Long-term data at possible stations

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5-21-21

Overview

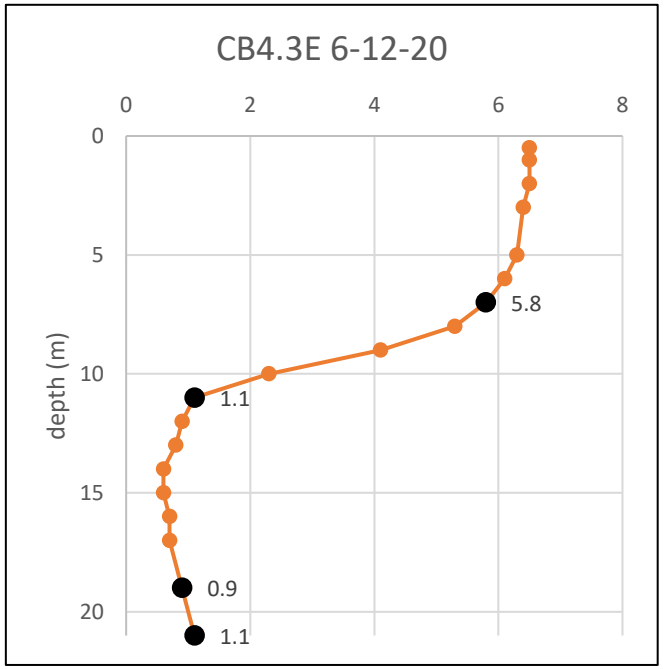
- Earlier this year, I took a look at the continuous vertical DO data from the prototype deployment last summer – to consider:
  - What that type of data could tell us about short-term water quality criteria
  - To start thinking about how we could use it in a 4D interpolator

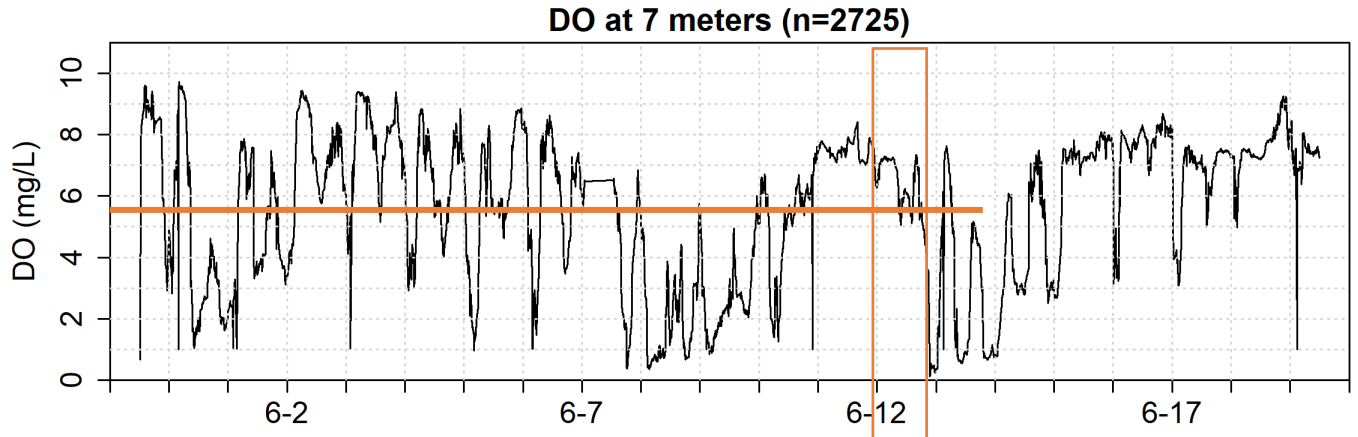
  →some slides on comparing the continuous observations at CB4.3E to long-term monitoring
- Normally I work with long-term monitoring trends

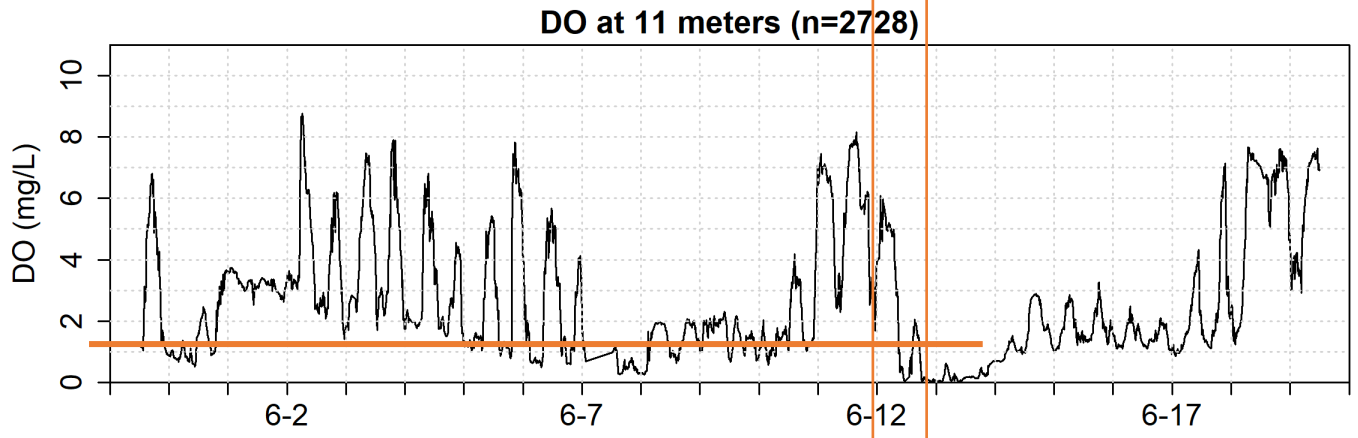
  →some comparison stations at CB4.1, CB4.3 and CB5.1 over the long-term

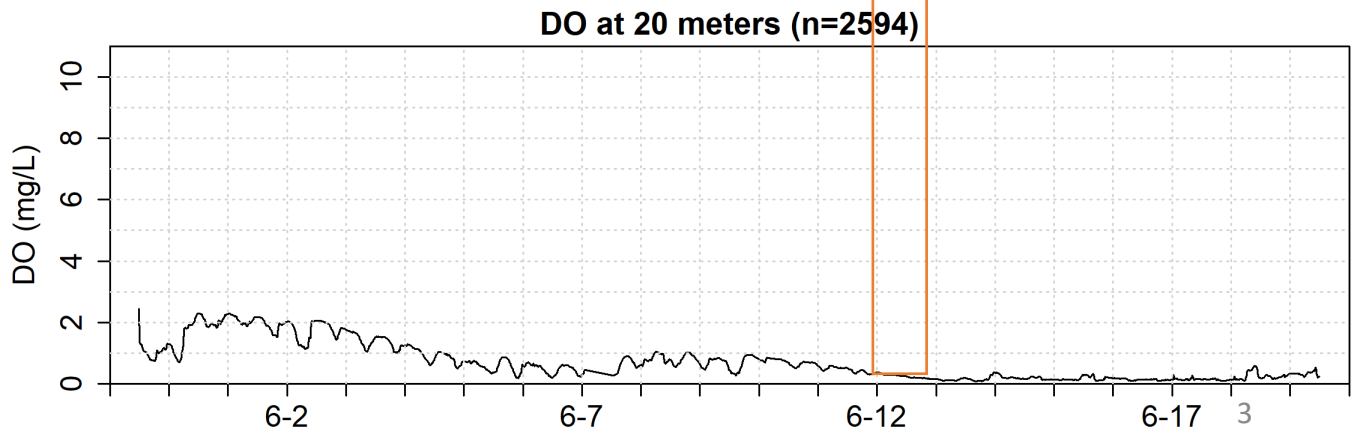
  →Thoughts on what we could get from each location

Compare to long-term sampling in the period

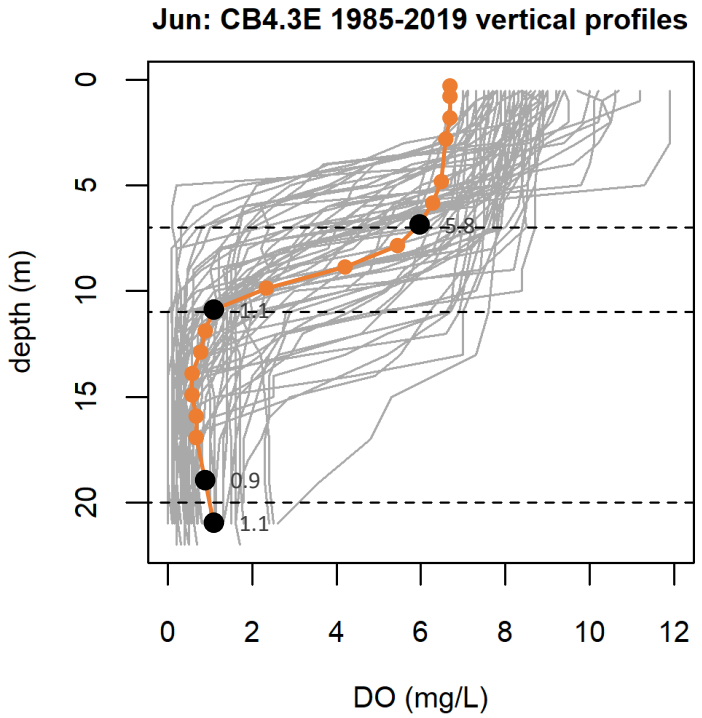




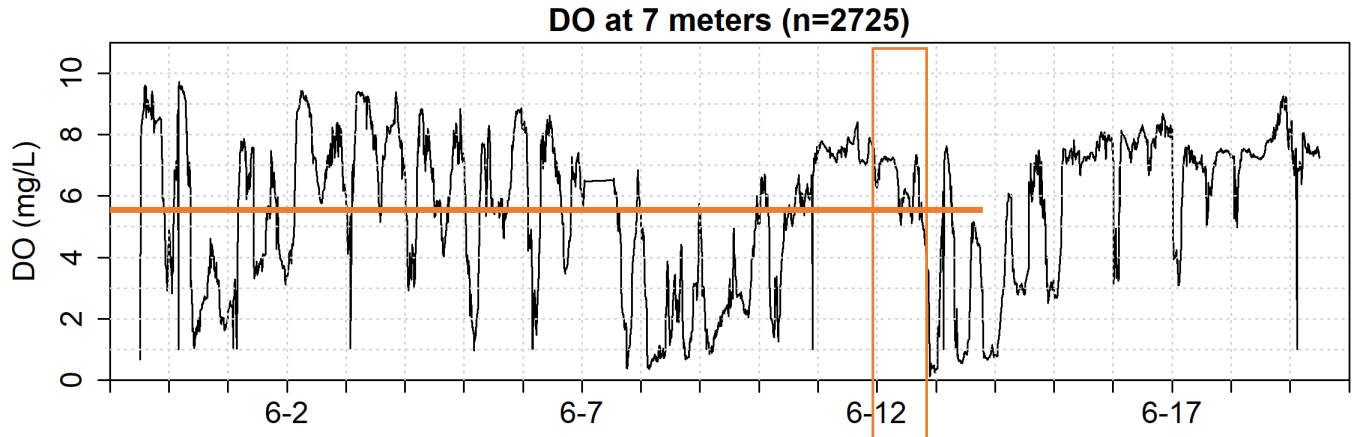


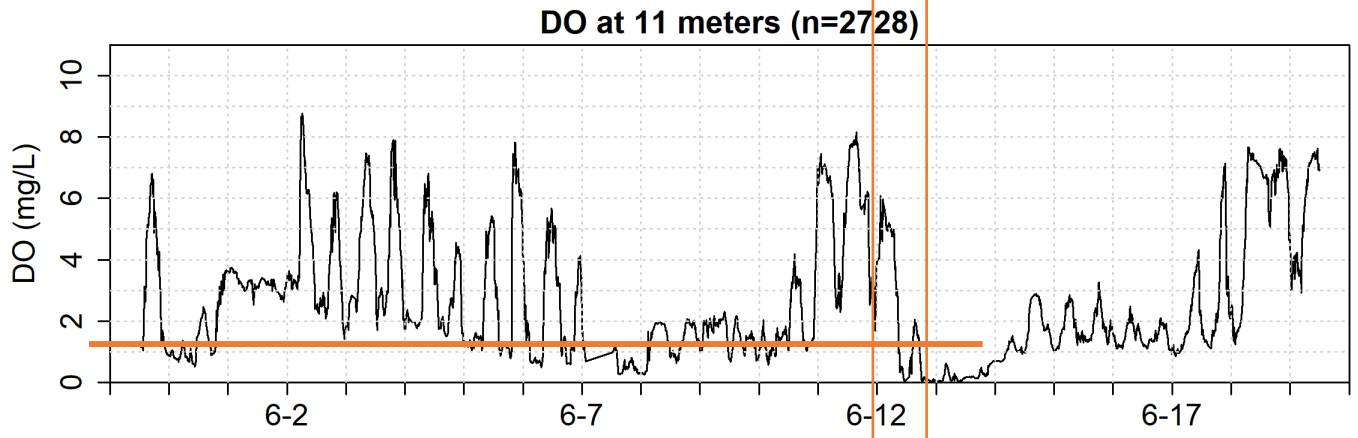


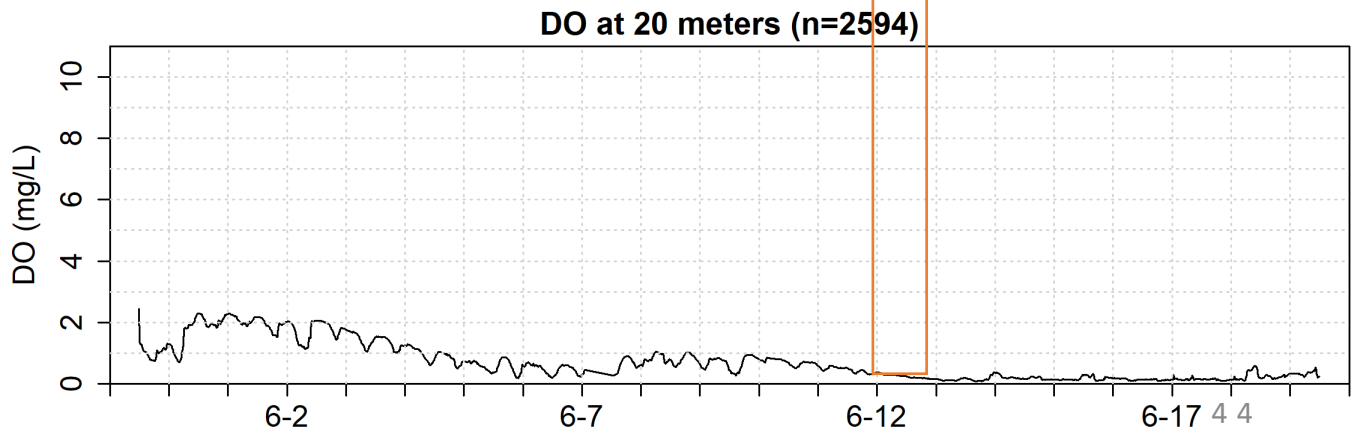
Compare to range of June DO profiles



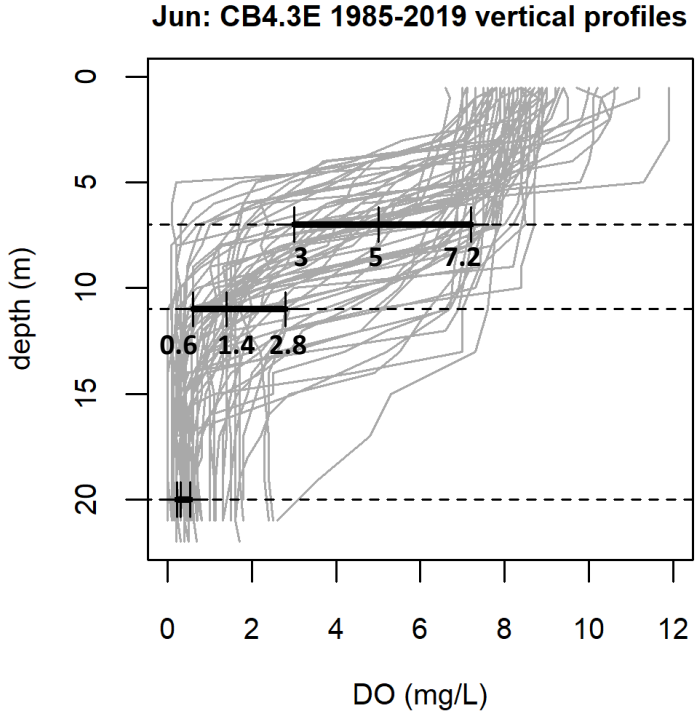
(note: lower surface observation for June 2020 is because I suspect this is the only sample time was different than usual.)



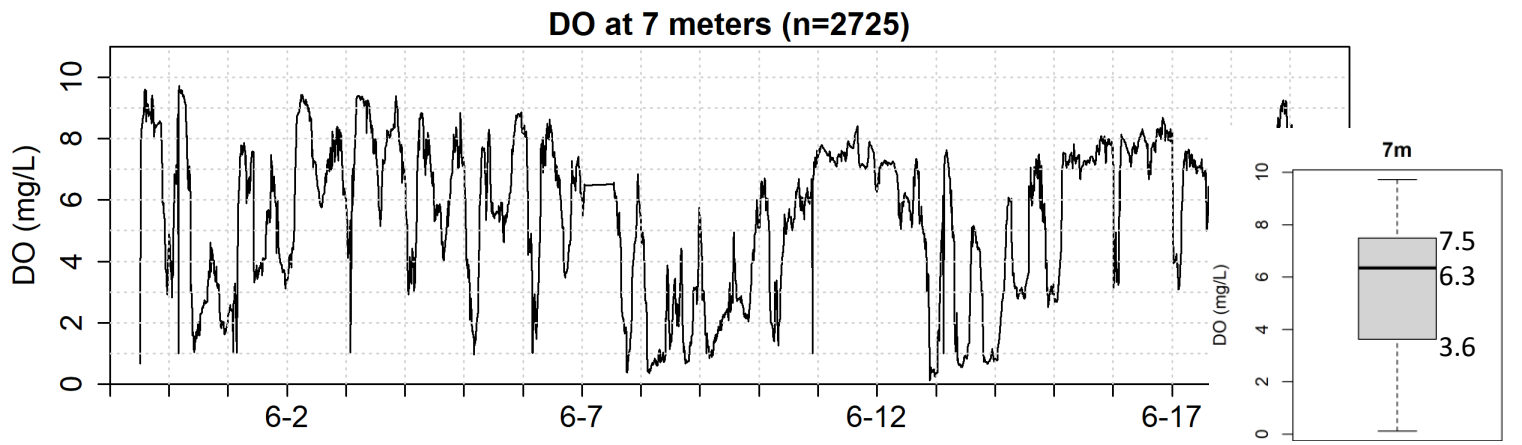


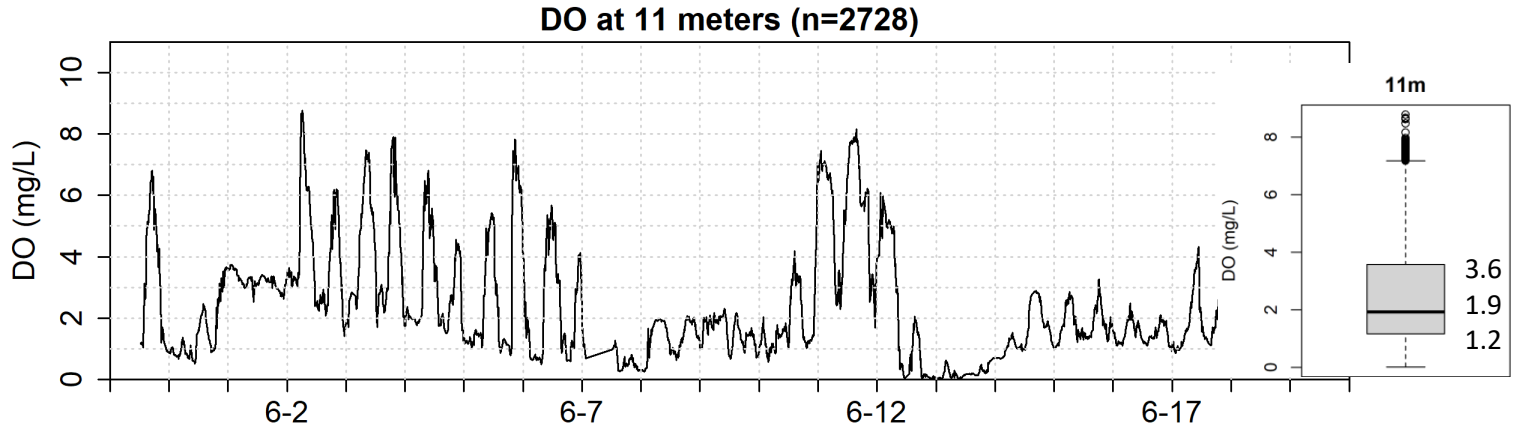


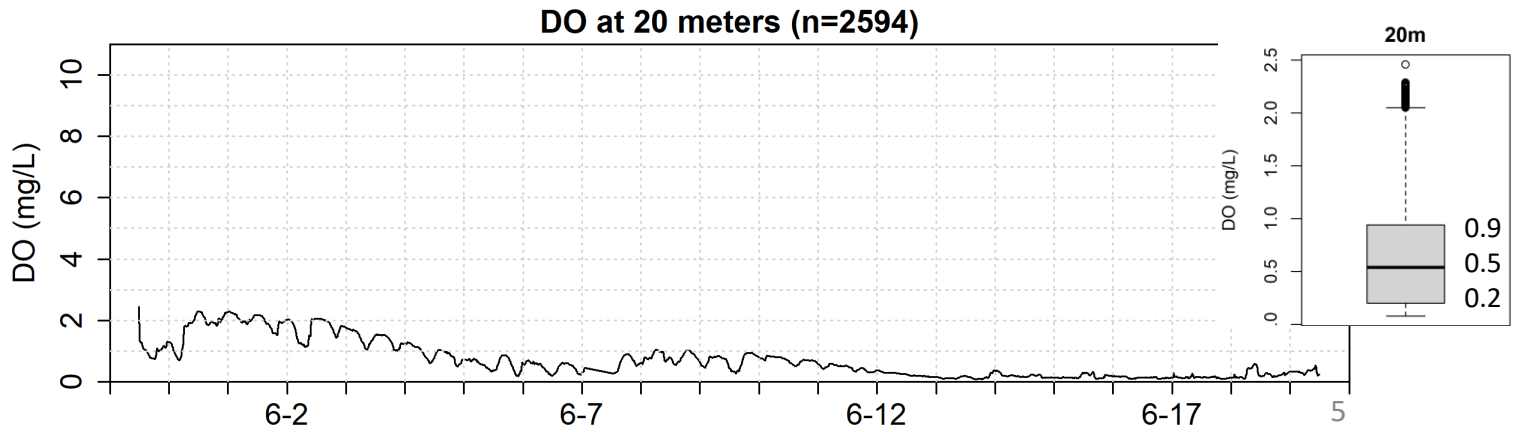
Compare to range of June DO profiles



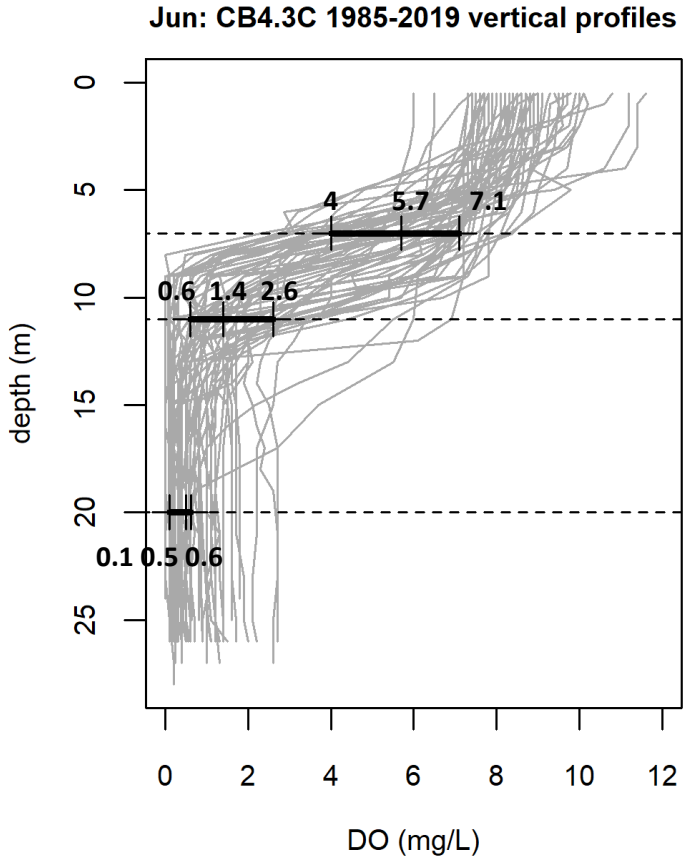
- Combined long-term profiles have similar variability to the 10-min data

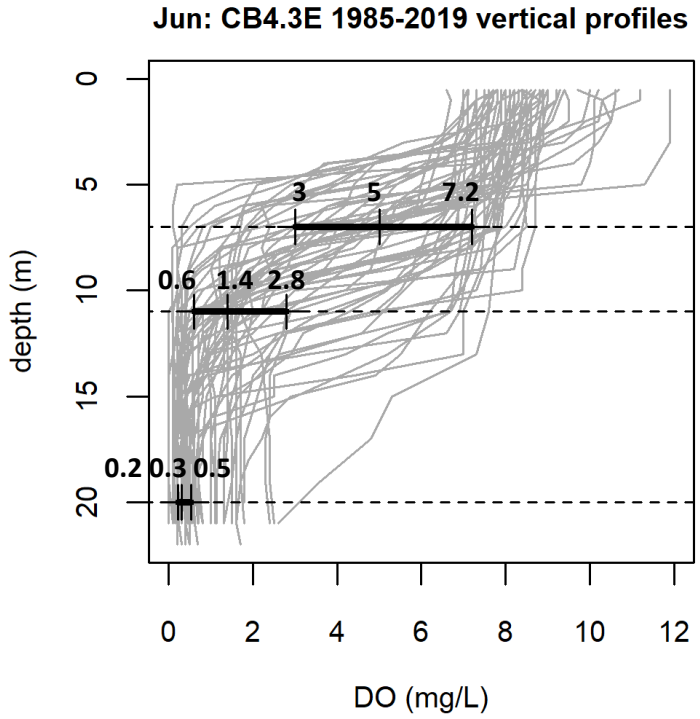






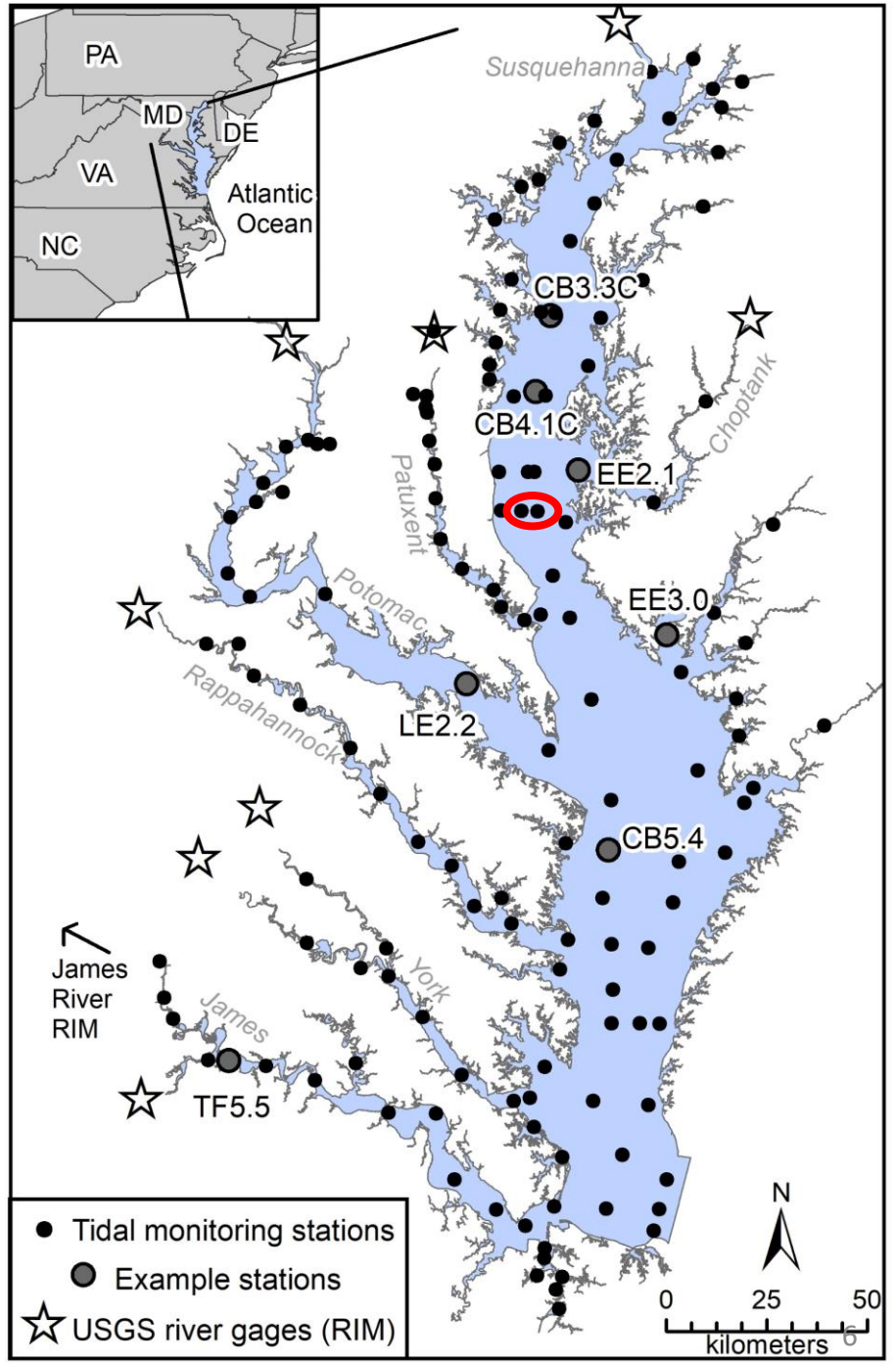
Compare to range of June DO profiles at center channel station



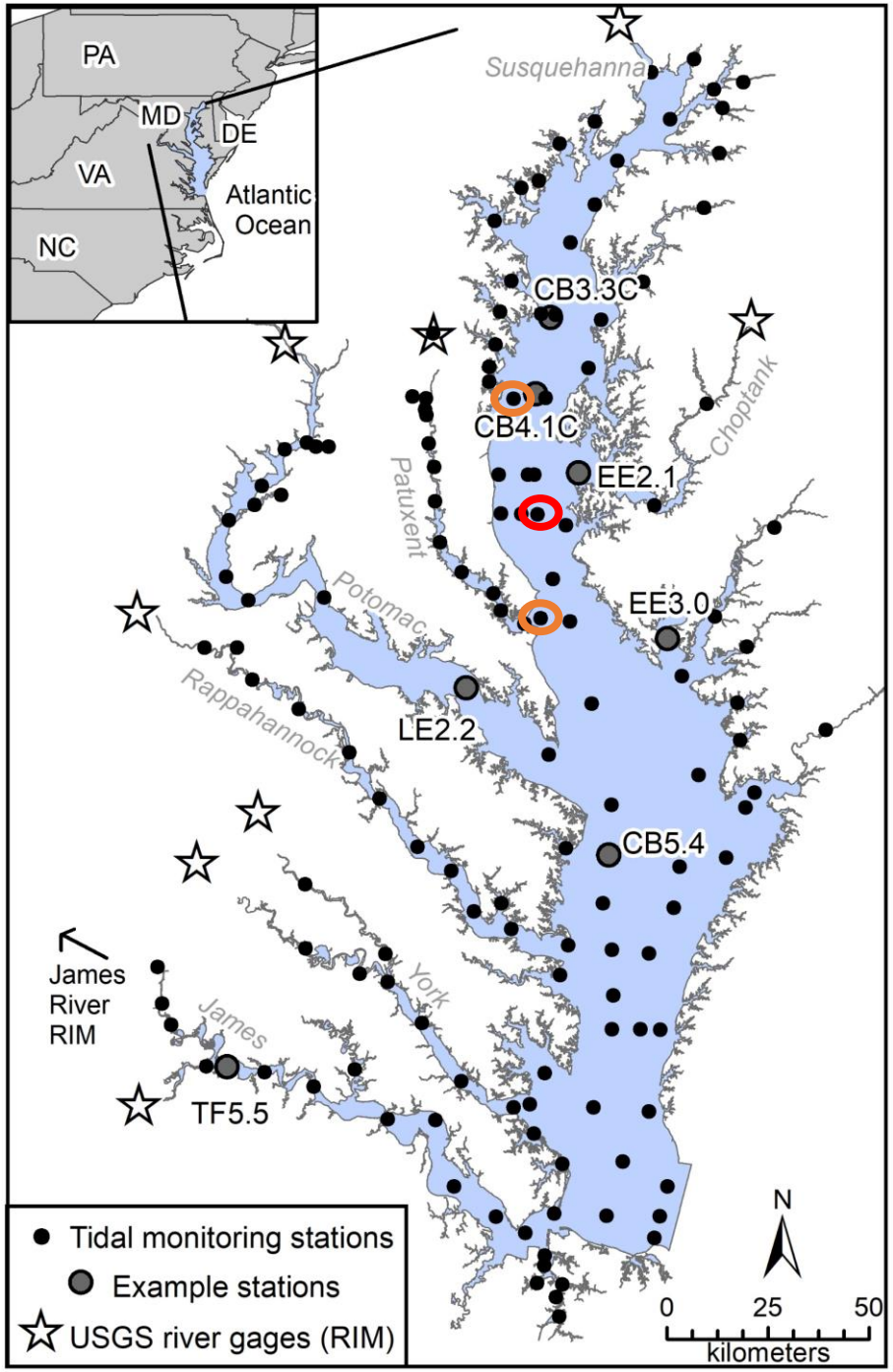


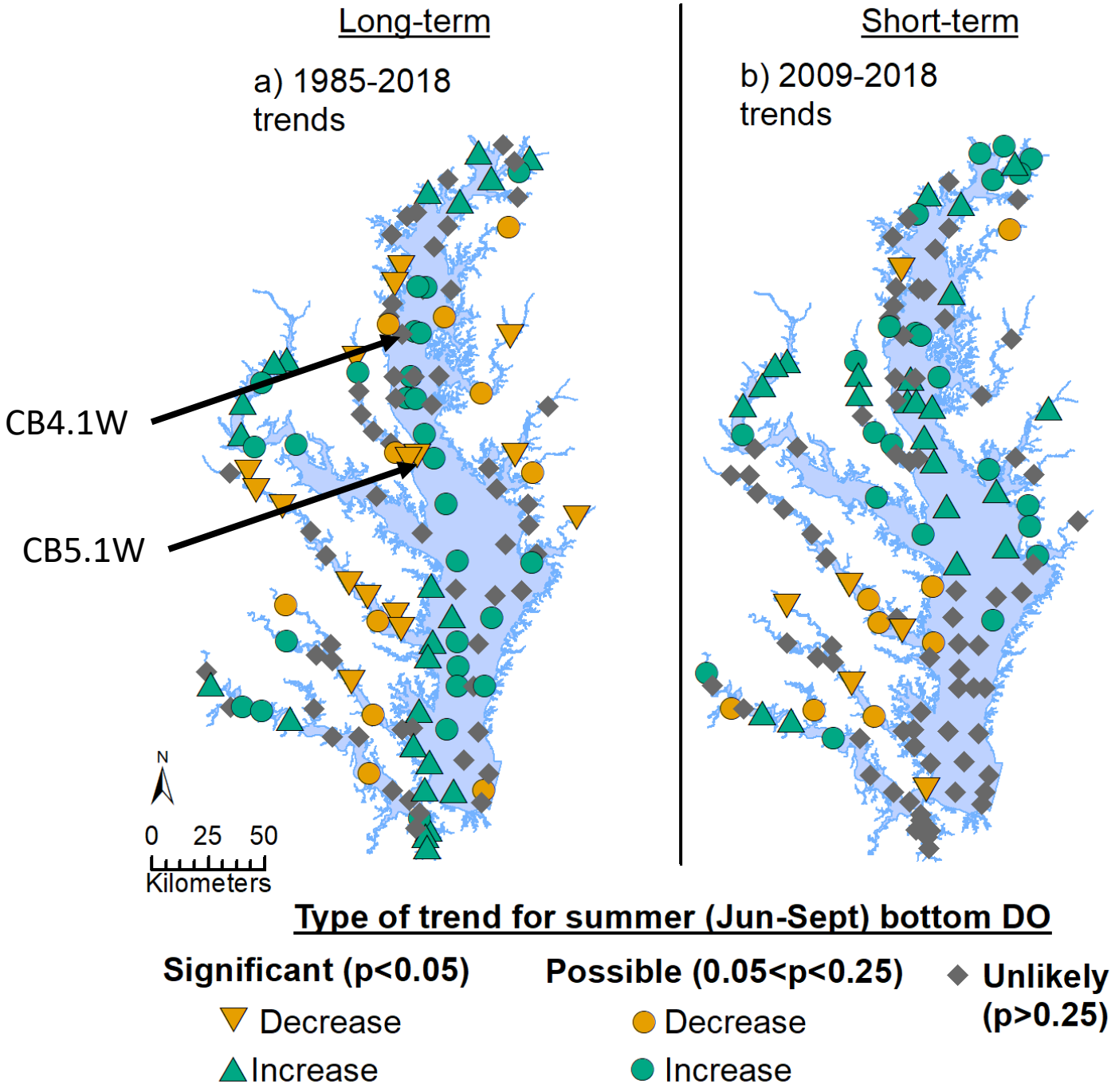
- Surface mixed layer more frequently shallower at E than C.

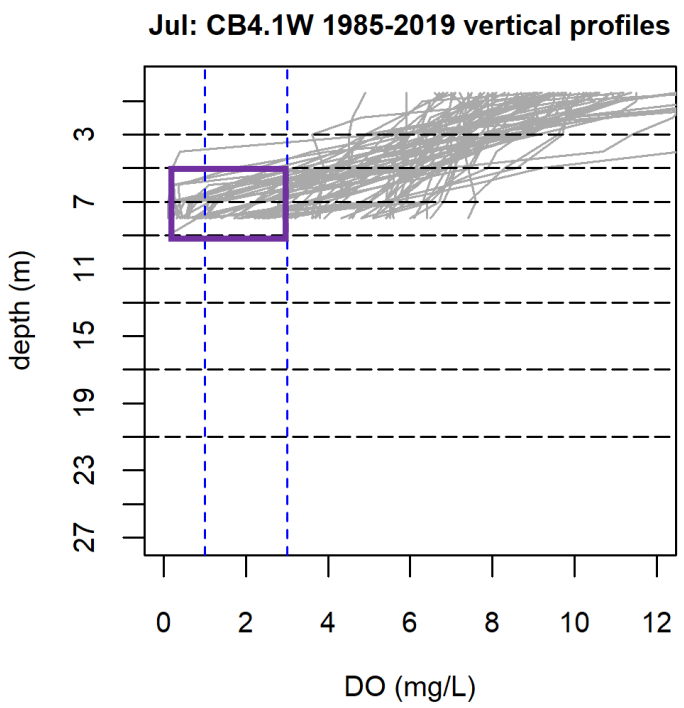
→ Conclusion: the short-term variability seen this continuous station might not be the same as even at nearby stations.

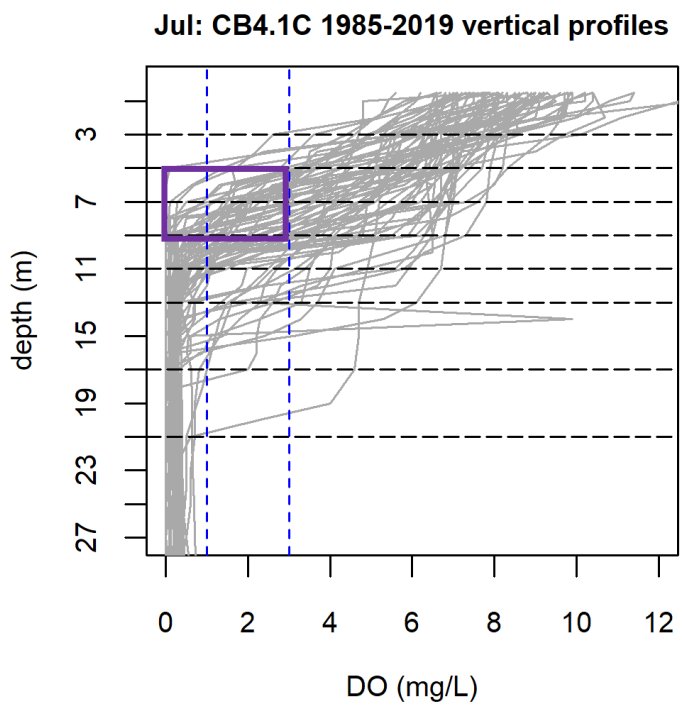


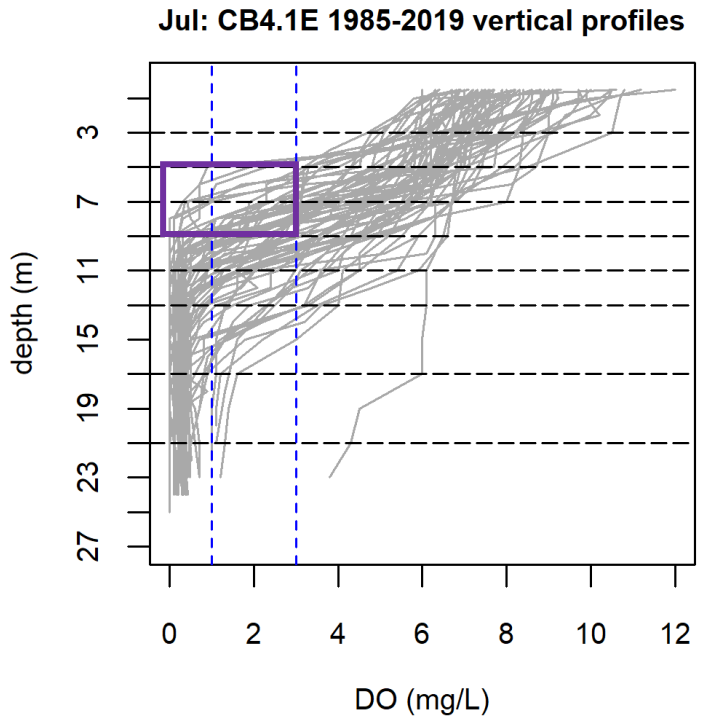
Other locations

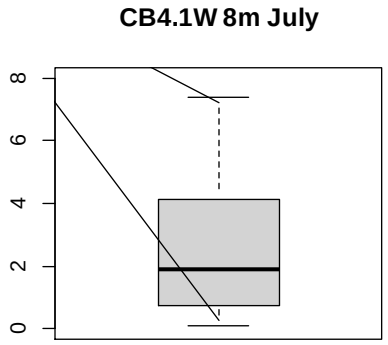


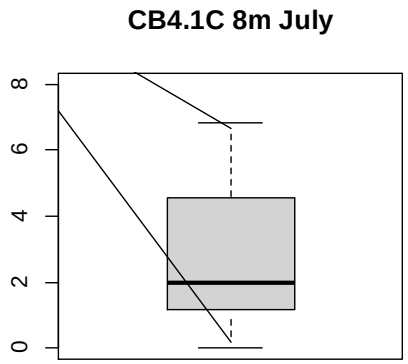

Long-term
a) 1985-2018 trends
Short-term
b) 2009-2018 trends
CB4.1W
CB5.1W
N
0 25 50
Kilometers
Type of trend for summer (Jun-Sept) bottom DO
Significant (p<0.05)
Decrease
Increase
Possible (0.05<p<0.25)
Decrease
Increase
Unlikely (p>0.25)

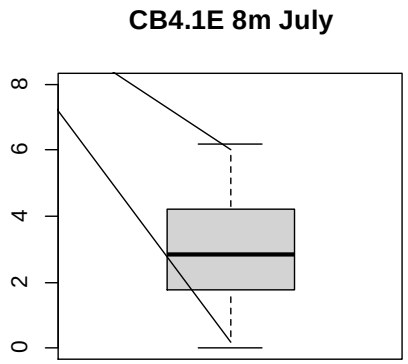

Jul: CB4.1W 1985-2019 vertical profiles
depth (m)
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

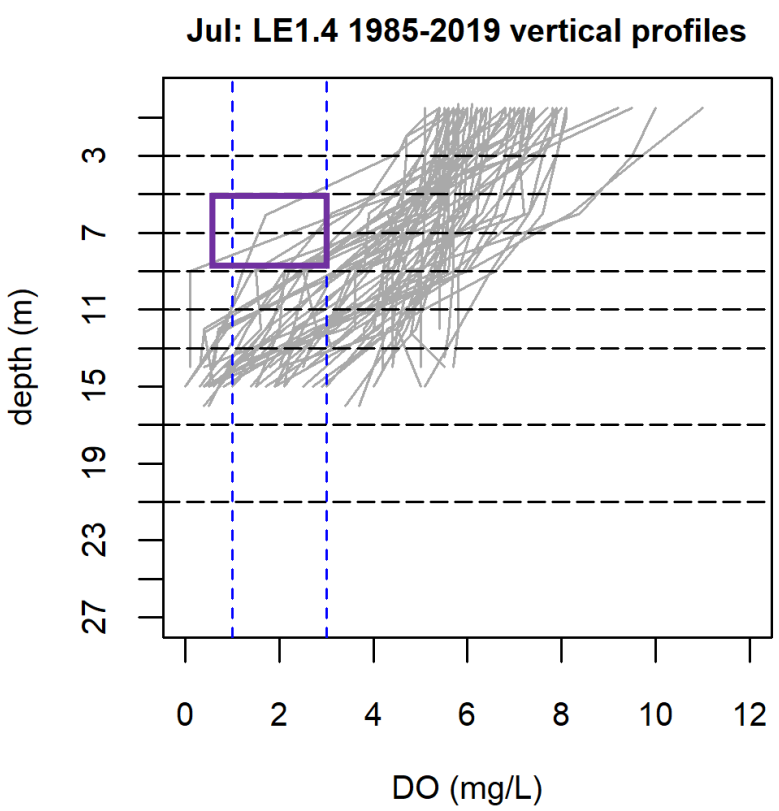

Jul: CB4.1C 1985-2019 vertical profiles
depth (m)
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

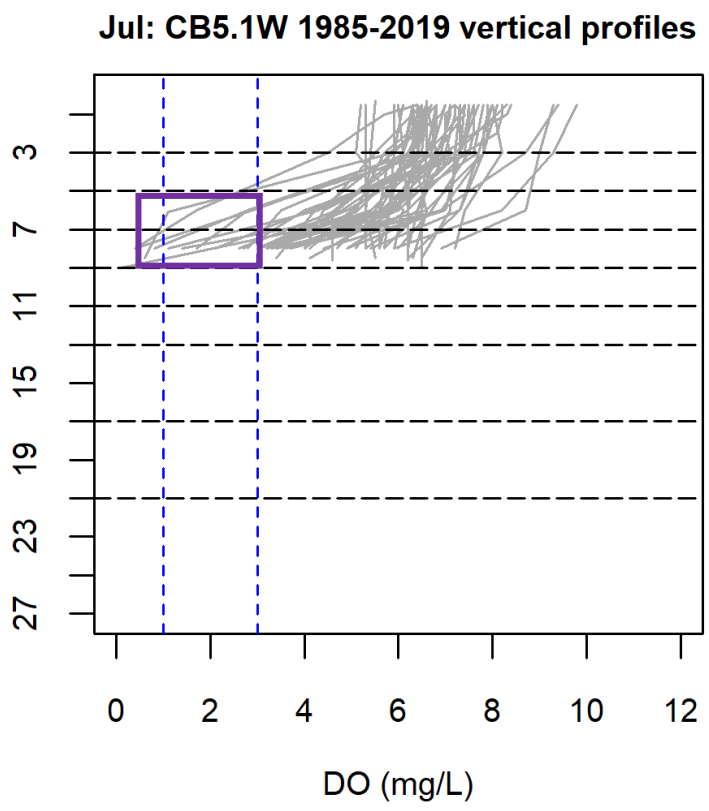

Jul: CB4.1E 1985-2019 vertical profiles
depth (m)
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

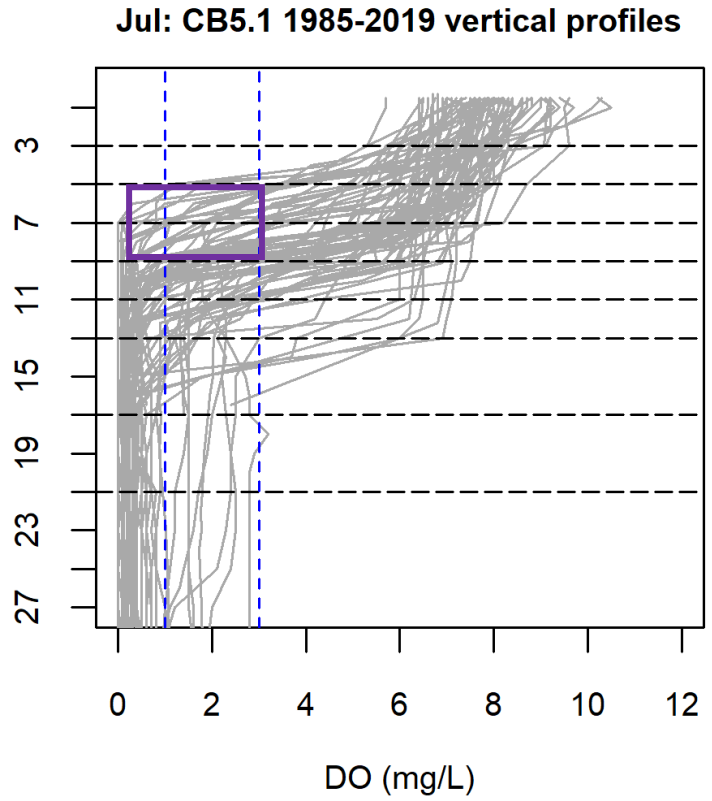

CB4.1W 8m July
0
2
4
6
8

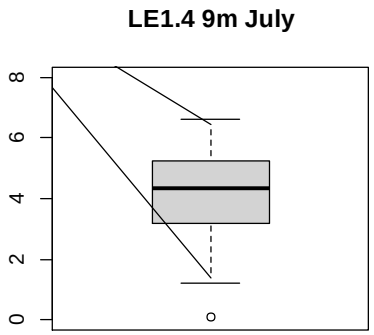

CB4.1C 8m July
0
2
4
6
8

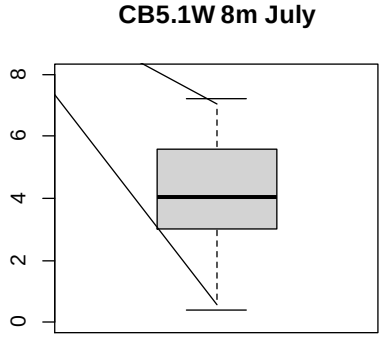

CB4.1E 8m July
0
2
4
6
8

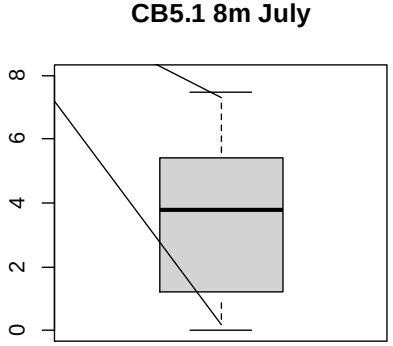

Jul: LE1.4 1985-2019 vertical profiles
depth (m)
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

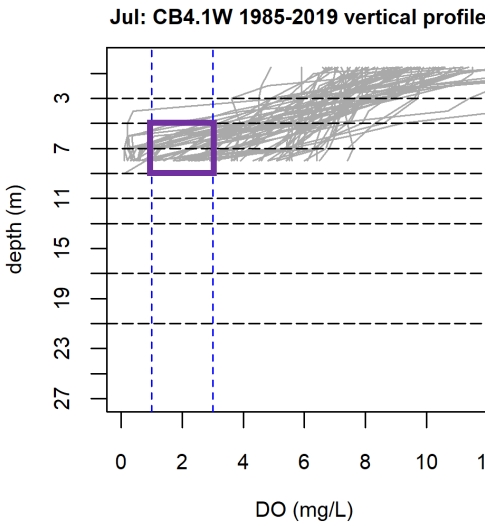

Jul: CB5.1W 1985-2019 vertical profiles
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

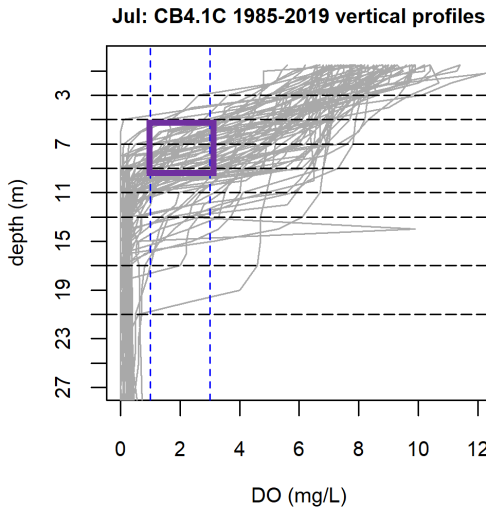

Jul: CB5.1 1985-2019 vertical profiles
3
7
11
15
19
23
27
0
2
4
6
8
10
12
DO (mg/L)

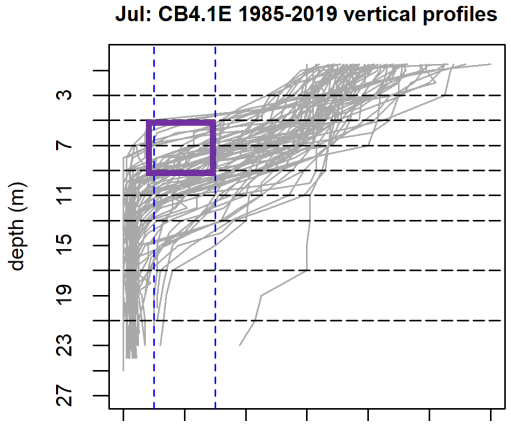

LE1.4 9m July
0
2
4
6
8


CB5.1W 8m July
0
2
4
6
8


CB5.1 8m July
0
2
4
6
8

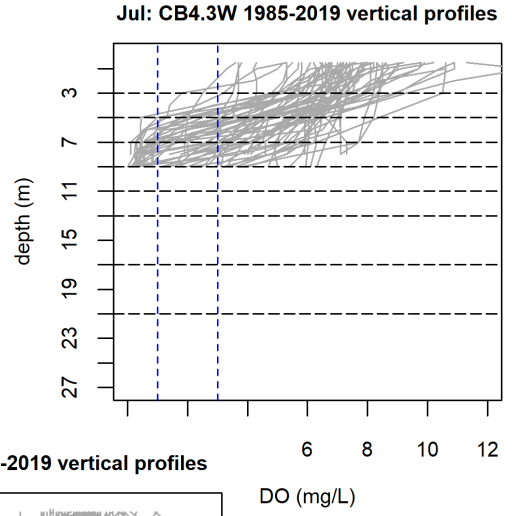


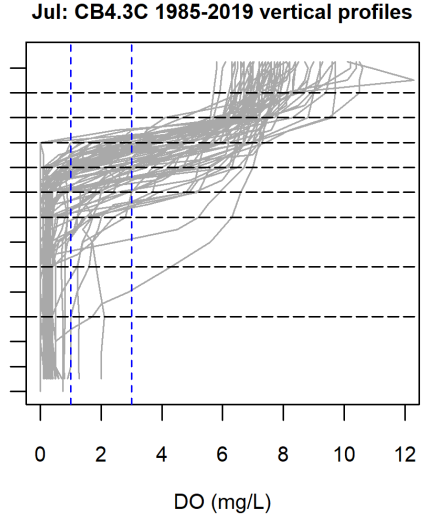


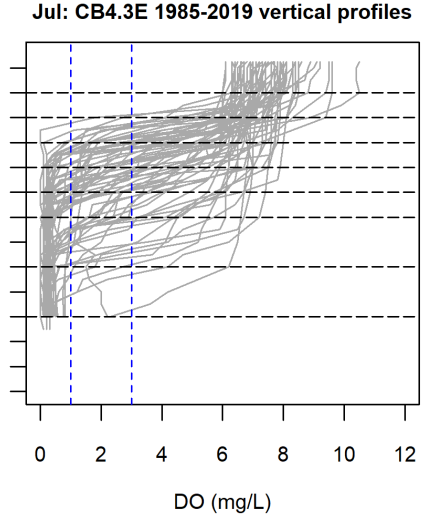


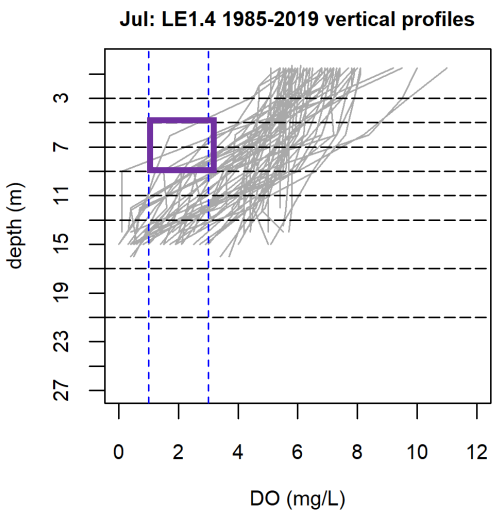
Vertical sampling – focus on getting same depths at both stations

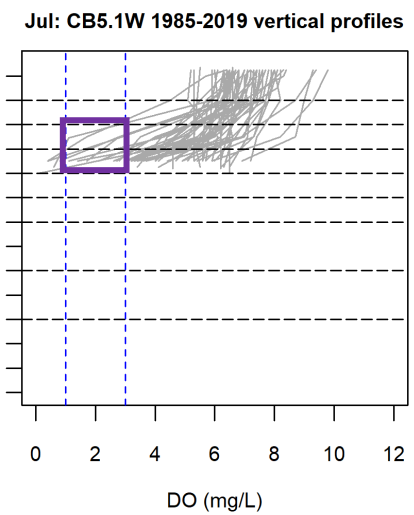
- Every 2 meters (1, 3, 5..)
- Until the bottom of “W” station.
- Then every 4 to bottom of “E” (… 13, 17, 21)

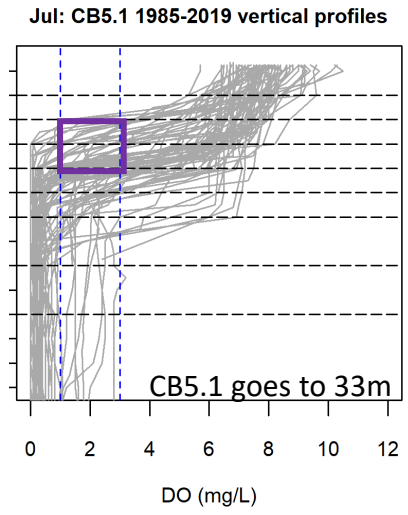












Summary

- Continuous vertical monitoring at either location will give us a lot of information to use and be helpful for developing the 4D interpolator.
- However, CB5.1W seems to be highly influenced by the Patuxent River, and might be limited in how much it tell us about mainstem oxygen dynamics.
- CB4.1W would be more helpful with analyzing the vertical dynamics of low DO movement on the western side of the mainstem (compared to CB4.3E for eastern).
  - But I understand the findings that CB5.1 was a helpful location for modeling hypoxic volume.
  - There's a chance CB5.1W will help with understanding the volume of hypoxia (if it is correlated with CB5.1).