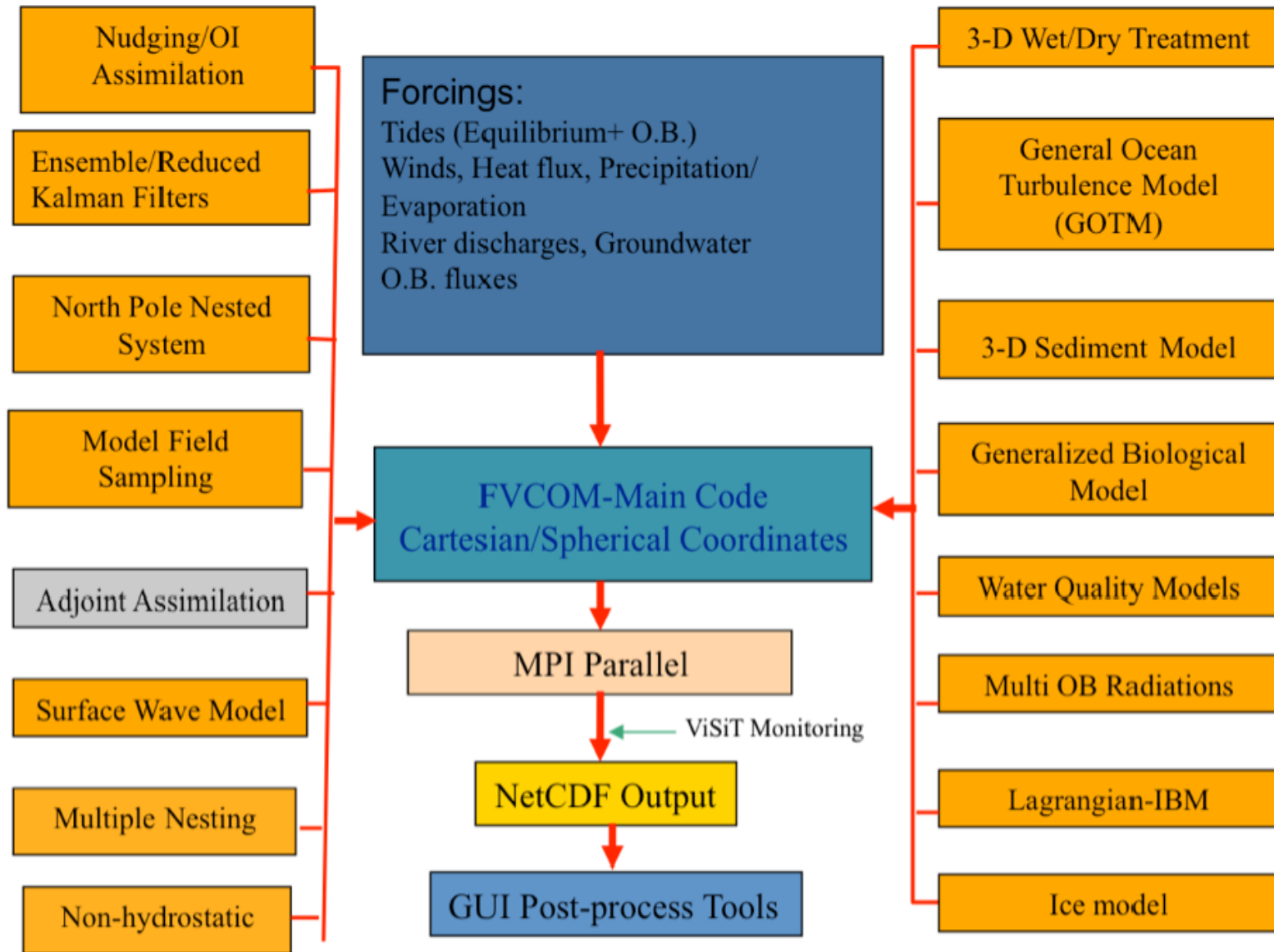


Progress report on FVCOM-ICM application in the Chester River: Evaluation

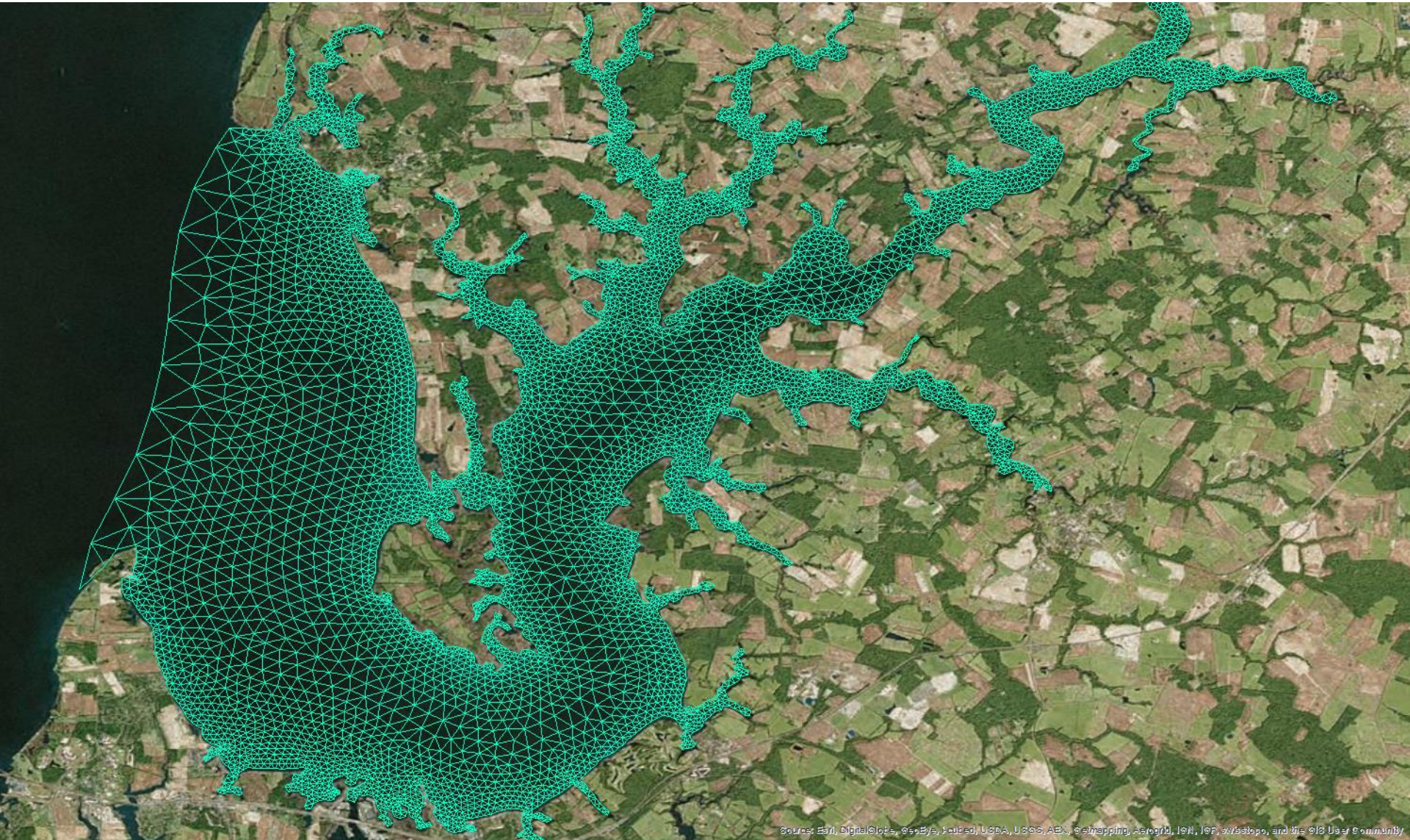
Richard Tian & modeling team
UMCES/CBPO

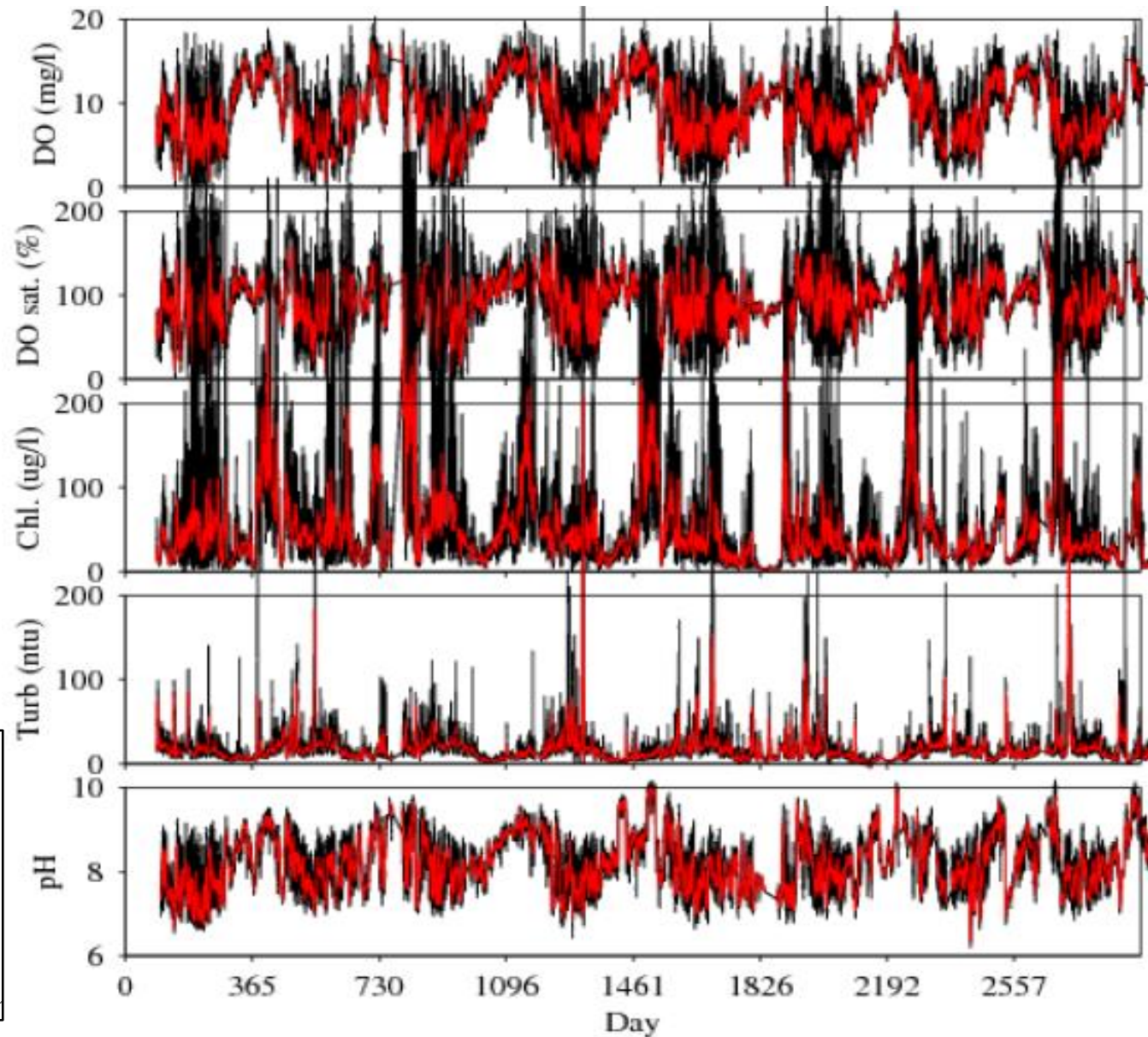
Modeling Quarterly Review
April 26 2016

FVCOM



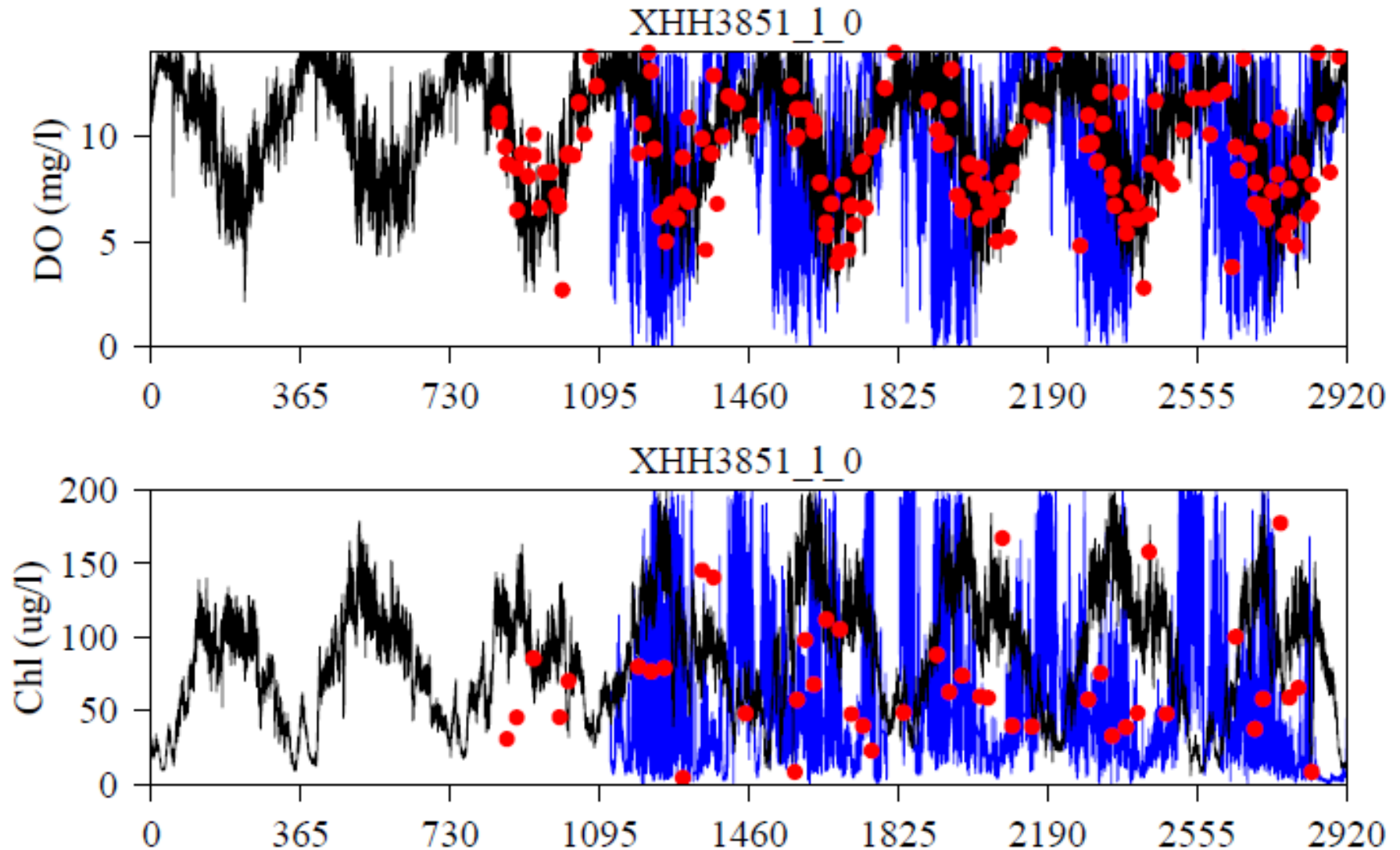
FVCOM grid (Water quality & sensitivity)

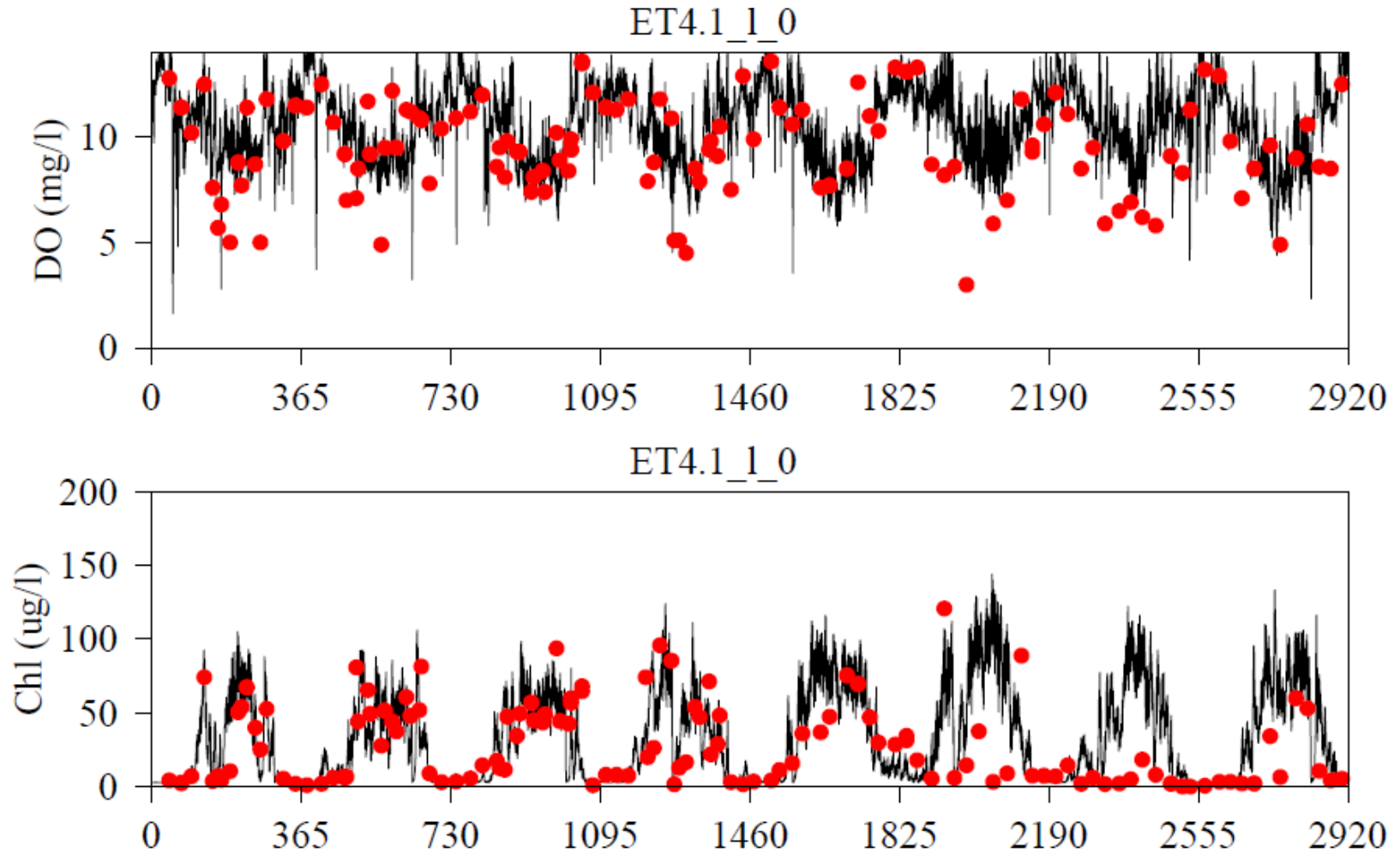




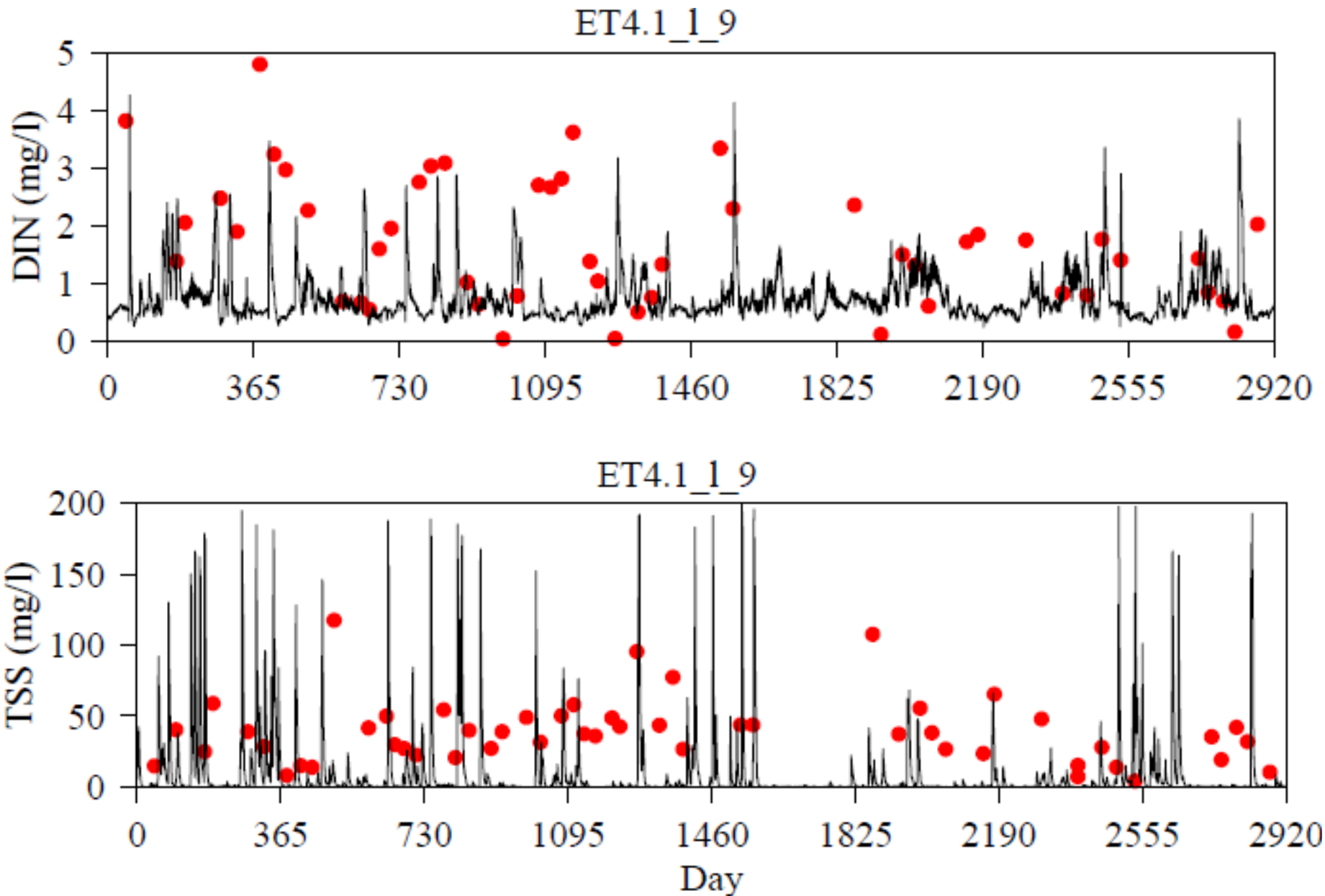
Station XHH3851 DO and Chl simulation

(Black: Model; Blue: CMON; Red: Samples)



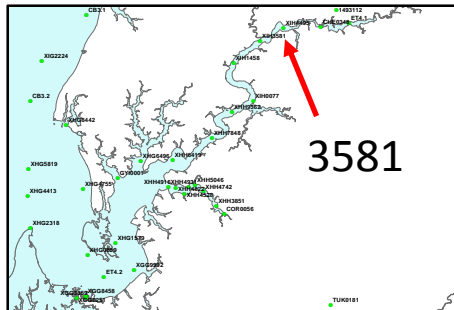
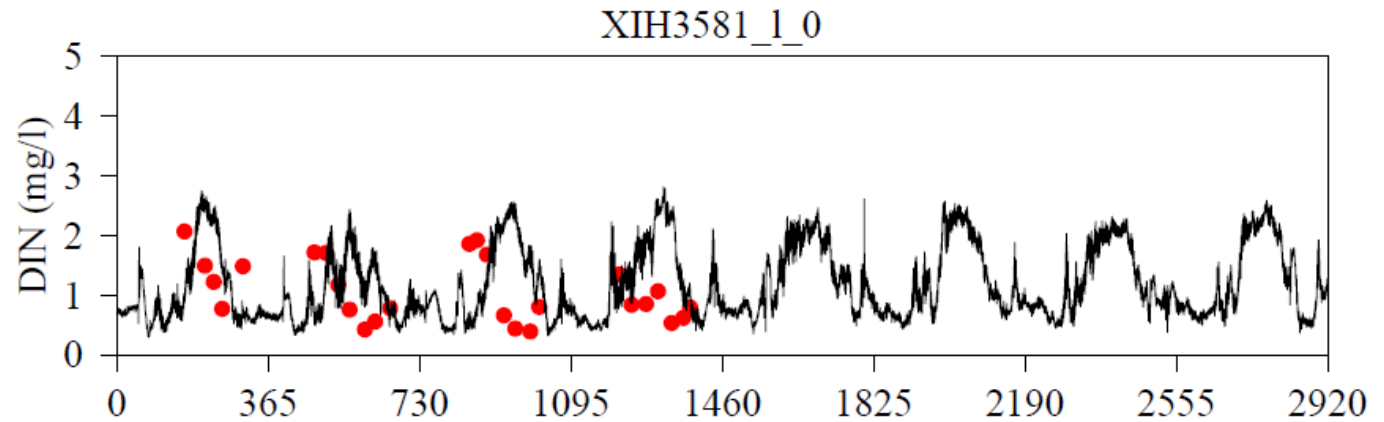
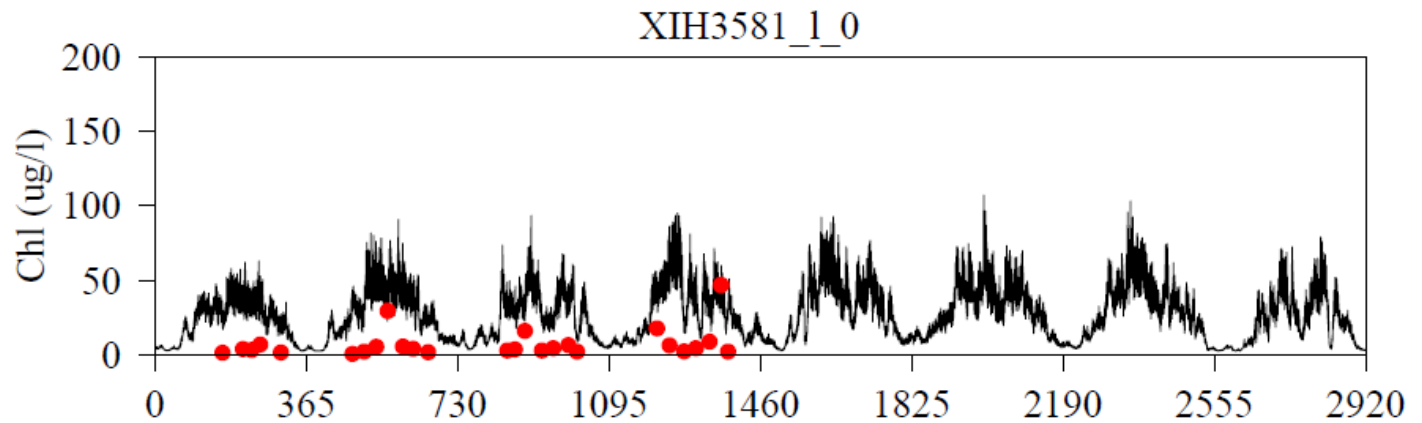
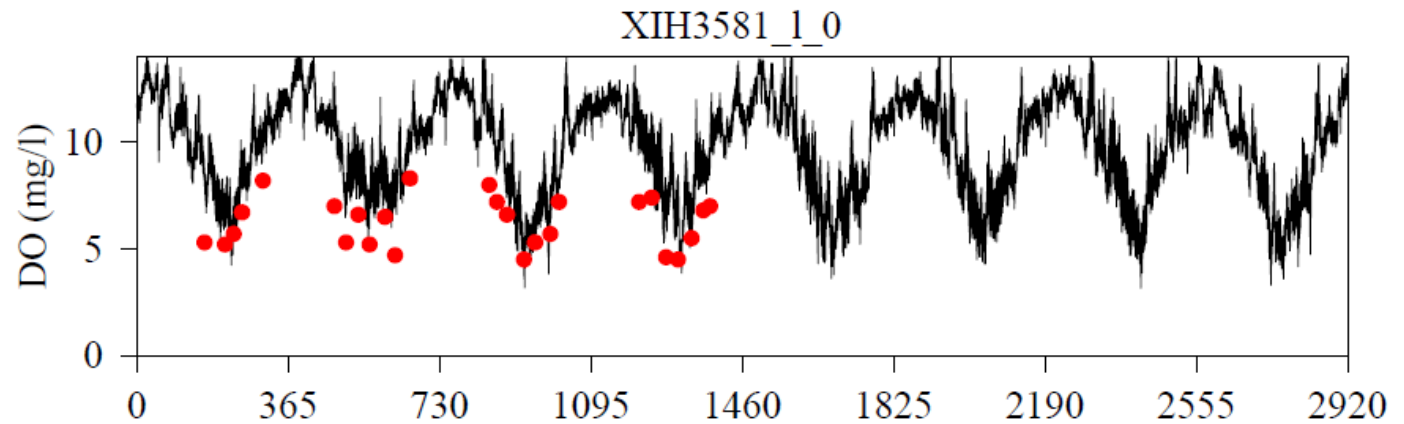


ET4.1 DIN and TSS (bottom)



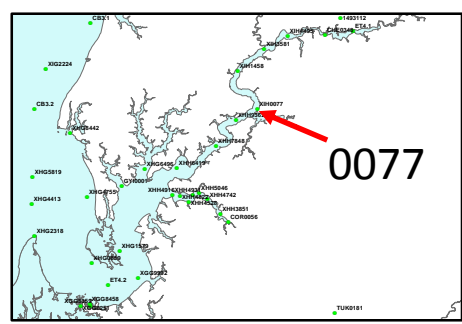
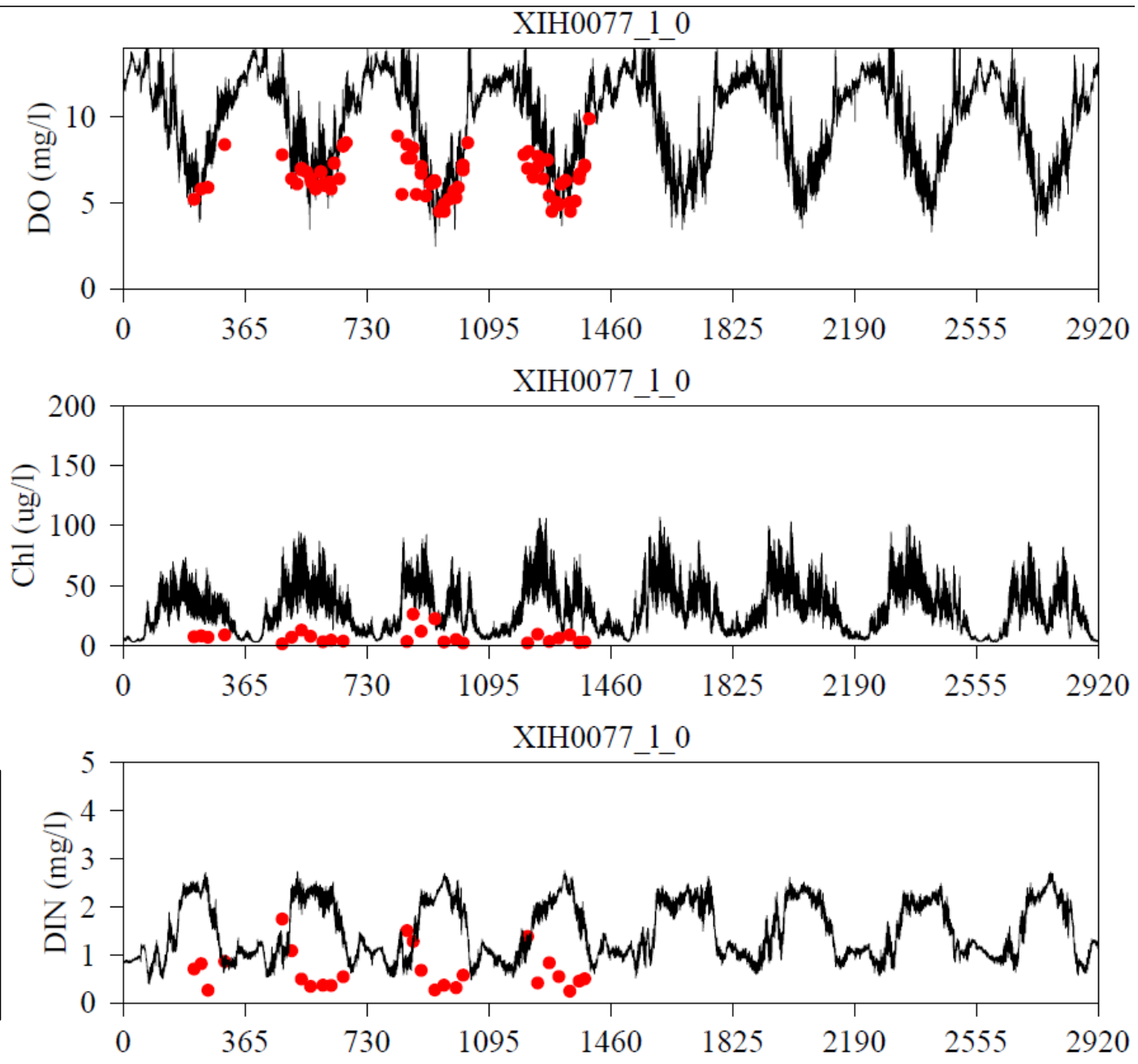
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DO, Chl, and DIN

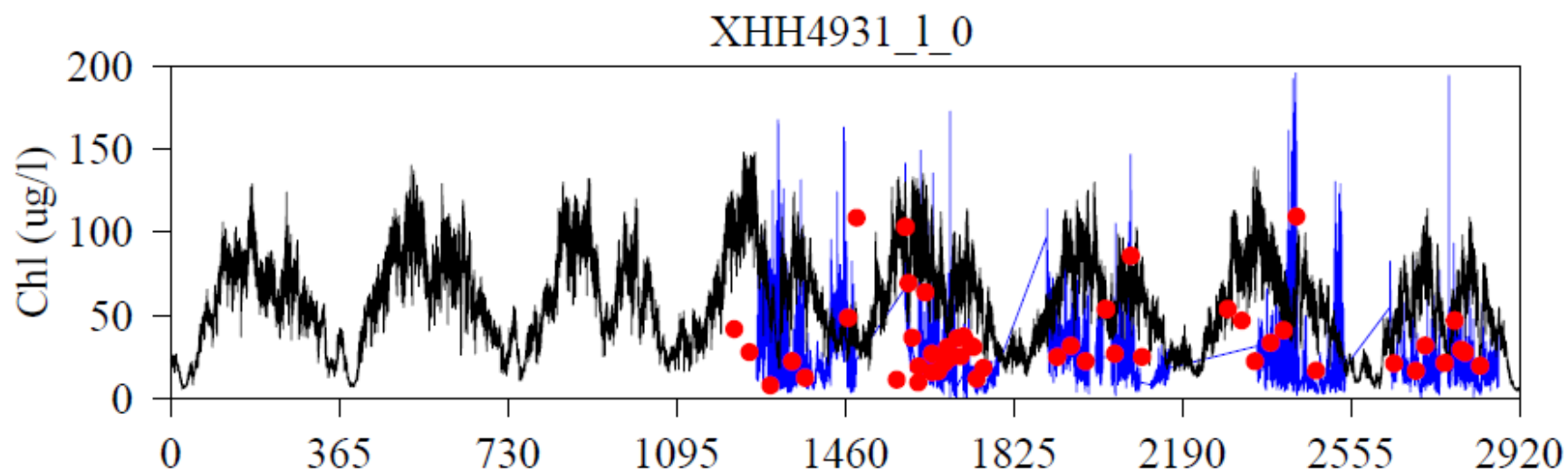


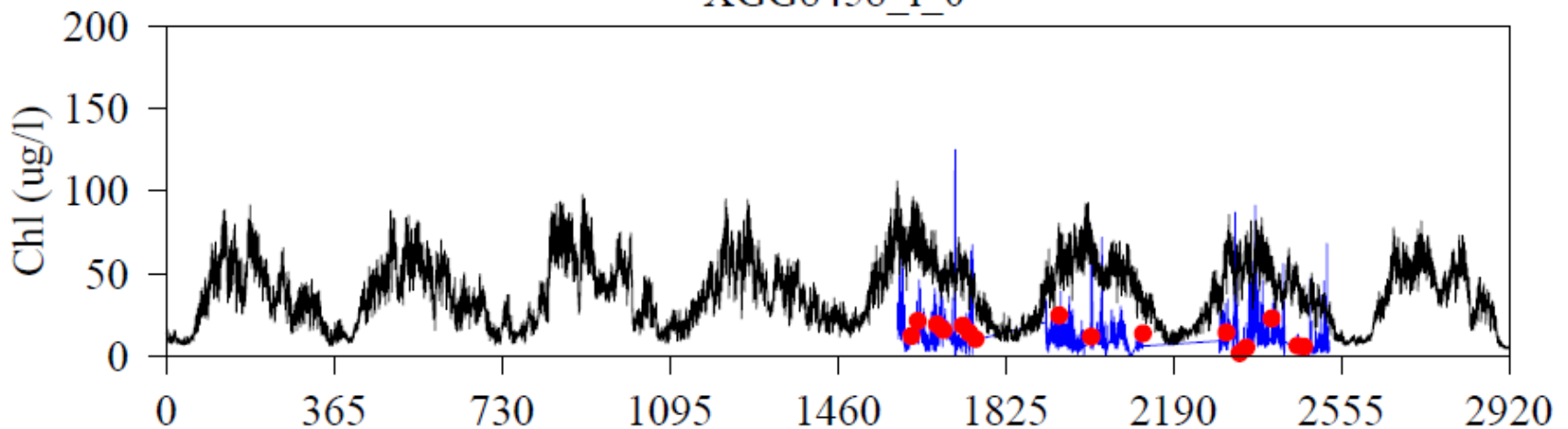
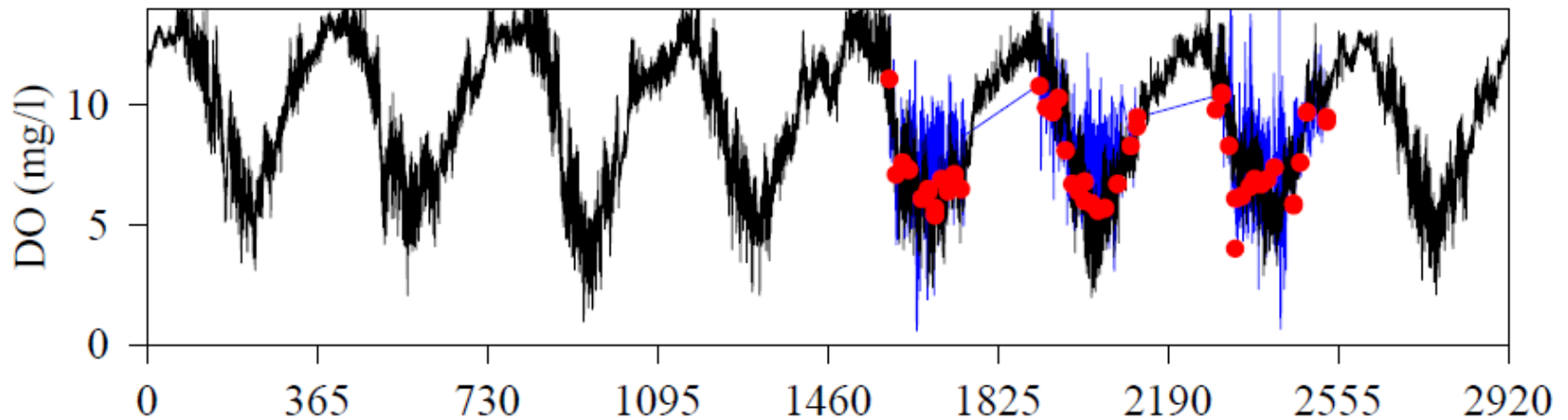
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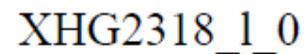
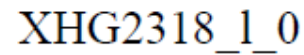


A map of the Chesapeake Bay area with various monitoring stations marked by green dots and labeled with codes. A large red arrow points from the number '4931' to a station located in the central part of the bay, near the mouth of the Potomac River. The station is labeled 'XHG0545' and 'XHG0546'. Other stations visible include XHG0224, CB3.2, XHG0412, XHG05819, XHG04413, XHG2318, XHG1500, XHG0606, ET4.2, XHG0602, XHG0608, XHG0609, XHG0610, XHG0611, XHG0612, XHG0613, XHG0614, XHG0615, XHG0616, XHG0617, XHG0618, XHG0619, XHG0620, XHG0621, XHG0622, XHG0623, XHG0624, XHG0625, XHG0626, XHG0627, XHG0628, XHG0629, XHG0630, XHG0631, XHG0632, XHG0633, XHG0634, XHG0635, XHG0636, XHG0637, XHG0638, XHG0639, XHG0640, XHG0641, XHG0642, XHG0643, XHG0644, XHG0645, XHG0646, XHG0647, XHG0648, XHG0649, XHG0650, XHG0651, XHG0652, XHG0653, XHG0654, XHG0655, XHG0656, XHG0657, XHG0658, XHG0659, XHG0660, XHG0661, XHG0662, XHG0663, XHG0664, XHG0665, XHG0666, XHG0667, XHG0668, XHG0669, XHG0670, XHG0671, XHG0672, XHG0673, XHG0674, XHG0675, XHG0676, XHG0677, XHG0678, XHG0679, XHG0680, XHG0681, XHG0682, XHG0683, XHG0684, XHG0685, XHG0686, XHG0687, XHG0688, XHG0689, XHG0690, XHG0691, XHG0692, XHG0693, XHG0694, XHG0695, XHG0696, XHG0697, XHG0698, XHG0699, XHG0700, XHG0701, XHG0702, XHG0703, XHG0704, XHG0705, 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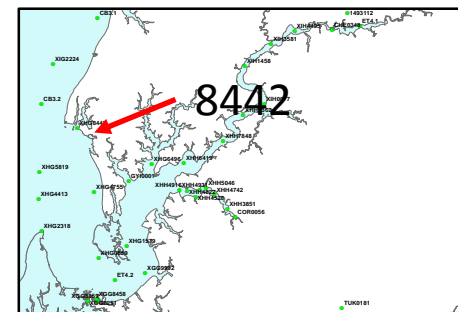




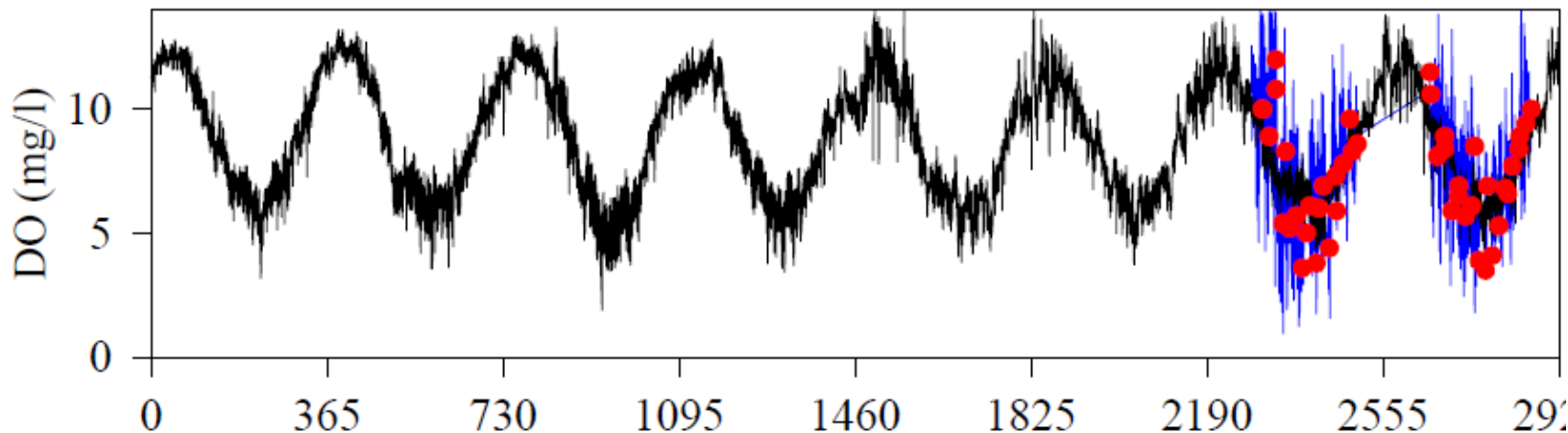
A map of the Chesapeake Bay area showing various sampling stations. The stations are marked with green dots and labeled with codes. A red arrow points to station XHG2318, which is labeled with the number 2318 in large black text. The map includes labels for several stations: XHG2318, XHG2319, XHG2320, XHG2321, XHG2322, XHG2323, XHG2324, XHG2325, XHG2326, XHG2327, XHG2328, XHG2329, XHG2330, XHG2331, XHG2332, XHG2333, XHG2334, XHG2335, XHG2336, XHG2337, XHG2338, XHG2339, XHG2340, XHG2341, XHG2342, XHG2343, XHG2344, XHG2345, XHG2346, XHG2347, XHG2348, XHG2349, XHG2350, XHG2351, XHG2352, XHG2353, XHG2354, XHG2355, XHG2356, XHG2357, XHG2358, XHG2359, XHG2360, XHG2361, XHG2362, XHG2363, XHG2364, XHG2365, XHG2366, XHG2367, XHG2368, XHG2369, XHG2370, XHG2371, XHG2372, XHG2373, XHG2374, XHG2375, XHG2376, XHG2377, XHG2378, XHG2379, XHG2380, XHG2381, XHG2382, XHG2383, XHG2384, XHG2385, XHG2386, XHG2387, XHG2388, XHG2389, XHG2390, XHG2391, XHG2392, XHG2393, XHG2394, XHG2395, XHG2396, XHG2397, XHG2398, XHG2399, XHG2400, XHG2401, XHG2402, XHG2403, XHG2404, XHG2405, XHG2406, XHG2407, XHG2408, XHG2409, XHG2410, XHG2411, XHG2412, XHG2413, XHG2414, XHG2415, XHG2416, XHG2417, XHG2418, XHG2419, XHG2420, XHG2421, XHG2422, XHG2423, 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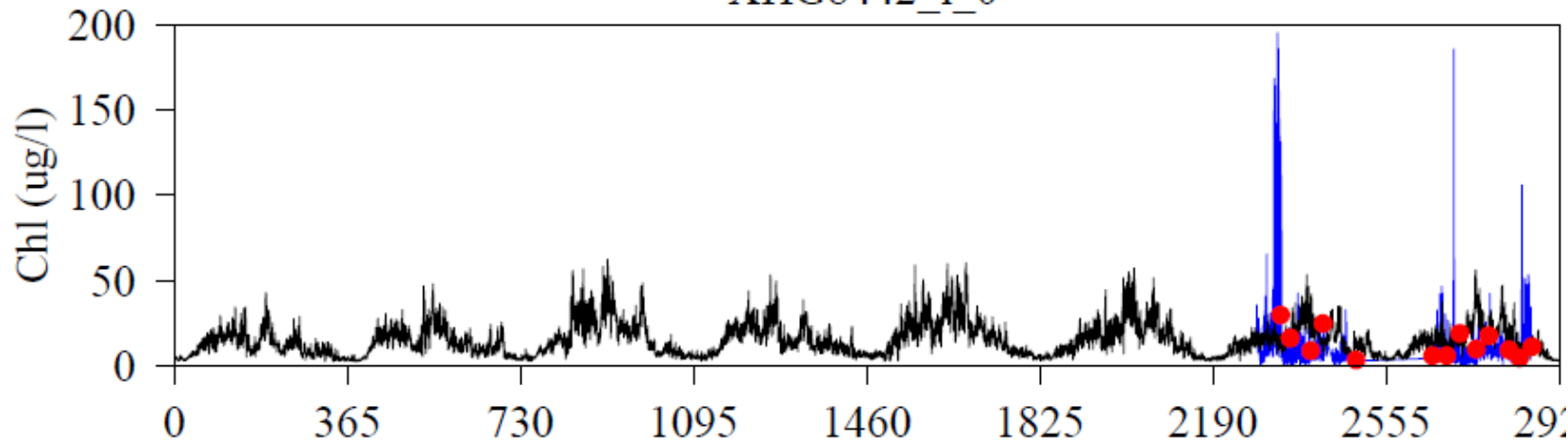
XHG8442 DO and Chl



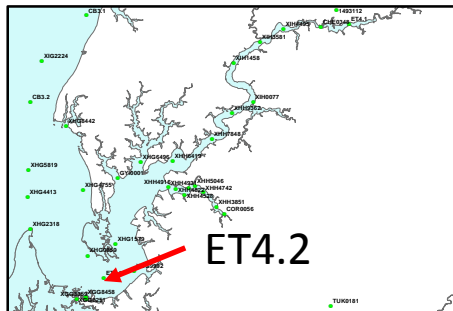
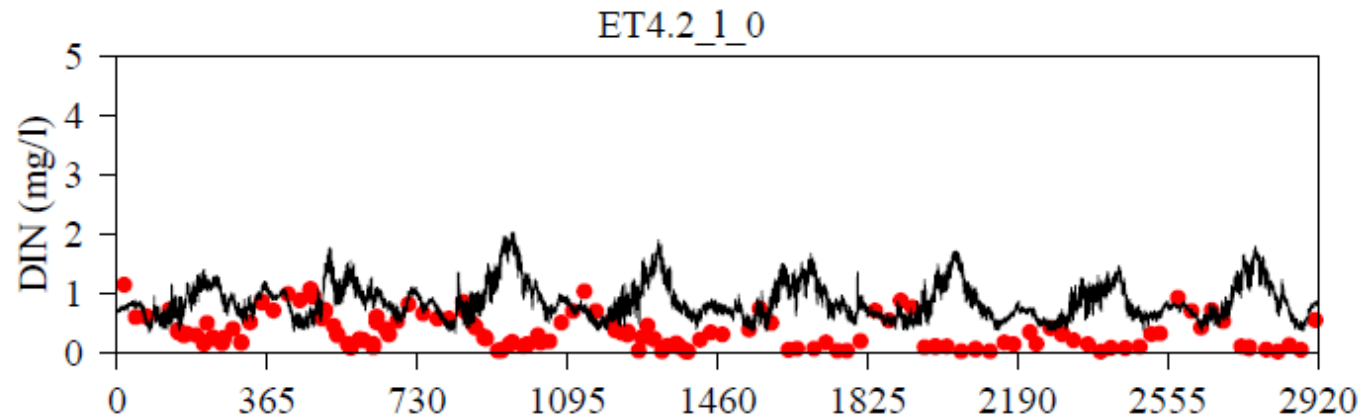
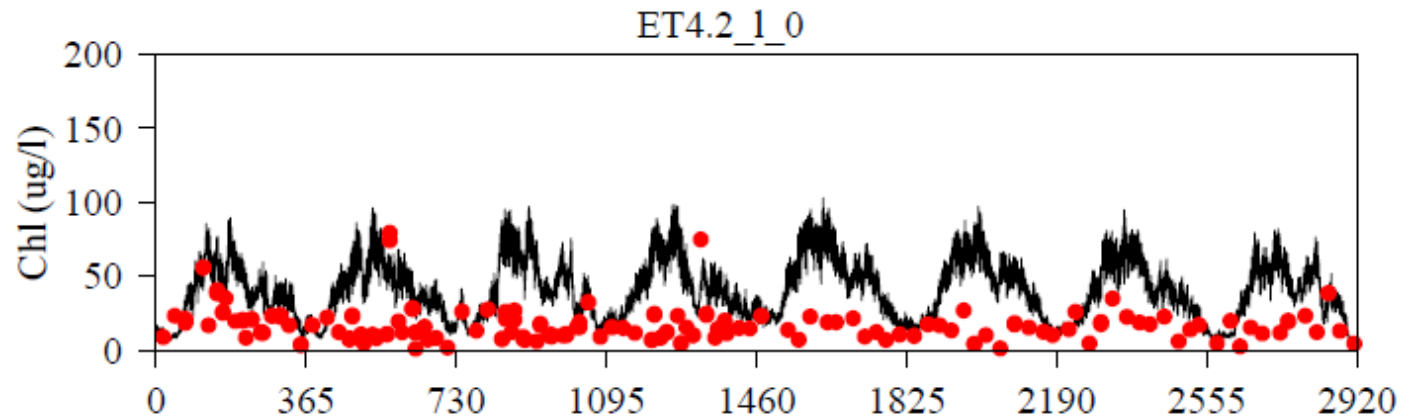
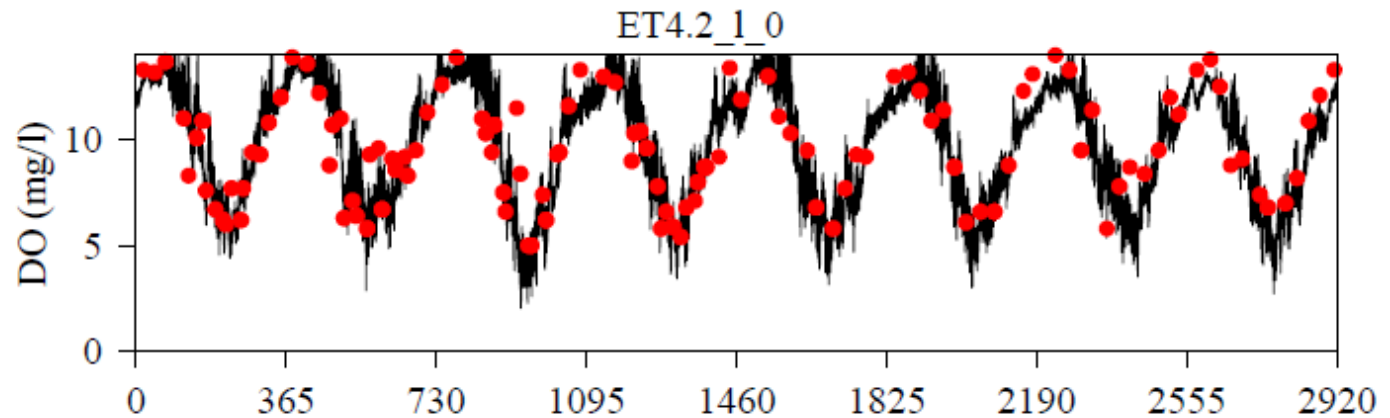
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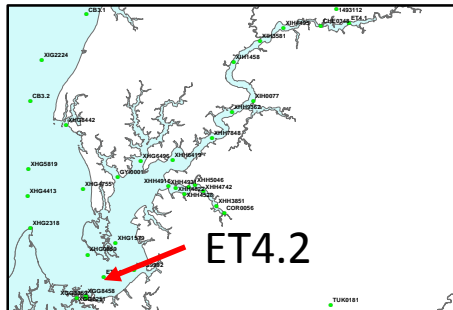
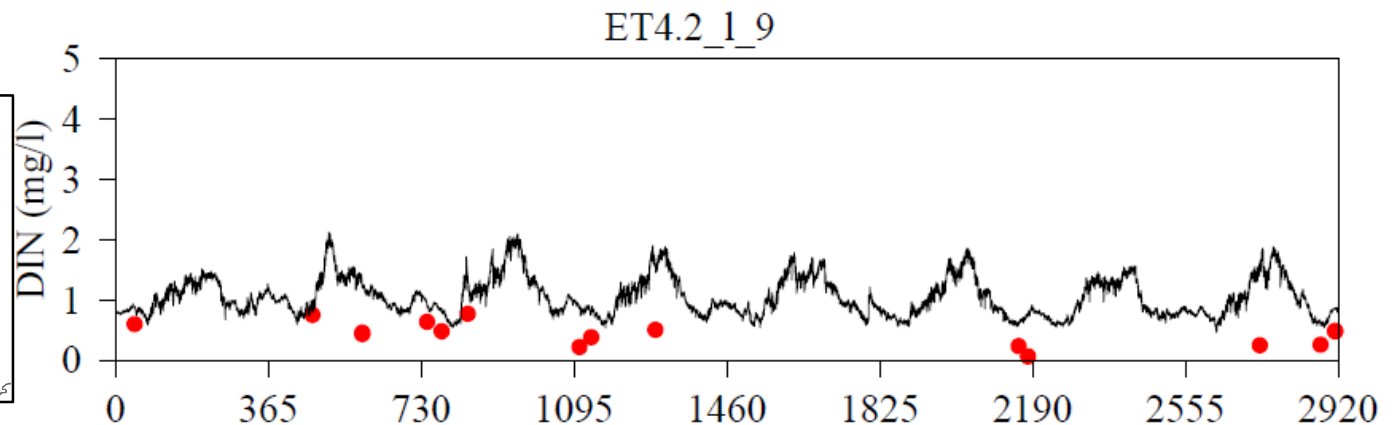
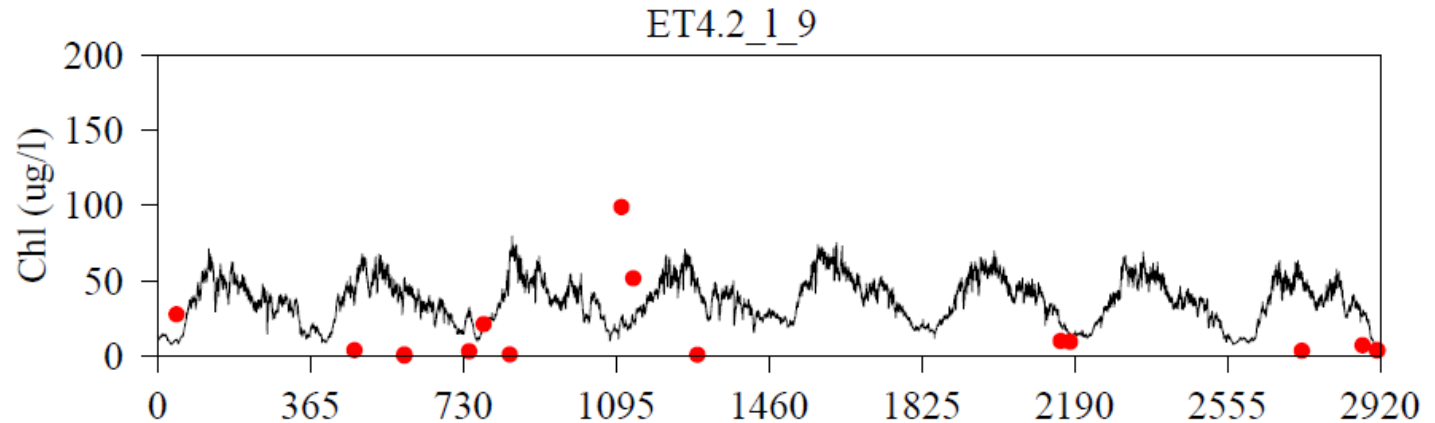
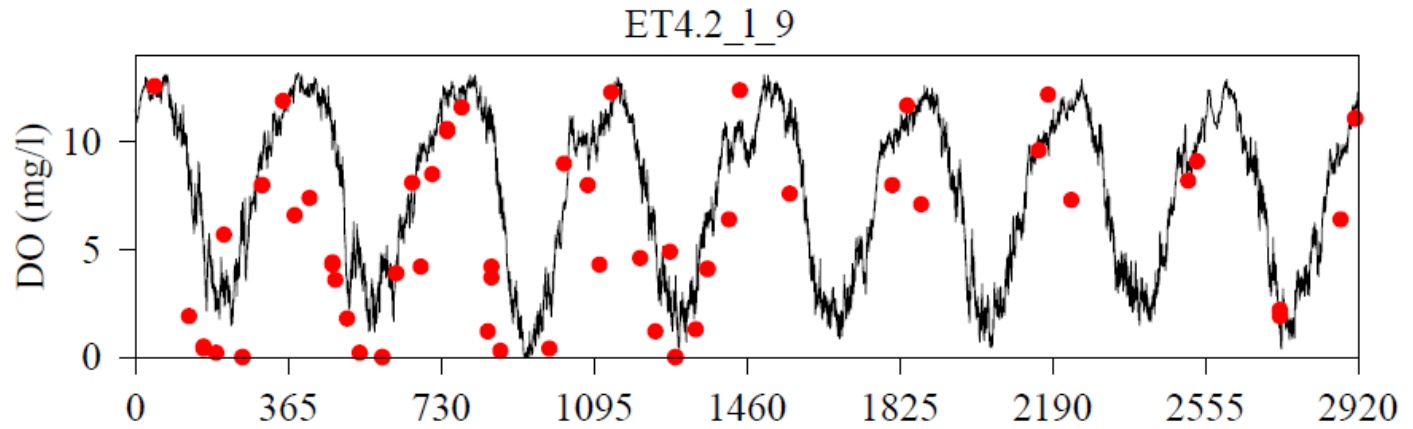


ET4.2 surface DO, Chl and DIN

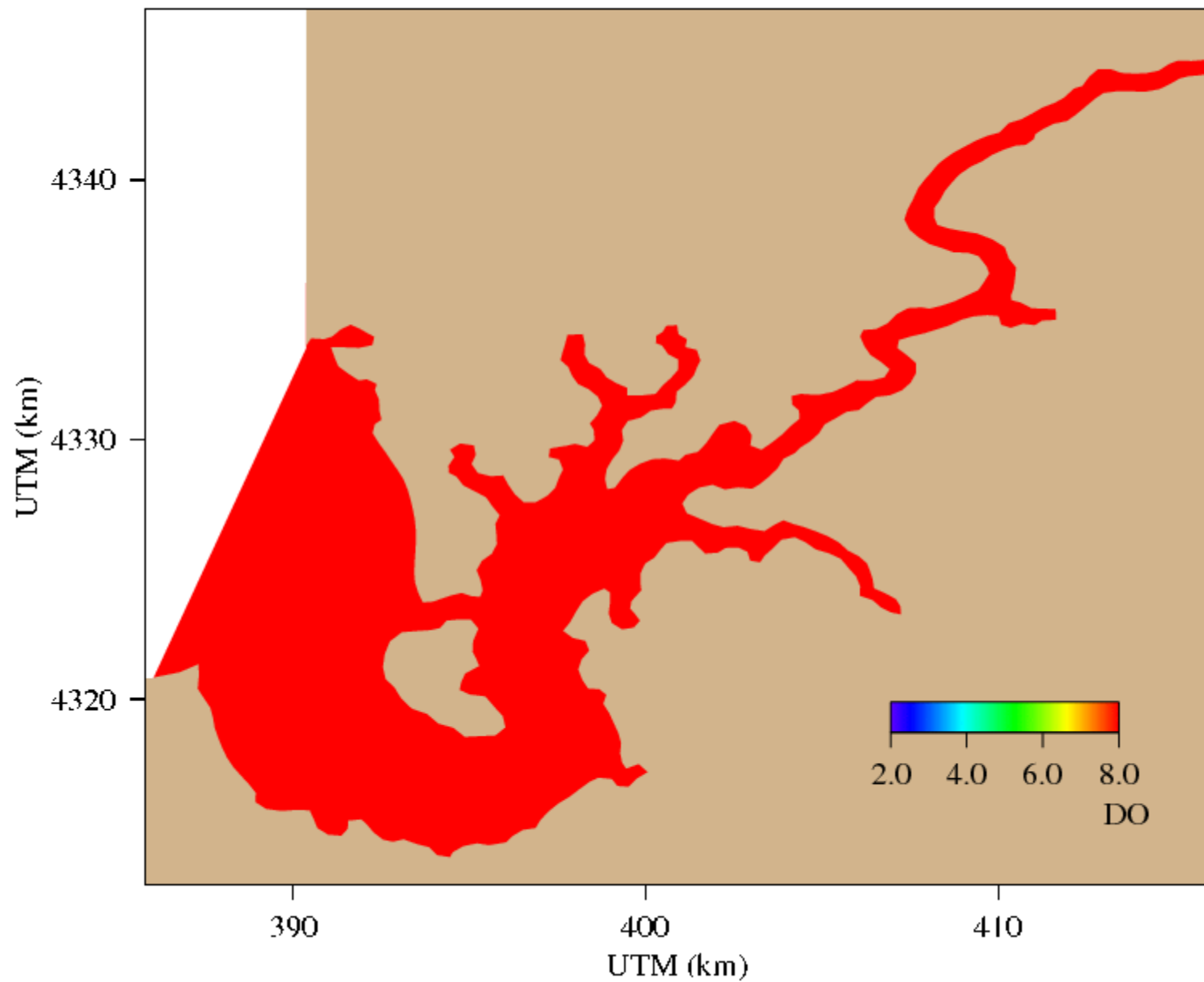


ET4.2

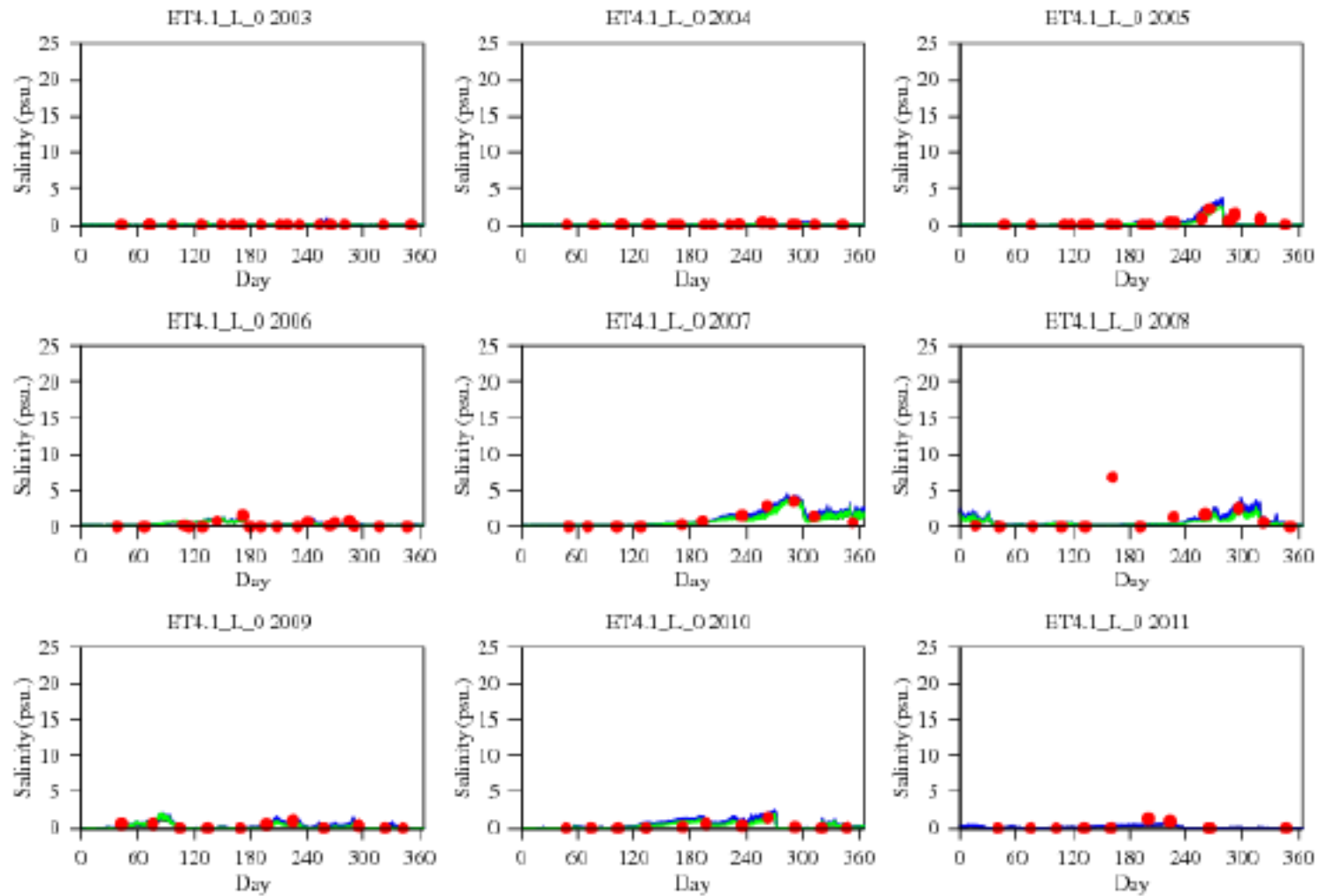
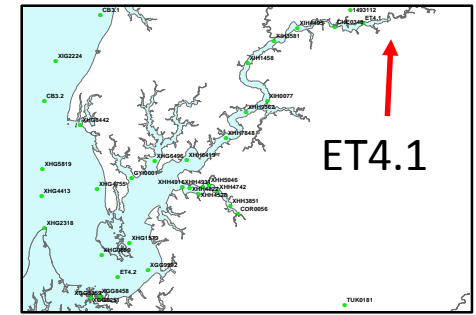
bottom DO, Chl and DIN



DO Run stac Layer bottom Day 90

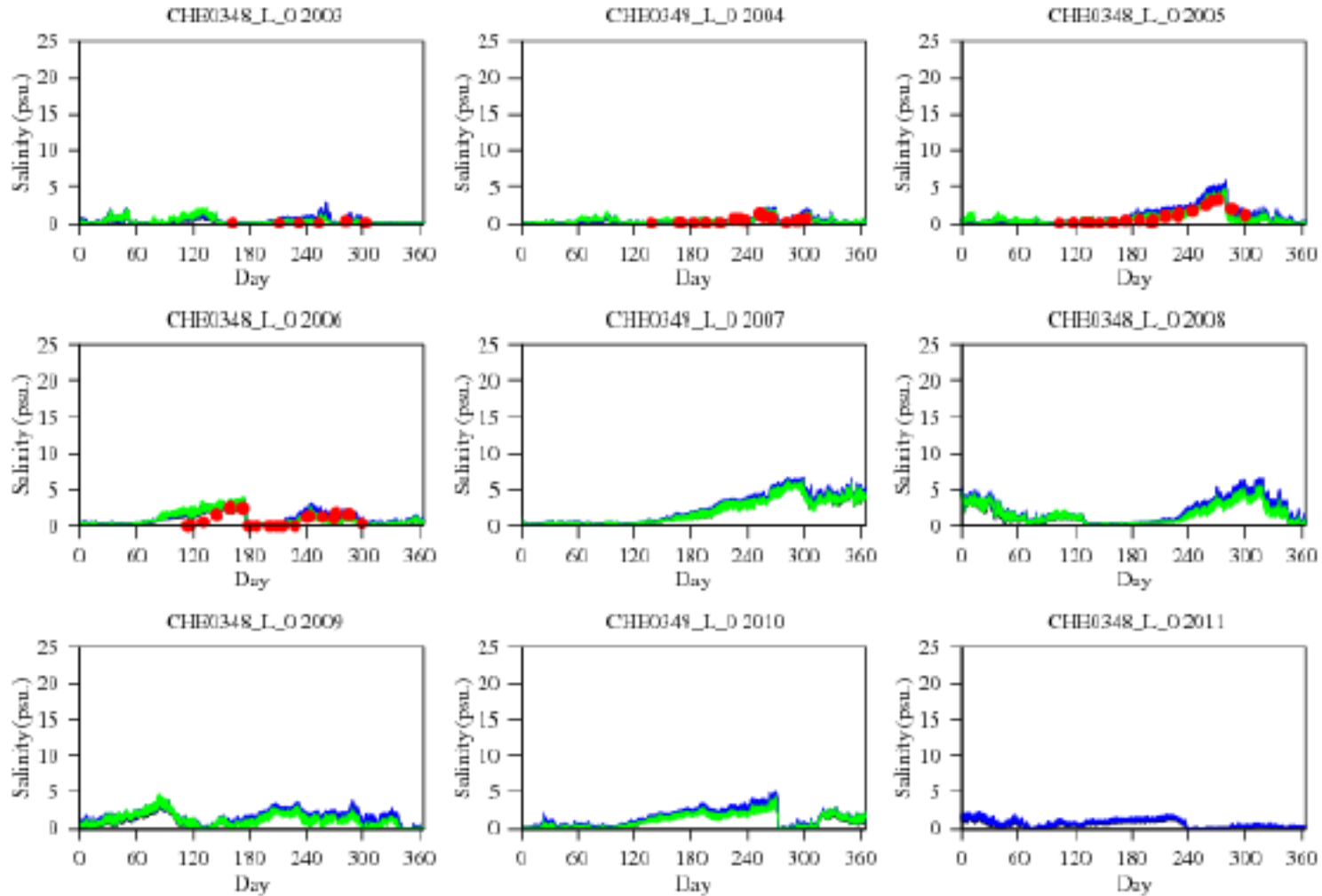
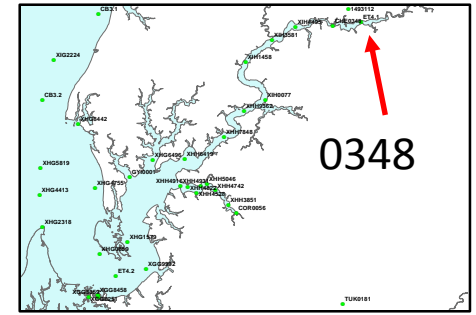


SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station ET4.1 (surface)

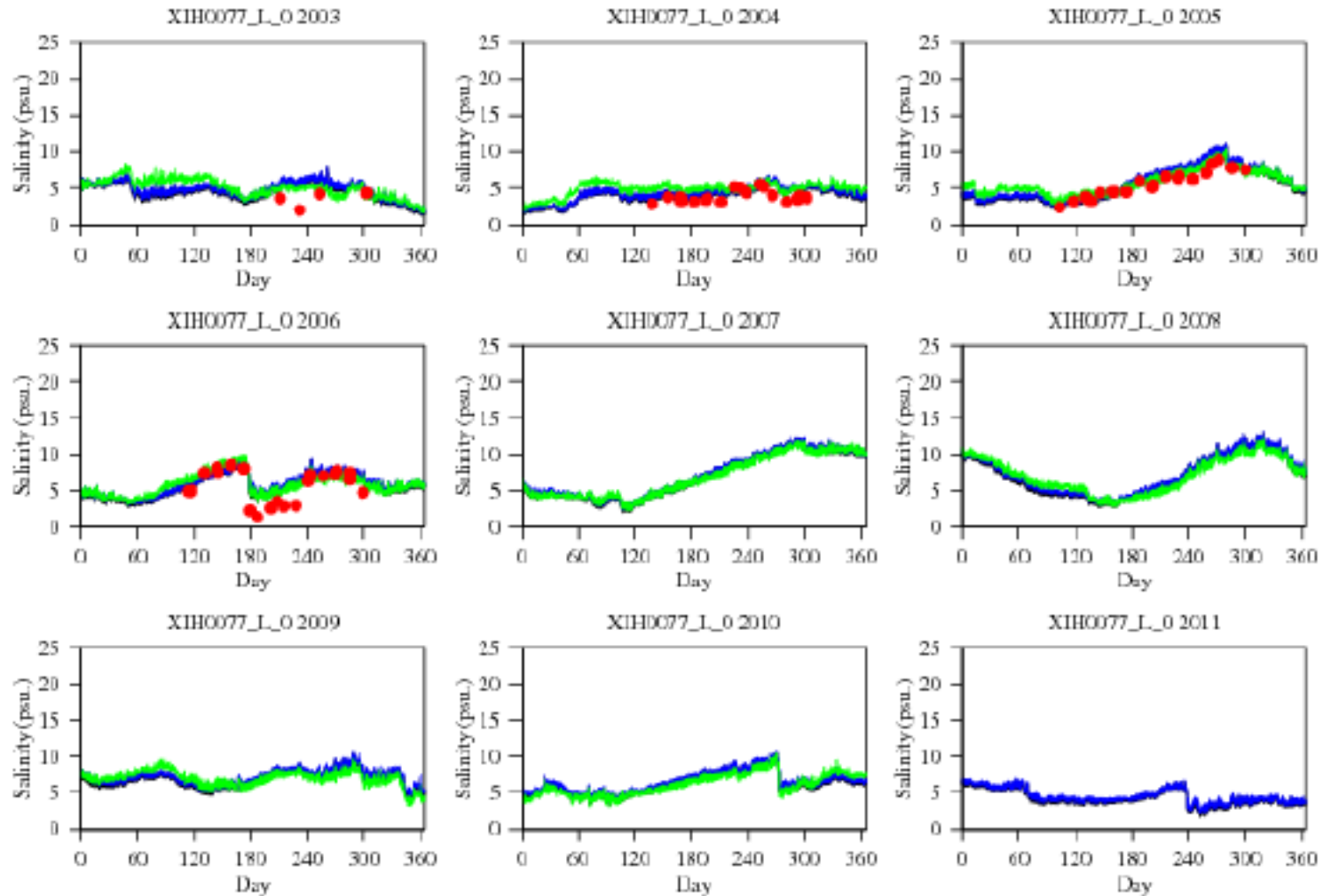
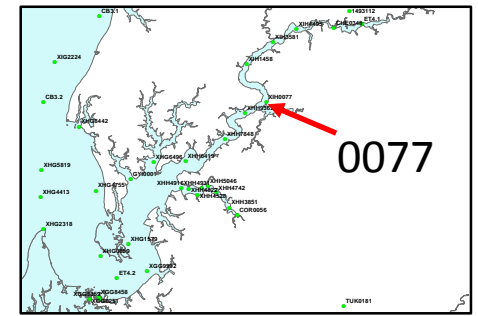


SCHICM (green) VS. CH3D (blue)

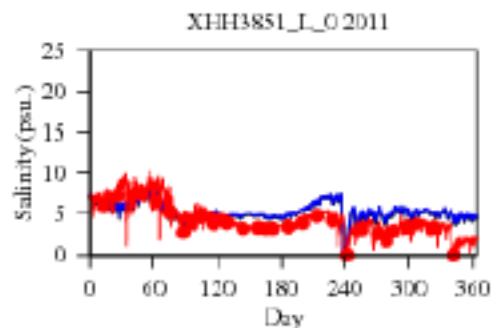
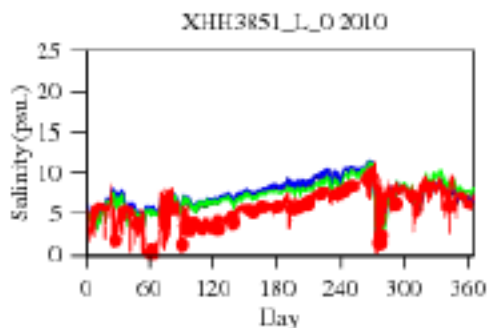
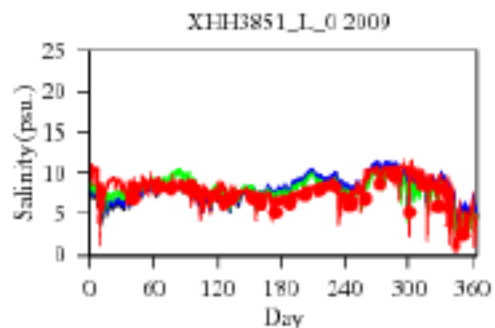
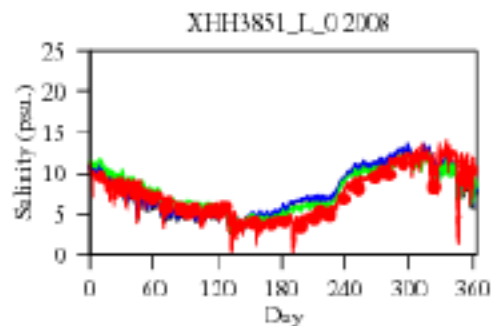
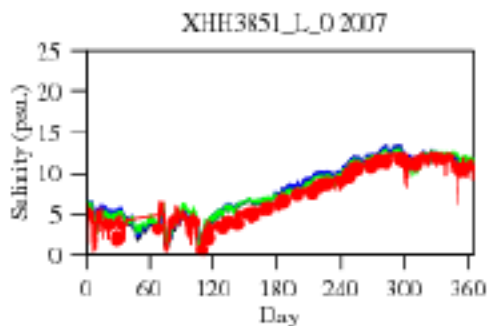
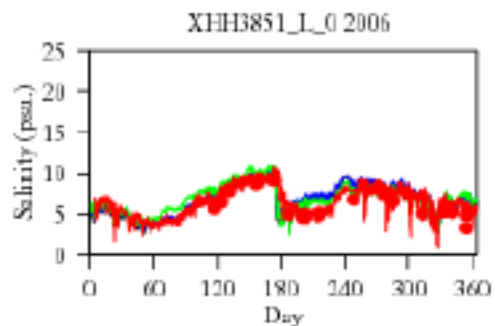
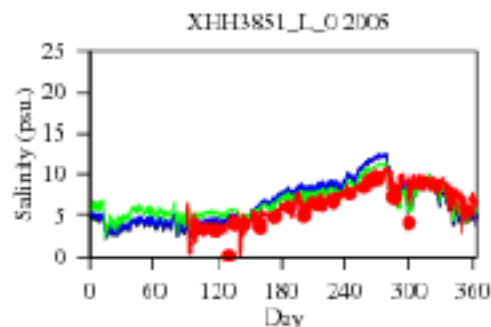
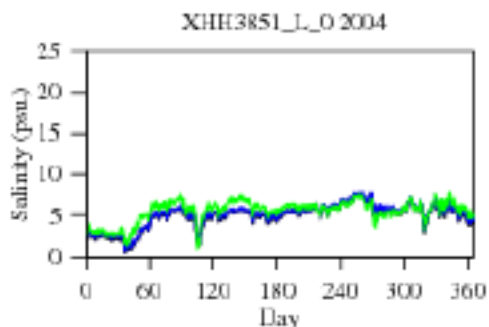
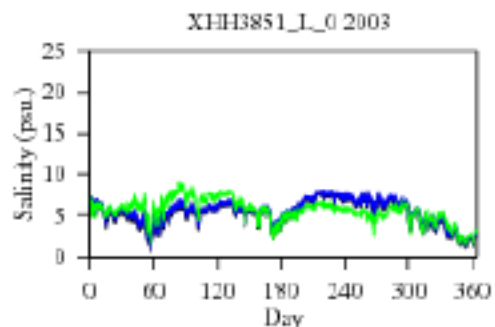
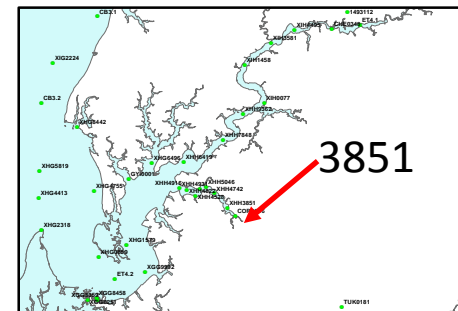
boundary condition, salinity at Station CHE0438 (surface)



SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station 0077 (surface)

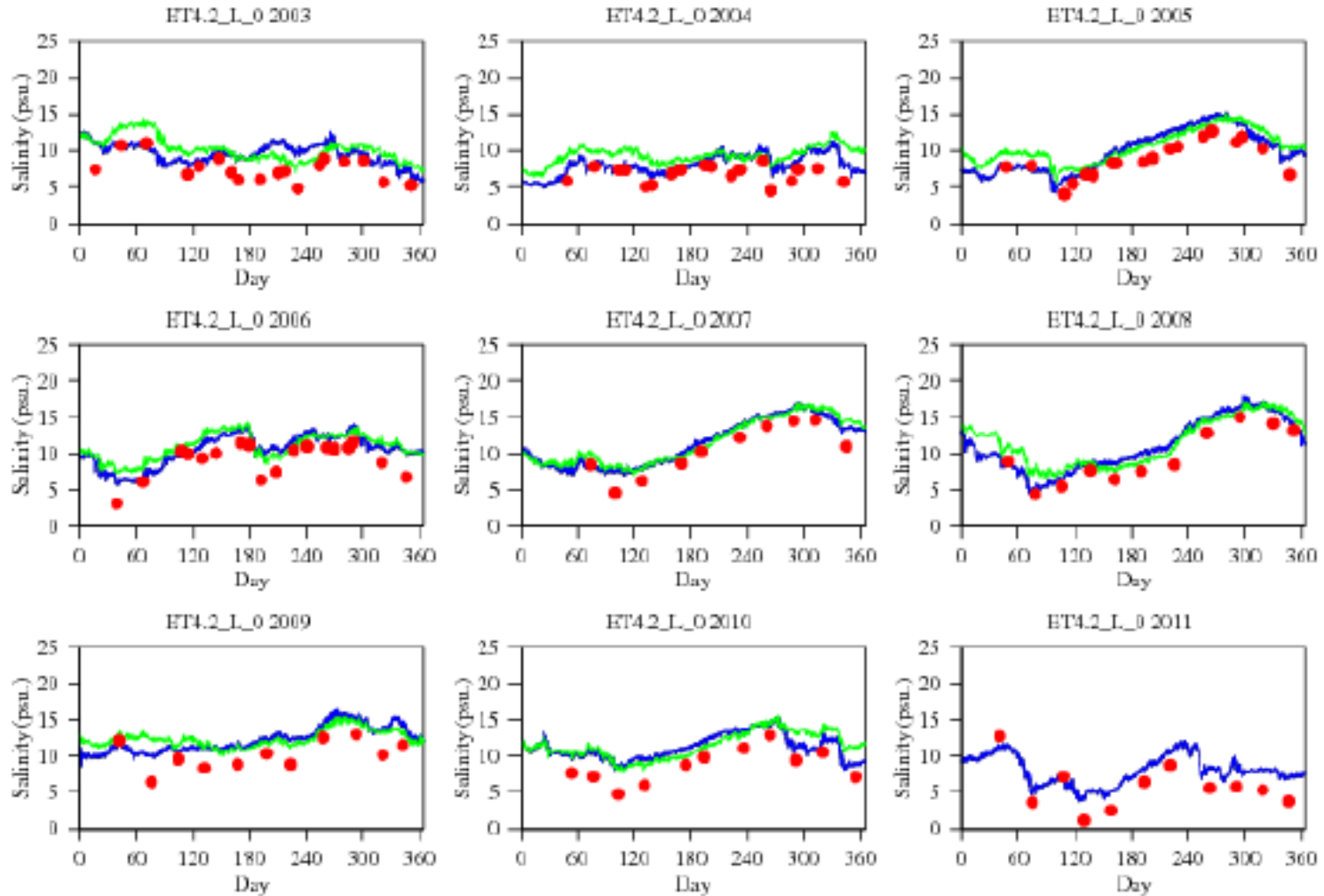
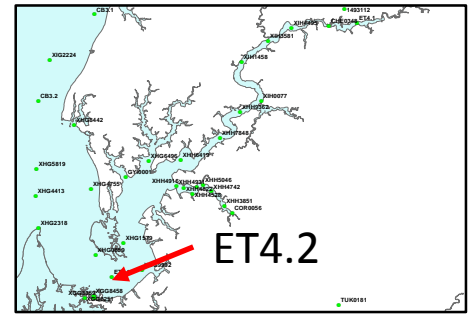


SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station 3851 (surface)

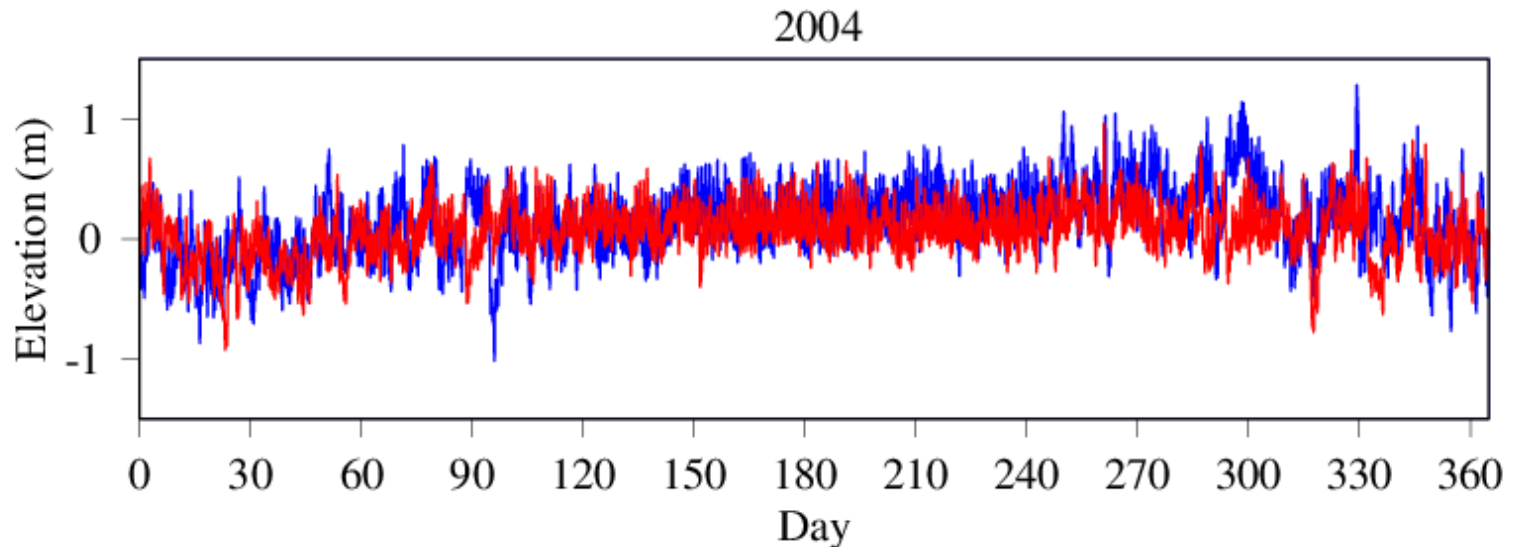
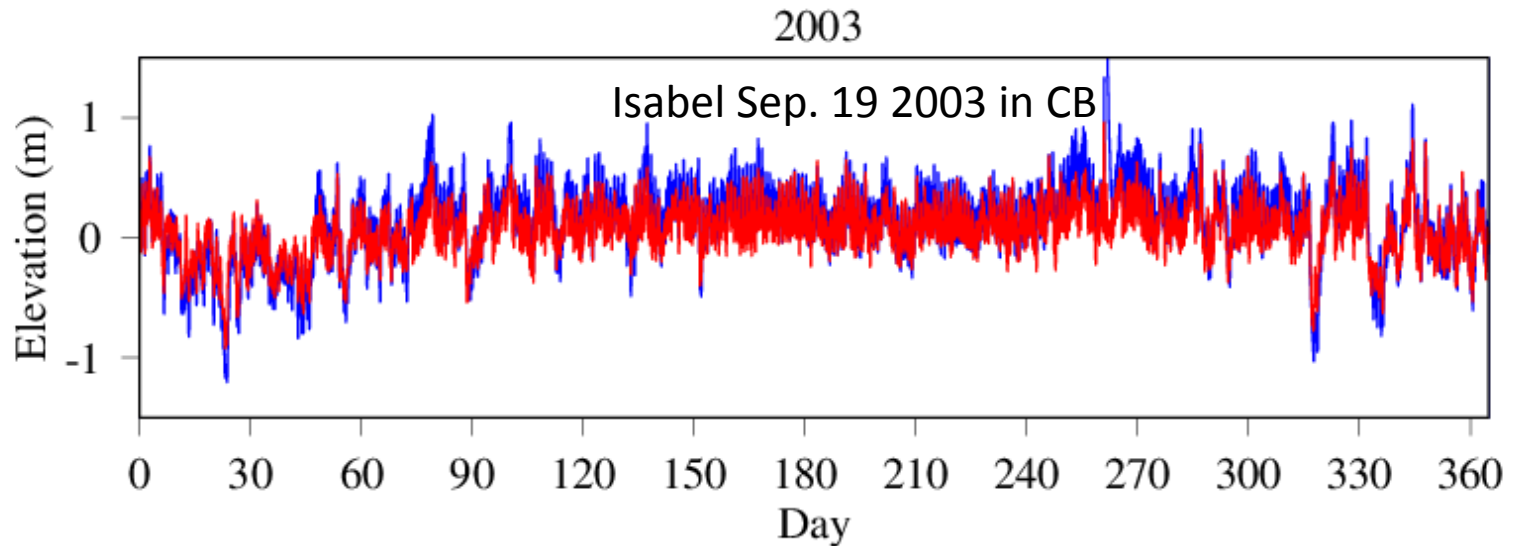


SCHICM (green) VS. CH3D (blue)

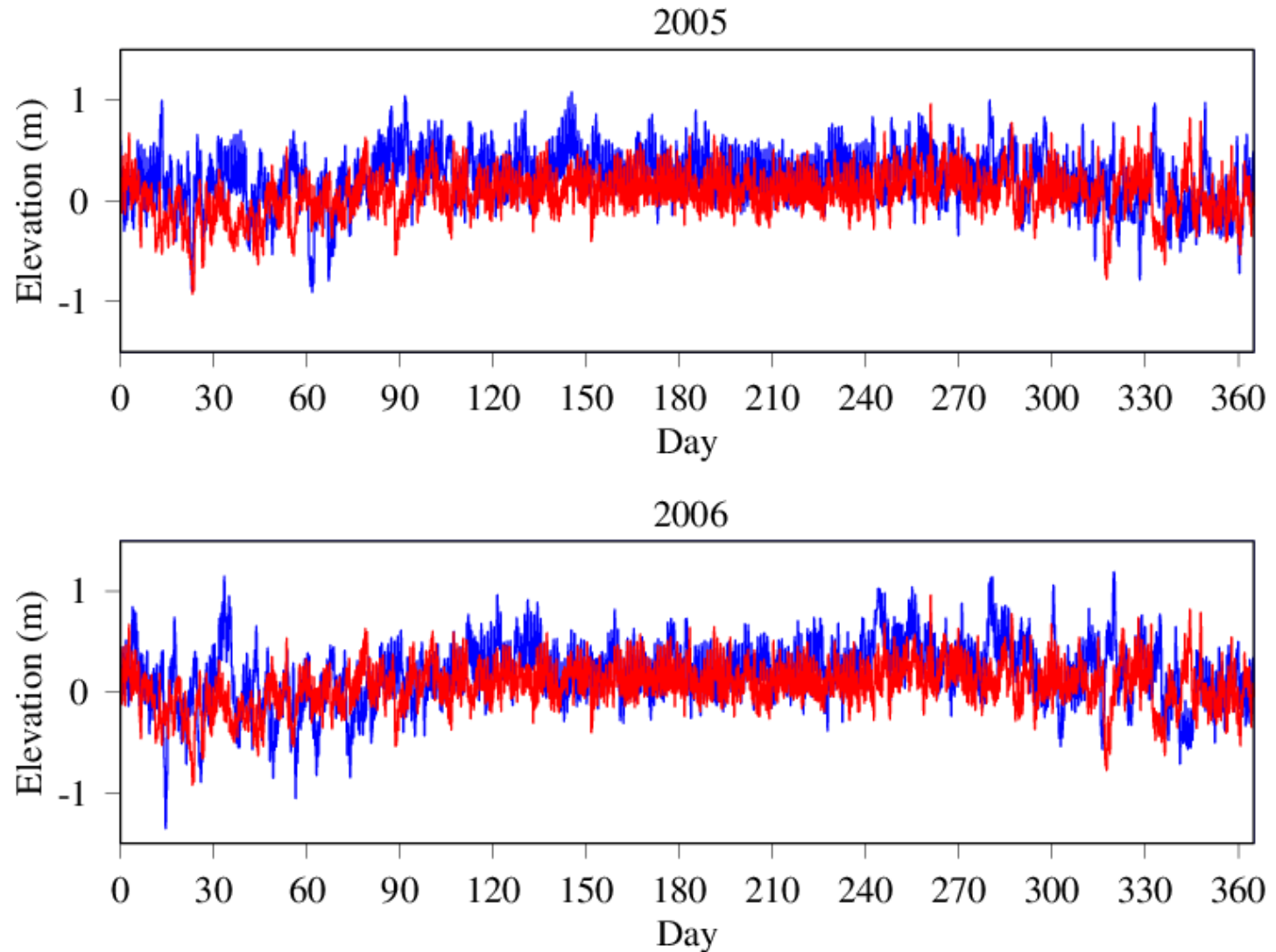
boundary condition, salinity at Station ET4.2 (surface)



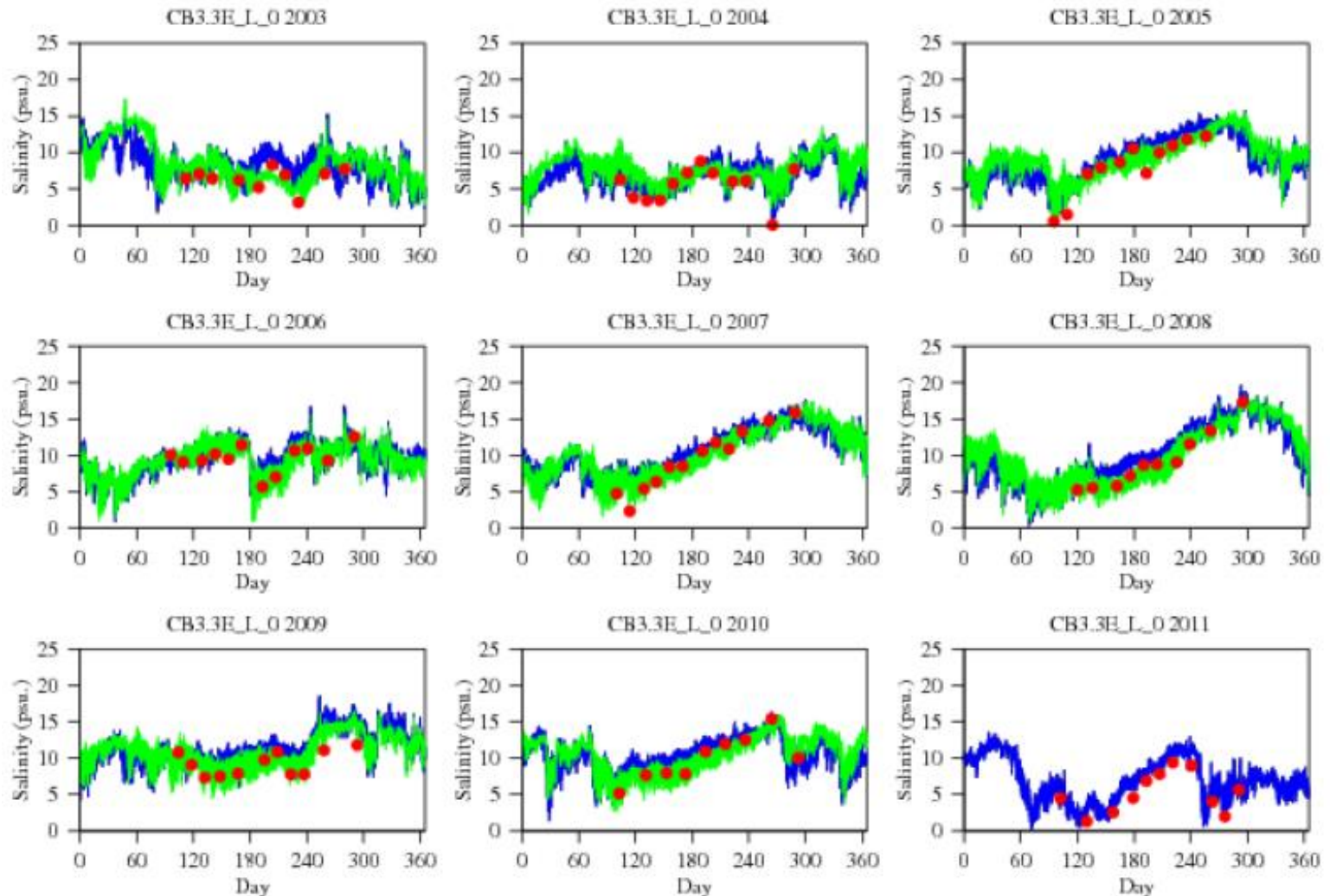
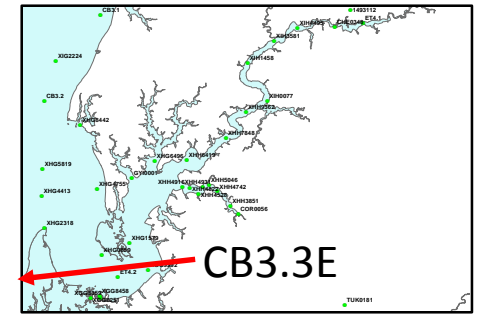
SCHICM (red) VS. CH3D (blue) boundary surface elevation 2003, 2004



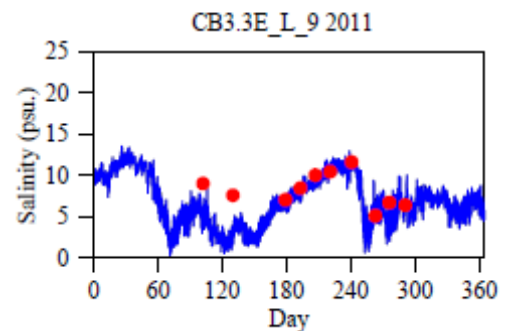
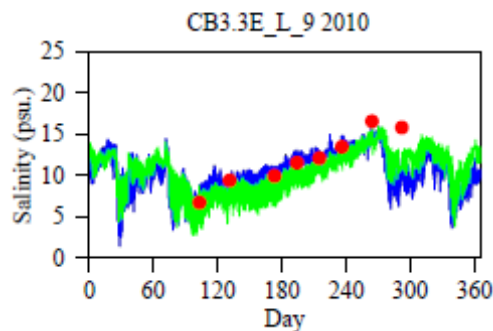
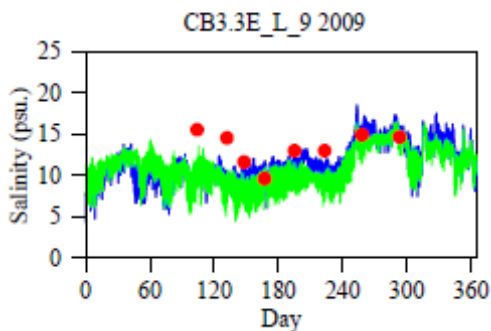
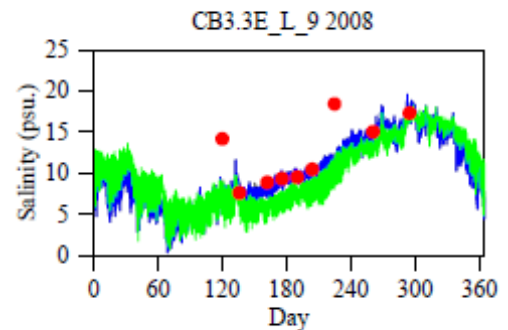
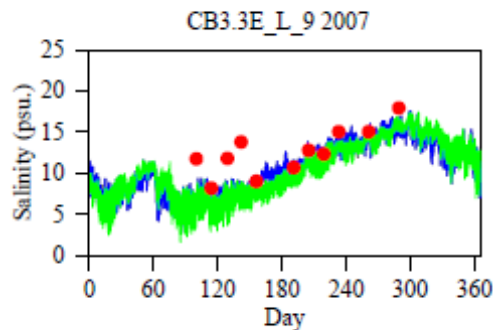
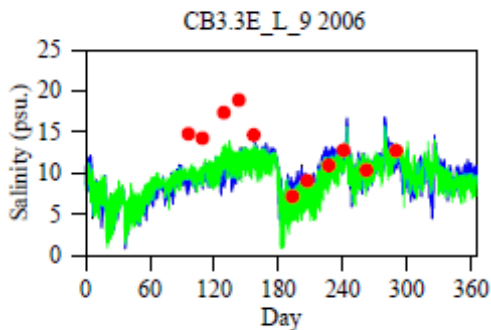
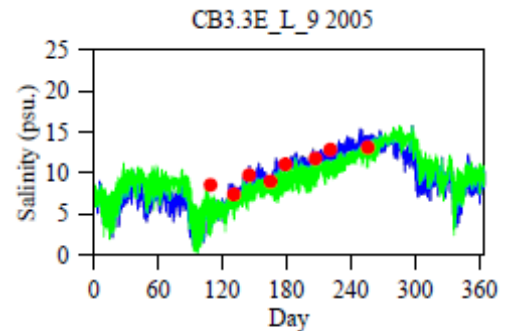
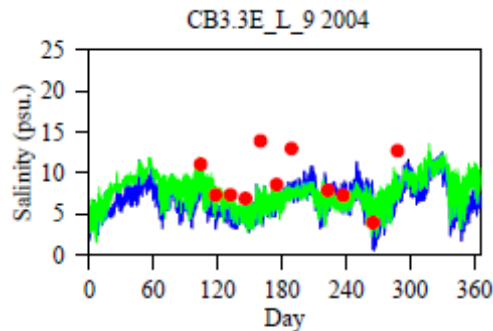
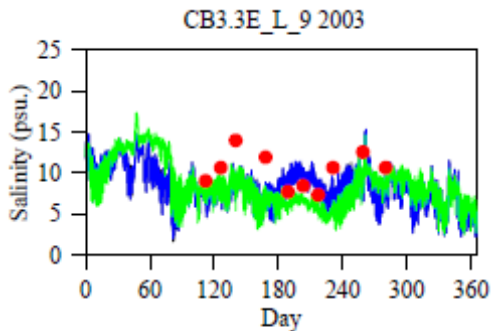
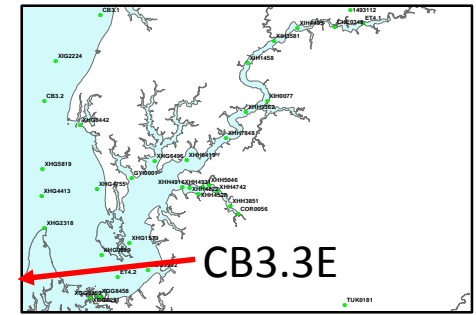
SCHICM (red) VS. CH3D (blue) boundary surface elevation 2005, 2006



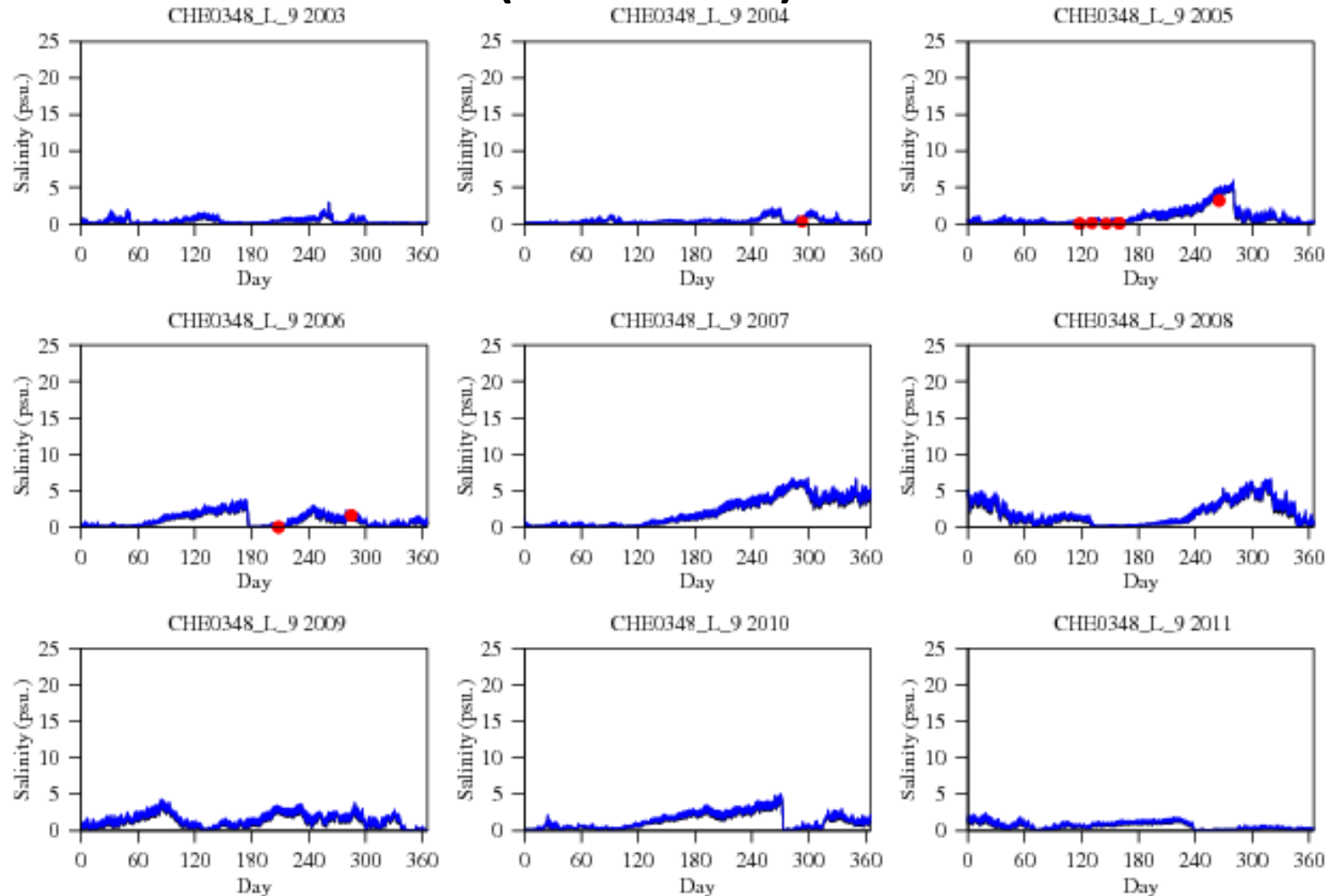
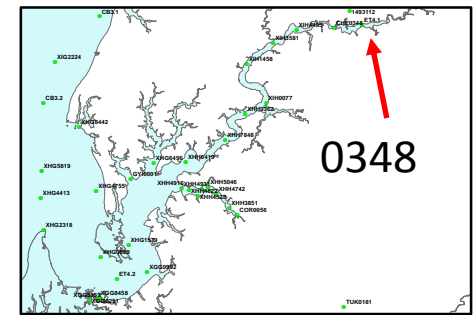
SCHICM (green) VS. CH3D (blue)
boundary condition, salinity at
Station CB3.3E (surface)



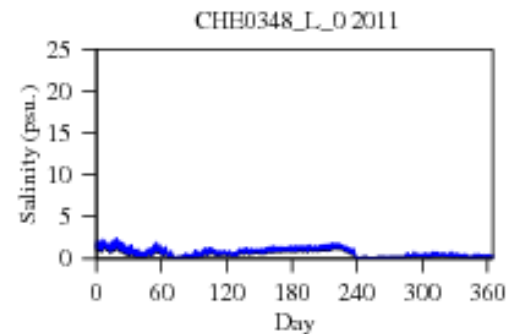
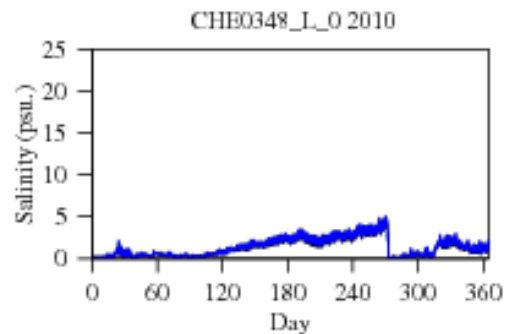
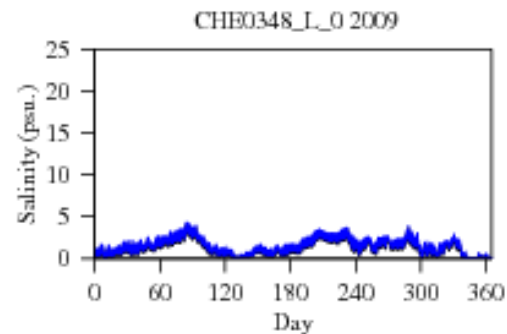
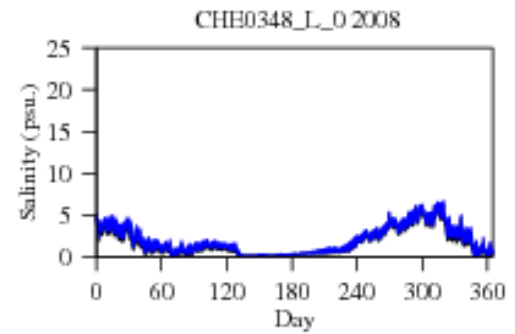
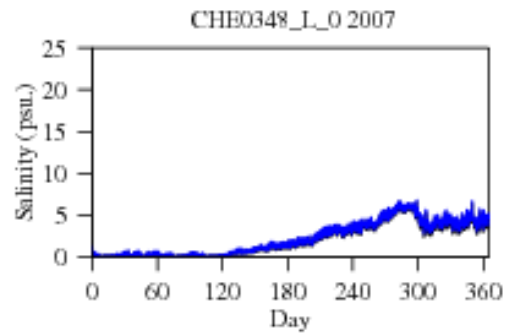
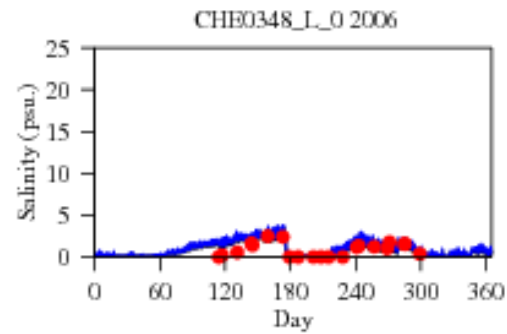
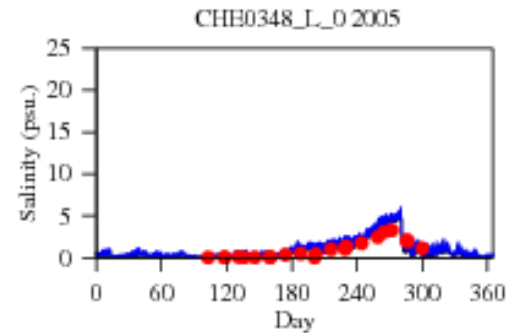
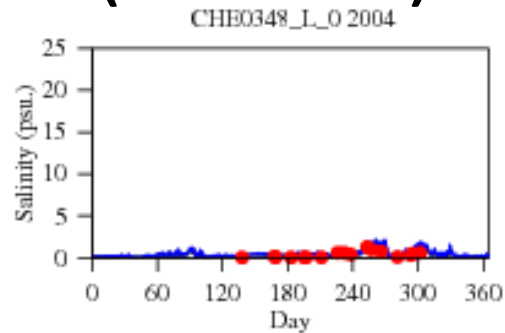
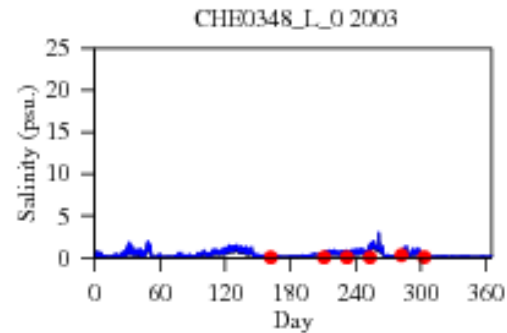
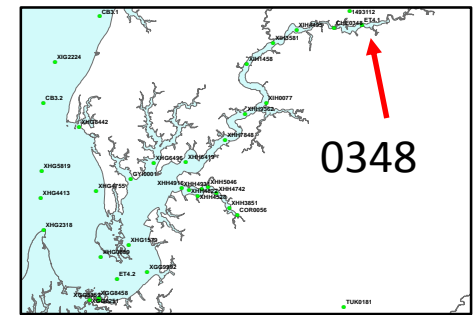
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station CB3.3E (bottom)



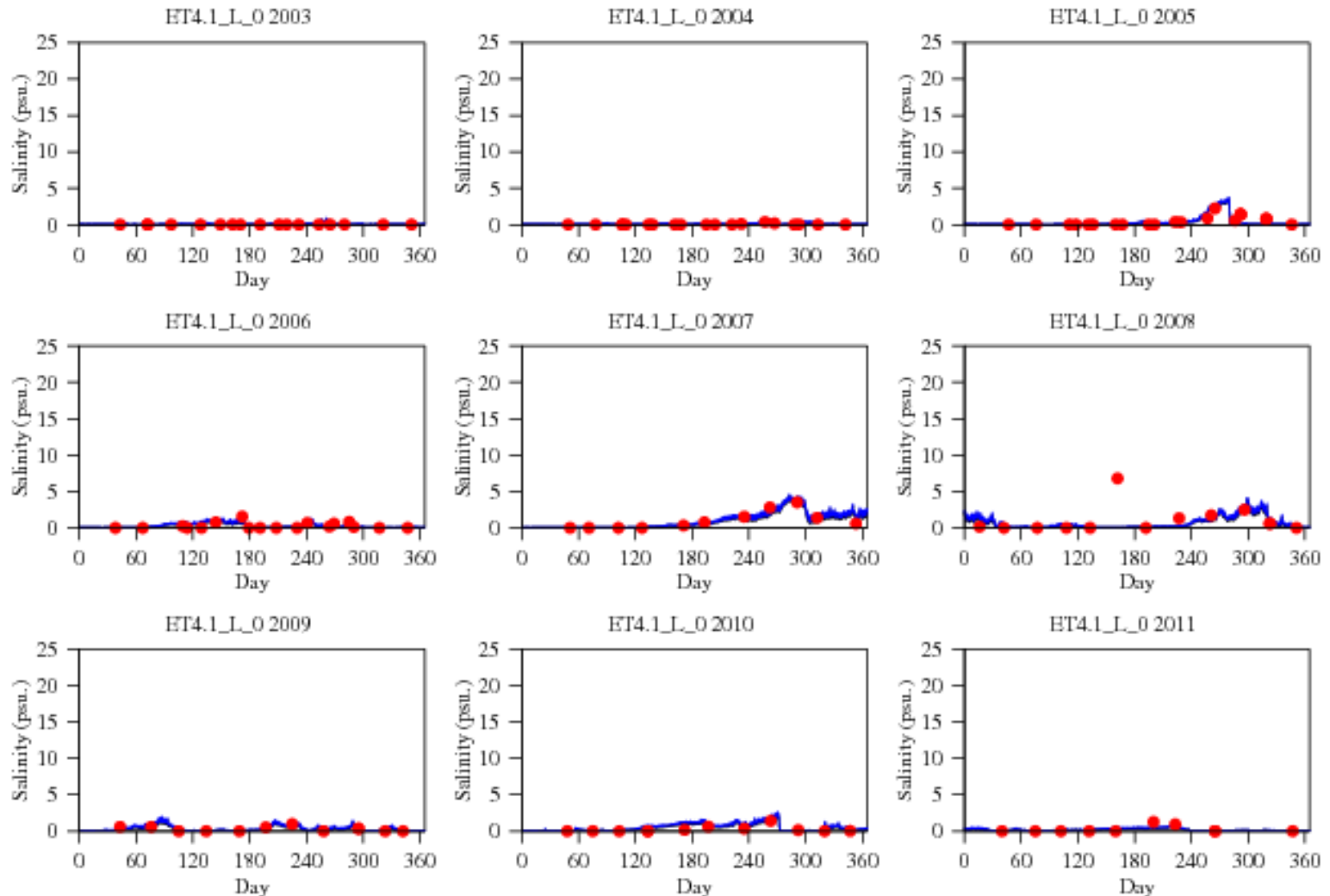
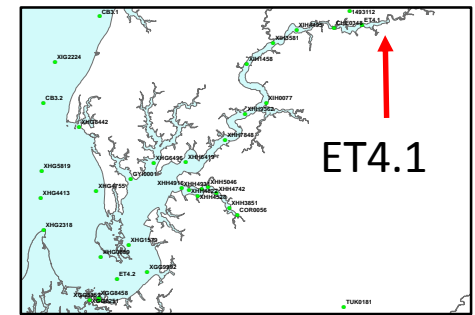
10% decrease (blue) VS.
base (black) flow, salinity at
Station CHE0438 (bottom)



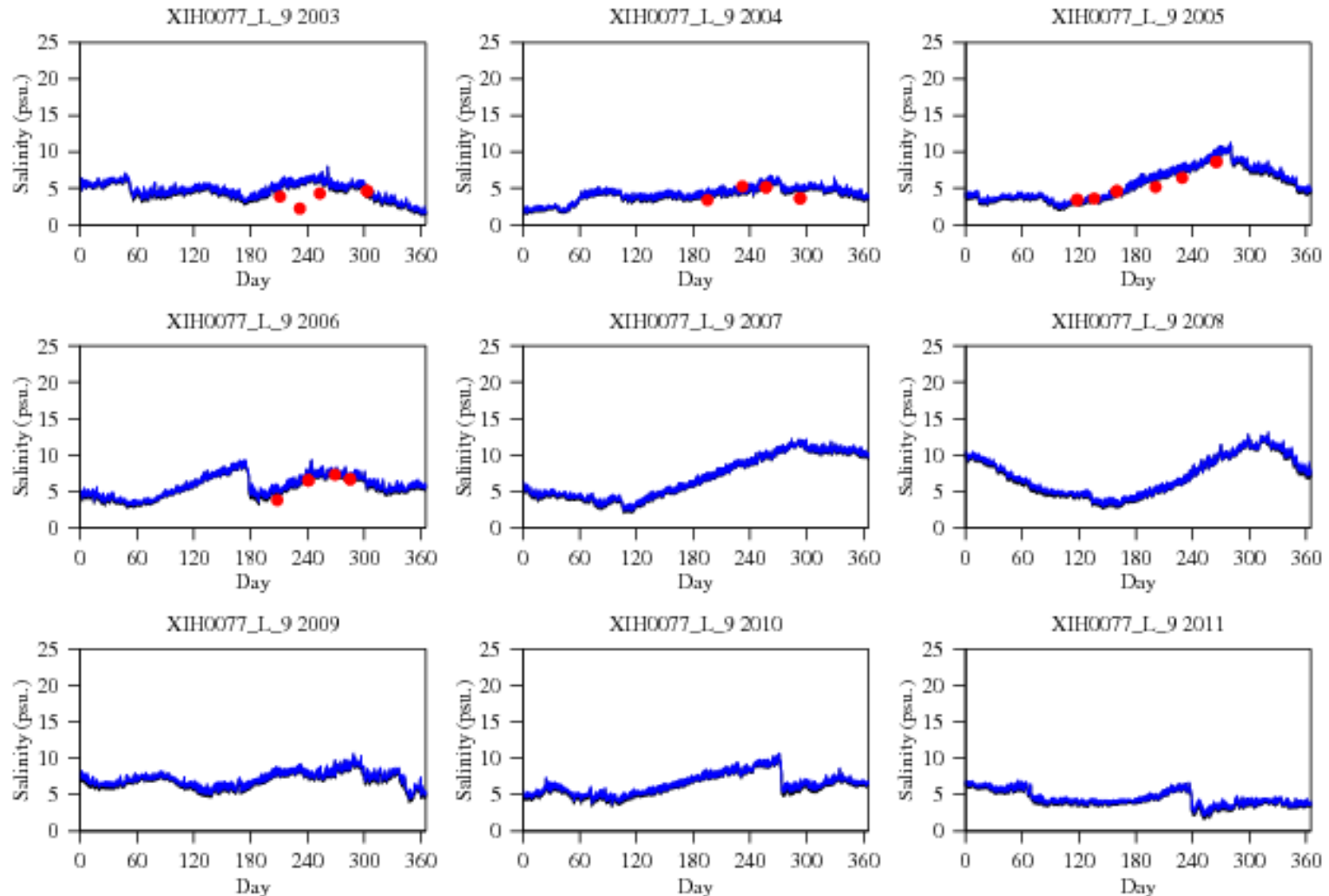
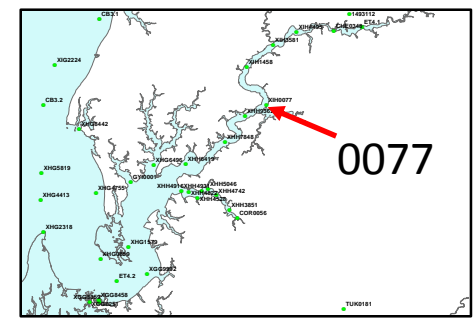
10% decrease (blue) VS. base (black) flow, salinity at Station CHE0438 (surface)



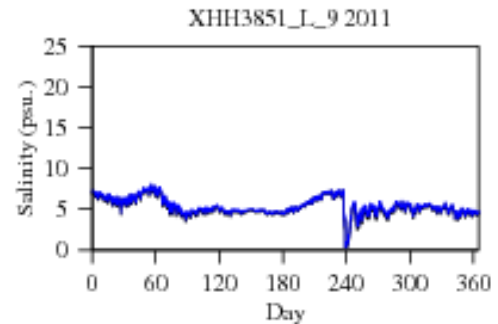
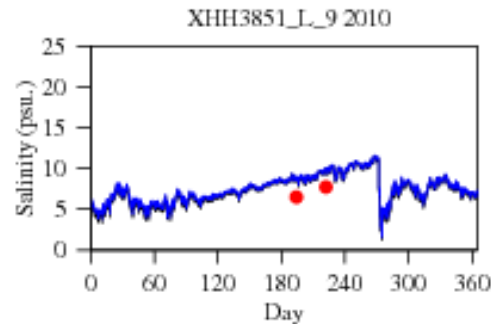
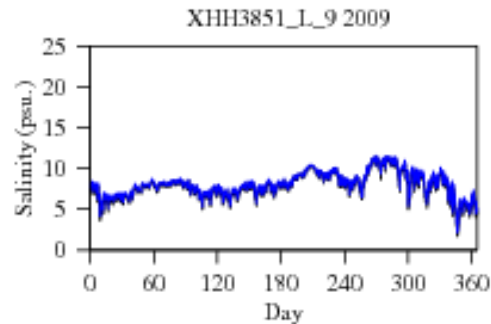
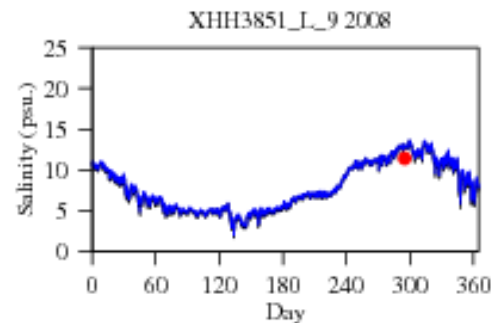
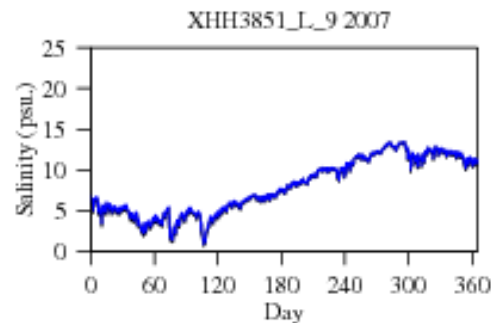
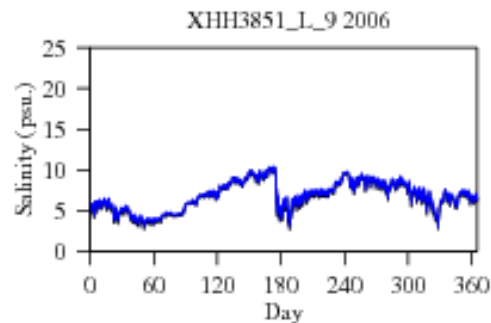
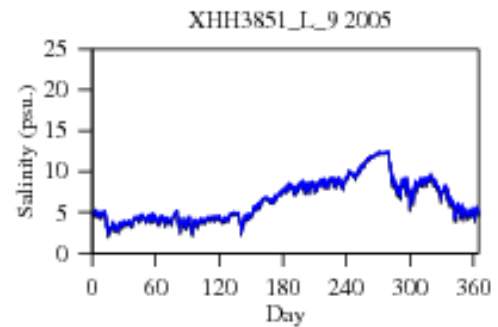
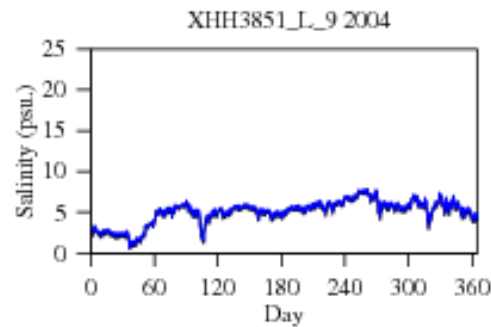
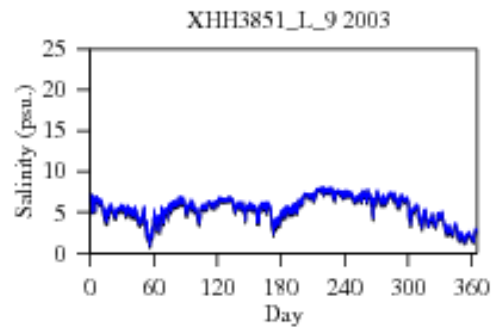
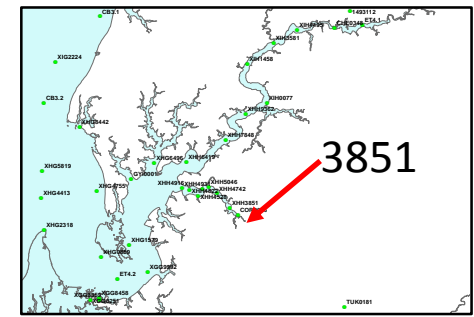
10% decrease (blue) VS. base (black) flow, salinity at Station ET4.1 (surface)



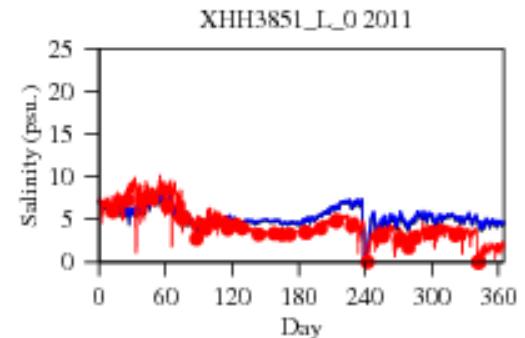
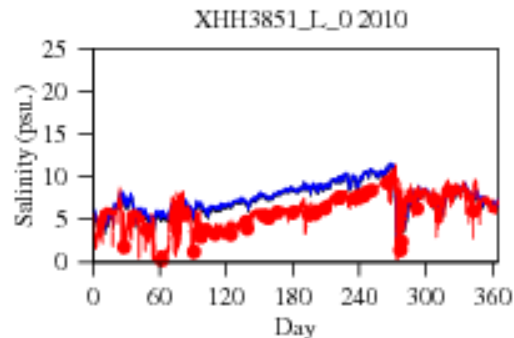
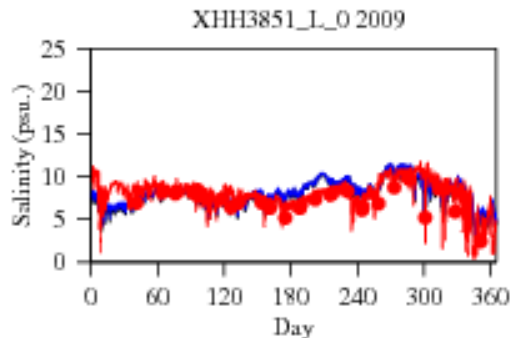
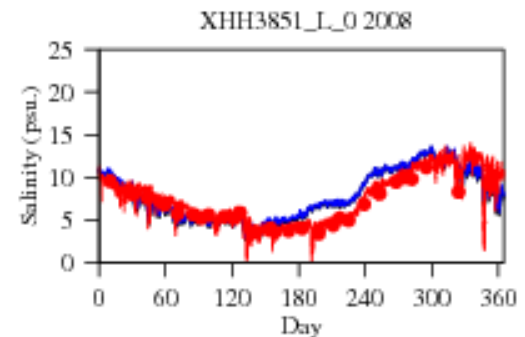
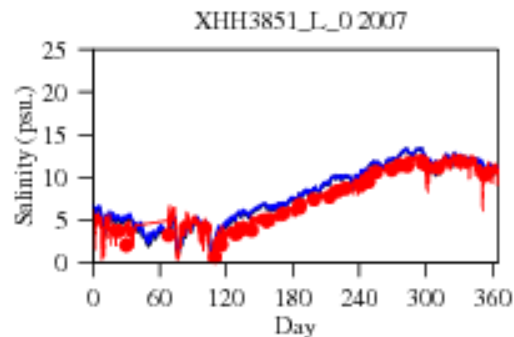
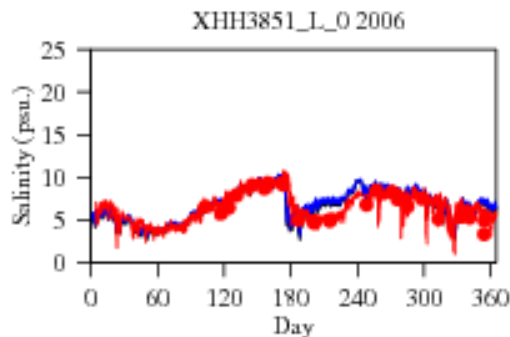
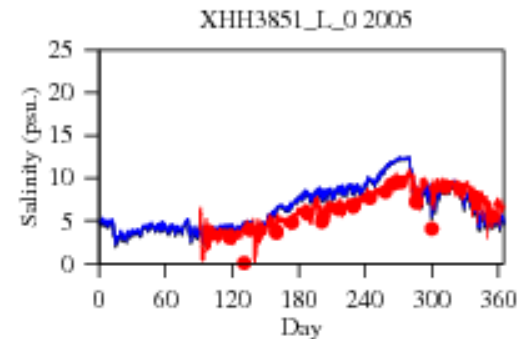
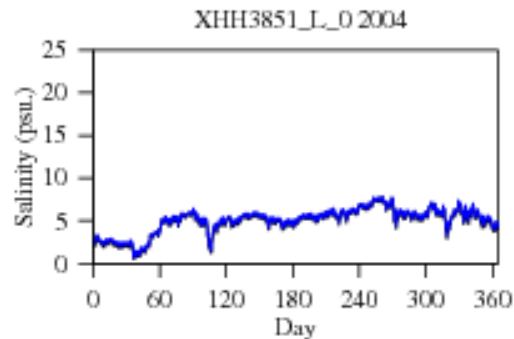
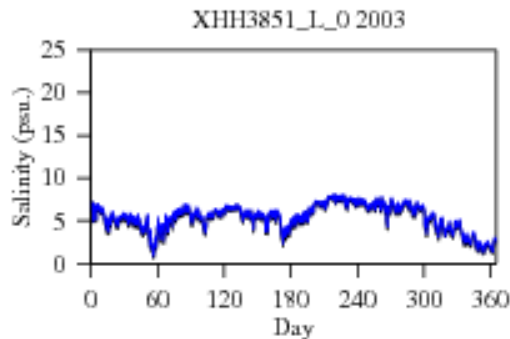
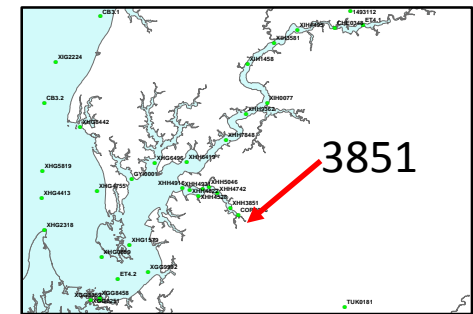
10% decrease (blue) VS. base (black) flow, salinity at Station 0077 (bottom)



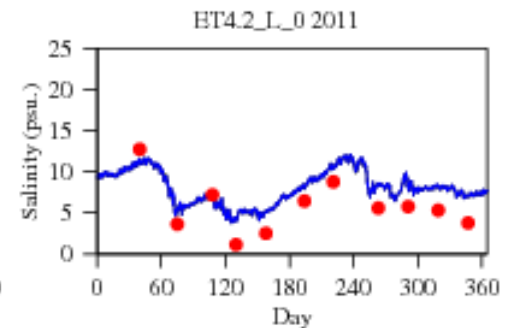
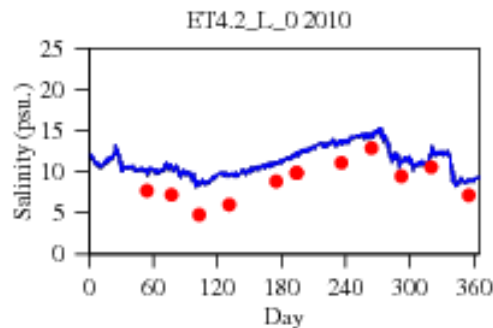
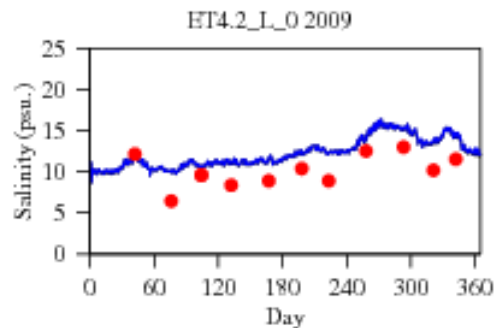
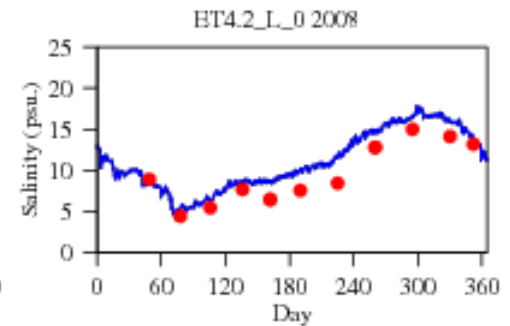
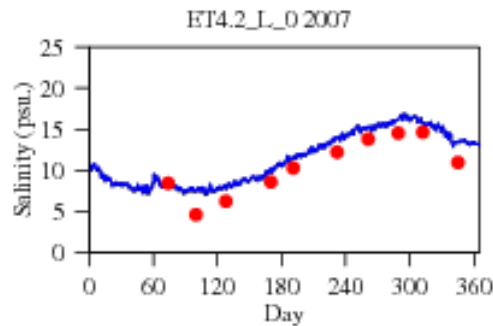
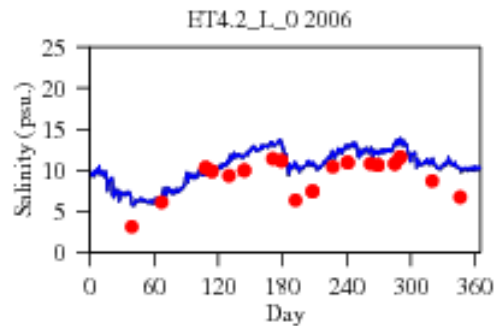
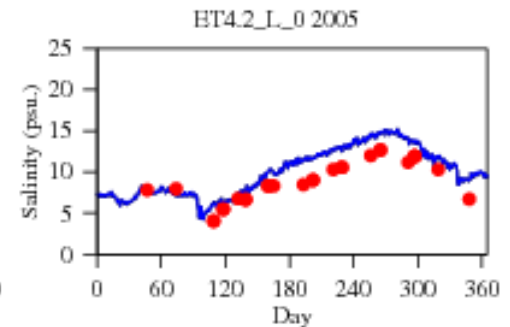
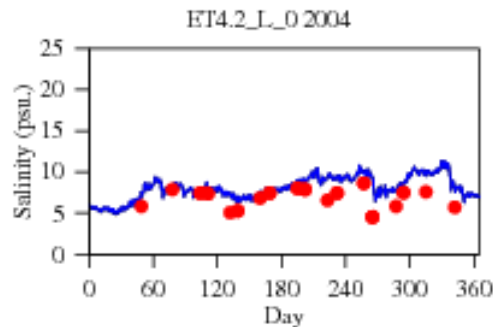
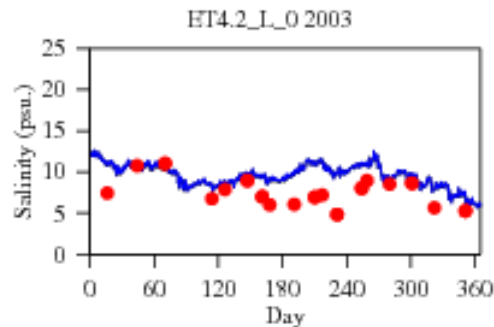
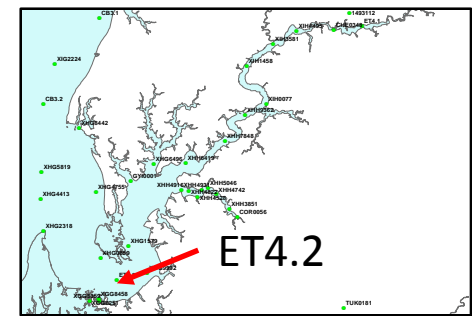
10% decrease (blue) VS. base
(black) flow, salinity at Station
3851 (bottom)



10% decrease (blue) VS. base (black) flow, salinity at Station 3851 (surface)



10% decrease (blue) VS. base (black) flow, salinity at Station ET4.2 (surface)

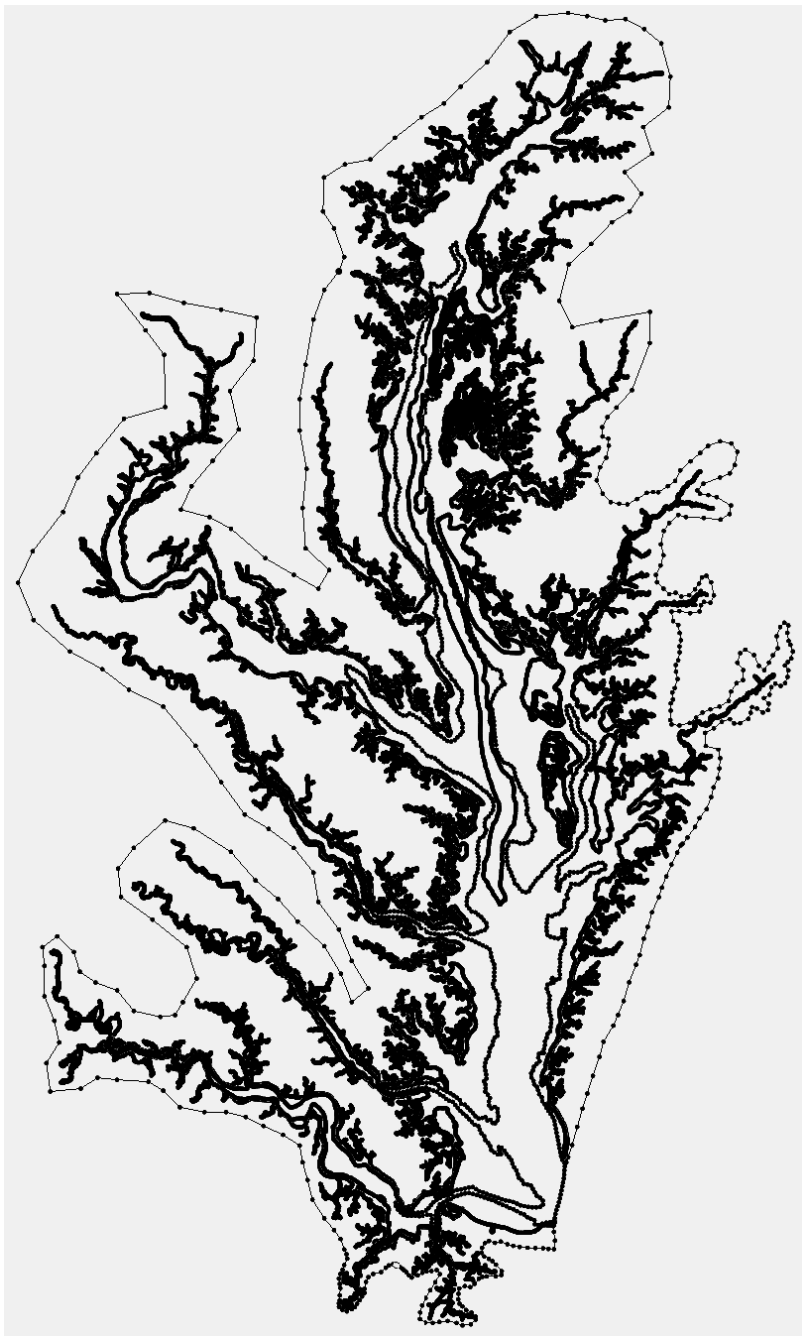


Future improvement

- **No significant difference in sensitivity runs.**
- **Underestimation of deep water DO.**
- **Overestimation of Chl.**
- **Un-seasonality.**
- **Lack of wave, TSS splits, bank erosion, wetland loss.**
- **Scale up to the Bay.**

Model Upscaling From Tributaries to Entire Bay

- Whole-Bay high-resolution model
 - High-resolution results throughout the Bay
 - Computationally intensive
- Grid nesting
 - Computationally more efficient than Bay-wide high-resolution model
 - Could be used as an offline one-way nested grid for scenario analysis
 - Open boundary conditions are difficult
- Targeted focus regions of grid refinement
 - Computationally more efficient than Bay-wide high-resolution model
 - No open boundary conditions for high-resolution area
 - Cannot be run as standalone high-resolution model



Bathymetry with moving coastline applicability

