

McHugh, C.M., et al., 2024, Sedimentary signatures of large earthquakes along the submerged Enriquillo–Plantain Garden transpressional plate boundary, northern Caribbean: *Geology*, <https://doi.org/10.1130/G52258.1>

## Supplemental Material

Figure S1: Event deposits correlations Navassa and Matley Basins.

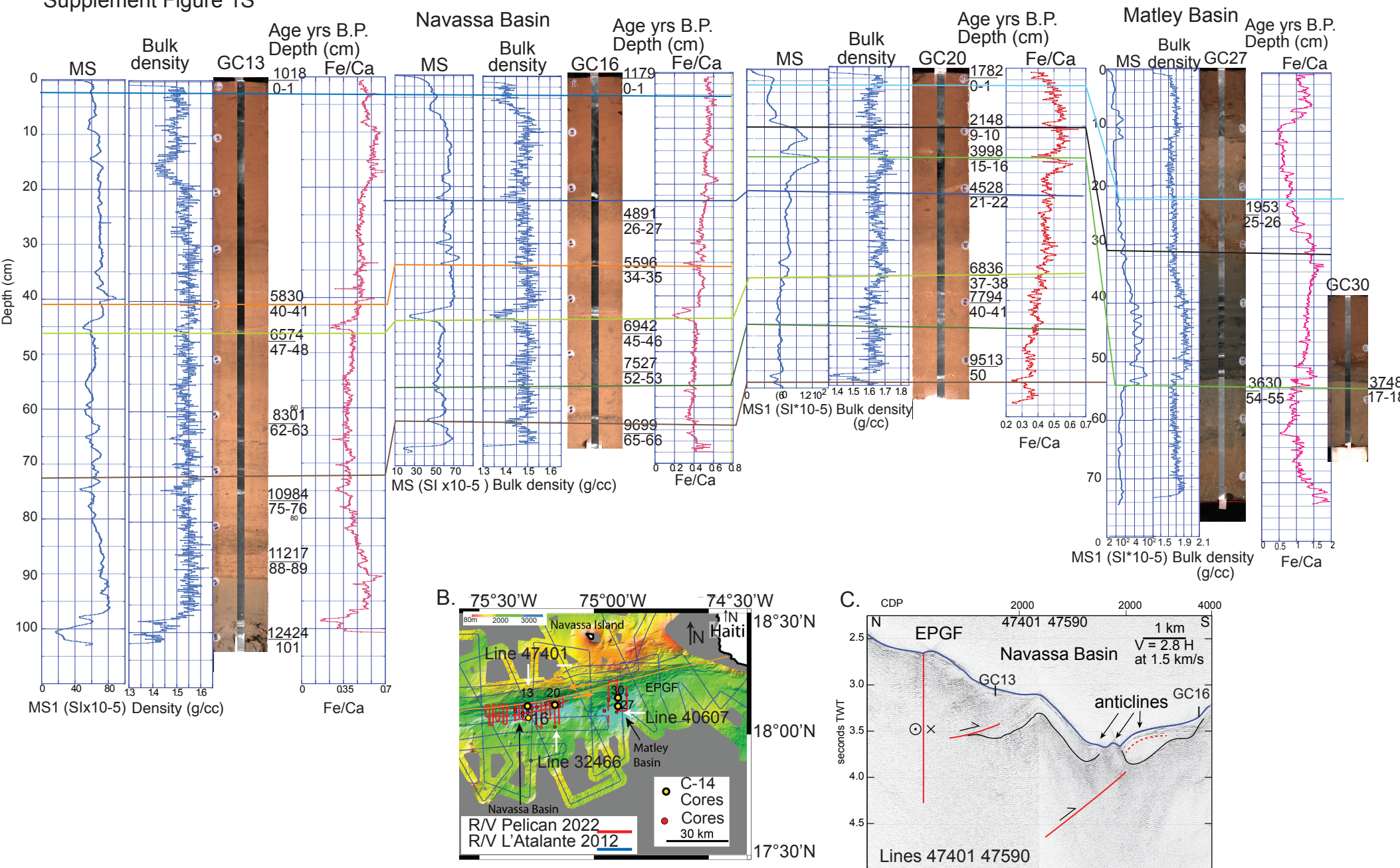
Figure S2: Event deposits correlations Kingston and Jamaica E Basins.

Figure S3: Core Log GCPE22-17-02.

Figure S4: Facies descriptions.

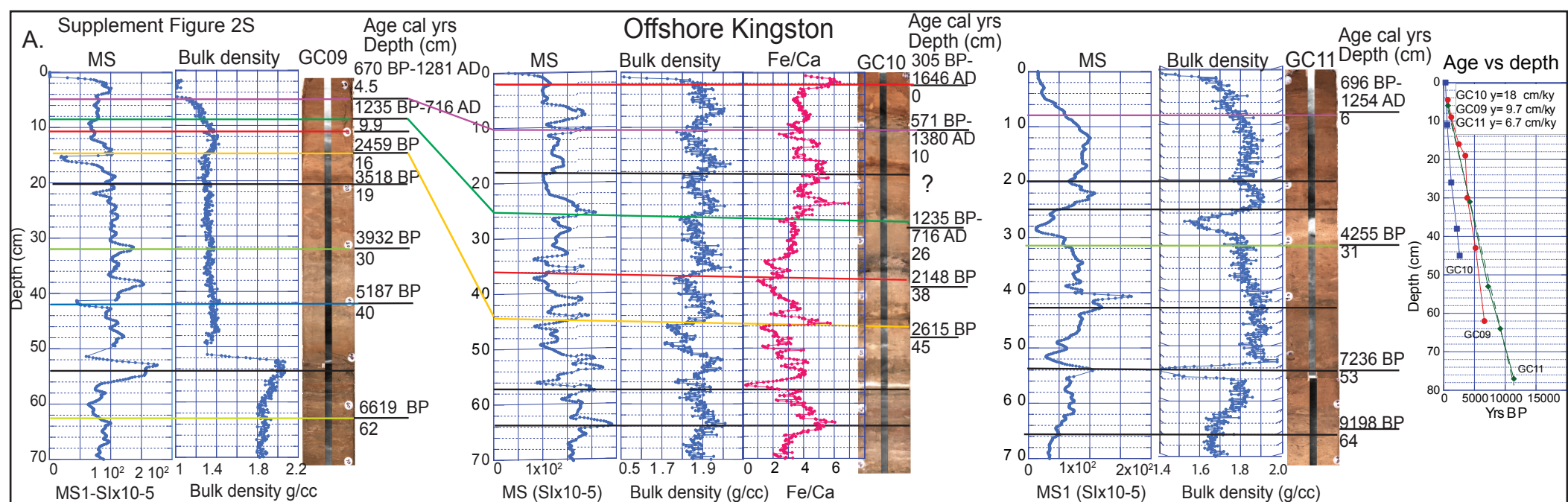
Table S1: Age calibrations.

Supplement Figure 1S

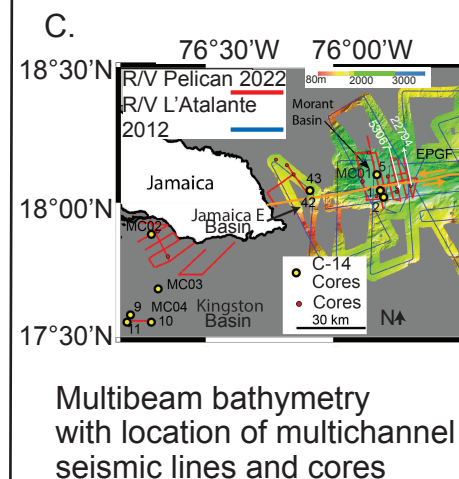
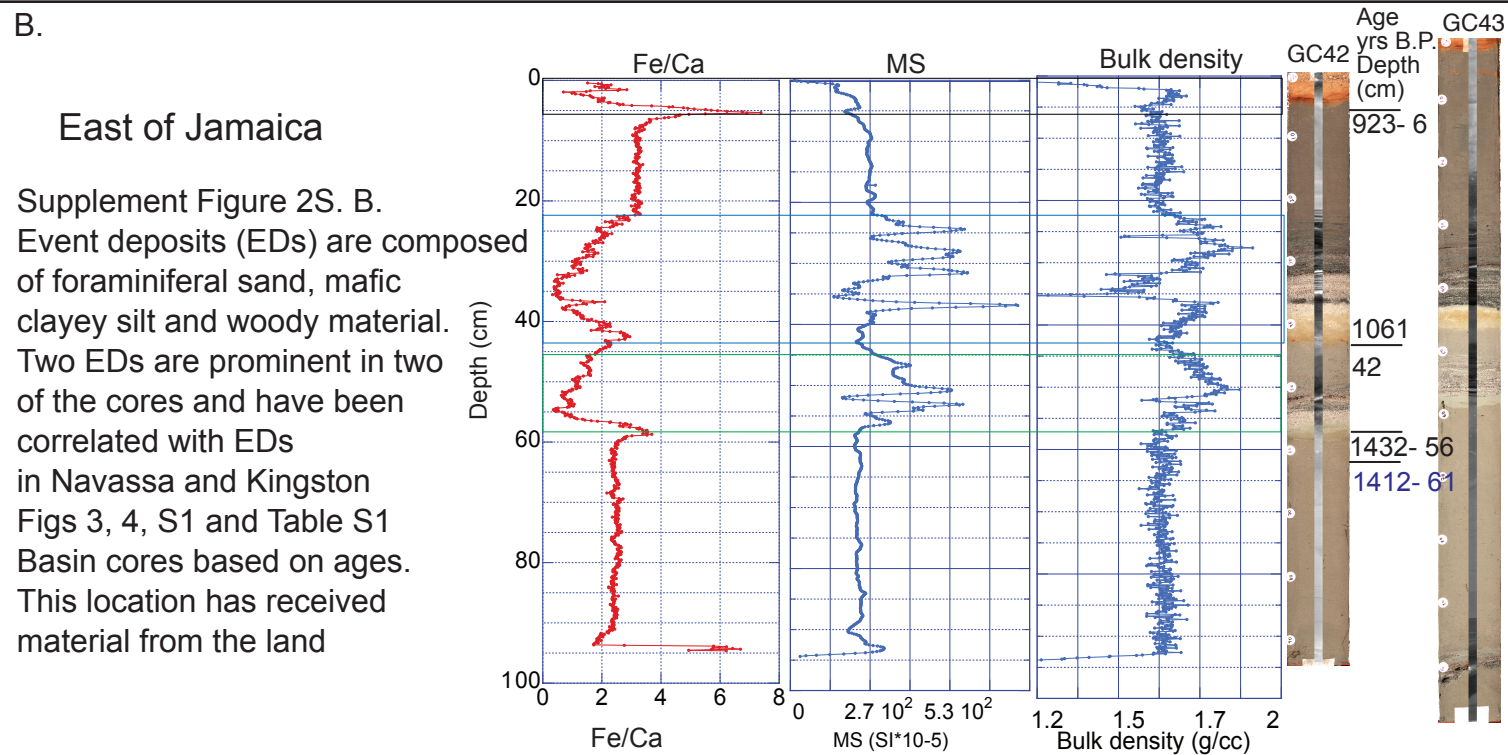


Supplement Fig. 1S. A. Navassa and Matley basins event deposit (EDs) correlations based on lithology, core photo, X-ray image (vertical stripe), C-14 age calibrated yrs B.P. (colors of EDs match Figs. 3, 4, 2S and Table S1), and magnetic susceptibility (MS) and bulk density (g/cc) and Fe/Ca. Fe/Ca highlight the sand component if rich in microfossils, e.g., GC13 40-45 cm or mafic component as in GC27 40-50 cm. The signal corresponds with decreases and increases in MS and bulk density, respectively. B. Multibeam bathymetry with core and seismic tracks locations. C. Multichannel seismic line with location of the Enriquillo-Plantain Garden Fault, structural interpretation and location of GC13 and 16.





Supplement Figure 2S. A. Event deposit (EDs) correlations for Kingston cores revealing historic 1692 (red) and prehistoric earthquakes ~1280 AD (~600 BP, purple), ~700 AD (~1230 BP, green), ~2400 BP (yellow). Either no C-14 age or correlation EDs (black). The 3900 BP correlates with event deposits in Navassa and Matley Basins (light green). The 6600 BP (lighter green) correlates with Morant and Navassa Basins. EDs colors same as Figs 3, 4, S1, Table S1. The event deposits in Kingston cores are rich in Fe likely derived from land sources. In the Jamaica Passage event deposits contain foraminifera-rich mud and sand. Sedimentation rates in all studied cores are low ranging from 6 to 18 cm/ky.



## PE22-17 GC-02- Sections 1, 2 - 0-110 cm

Latitude: 18.024 °N

Longitude: 75.8142 ° W

Core length: 373 cm

Water Depth: 2 5 1 7 m

Date taken: 01/10/22

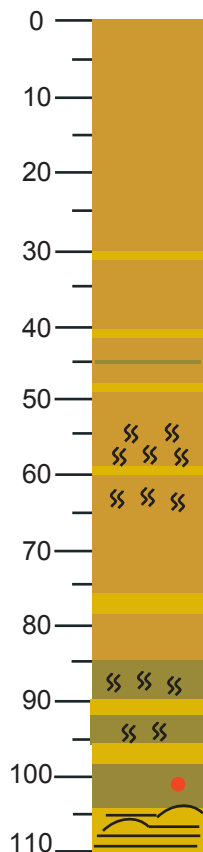
Date opened: 4/12, 4/19, 4/20/ 2022

Date described: 05/06/22

Date photographed: 4/12, 4/19, 4/20/ 2022

Described by: McHugh

Flow-in: no



- From 0 - 68 cm calcareous rich sandy clayey silt with scattered, v.f. sand patches. The sand is mainly composed of foraminifers and pterapods. Light brownish gray 2.5Y 6/2

Medium sand bed 30-31 cm with sharp upper and lower contacts.

The sand is a calcareous ooze.

V.f sand bed 40-41 cm with gradual upper and lower contacts.

The sand is a calcareous ooze.

From 45-46 cm wavy silt laminae, light olive brown 2.5Y 5/4

Discontinuous laminae with scattered sand at 48-49 cm.

V.f sand bed 59-60 cm with heavily bioturbated upper and lower contacts. Bioturbation extends from 55 to 59 cm. The sand is a calcareous ooze.

From 68-75 cm calcareous rich, sandy clayey silt. grayish brown 2.5Y 5/2

From 75 - 79 cm calcareous ooze composed of medium sand

From 79 - 85 cm calcareous rich, sandy clayey silt, grayish brown 2.5Y 5/2

From 85 - 90 cm calcareous rich silty clay, light brownish gray 2.5Y 6/2, heavily bioturbated

From 90-92 calcareous ooze sand. Wavy but sharp upper and lower contacts.

From 92-96 cm calcareous rich silty clay, light brownish gray 2.5Y 6/2.

Sparsely bioturbated. Circular burrows contain sand. Sharp upper and lower contacts.

From 96-98 cm calcareous ooze sand. Sharp upper and lower contacts.

From 98-99 cm calcareous silty clay, sharp upper and lower contact.

light brownish gray 2.5Y 6/2. No bioturbation except for a circular borrow is of an unusual yellowish red 5YR 4/6.

From 99-103 cm calcareous rich silty clay, grayish brown 2.5Y 5/2. No bioturbation

Sharp upper boundary and wavy but sharp lower contact.

From 103 - 110 cm calcareous sand. Sharp lower contact but wavy upper contact.

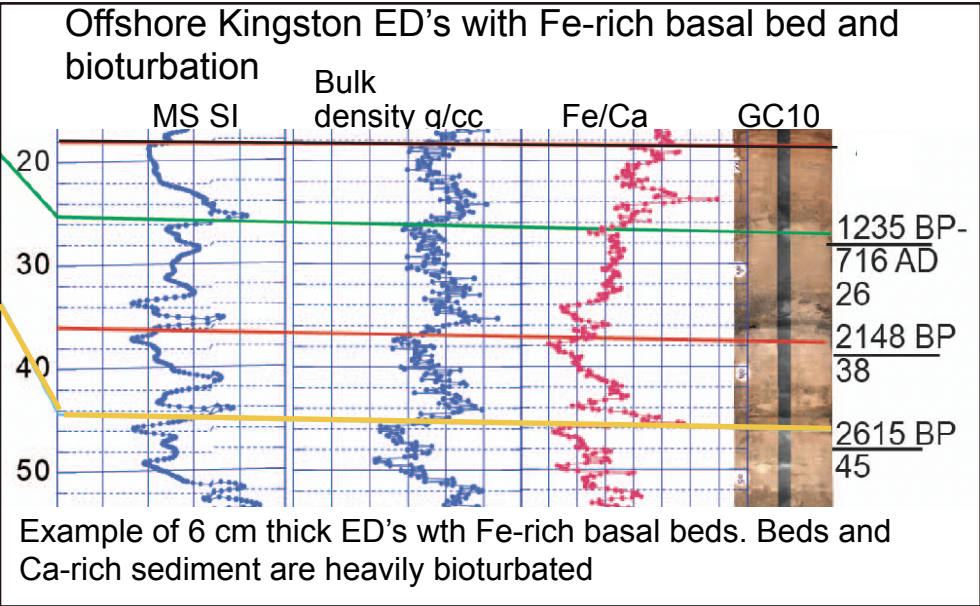
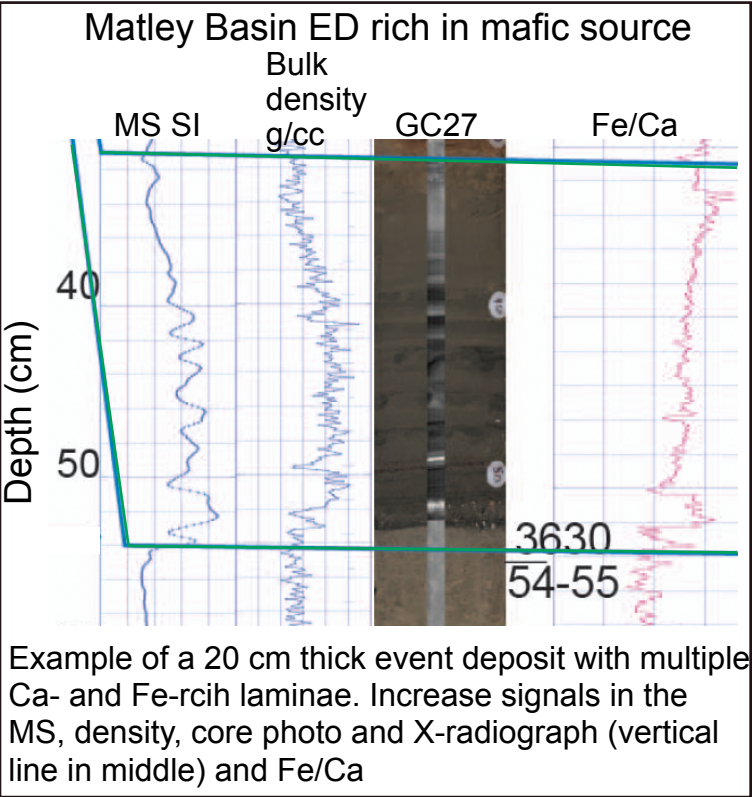
Six sand beds can be distinguished by their color variability from dark gray 2.5Y 4/0 to light brownish gray 2.5Y 6/2. The sand beds towards the top have ripple like features.

Three sand beds are of an unusual yellowish red 5YR 4/6. Contacts between sand beds are sharp.

## KEY



Supplemental Figure 4S. Facies examples



Event deposits vary in thickness from 2 to 30 cm. Laminae can be single or or multiple stacks. Fe/Ca exhibits great variability, but is the dominant chemical component. The sources are mafic sediments derived from the Paleocene extensional regime and calcareous oozes. The magnetic susceptibility (MS) and bulk density (g/cc) are excellent resources for characterizing EDs thickness and variability. Hemipelagic intervals are characterized by moderate to heavy bioturbation and can be identified from the line-scan and core X-ray radiograph. EDs variability is related to volume of sediment remobilization and availability of mafic vs calcite-rich sources. Studies (in prep) expand on rupture and flow patterns along the EPGF basins.

