled interval indicated by a red arrow. Note the isolated nodule at 70–76 cm. **B.** Scan of Sample 317-U1354B-13H-2W, 74 cm, thin section shows evidence of extensive burrowing as well as bored hardground.

Figure AF83. Thin section micrographs of Sample 317-U1354B-13H-2W, 74 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this marlstone to be very fine grained. **C.** Close-up image showing the fine-grained nature.

Figure AF84. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1354B-13H-2W, 74 cm, showing elemental distribution of selected elements. The magnesium and calcium maps (C and E) show that the calcium-based cement is significantly enriched in magnesium. This has been identified as dolomite via XRD.

Figure AF85. **A**. Image scan of Section 317-U1354C-17X-CC with sampled interval indicated by a red arrow. Note the lithified interval at 2–8 cm. **B.** Scan of Sample 317-U1354C-17X-CC, 3 cm, thin section shows evidence of burrowing and very low amounts of porosity.

Figure AF86. Thin section micrographs of Sample 317-U1354C-17X-CC, 3 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show well sorted grains surrounded by calcite cement. **C.** Close-up image showing the well-sorted grains in calcite.

Figure AF87. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1354C-17X-CC, 3 cm, showing elemental distribution of selected elements. The calcium map (E) shows the extent of calcite cement. The back-scattered electron image (A) and the aluminum map (D) highlight interspersed clay in the calcite cement.

Figure AF88. **A**. Image scan of Section 317-U1354C-20X-CC with sampled interval indicated by a red arrow. Note the lithified intervals at 18–24 and 39–42 cm. **B.** Scan of Sample 317-U1354C-20X-CC, 20 cm, thin section shows extensive intraparticle and moldic porosity.

Figure AF89. Thin section micrographs of Sample 317-U1354C-20X-CC, 20 cm. Left-side images are taken in plane-polarized light, and right-side images are taken in cross-polarized light. **A, B.** Low magnification images show this limestone to be comprised of poorly sorted bioclastic fragments. **C.** Close-up image showing equant calcite crystals present in pore space.

Figure AF90. Back scattered electron micrograph and EDS elemental maps of Sample 317-U1354C-20X-CC, 20 cm, showing elemental distribution of selected elements. The magnesium and calcium maps (C and E) show that the calcite cement is slightly enriched in magnesium. The backscattered electron image gives a clearer picture of the fine-grained texture of the cement.