Where did all that sediment go?

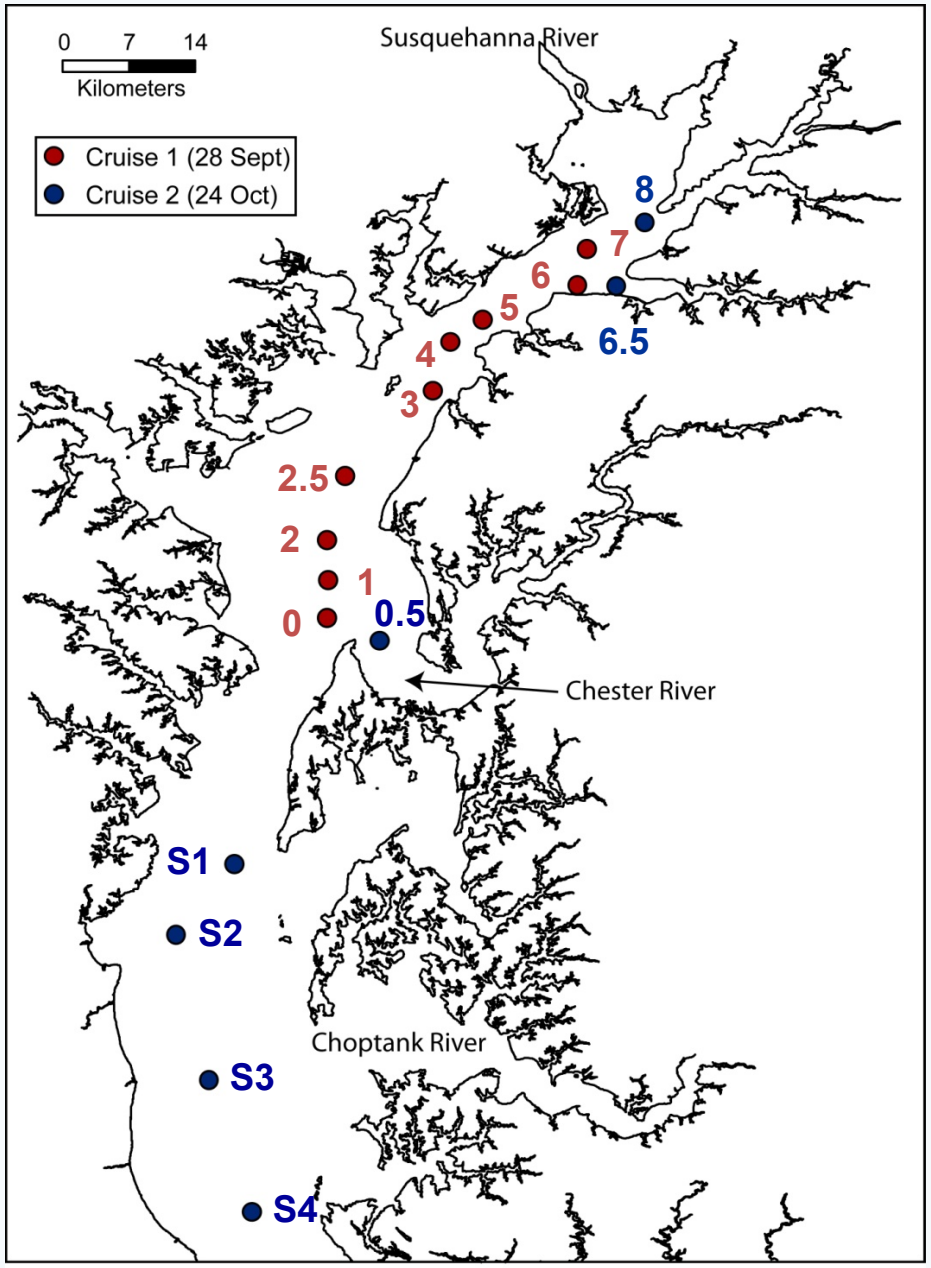
Jeffrey Halka
Maryland Geological Survey

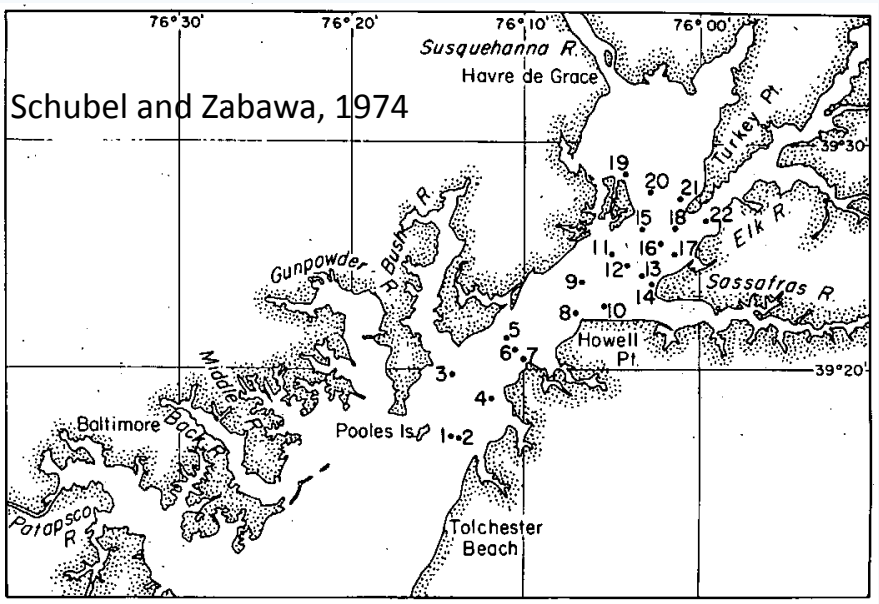
Cindy Palinkas
UMCES – Horn Point Laboratory

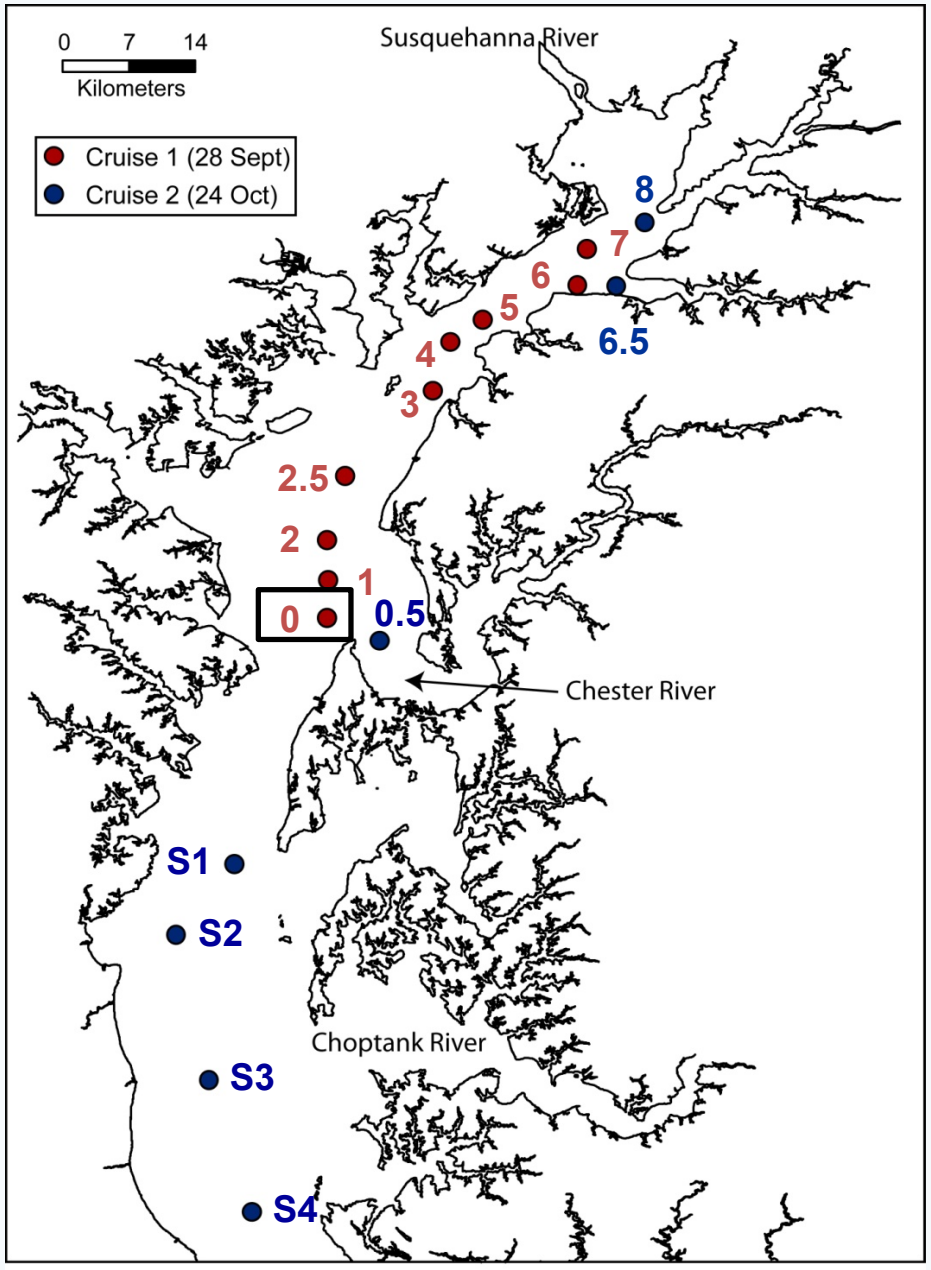
Sediment Sampling After Tropical Storm Lee

Cruise 1: 28 September 2011
Cruise 2: 24 October 2011

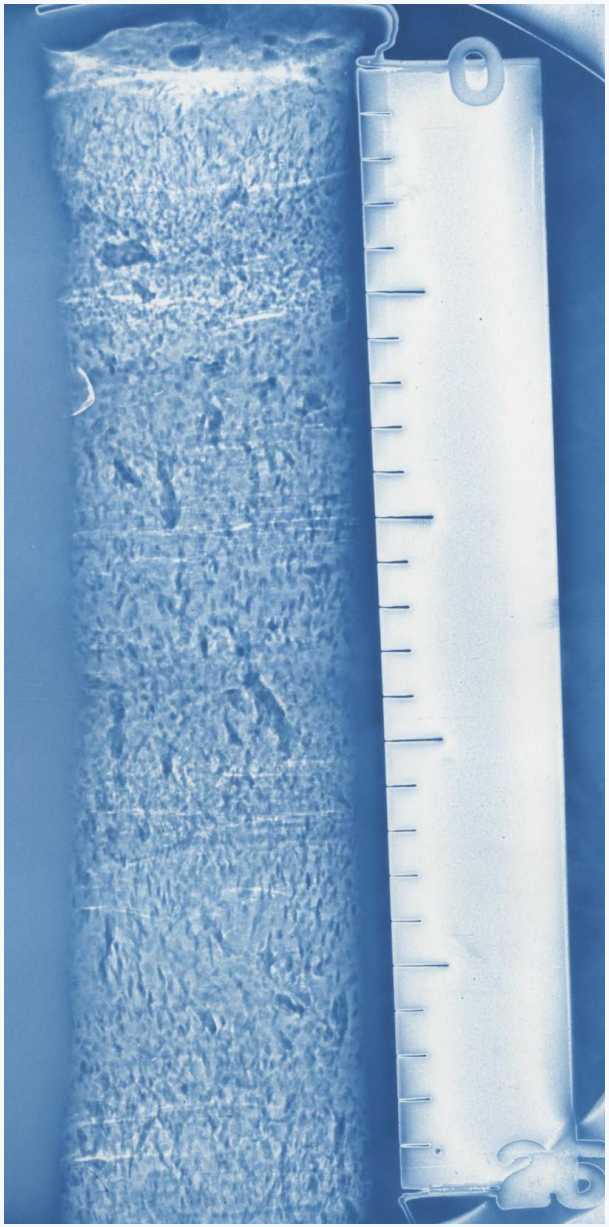
17 gravity core locations

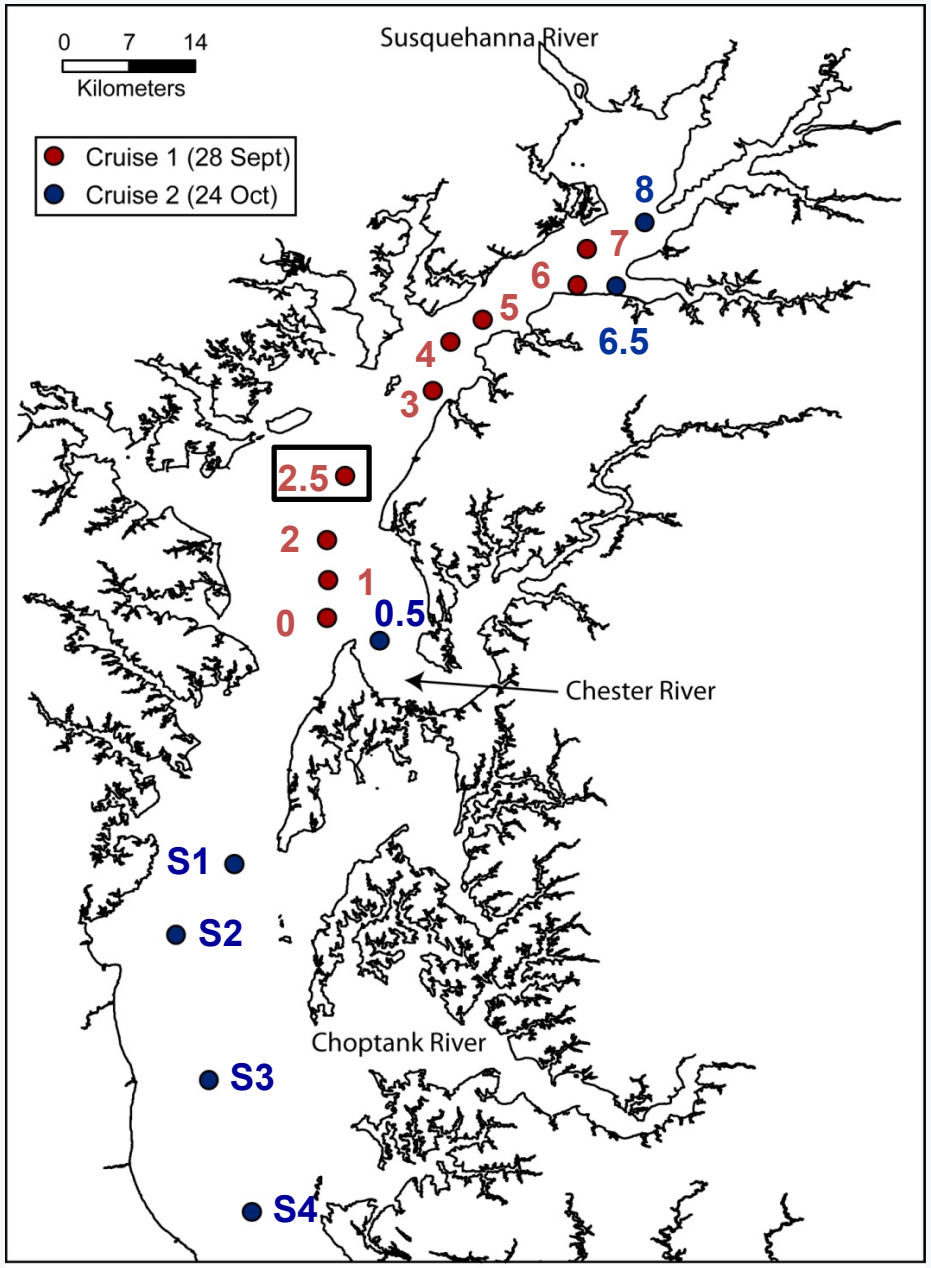




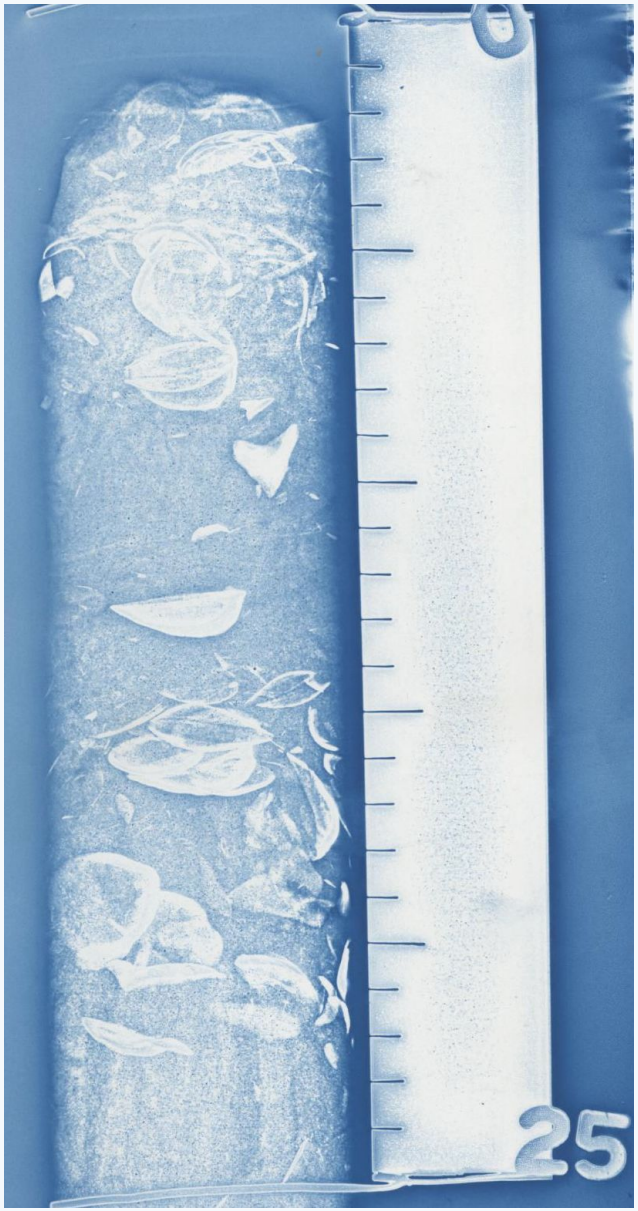

0 7 14
Kilometers
Susquehanna River
Cruise 1 (28 Sept)
Cruise 2 (24 Oct)
8
7
6
5
6.5
4
3
2.5
2
1
0
0.5
Chester River
S1
S2
Choptank River
S3
S4

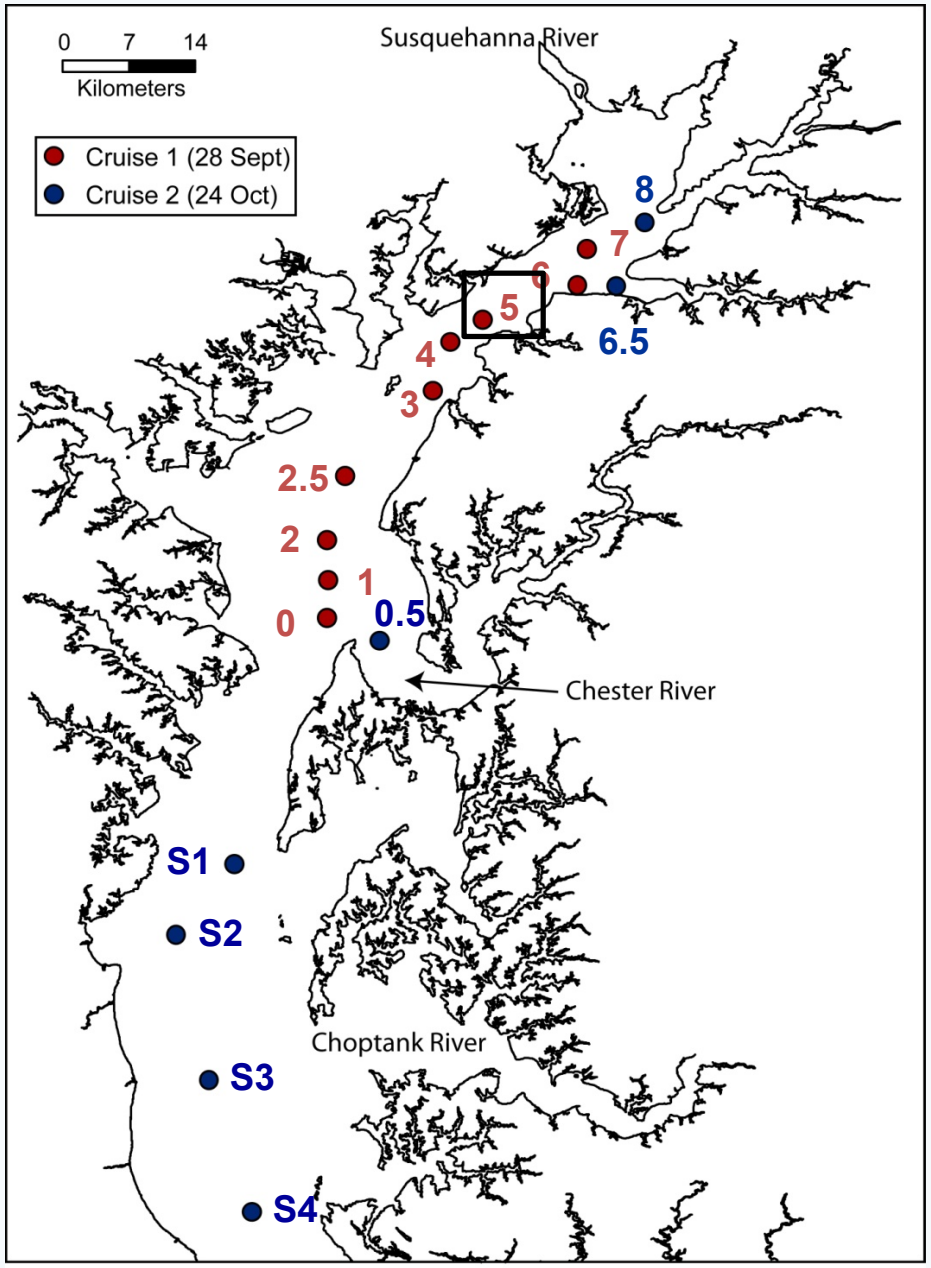
Station 0



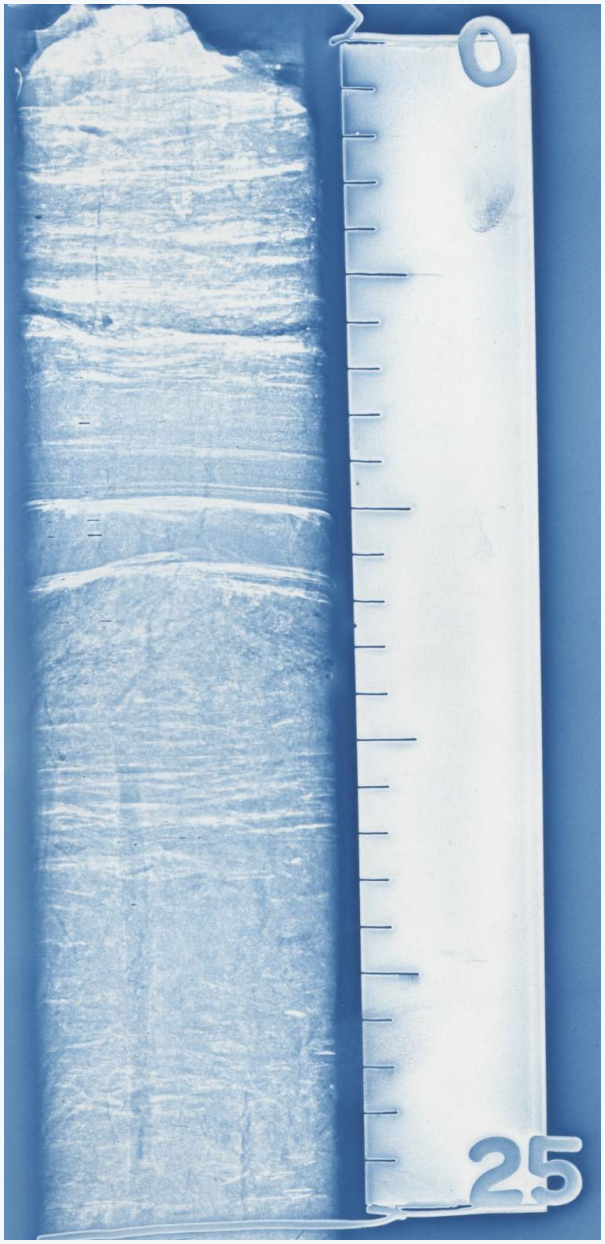

0 7 14
Kilometers
Susquehanna River
Cruise 1 (28 Sept)
Cruise 2 (24 Oct)
8
7
6
5
6.5
4
3
2.5
2
1
0
0.5
Chester River
S1
S2
Choptank River
S3
S4

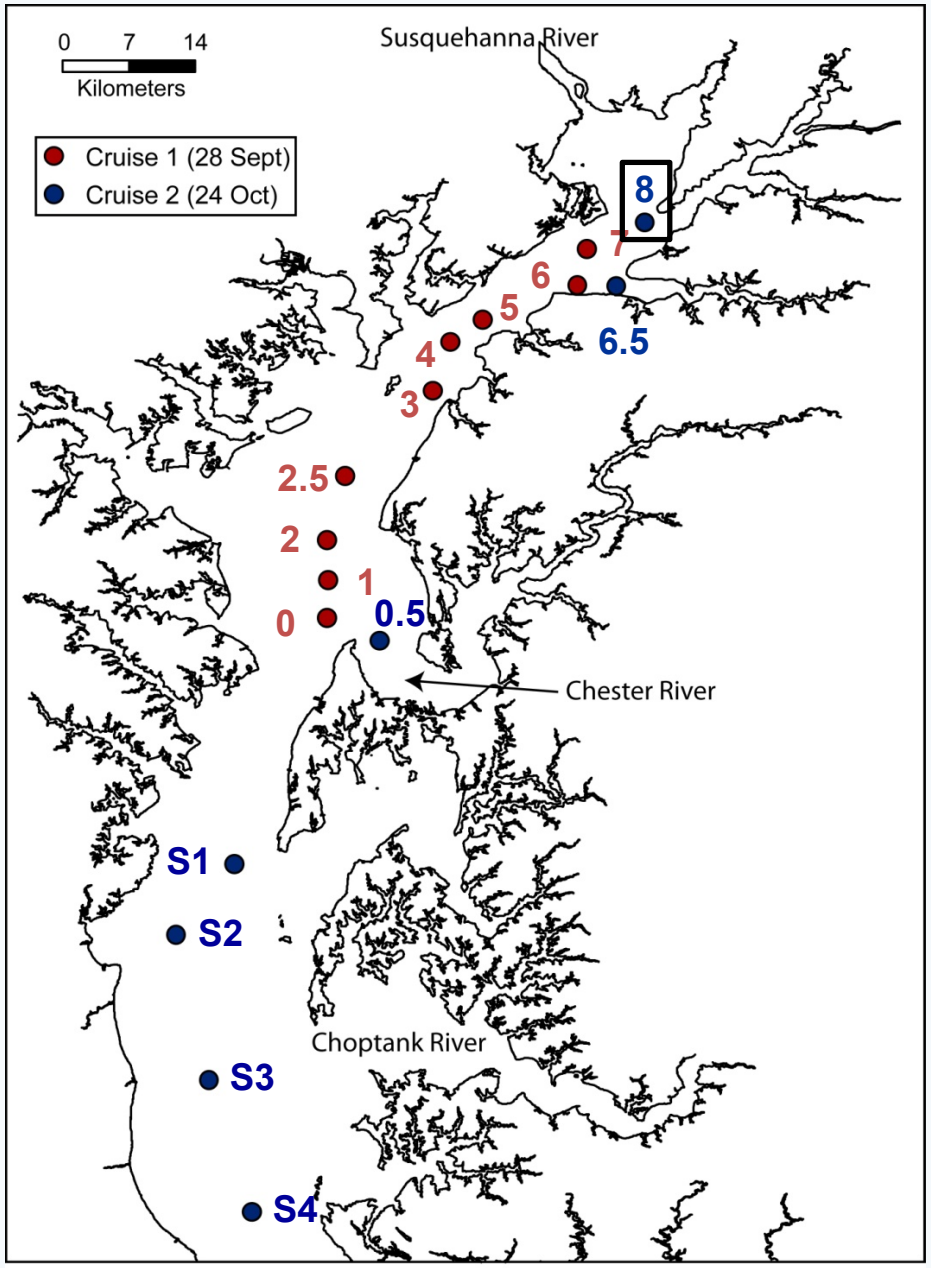
Station 2.5


25

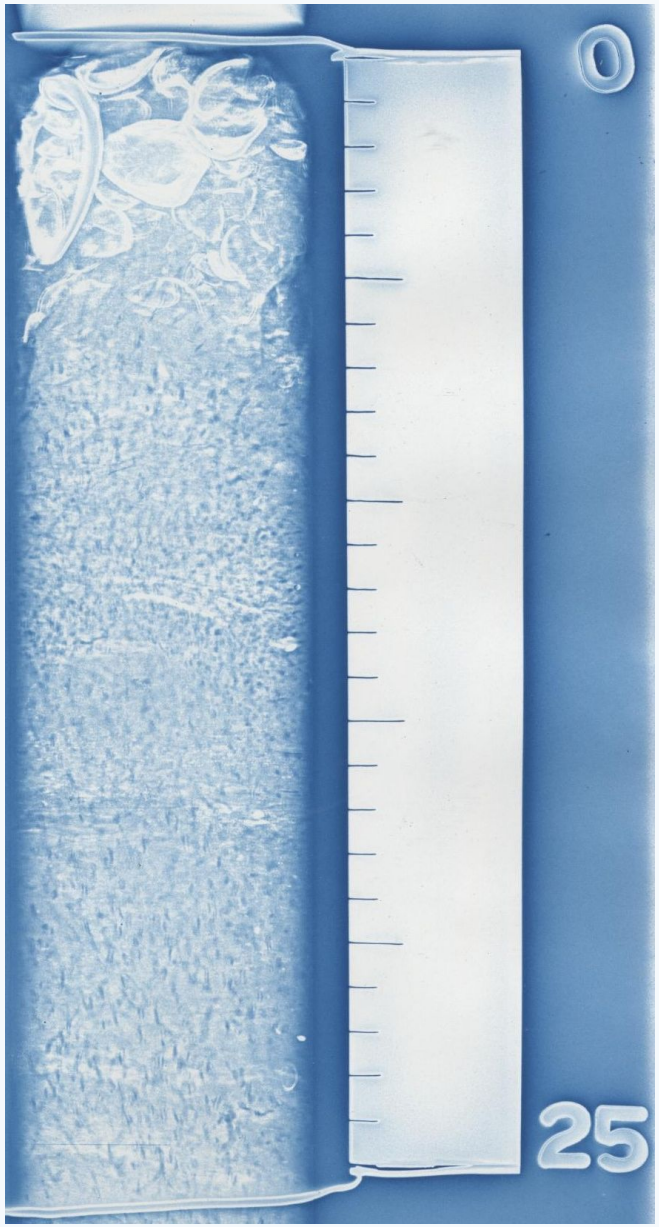

0 7 14
Kilometers
Susquehanna River
Cruise 1 (28 Sept)
Cruise 2 (24 Oct)
8
7
6
5
6.5
4
3
2.5
2
1
0
0.5
Chester River
S1
S2
Choptank River
S3
S4

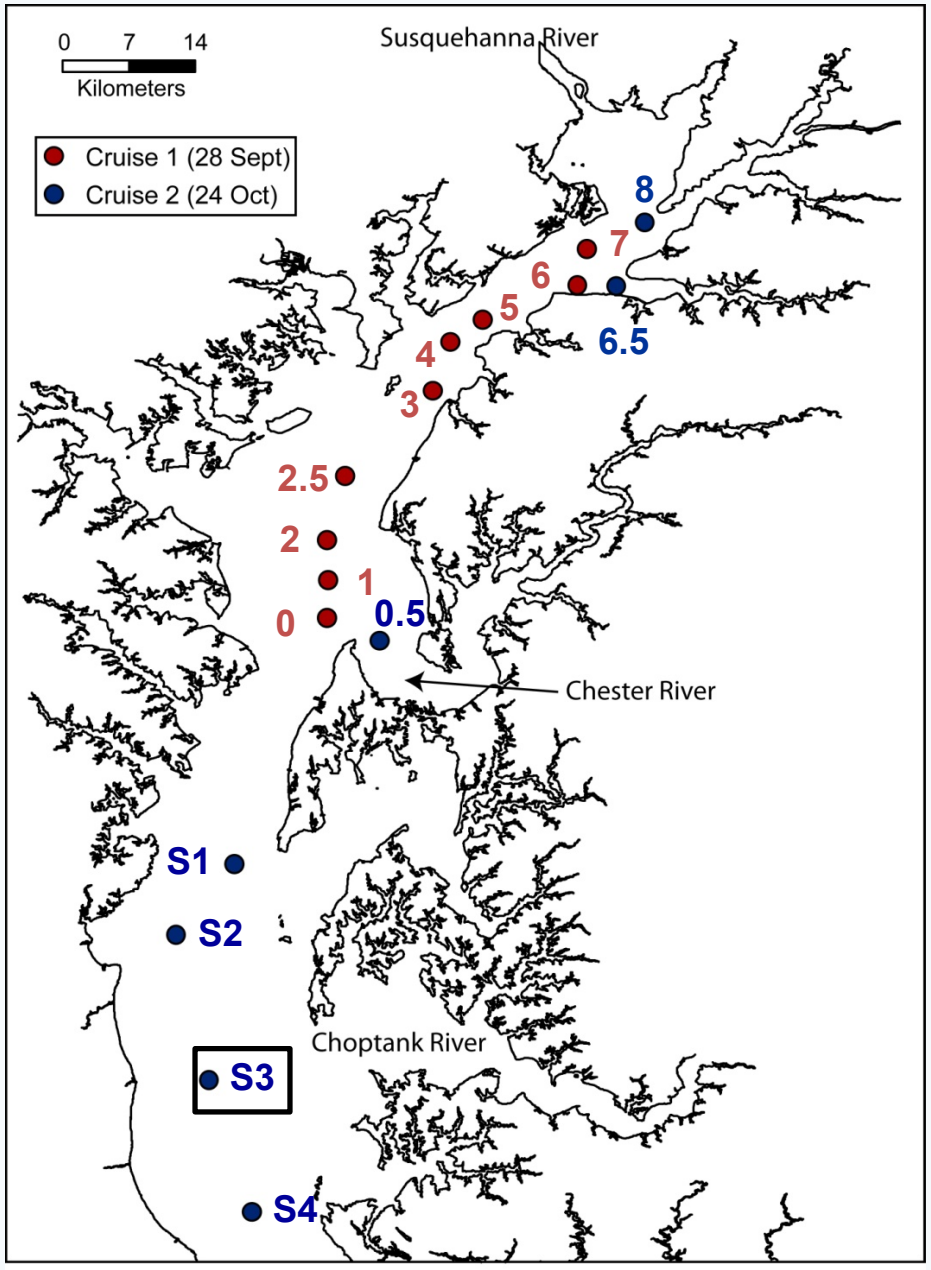
Station 5


0
25

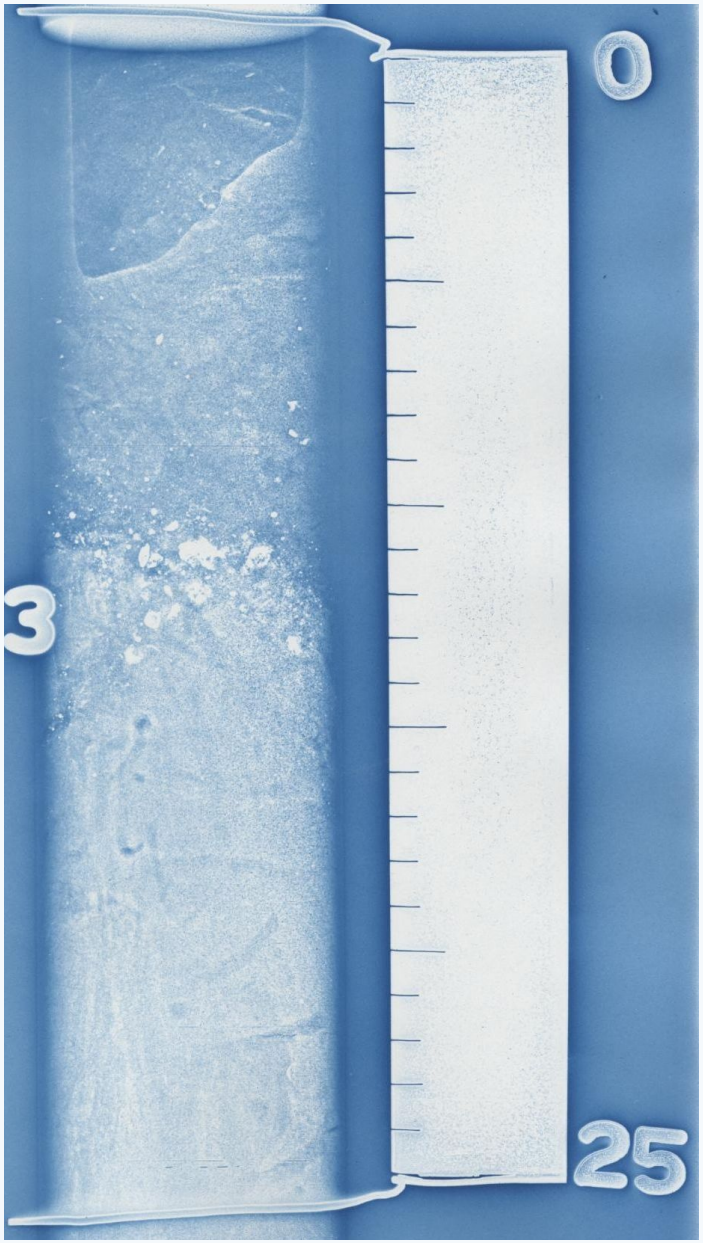

0 7 14
Kilometers
Susquehanna River
Cruise 1 (28 Sept)
Cruise 2 (24 Oct)
8
7
6
5
6.5
4
3
2.5
2
1
0
0.5
Chester River
S1
S2
Choptank River
S3
S4

Station 8

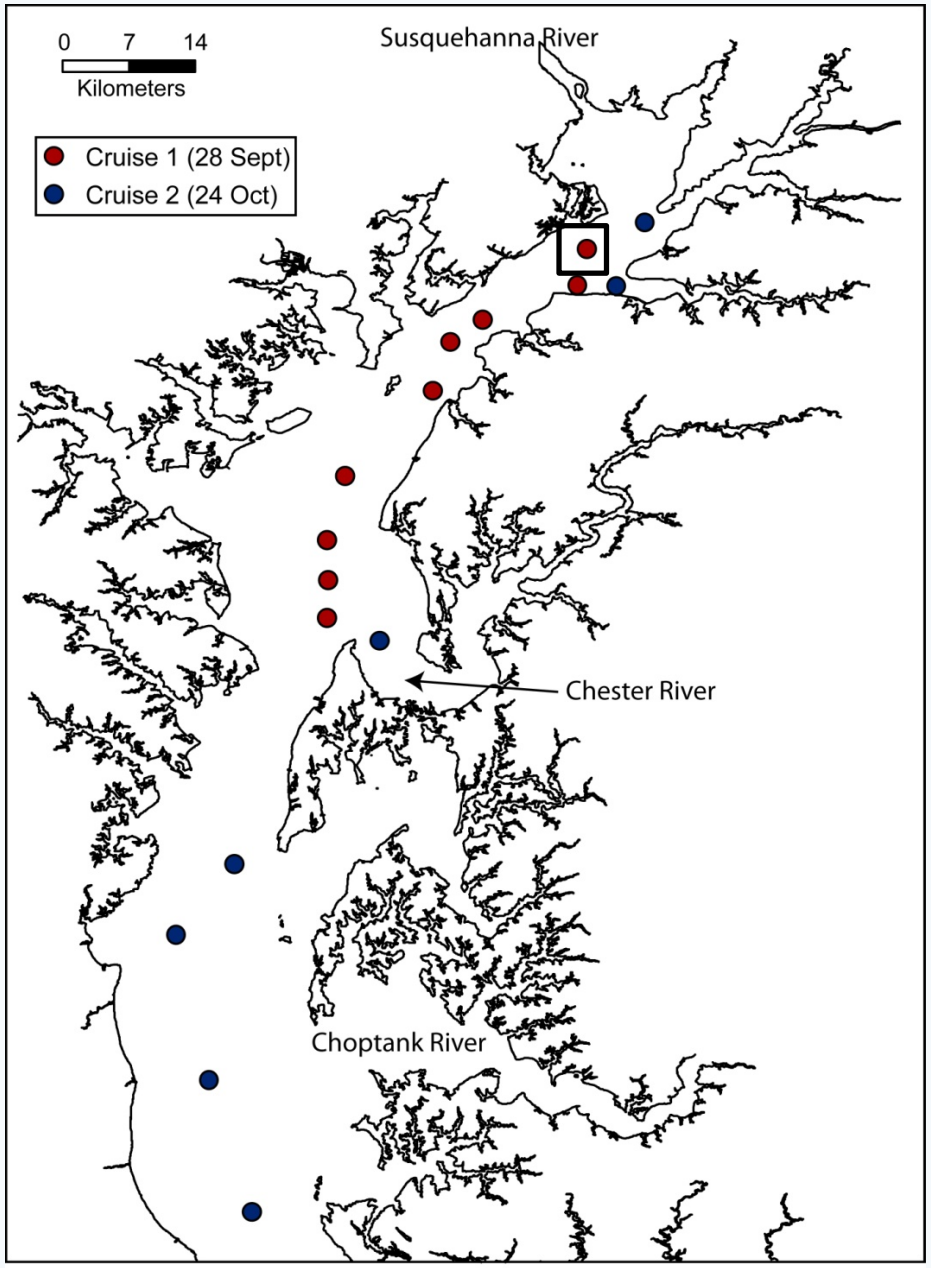

0
25


0 7 14
Kilometers
Susquehanna River
Cruise 1 (28 Sept)
Cruise 2 (24 Oct)
8
7
6
5
6.5
4
3
2.5
2
1
0
0.5
Chester River
S1
S2
S3
Choptank River
S4

Station S3


0
3
25

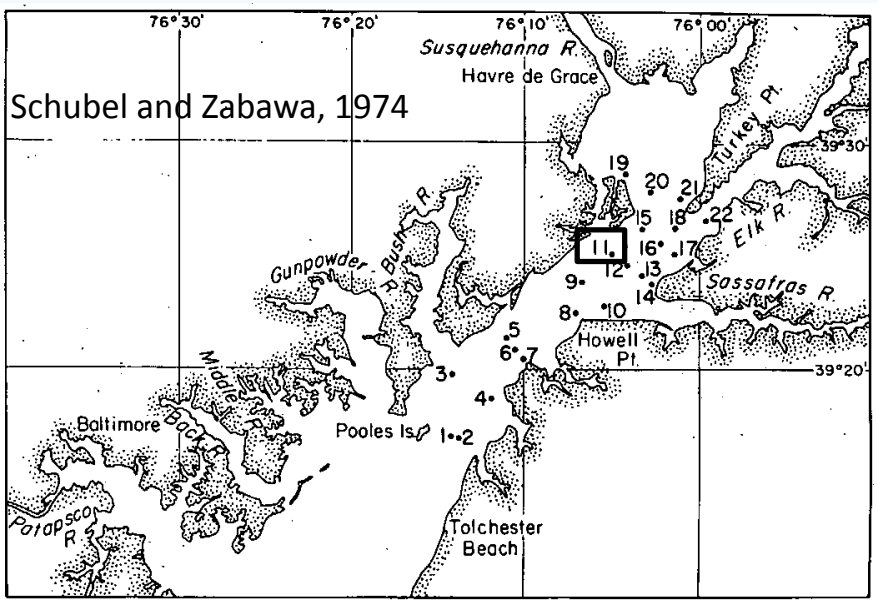
Sediment Sampling After Tropical Storm Lee



Cruise 1: 28 September 2011
Cruise 2: 24 October 2011

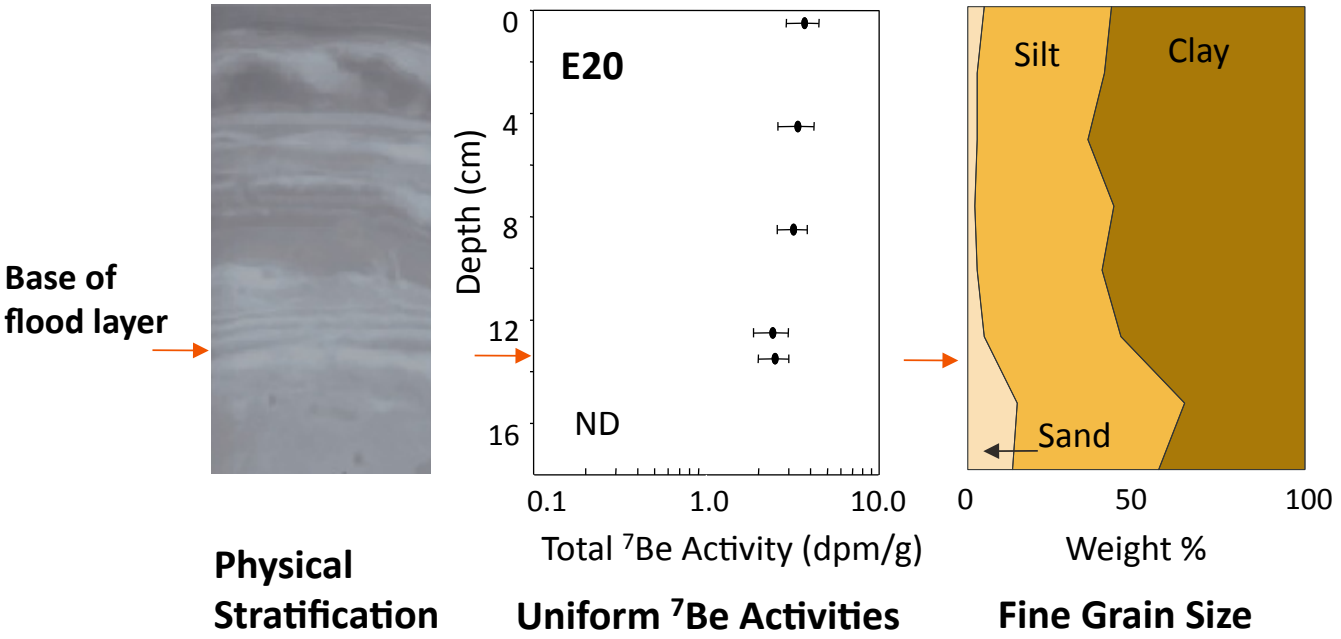
Gravity coring with MGS
Total of 17 cores

Reoccupied some post-Agnes stations
Looked for typical flood sediment signatures…



Flood Sediment Characteristics

Po River



Eel River

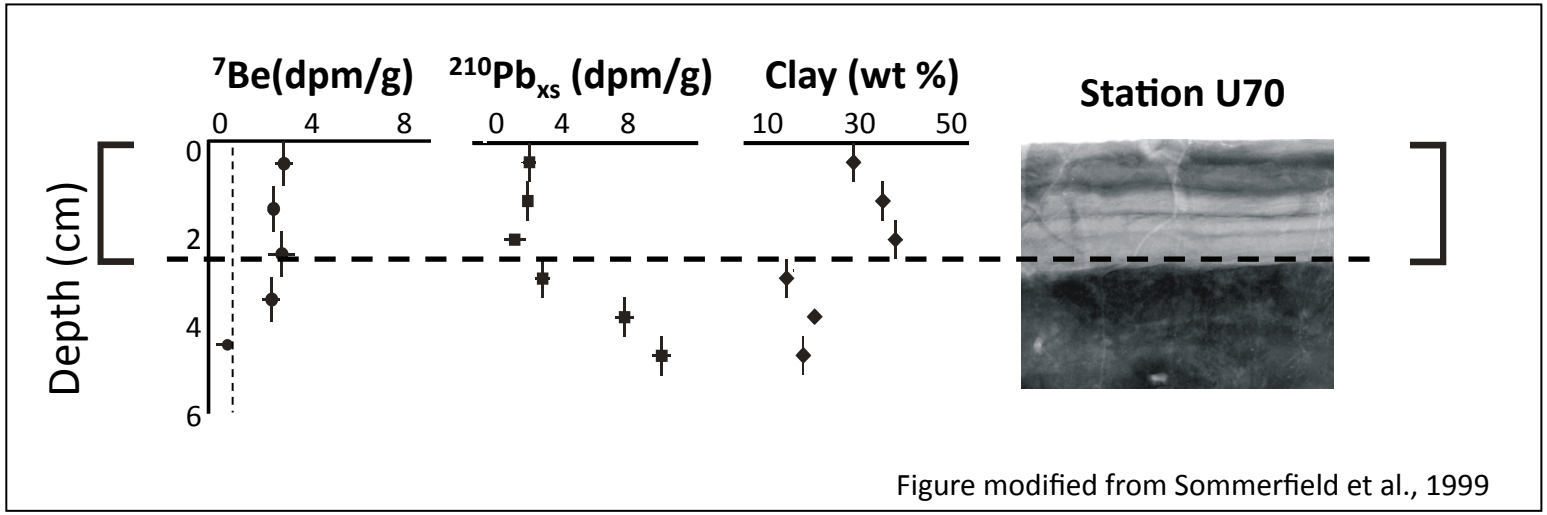
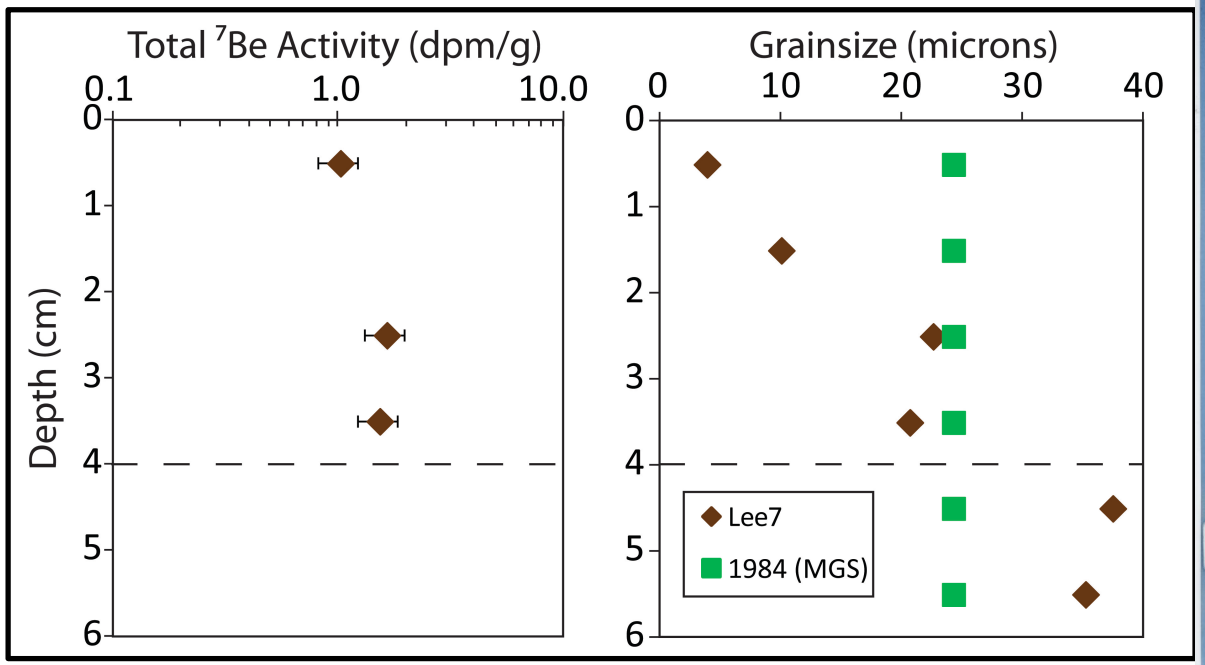
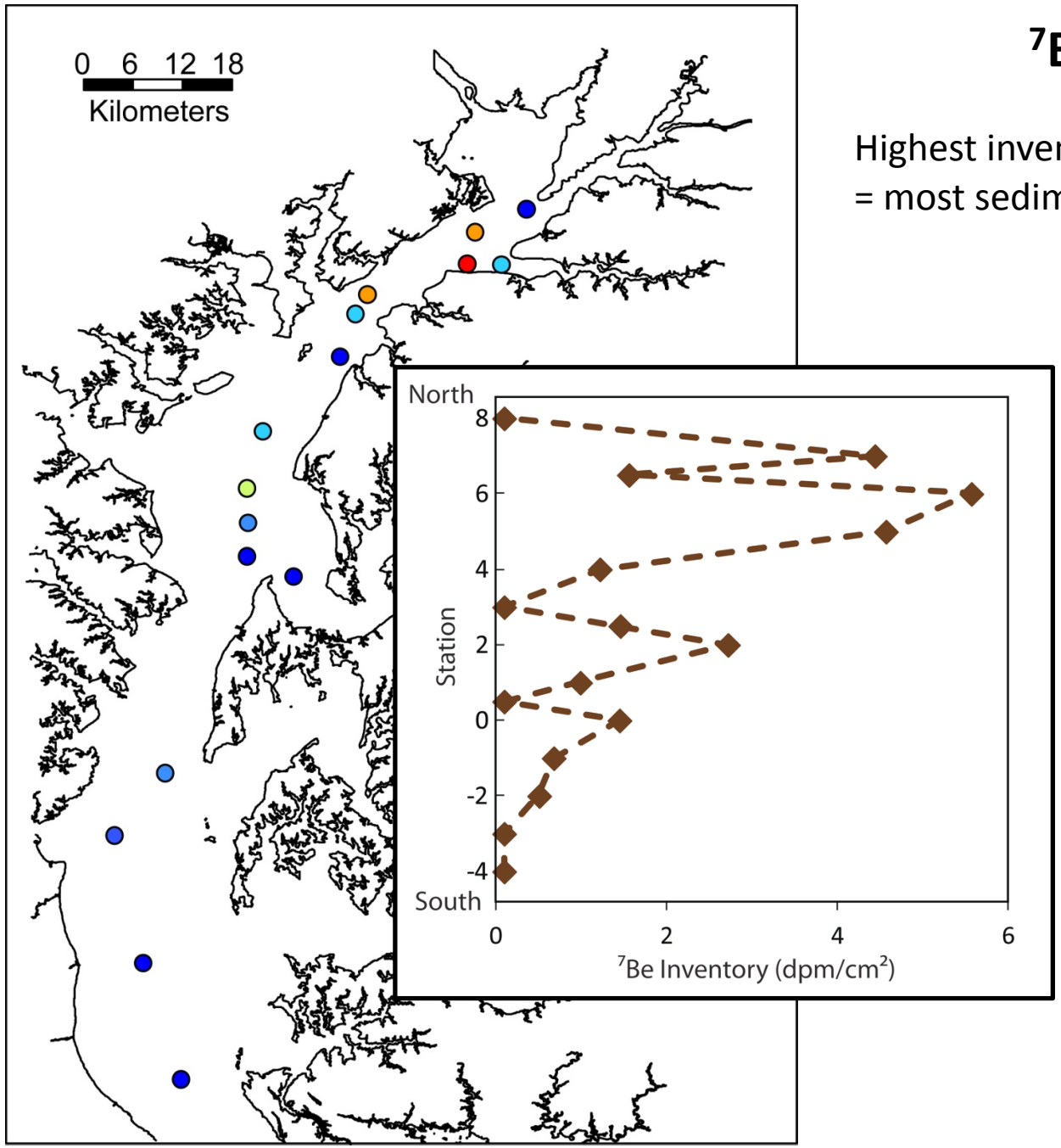


Figure modified from Sommerfield et al., 1999

Flood Sediment Signature After Tropical Storm Lee



- Classic flood-sediment signatures present in Lee cores
- Lee7 ~ Site 11 in post-Agnes study (Schubel and Zabawa, 1974), where 20-30 cm was found
- Lee = ~1/5 of Agnes deposition in upper Bay?
- Problem: many cores only have detectable ^{7}Be in upper 1 cm…



^{7}Be Inventories

Highest inventories are in the upper Bay = most sediment deposition

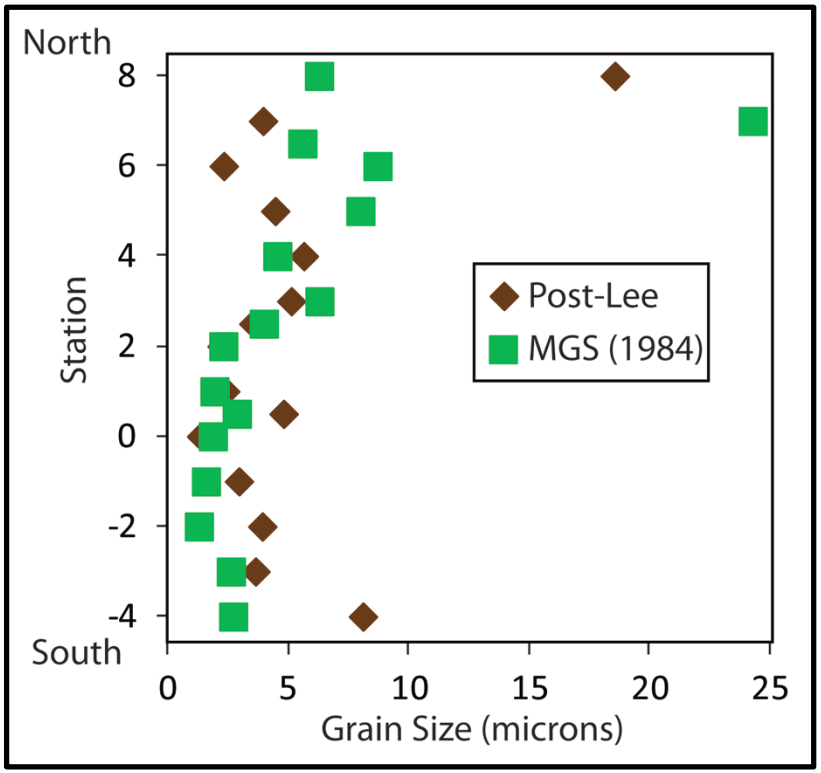
^{7}Be was not detectable everywhere:

- Erosion? Lee8 (Susquehanna Flats), Lee3 (Poole's Island)
- "Dusting" of sediment?
- Conowingo Dam sediment?

More data to come!

- ^{210}Pb, ^{234}Th
- Grainsize

Grainsize Trends



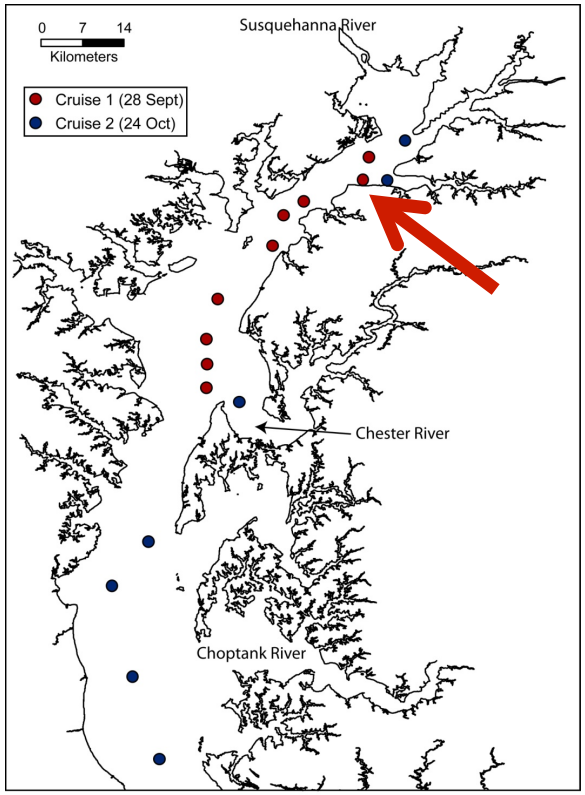
Comparison with previous data:

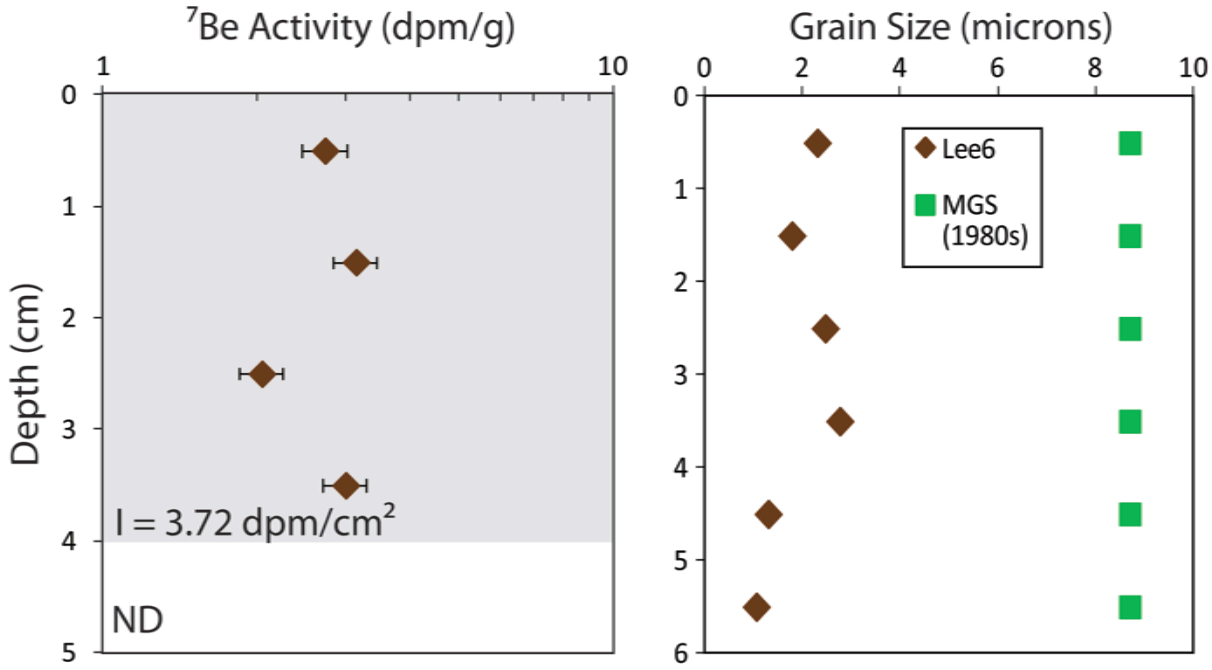
- Upper Bay: post-Lee sediments are finer (except near Susquehanna Flats)
- Mid-May: post-Lee sediments are about the same as previous observations
- Lower Bay: post-Lee sediments are somewhat coarser

Note: post-Lee data are for surficial (0-1 cm) sediments; MGS data are from grab sampling (typically ~5 cm)

More data to come! Down-core profiles at each site

Lee6

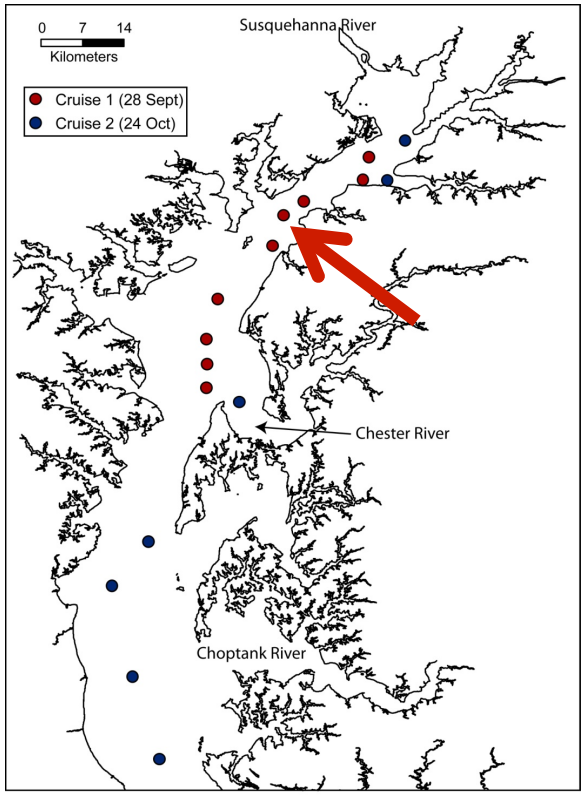


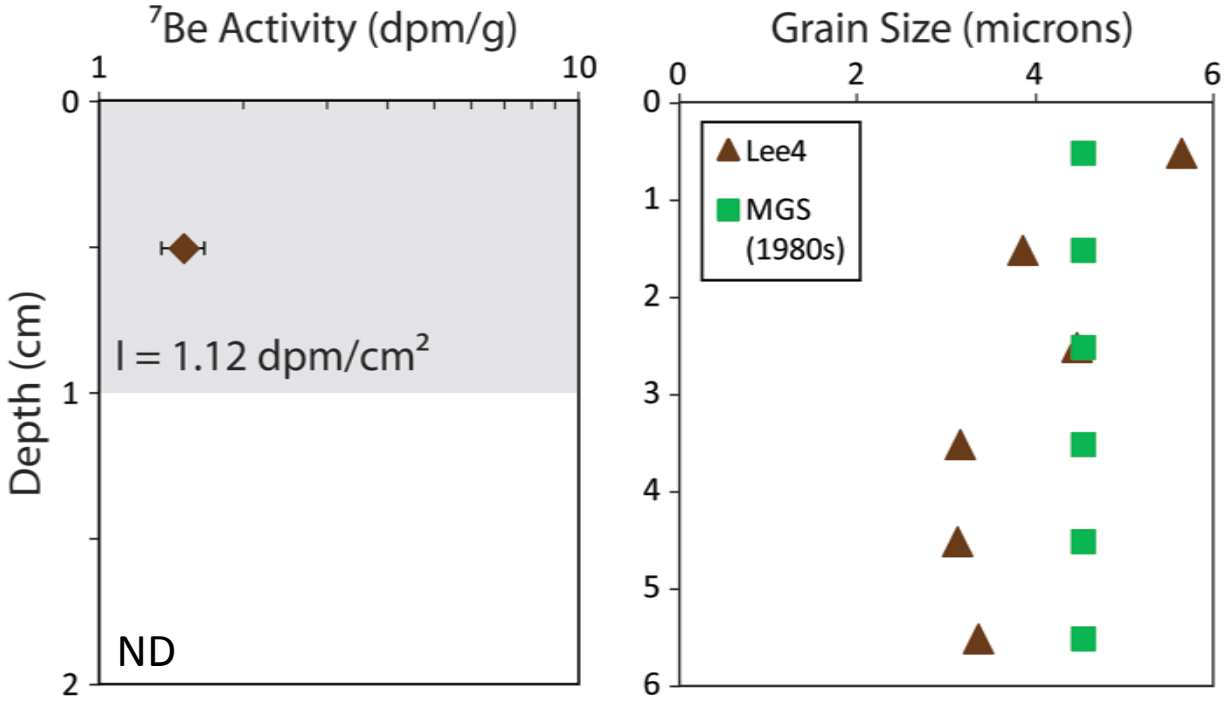


Similar to S&Z Site 10: 15-20 cm; noted that it could be overestimated

Lee deposition: 4 cm
But could be overestimate due to mixing

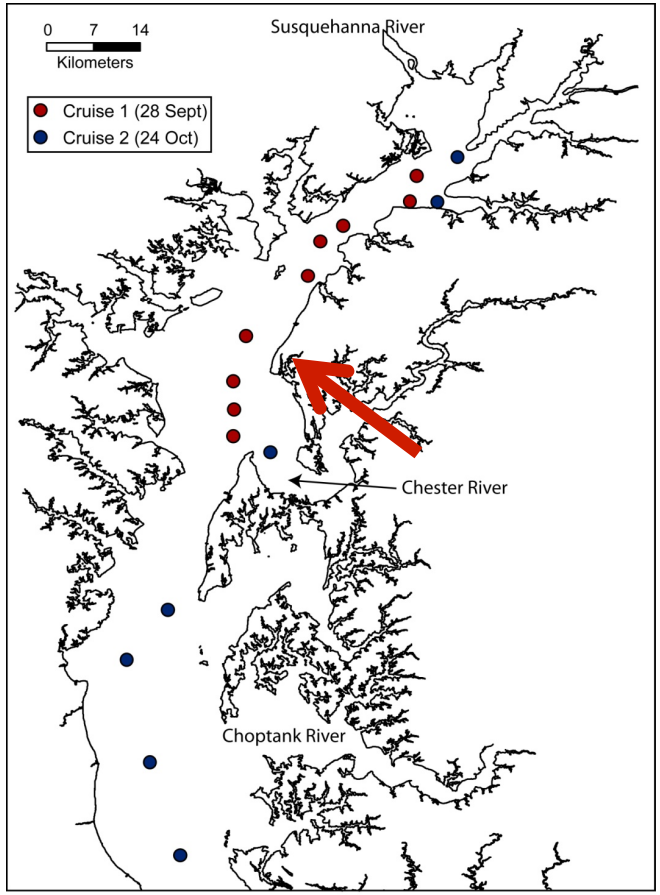
Lee4





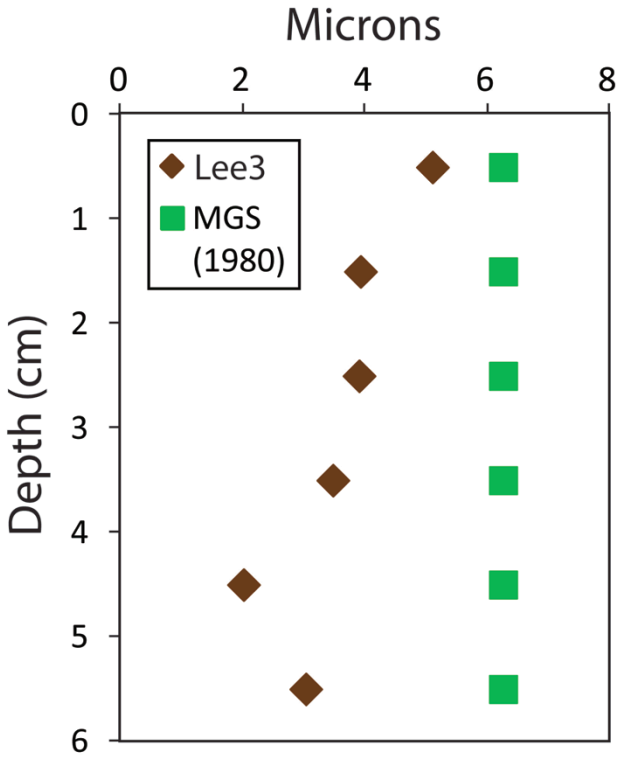
Lee deposition: <1 cm

Lee3



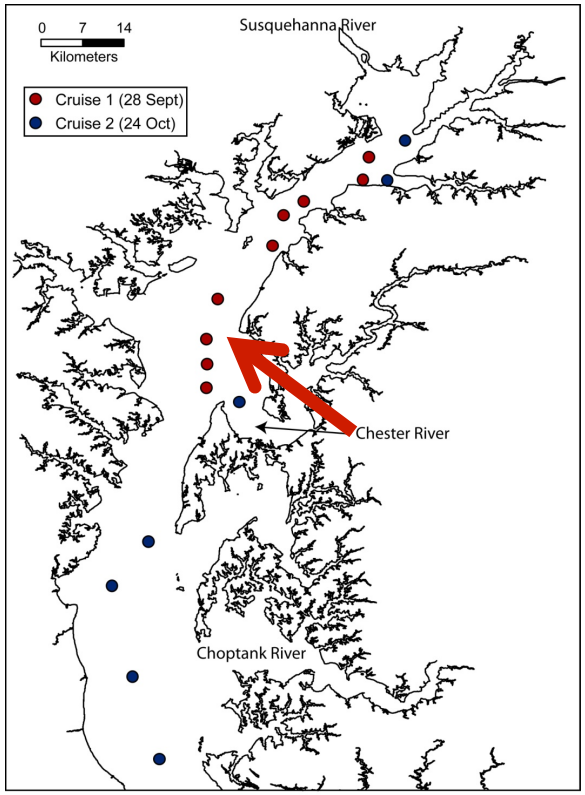
Similar to S&Z Site 2: 4-6 cm

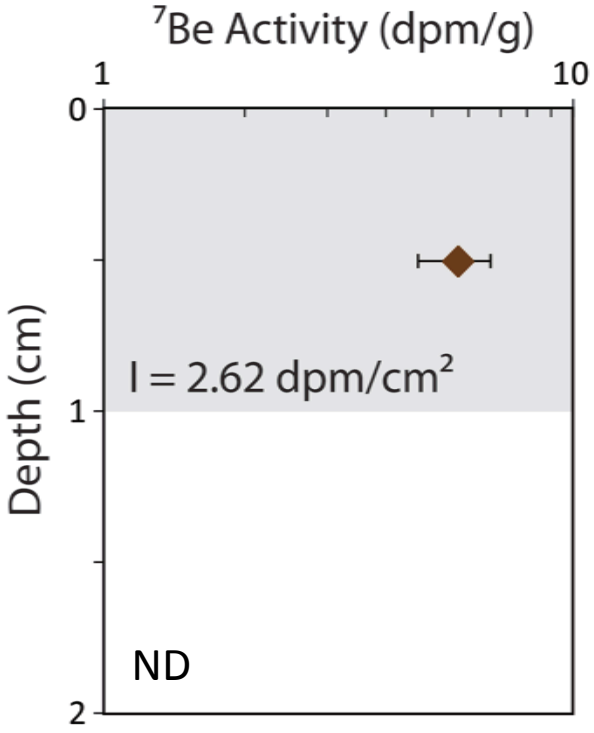
^{7}Be not detectable

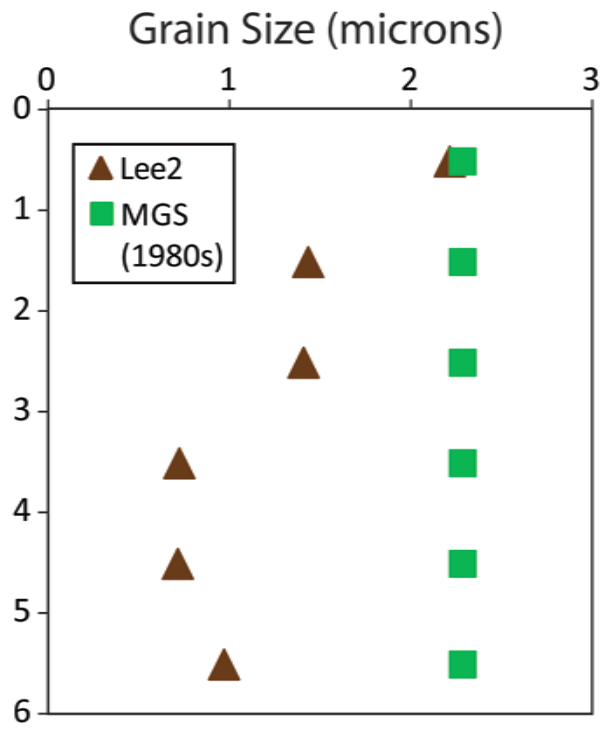


No Lee deposition

Lee2

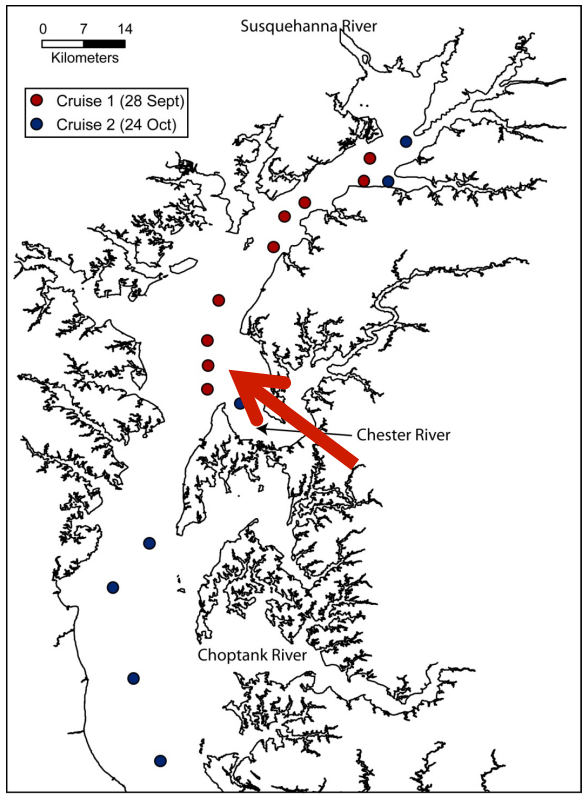


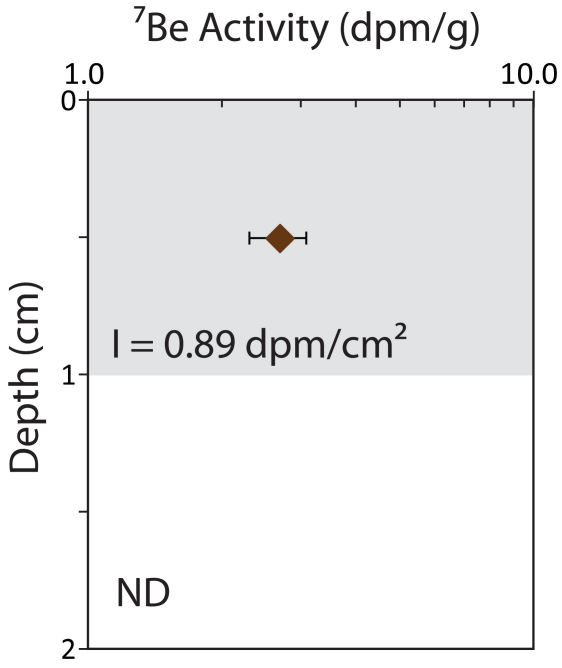


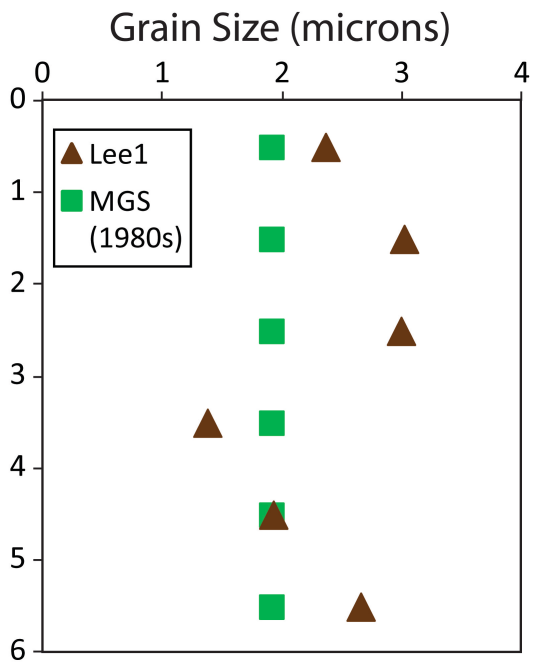


Lee deposition: <1 cm but more than Lee4

Lee1







Lee deposition: <1 cm but less than Lee2

Summary

- Sediment data are incomplete
  - Preliminary grain-size data inconclusive; need longer and more profiles
  - Some radiochemical signatures not yet analyzed

- Most ^{7}Be-tagged sediment deposited in upper Bay, with little to no deposition in lower Bay
  - ~1 cm or less at most sites
  - Maximum thickness of 4cm at Lee7

- X-radiograph and ^{7}Be estimates of flood-deposit thickness do not agree at many sites
  - Difficulties with resolution
  - Conowingo Dam sediment?
  - Time delay between upper and lower Bay sampling?

- We need all the pieces of the puzzle! More data soon!