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

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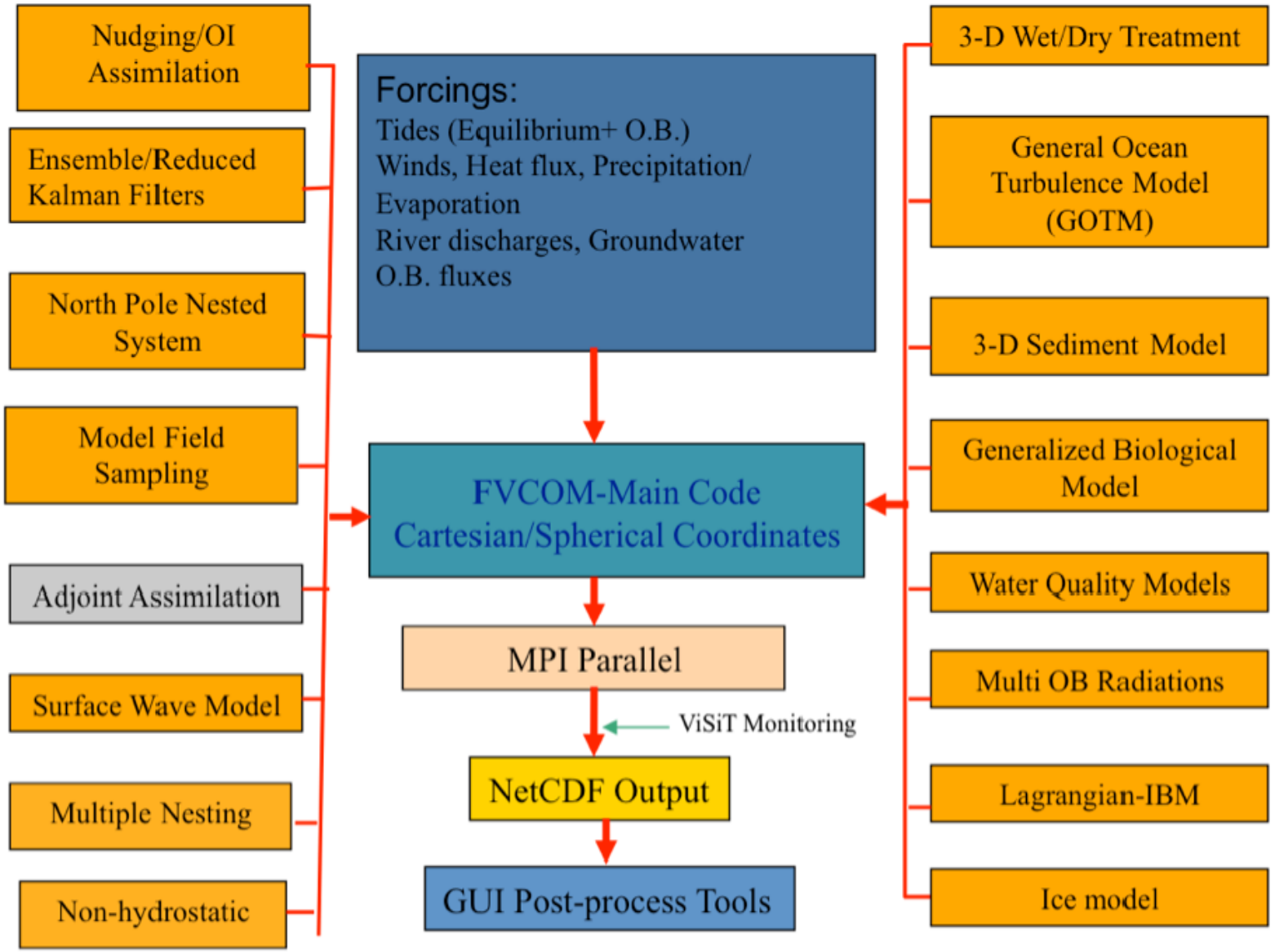
UMCES/CBPO

Modeling Quarterly Review
April 26 2016

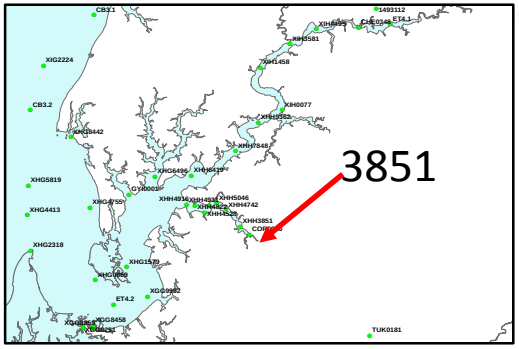
FVCOM

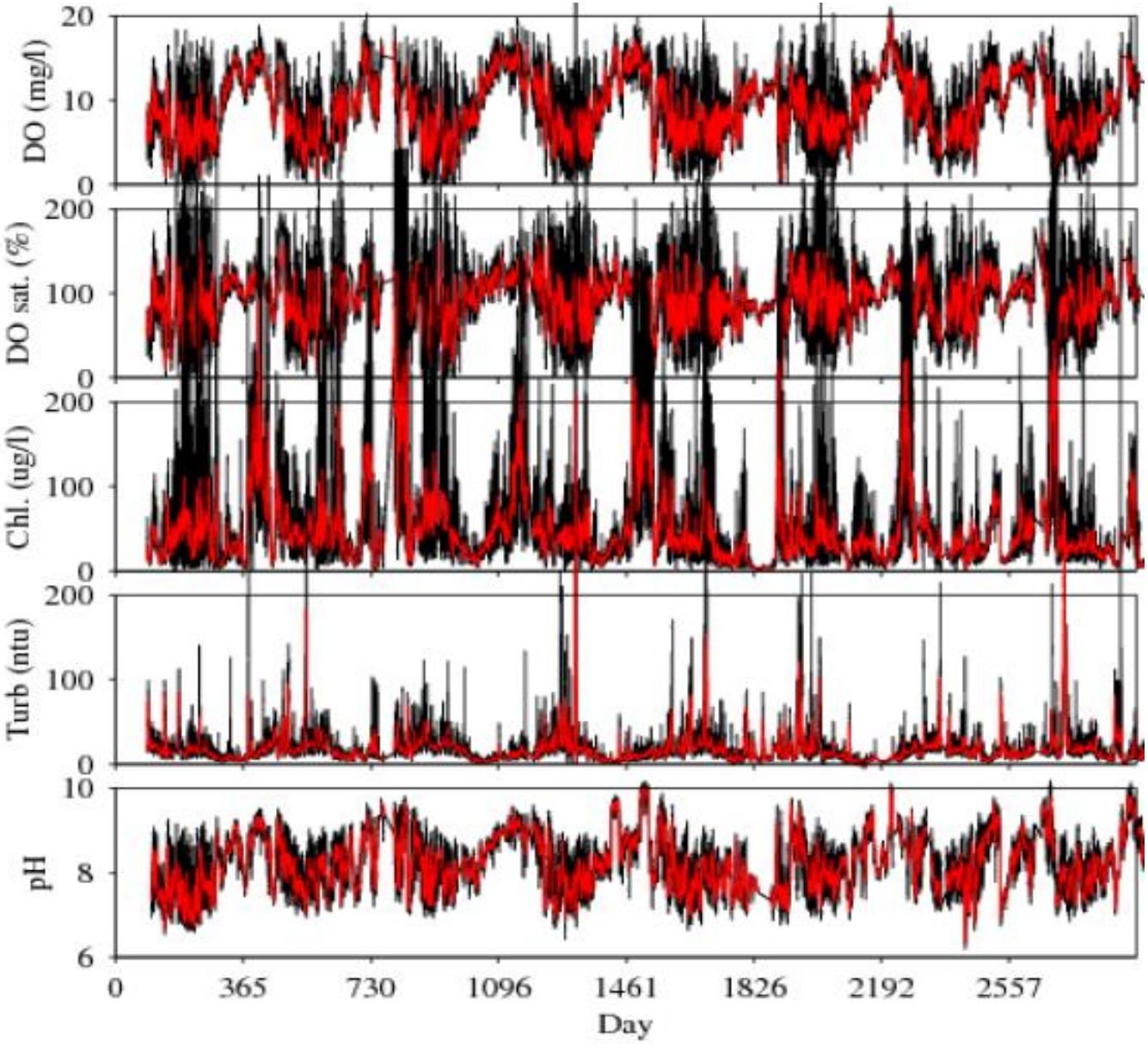


Chen et al. 2013.

FVCOM grid
(Water quality & sensitivity)

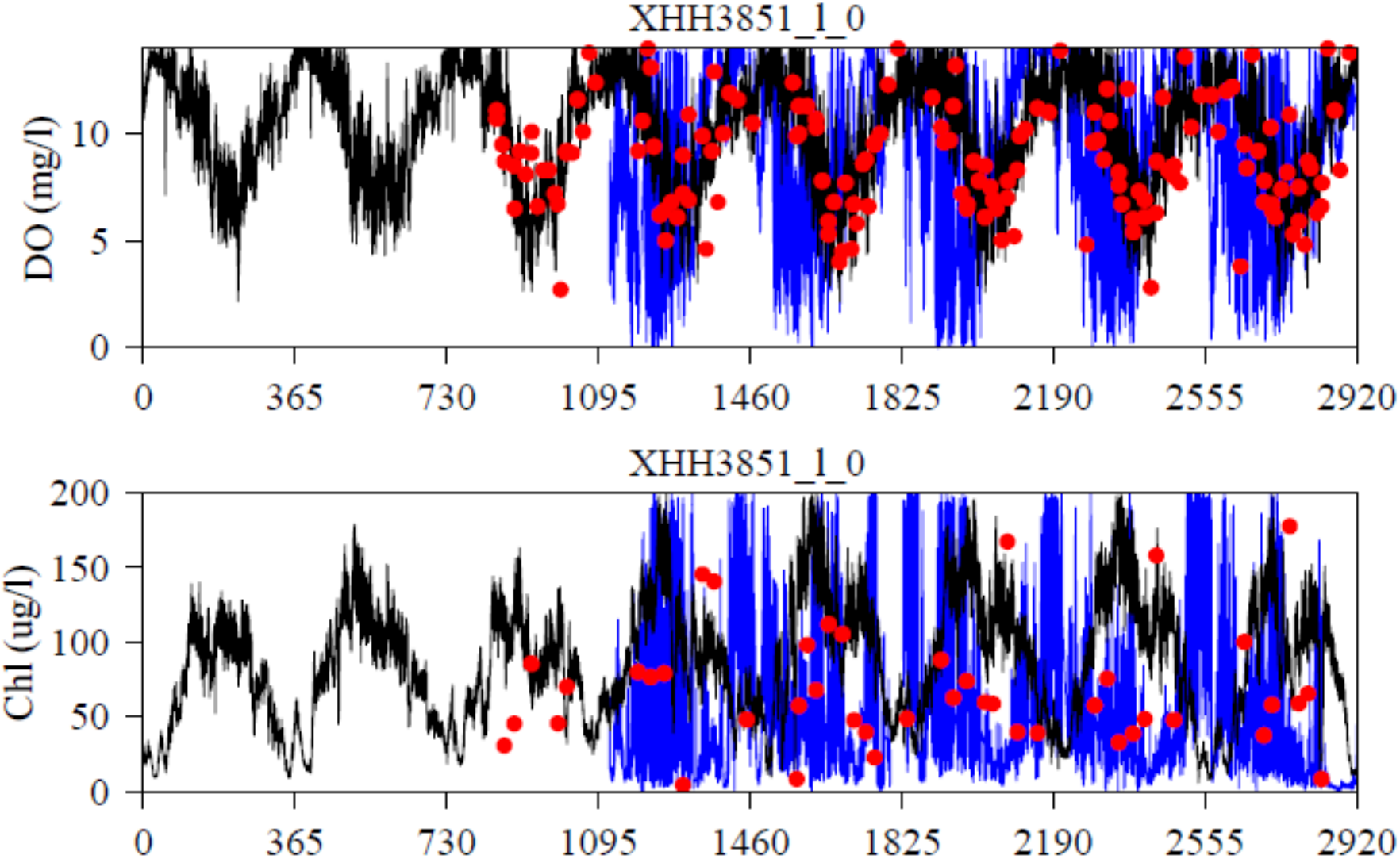
CMON data Station XHH3851 (Blue: Raw data; Red: daily average) (DNR)



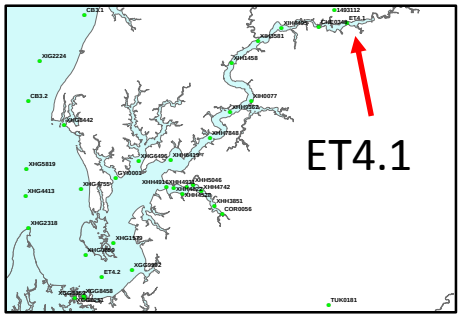


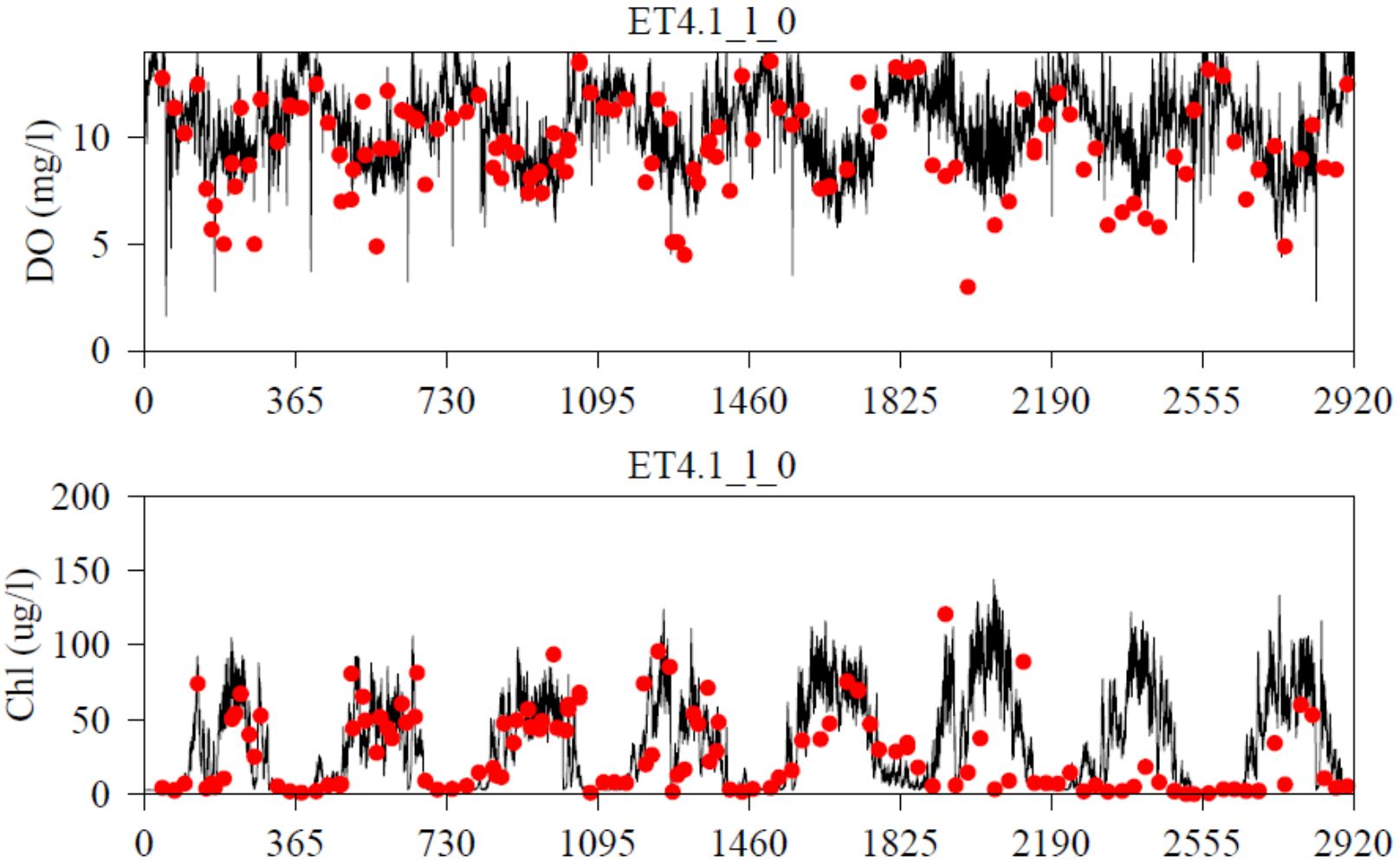
Station XHH3851 DO and Chl simulation

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

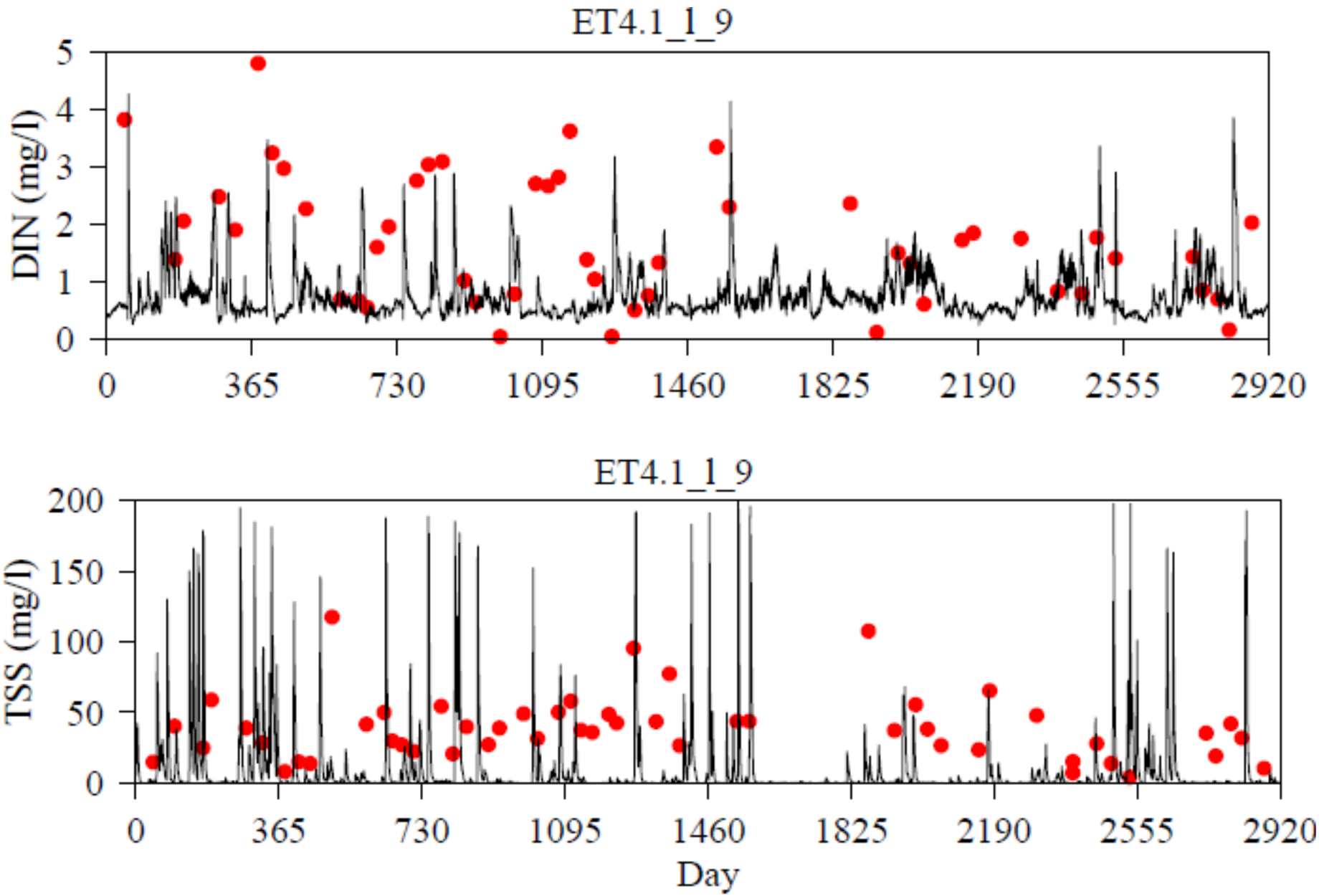


ET4.1 DO and Chl (surface)

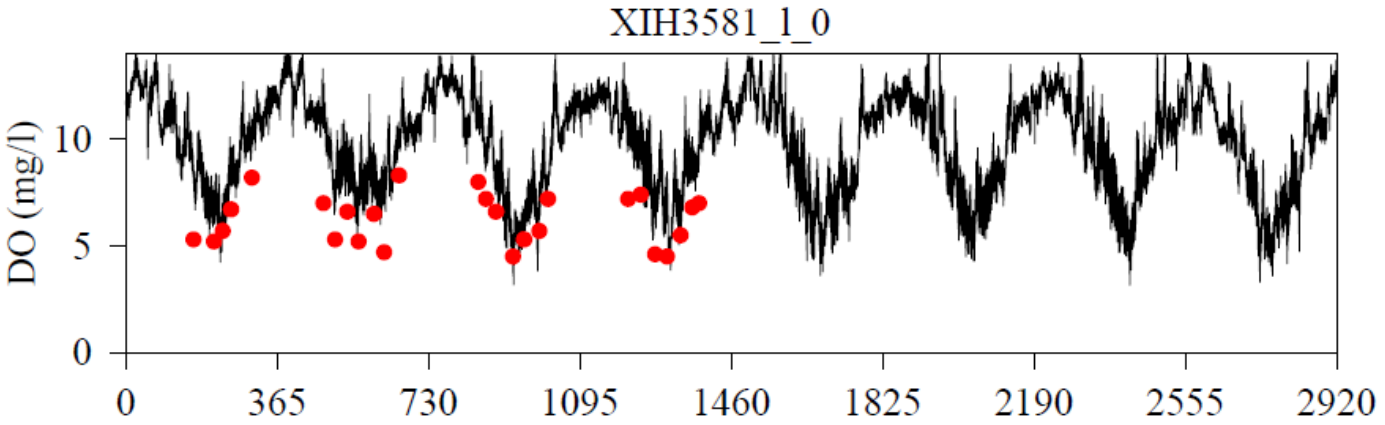


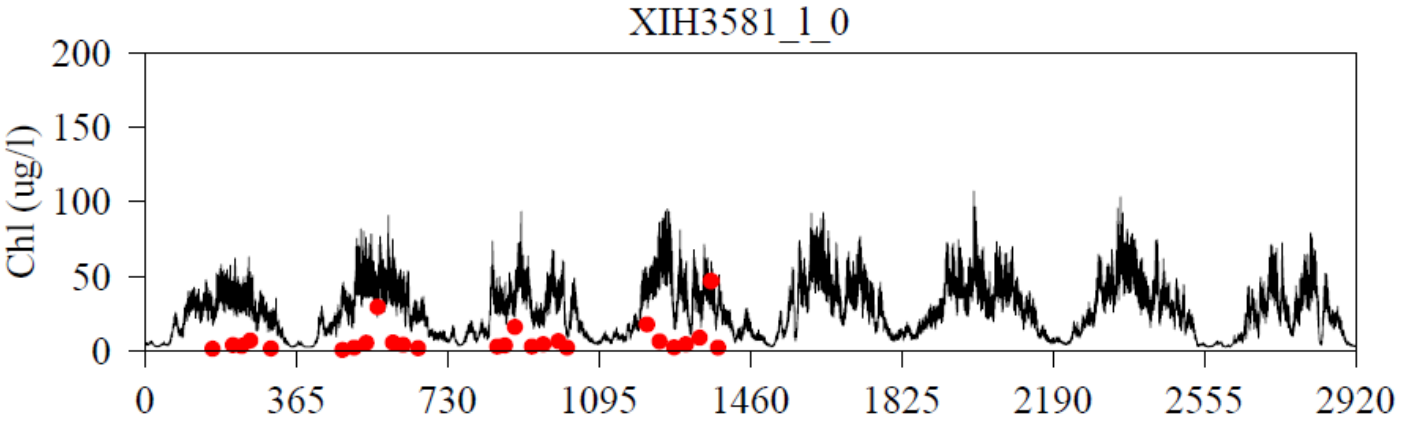


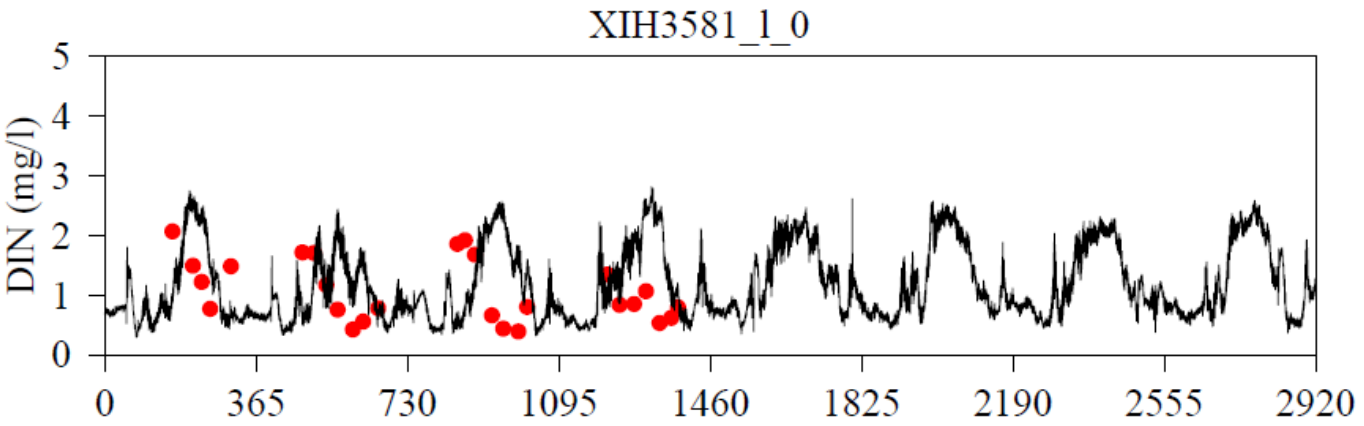
ET4.1 DIN and TSS (bottom)

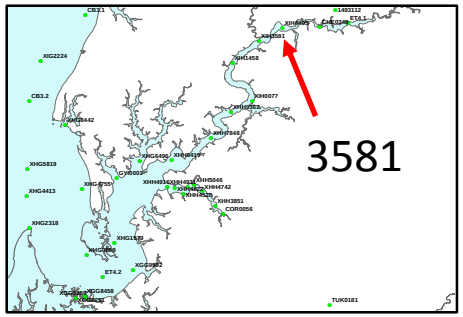


XIH3581 DO, Chl, and DIN

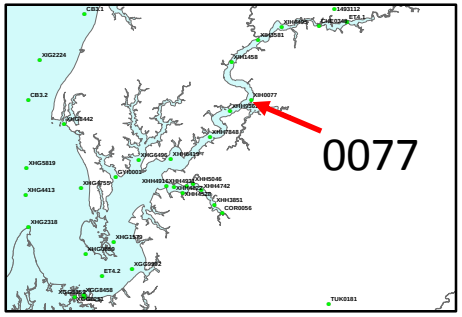


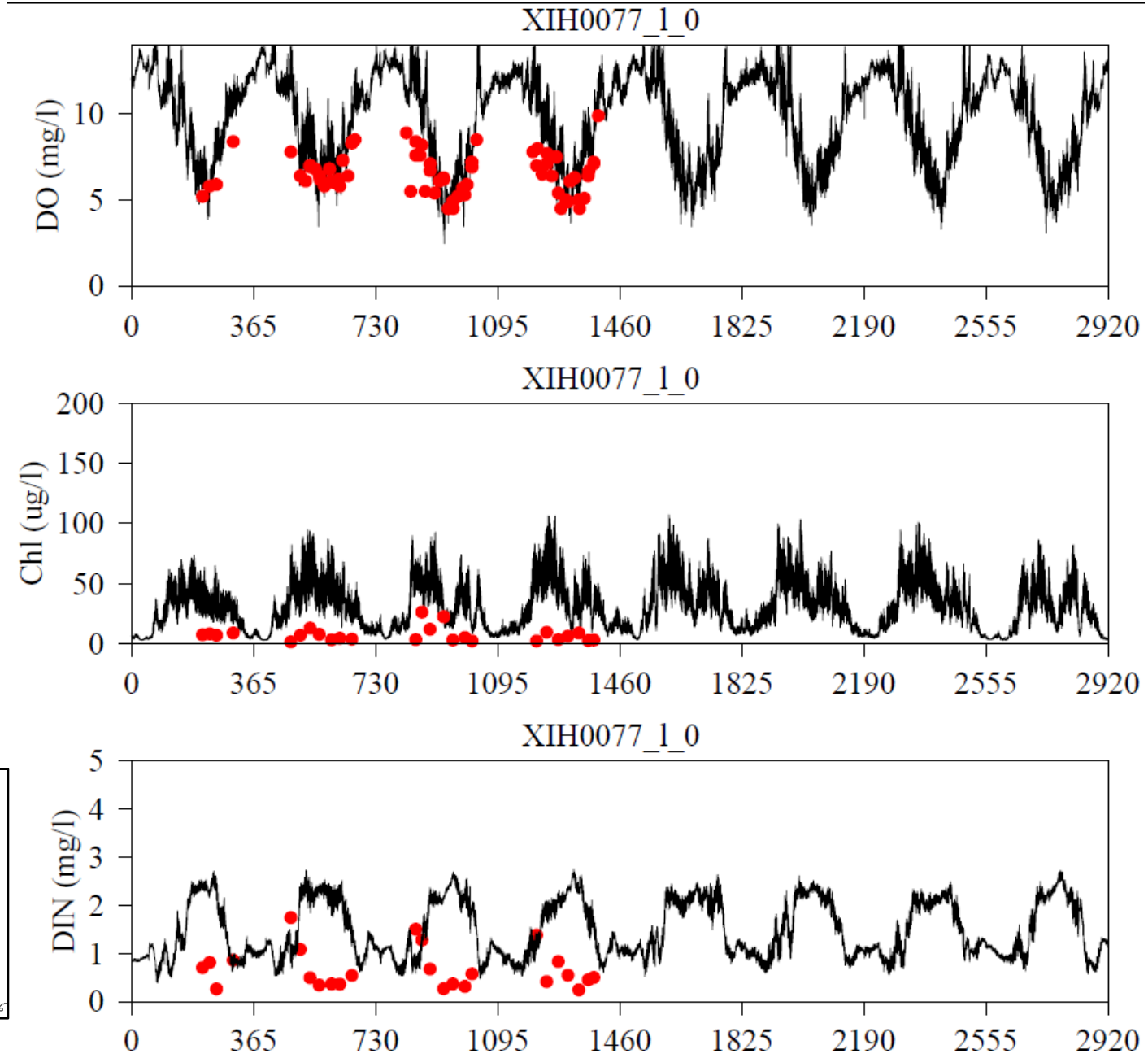




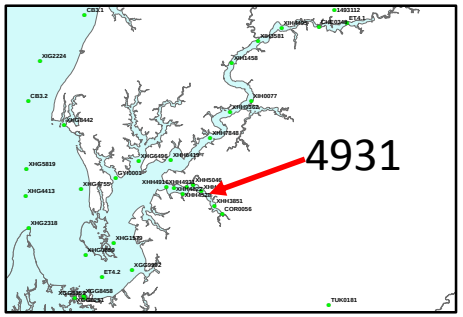


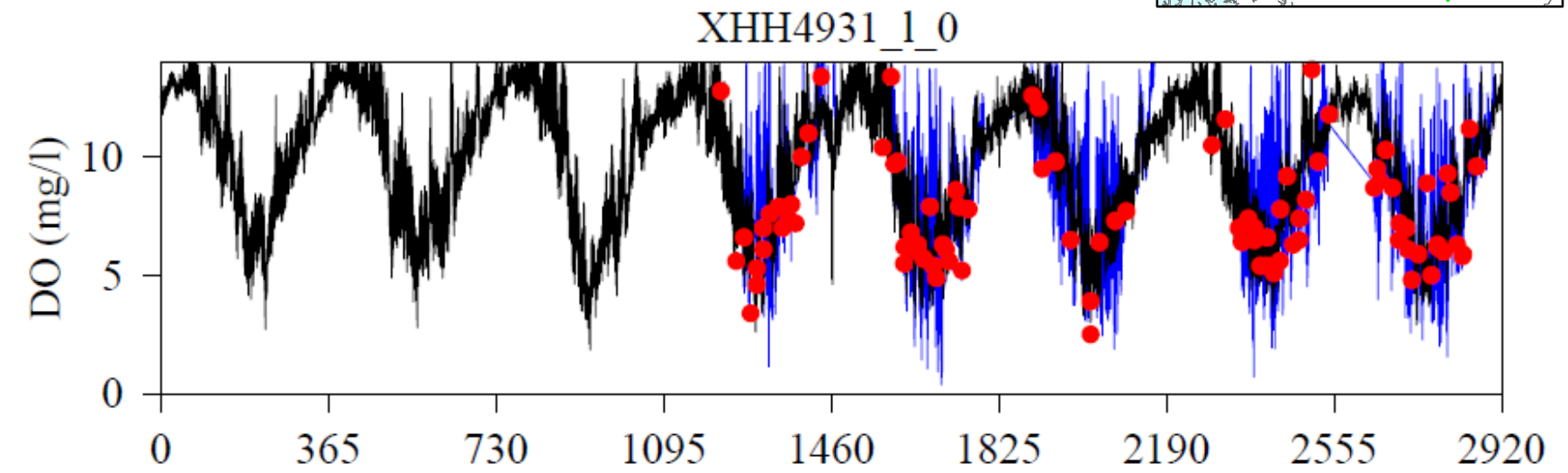
XIH0077 DO, Chl, and DIN

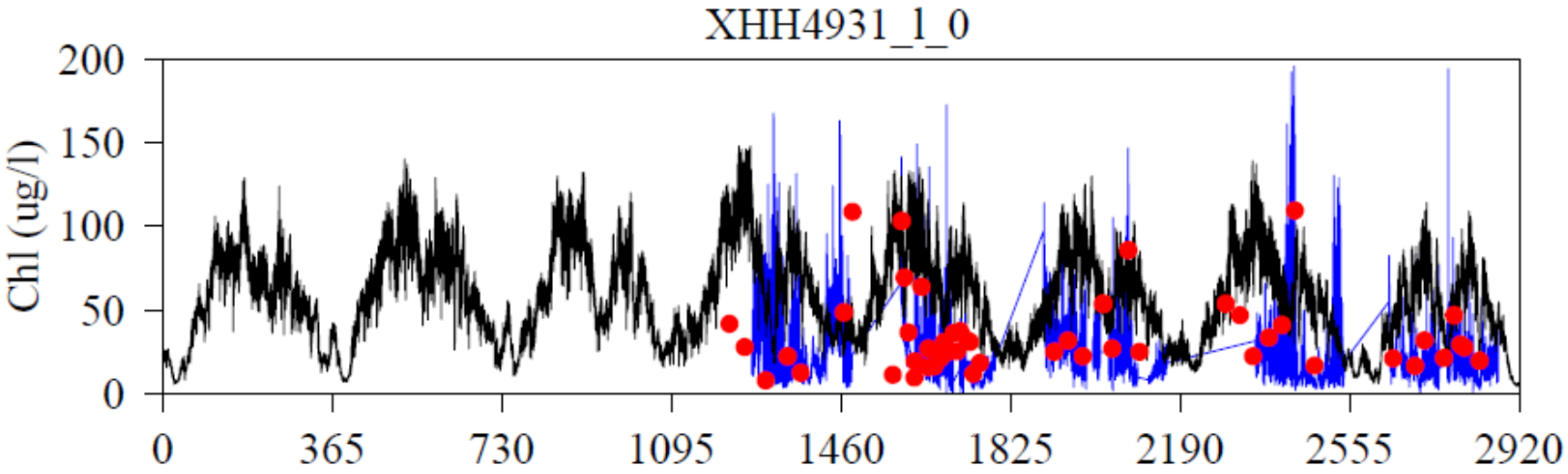




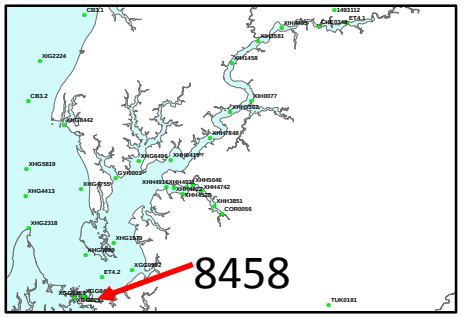
XHH4931 DO and Chl

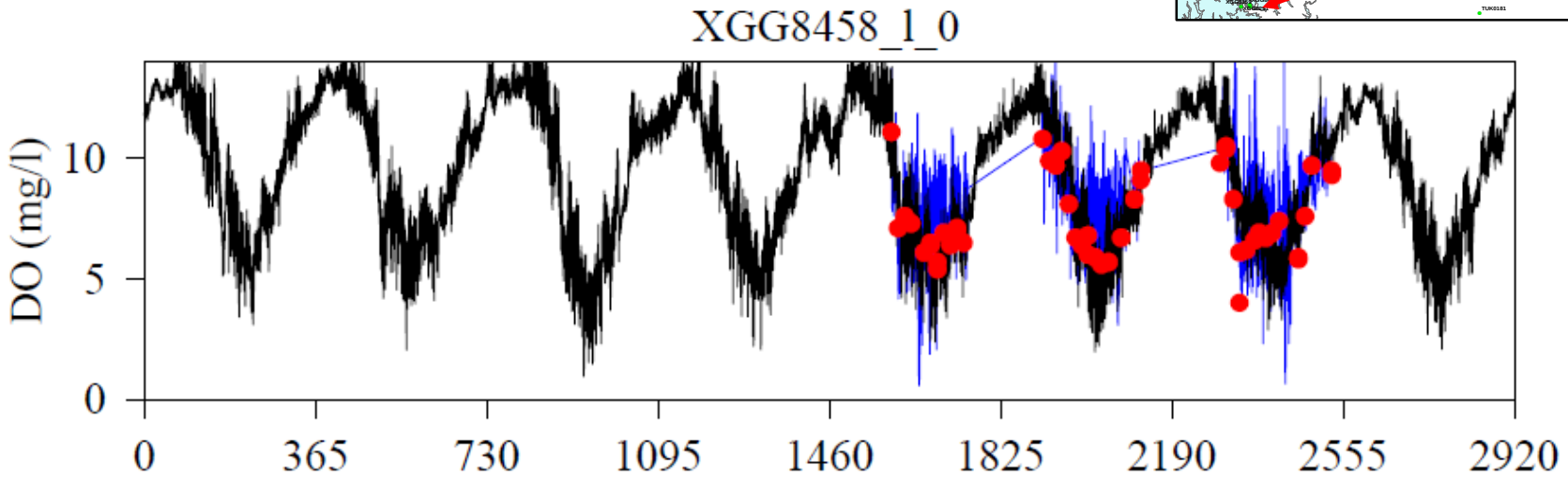


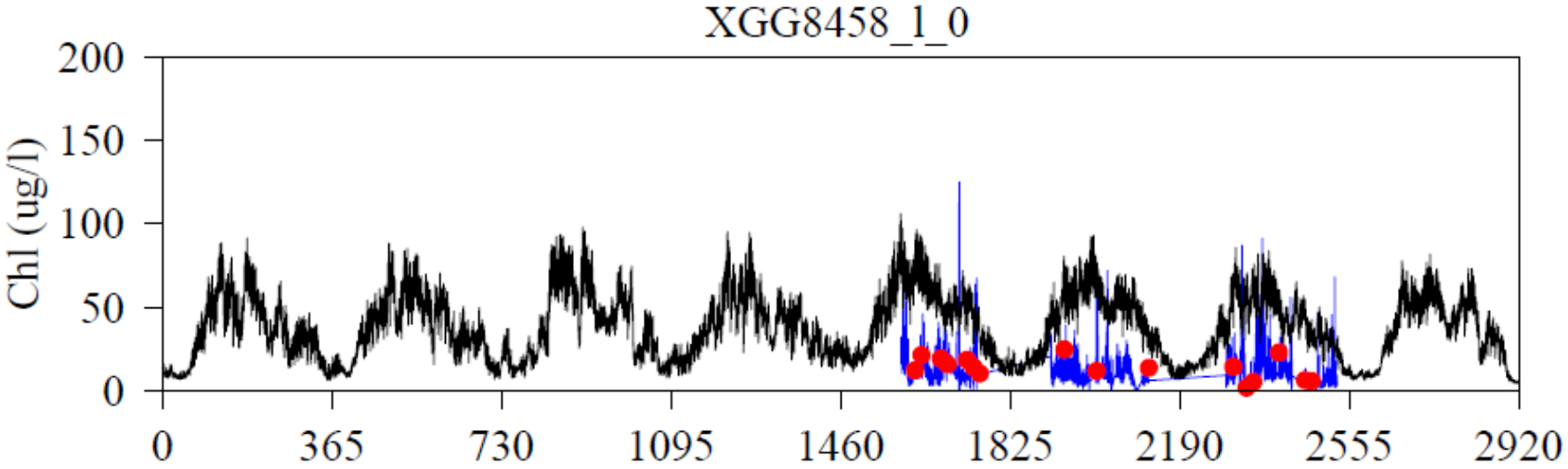




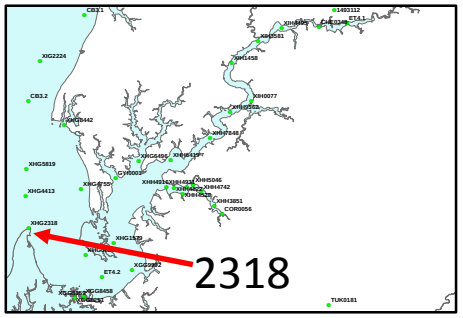
XGG8458 DO and Chl

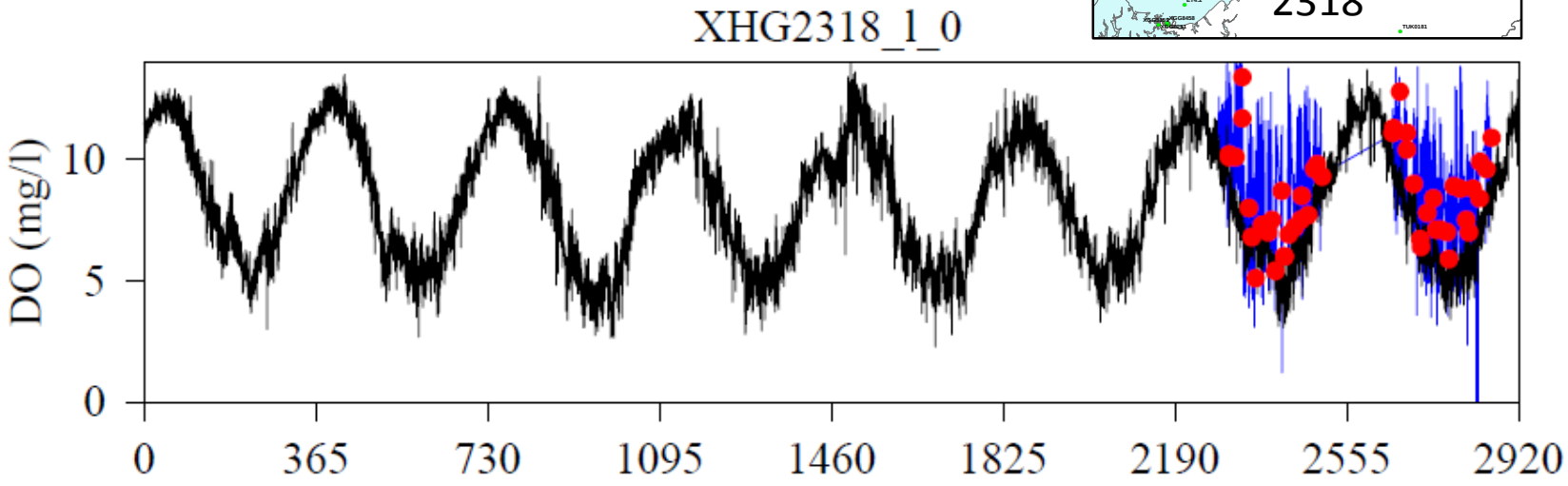


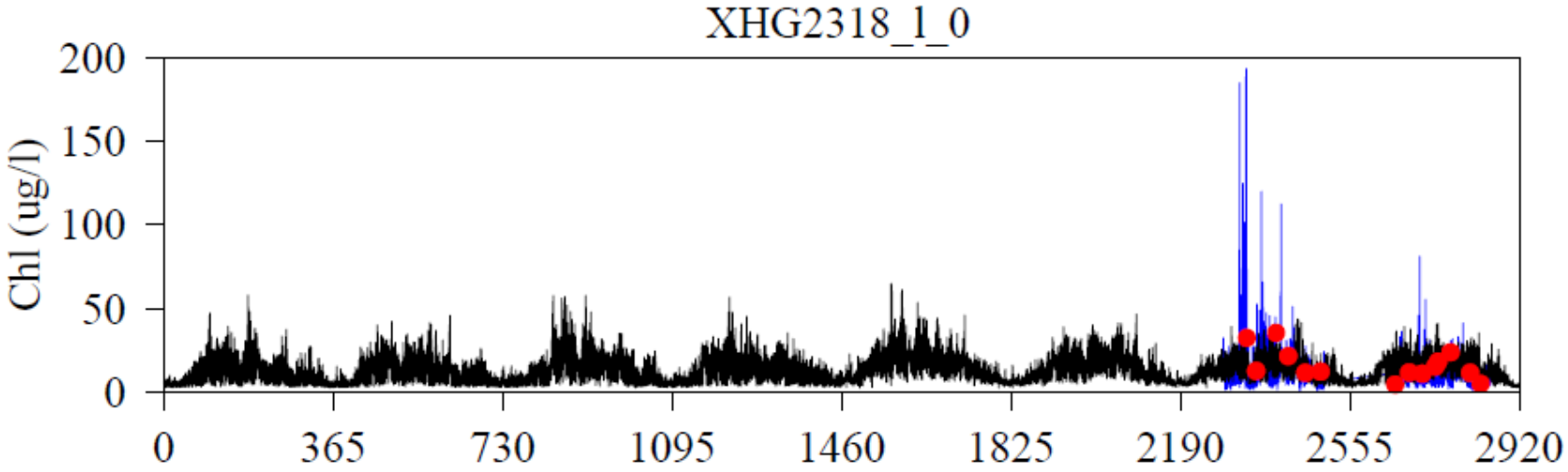




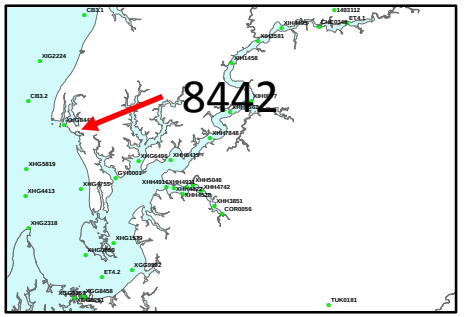
XHG2318 DO and Chl

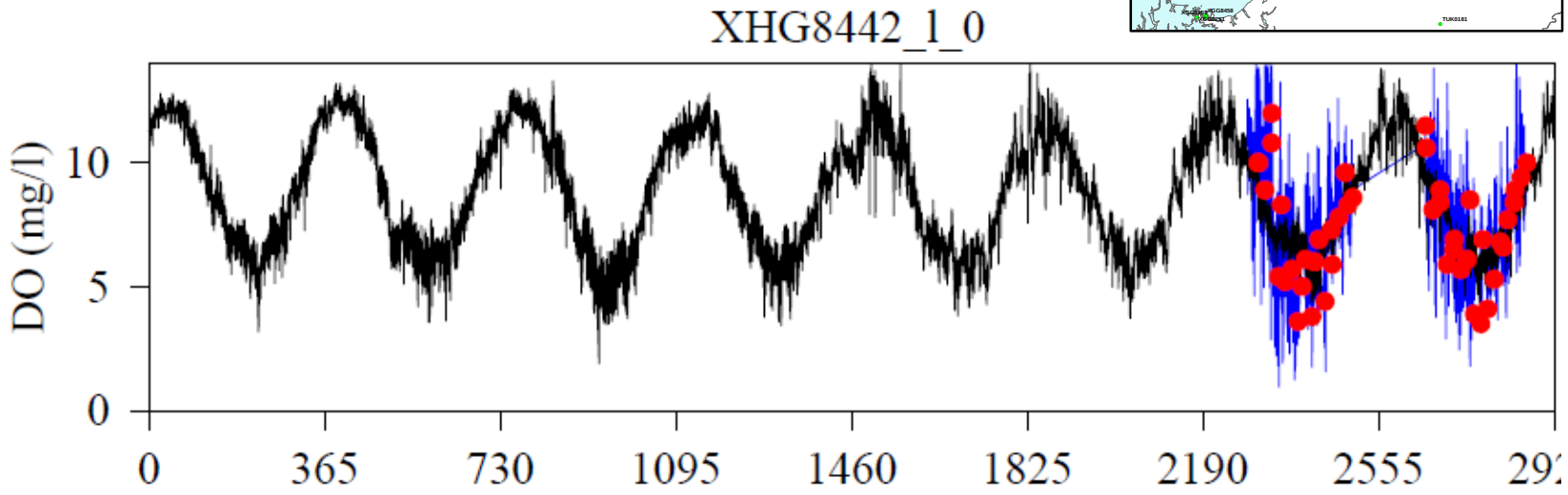


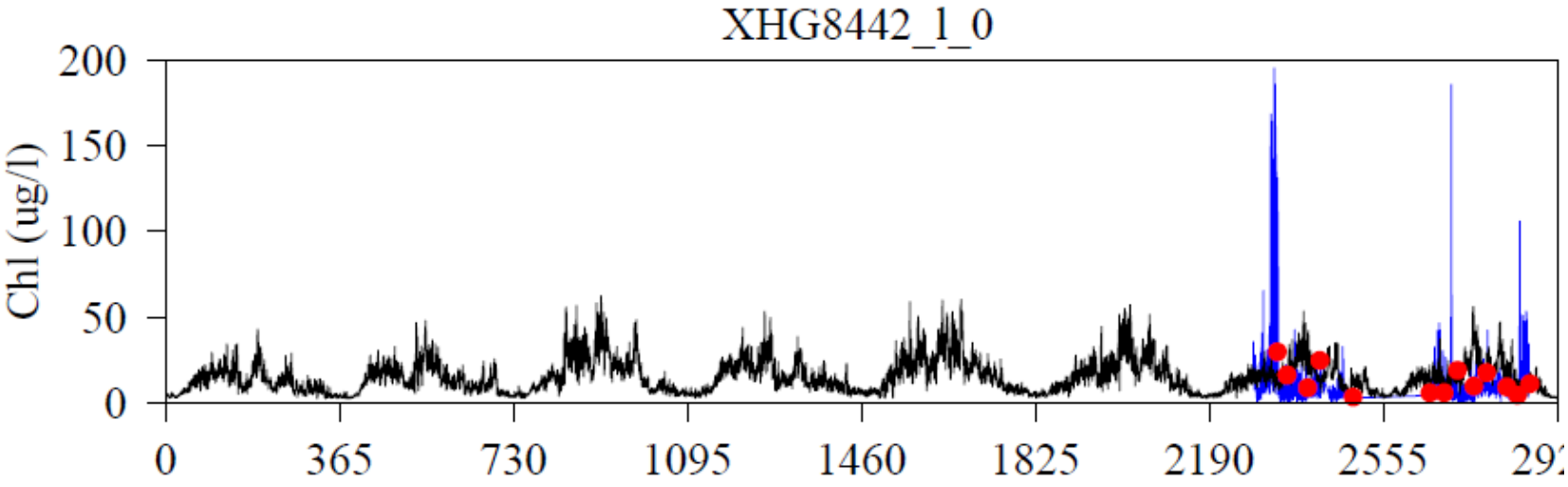




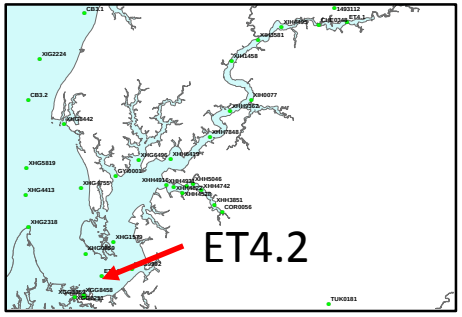
XHG8442 DO and Chl

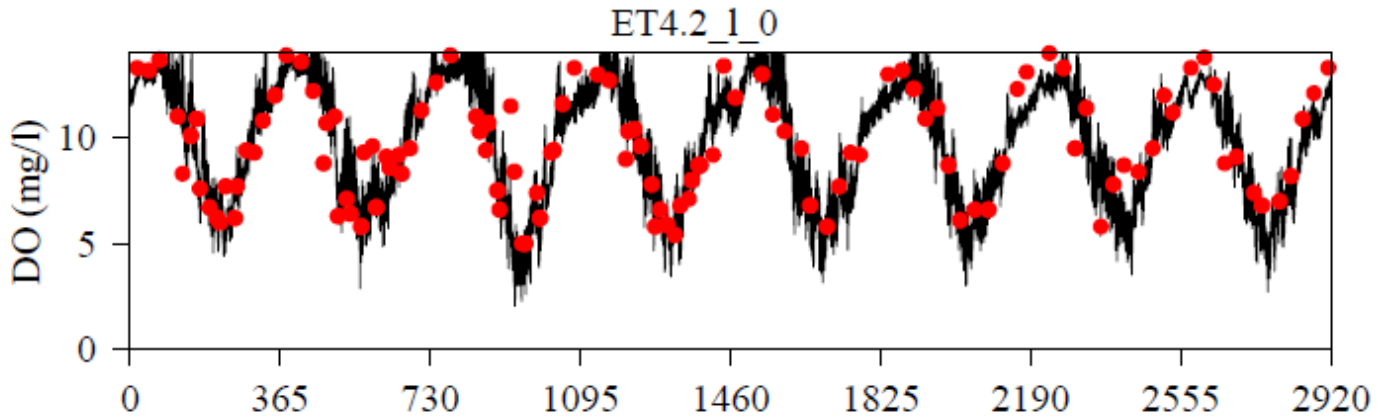


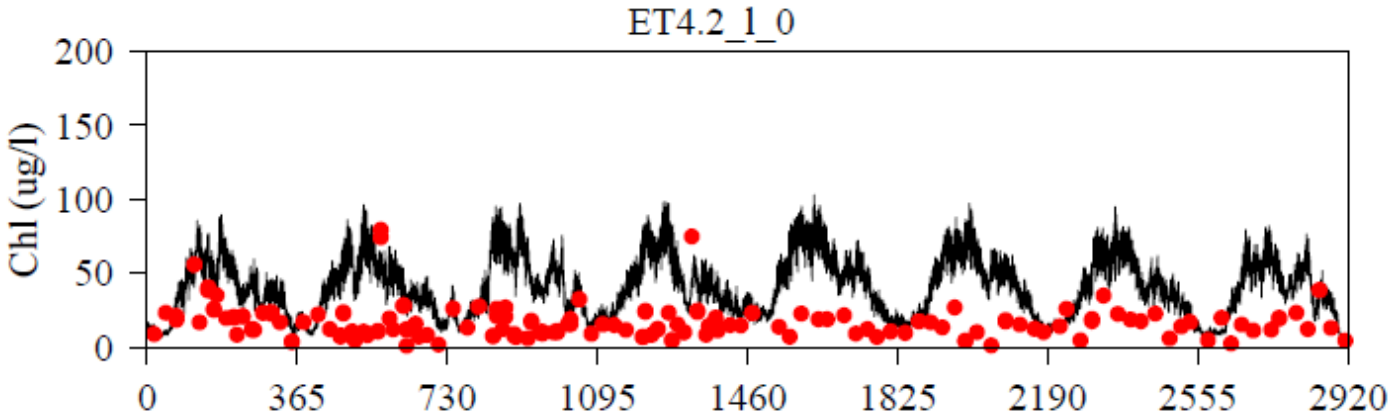


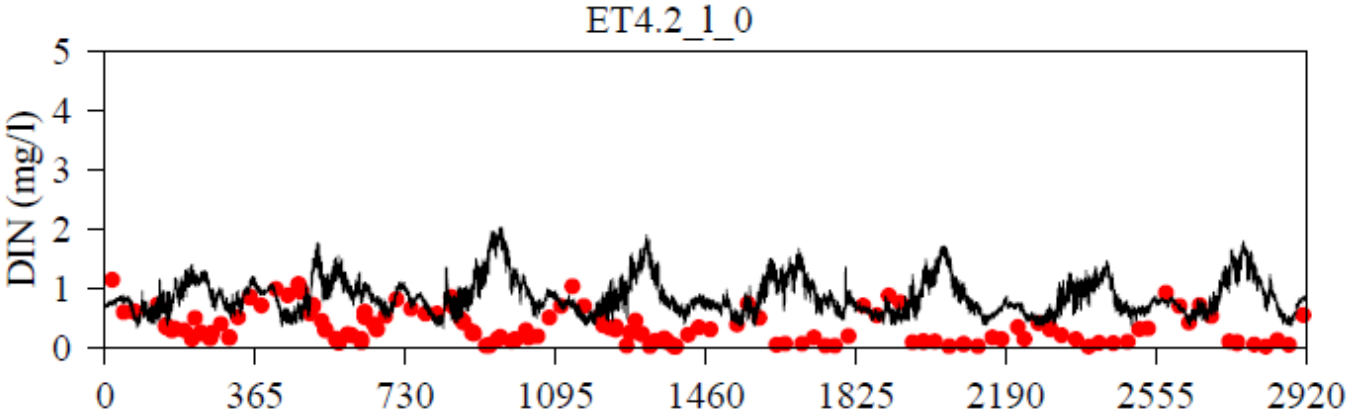


ET4.2 surface DO, Chl and DIN

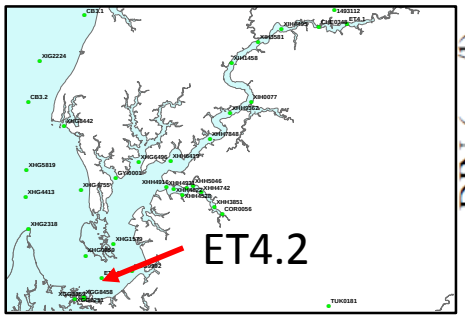


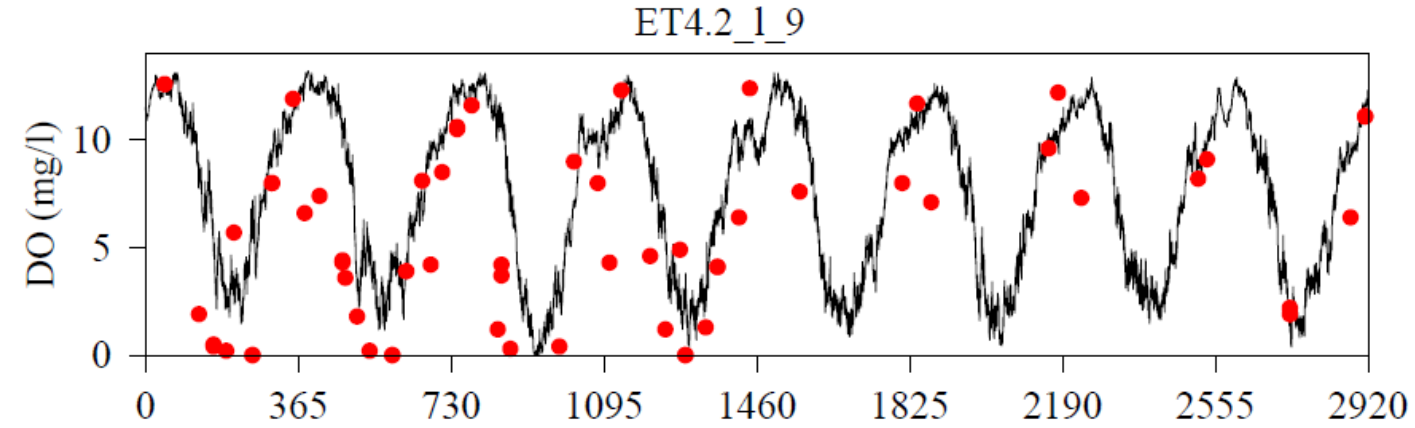


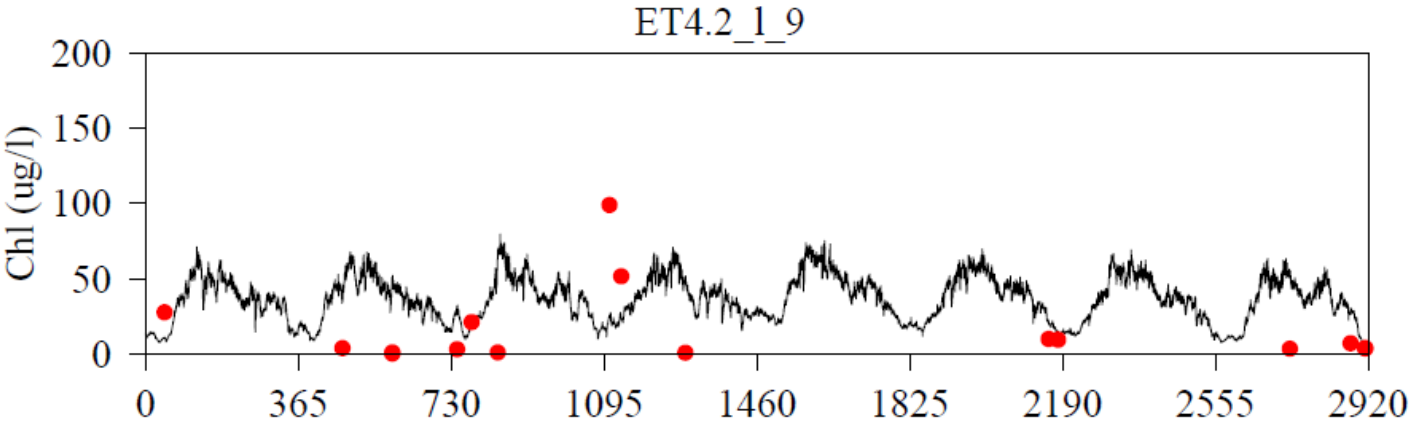


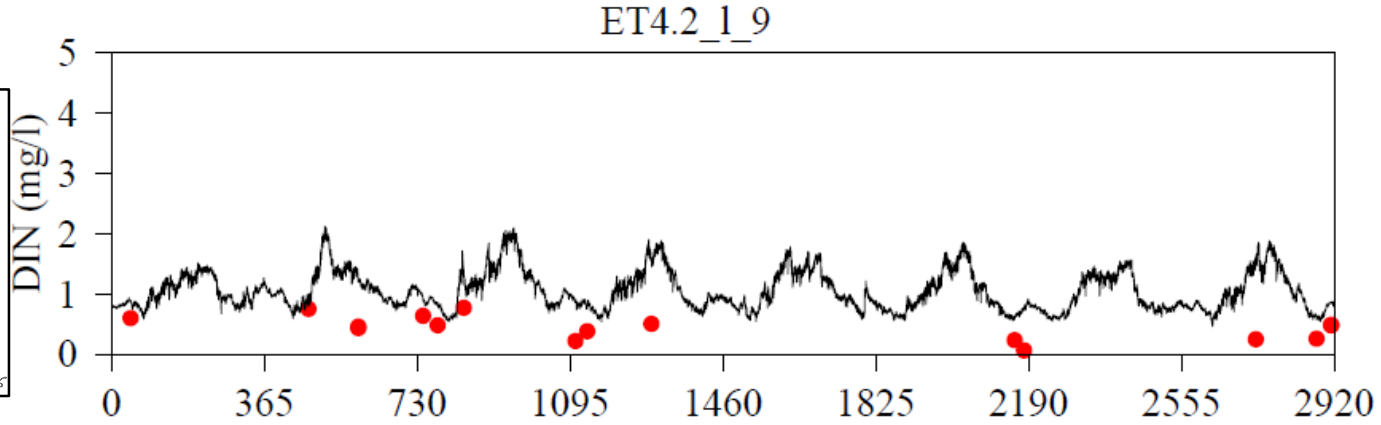


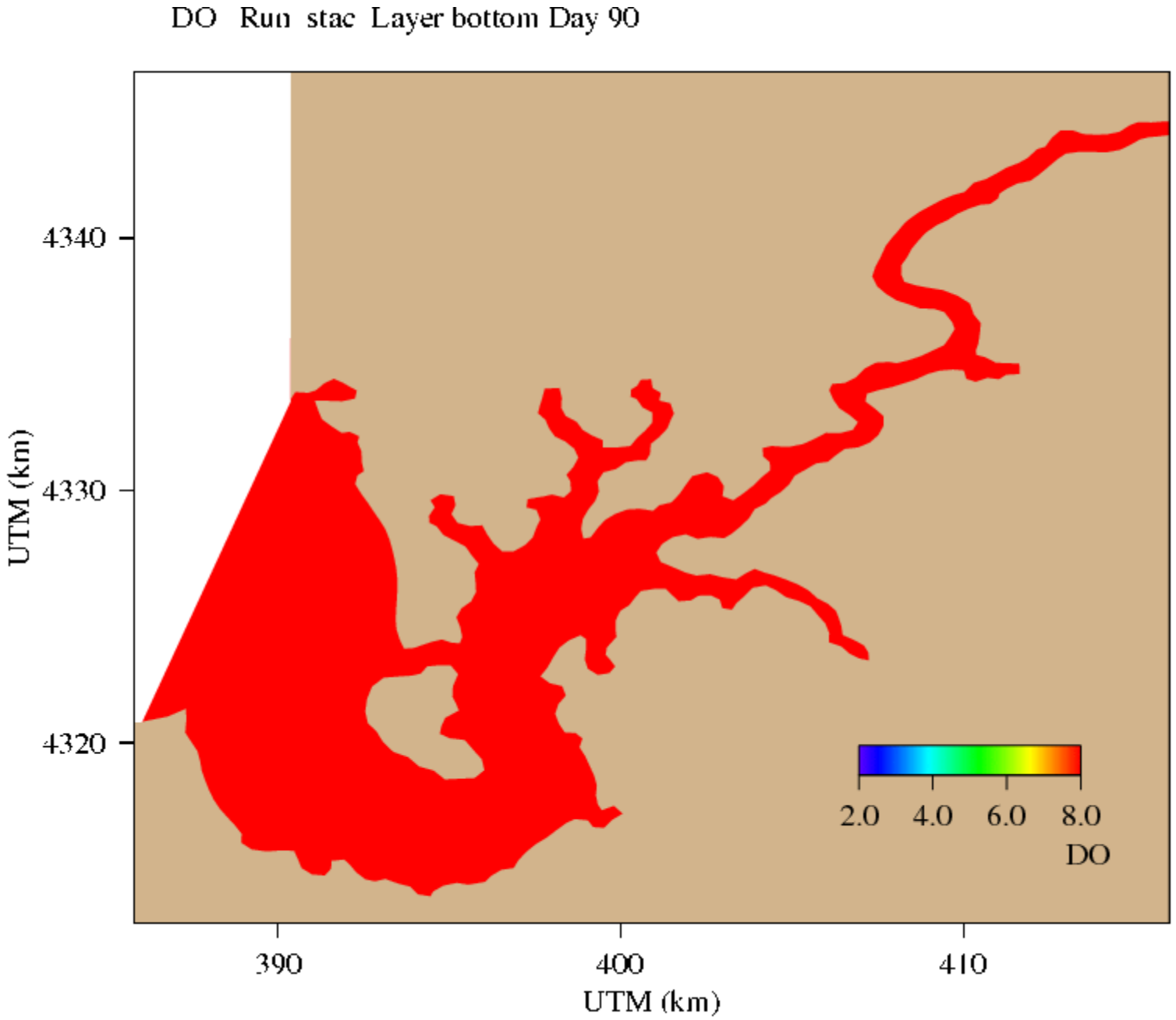
ET4.2 bottom DO, Chl and DIN



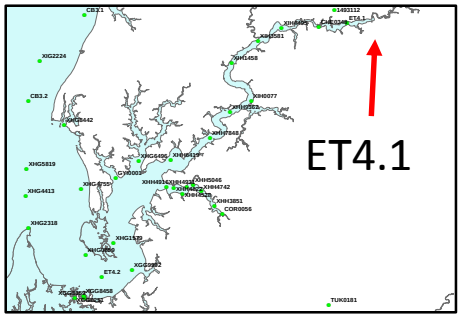


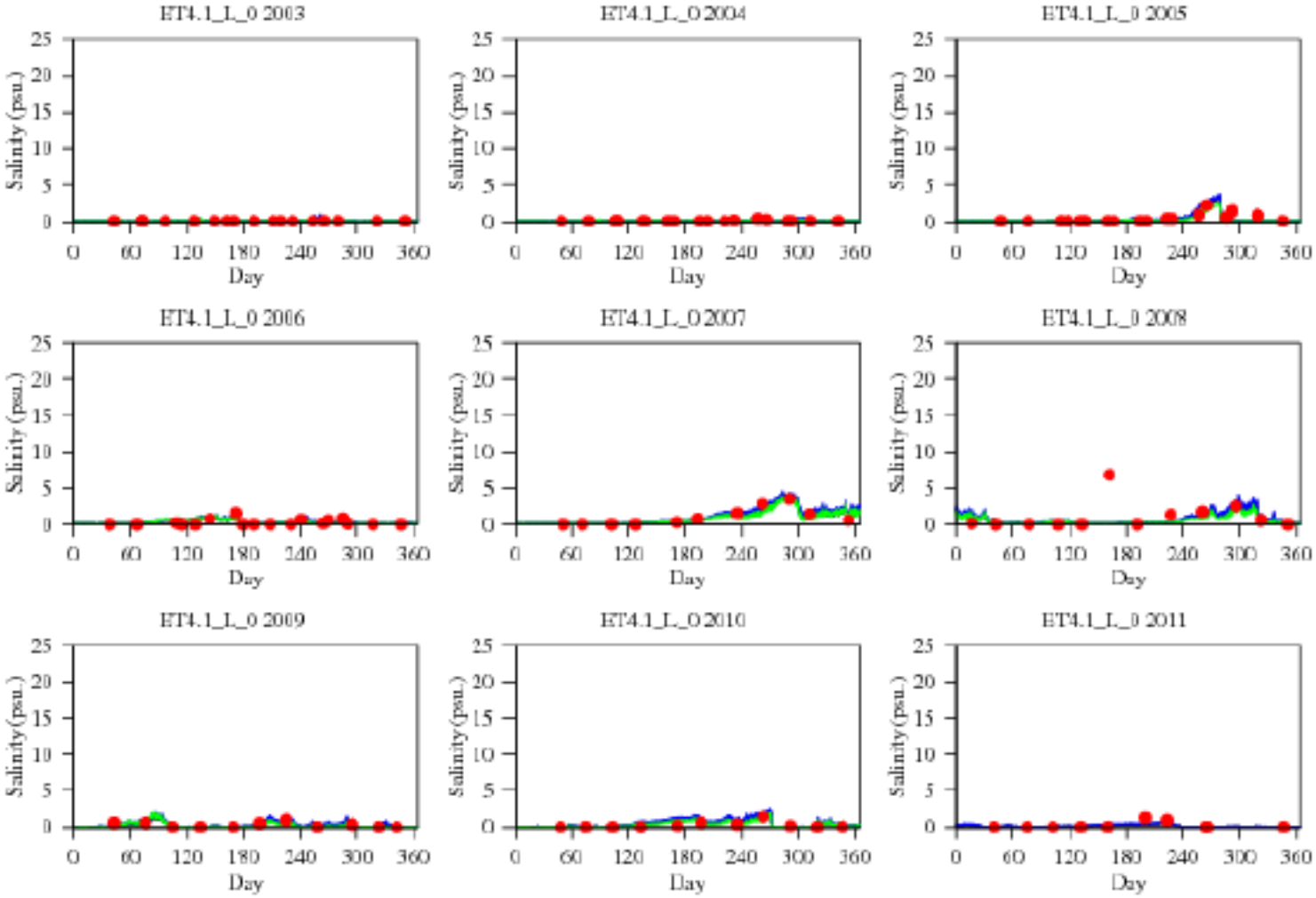




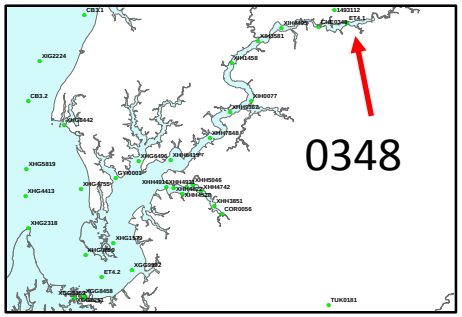

DO Run stac Layer bottom Day 90
4340
4330
4320
UTM (km)
390
400
410
UTM (km)
2.0
4.0
6.0
8.0
DO

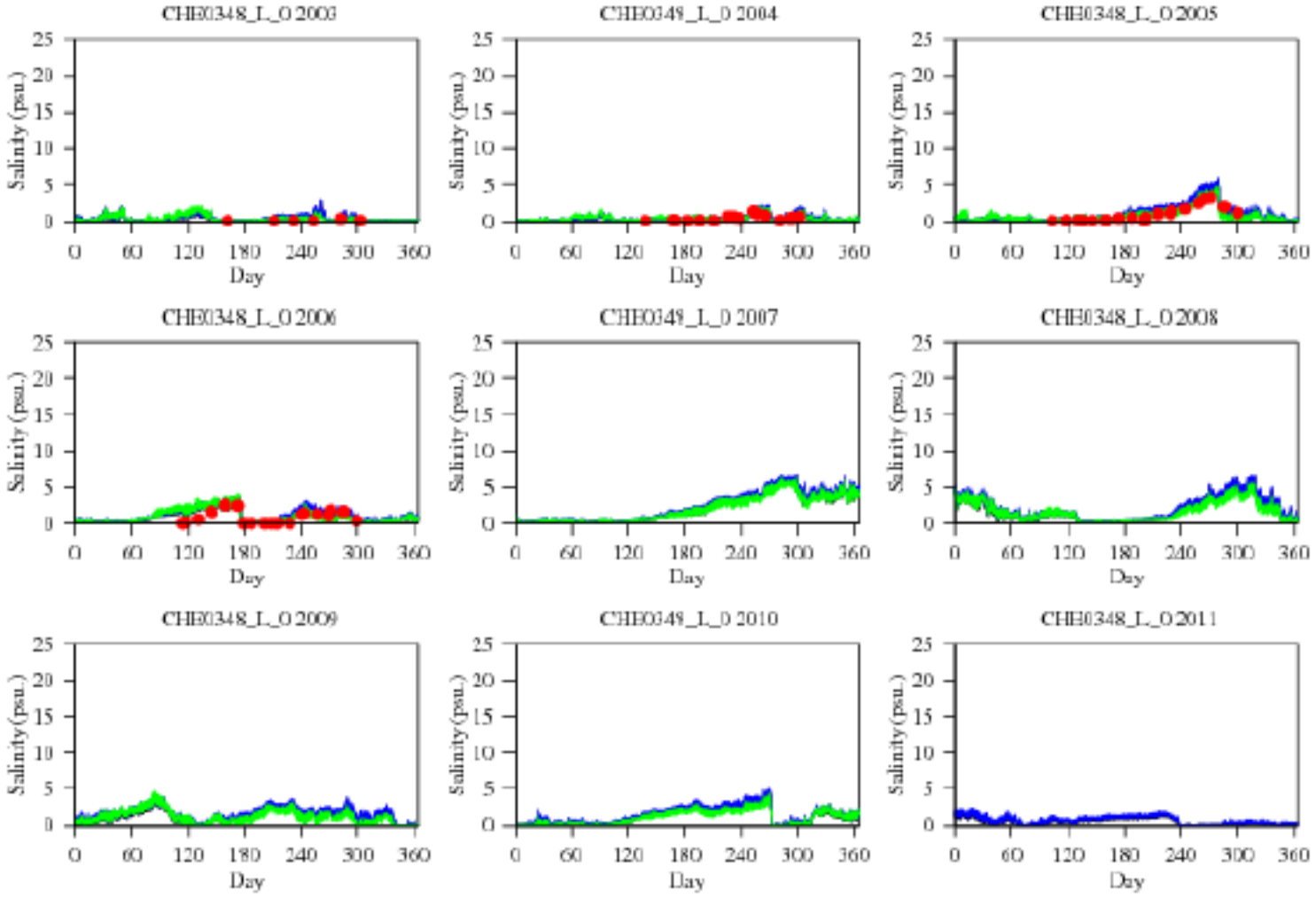
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station ET4.1 (surface)



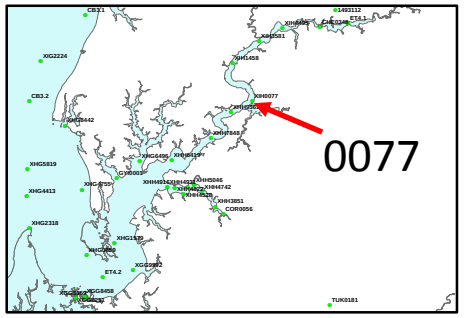


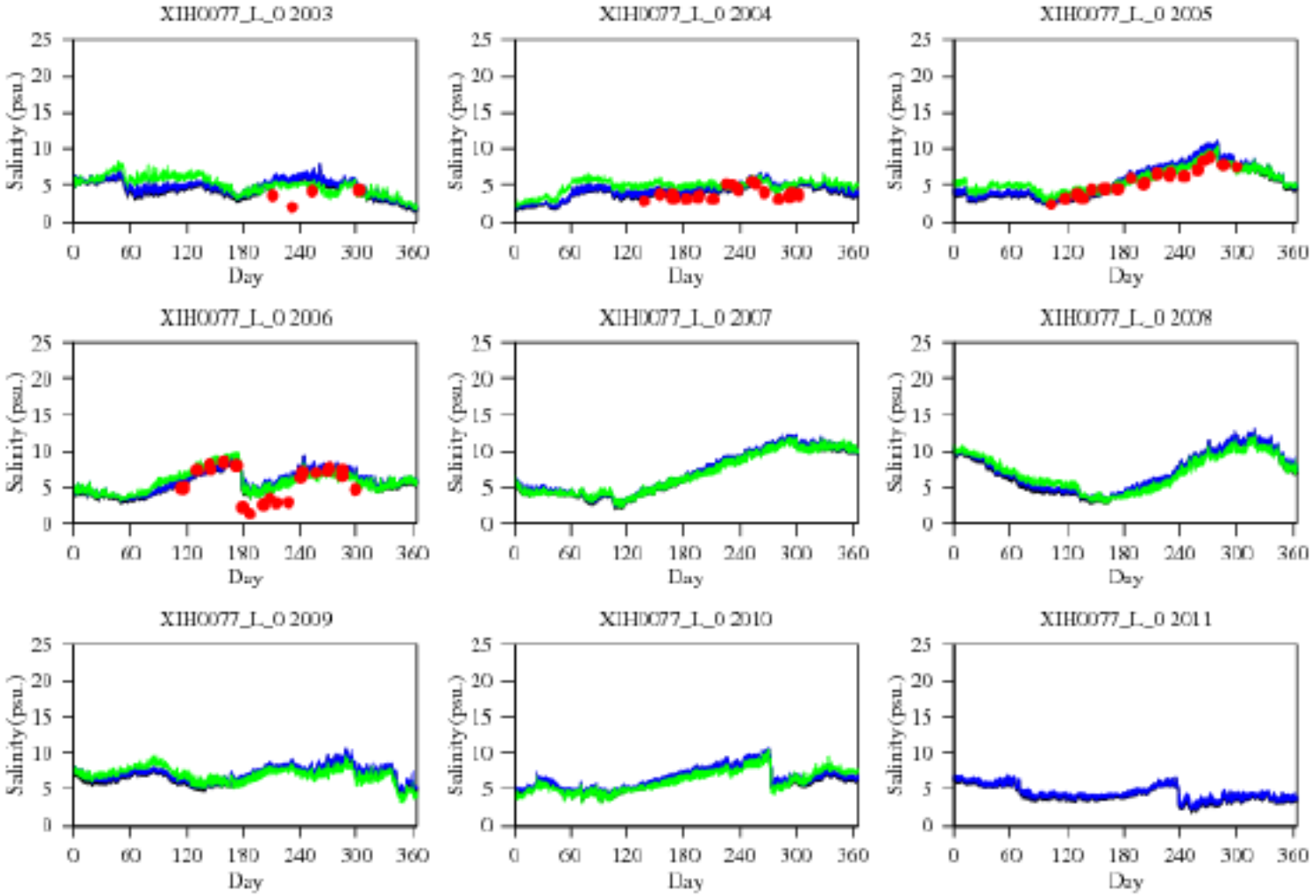
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station CHE0438 (surface)



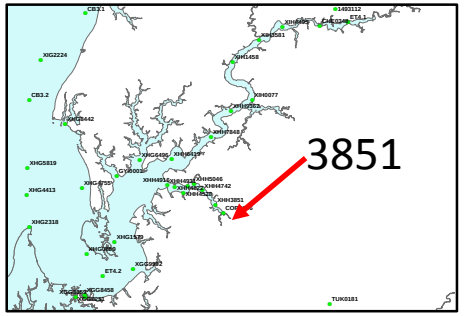


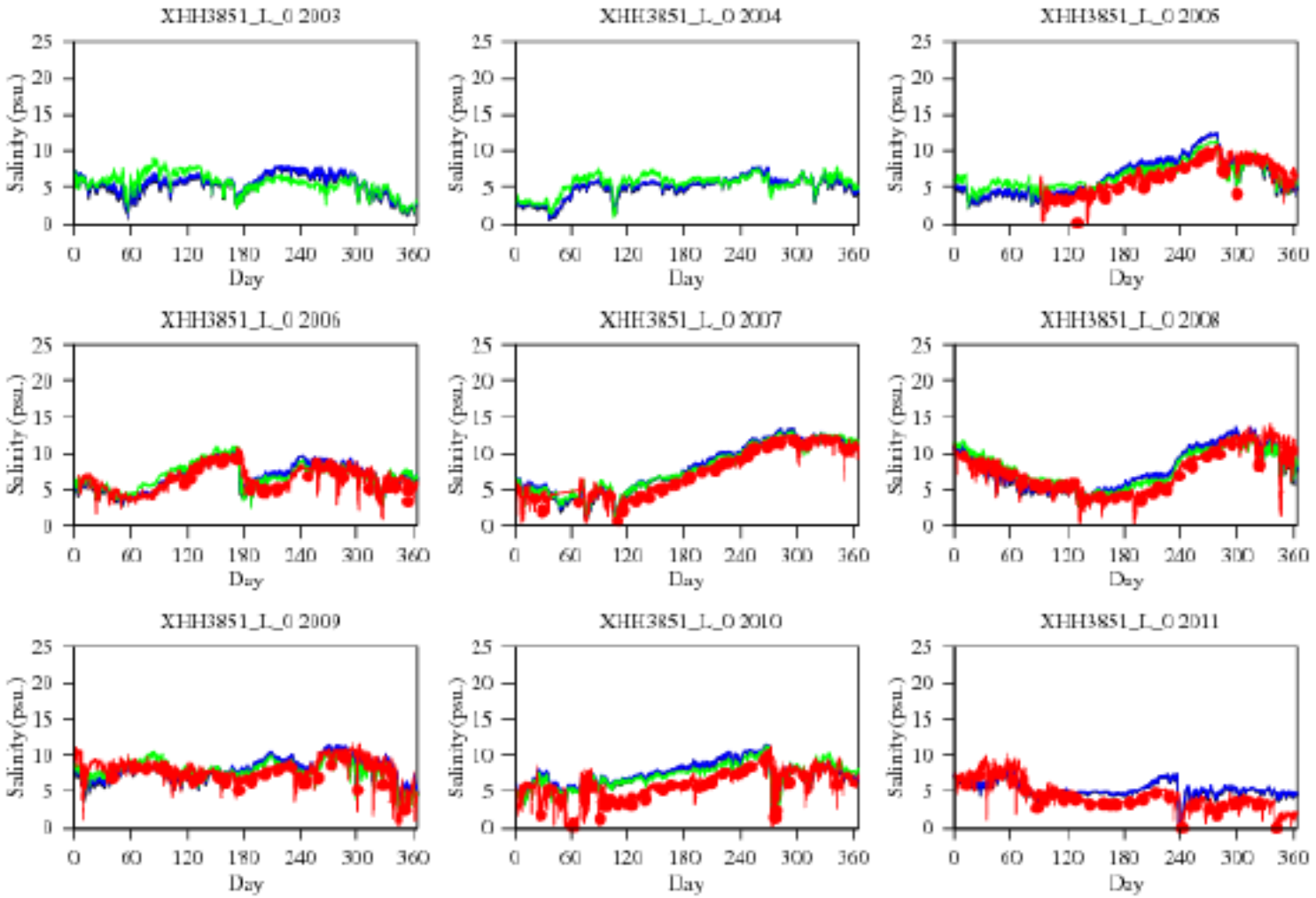
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station 0077 (surface)



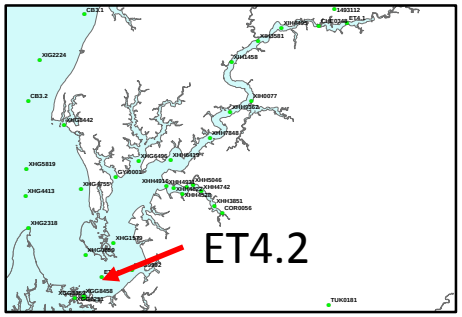


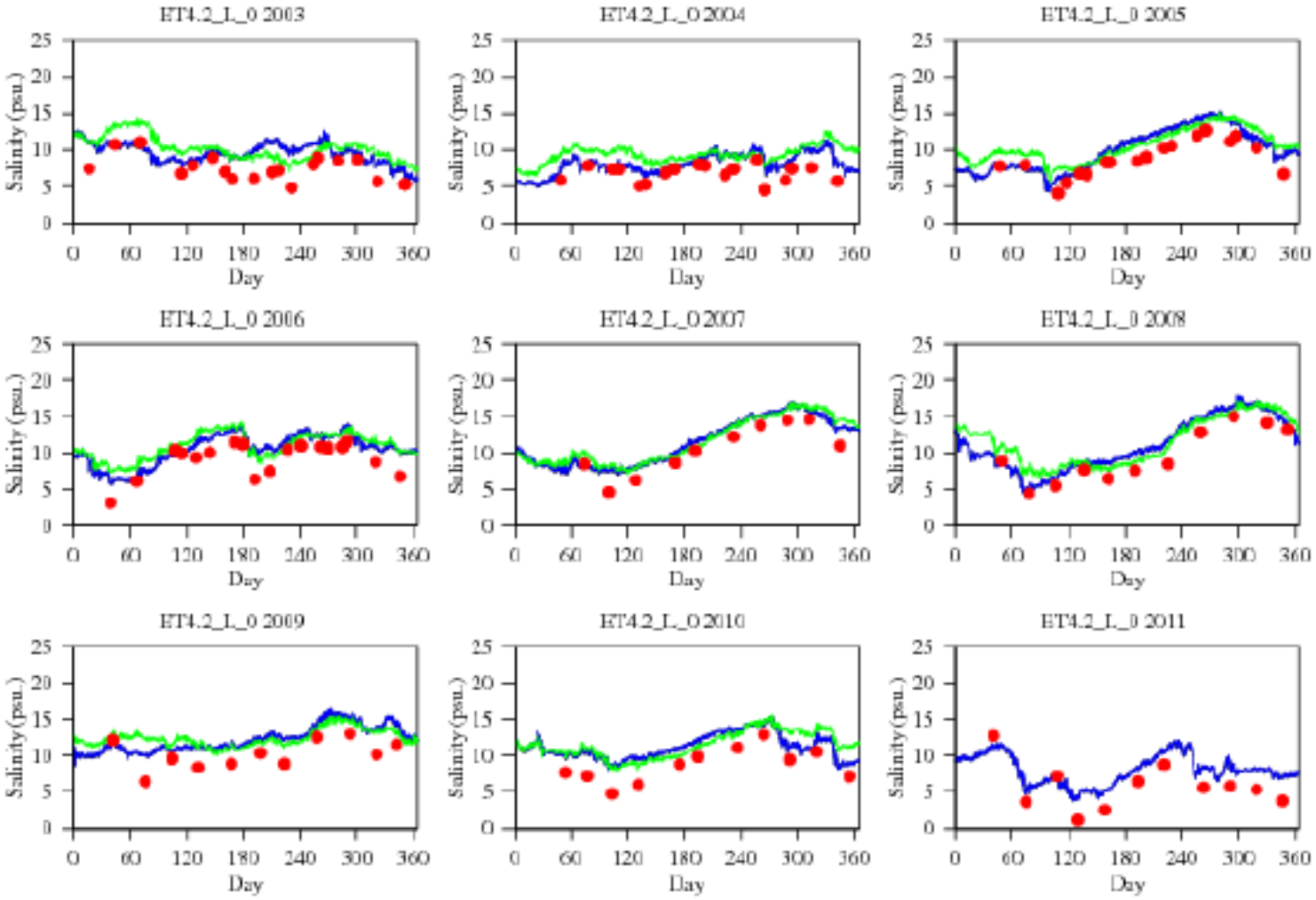
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station 3851 (surface)



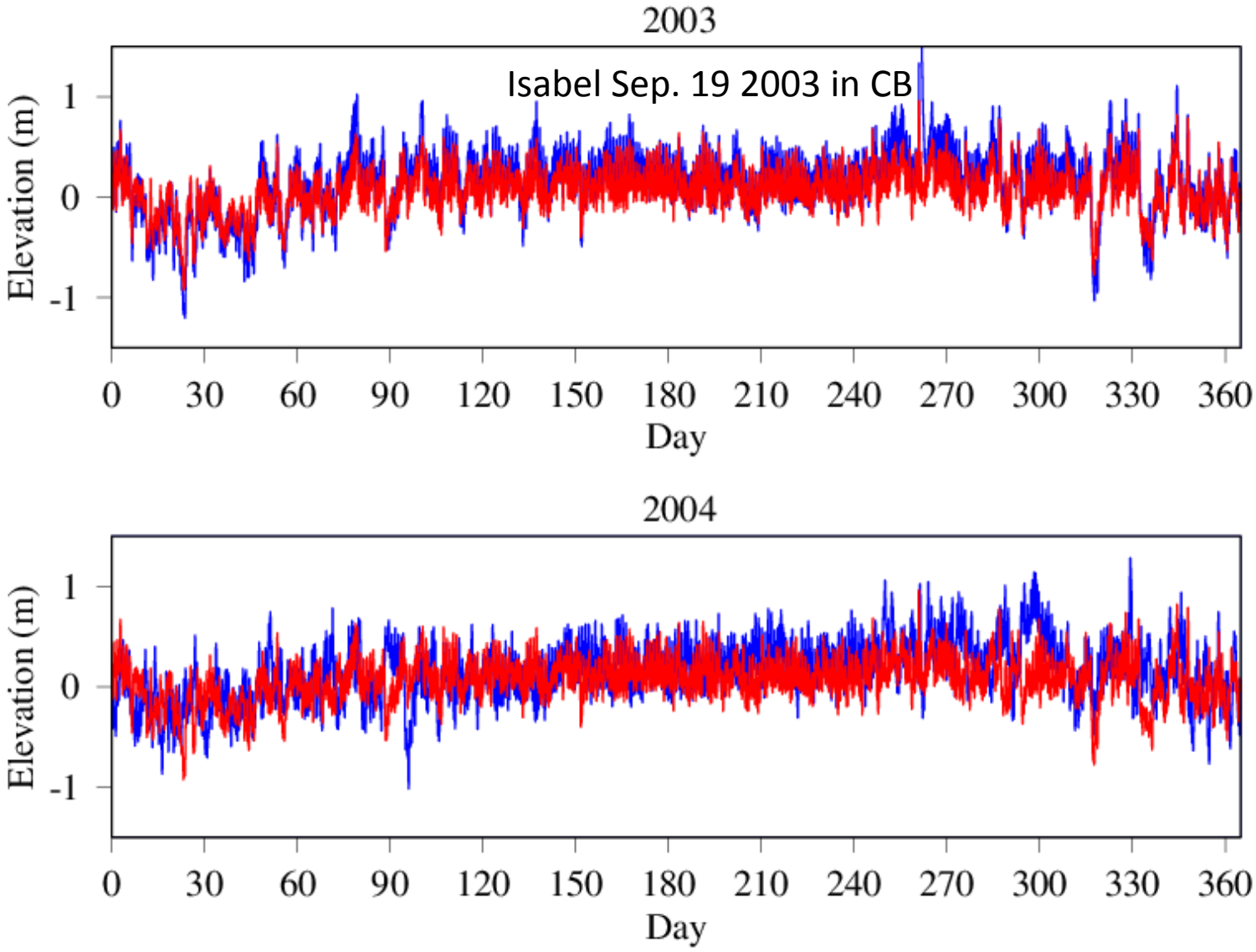


SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station ET4.2 (surface)

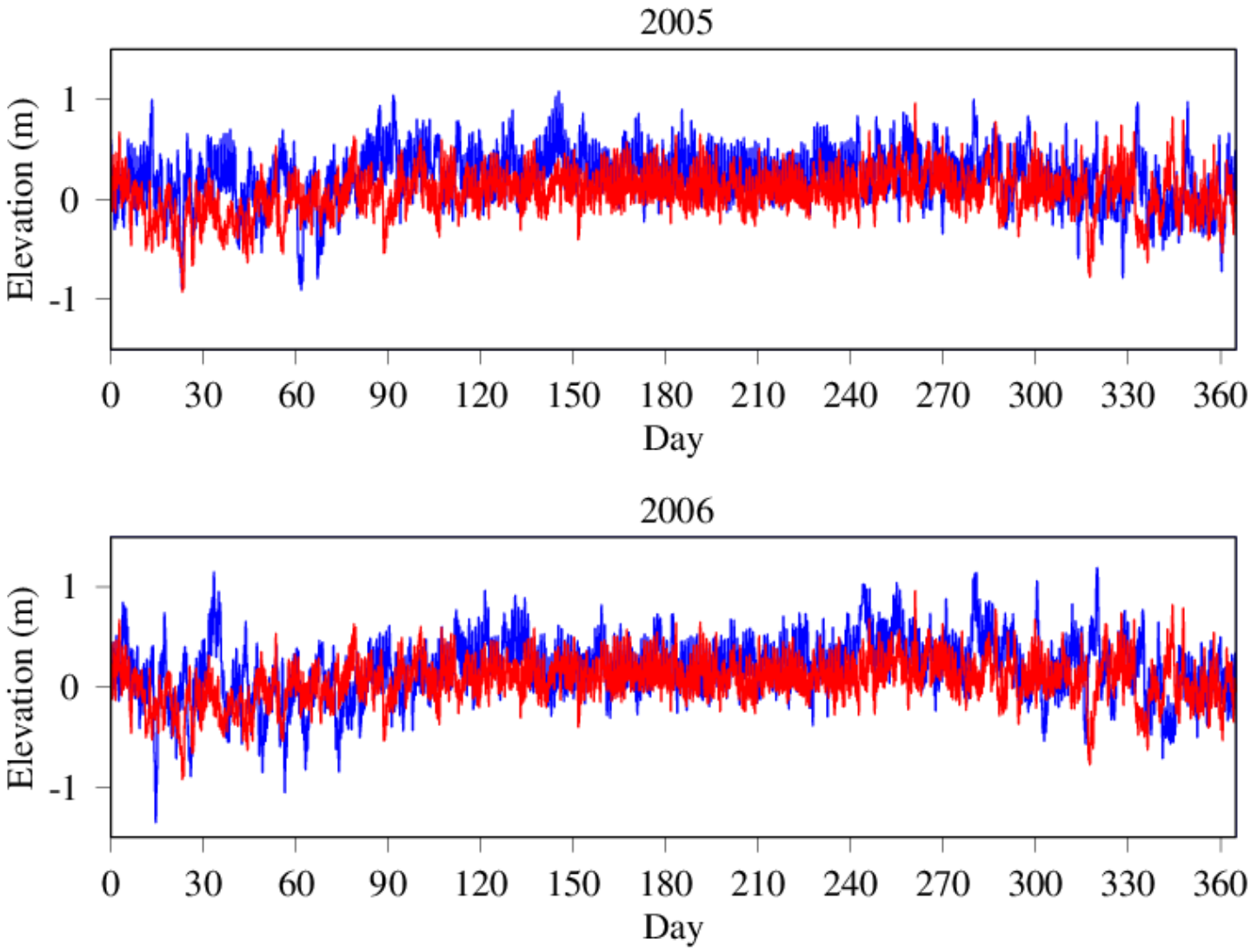




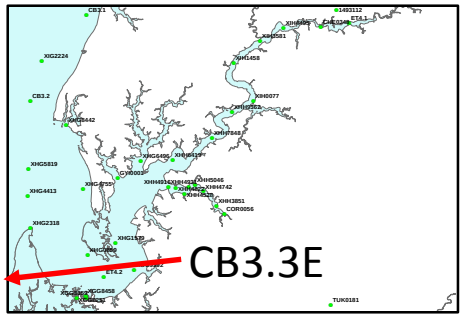
SCHICM (red) VS. CH3D (blue) boundary surface elevation 2003, 2004

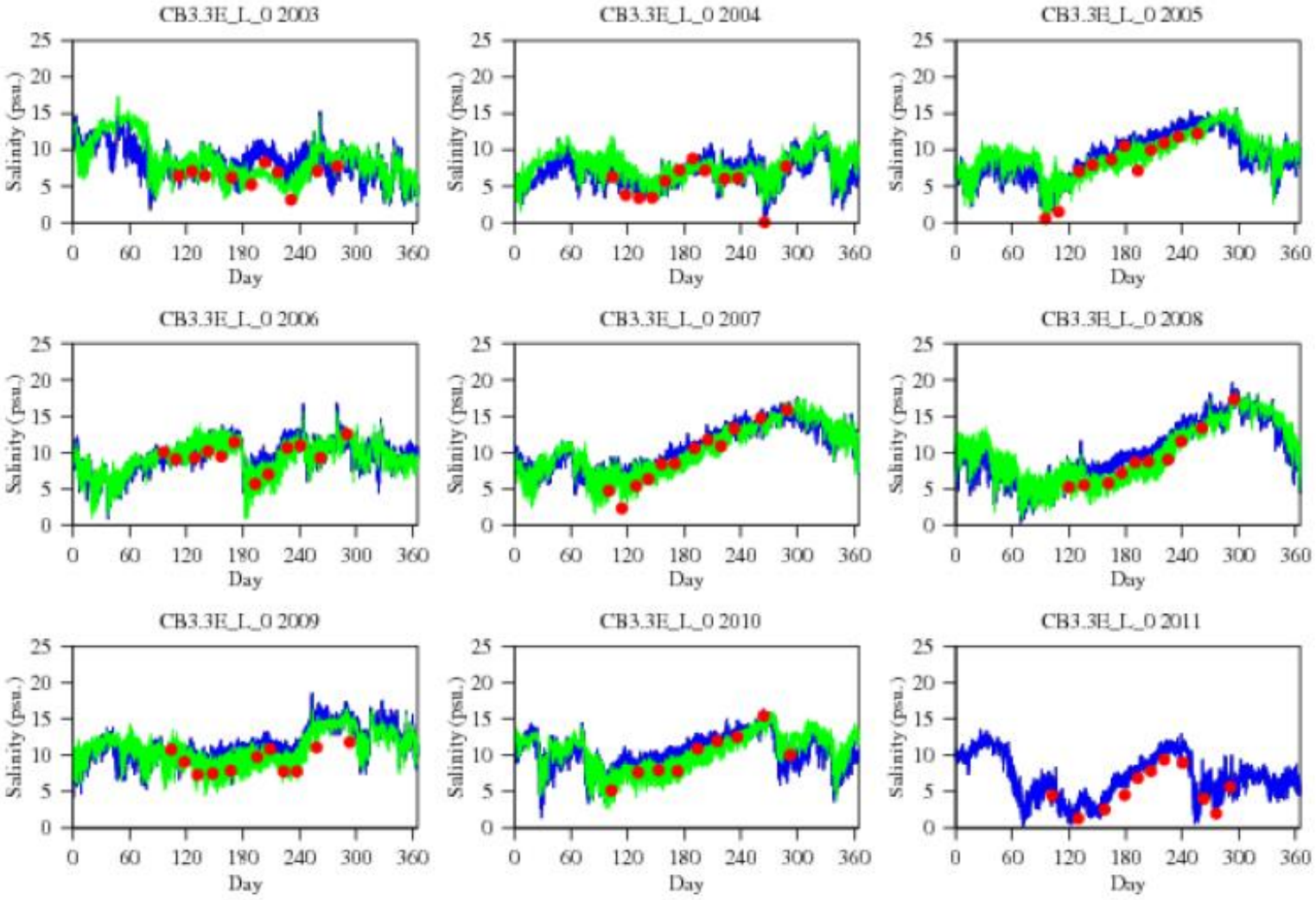


SCHICM (red) VS. CH3D (blue) boundary surface elevation 2005, 2006

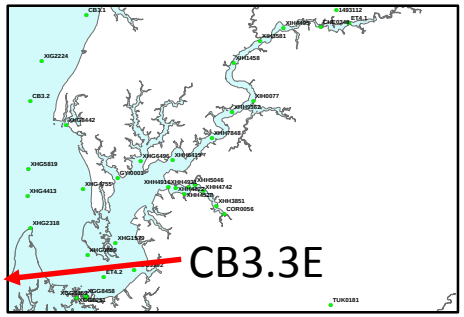


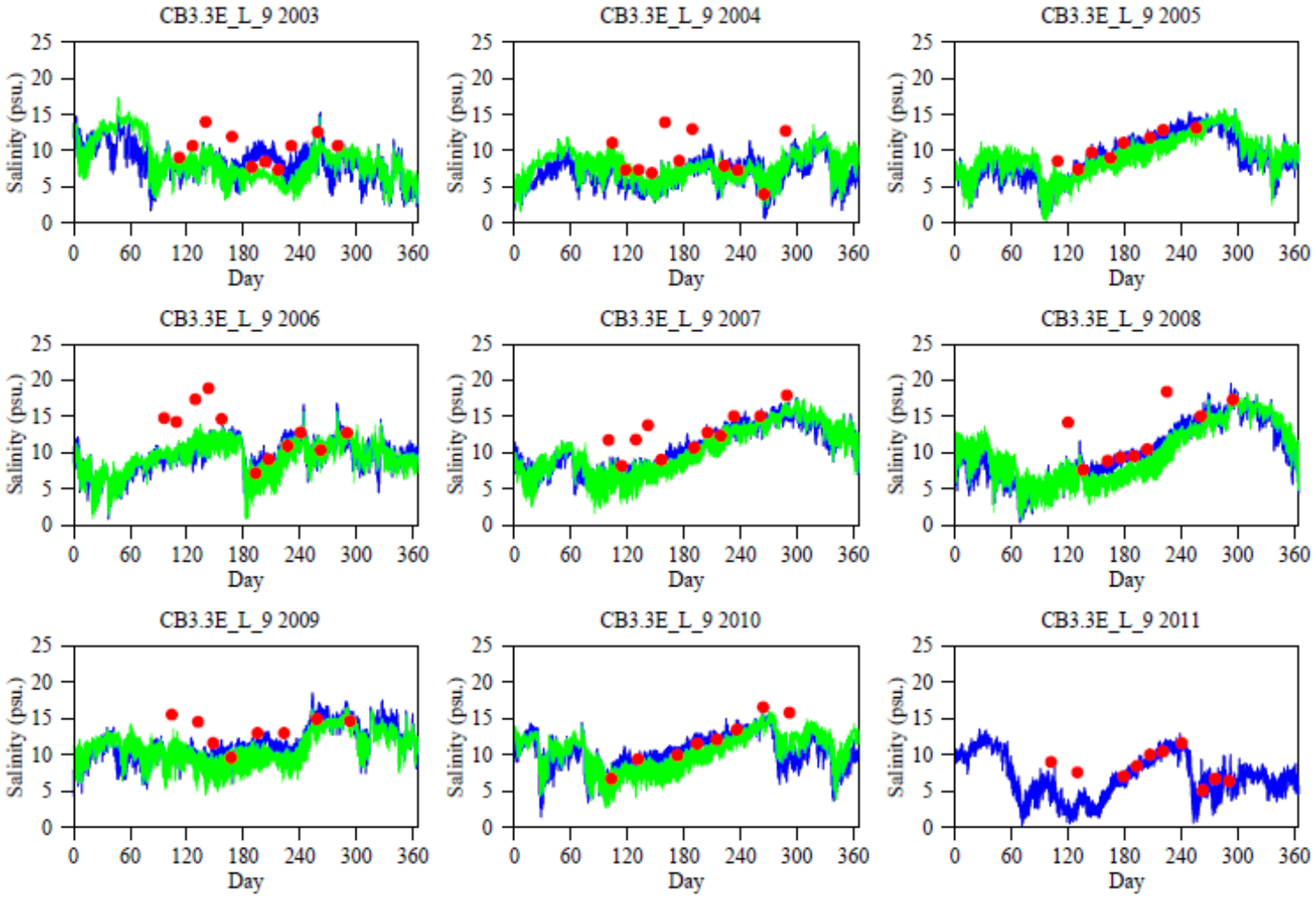
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station CB3.3E (surface)



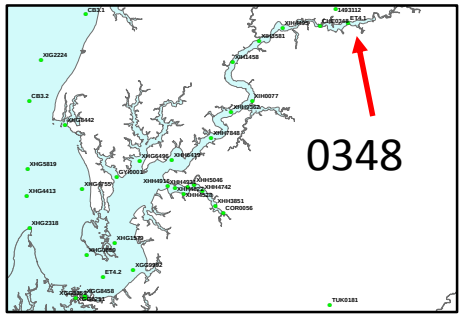


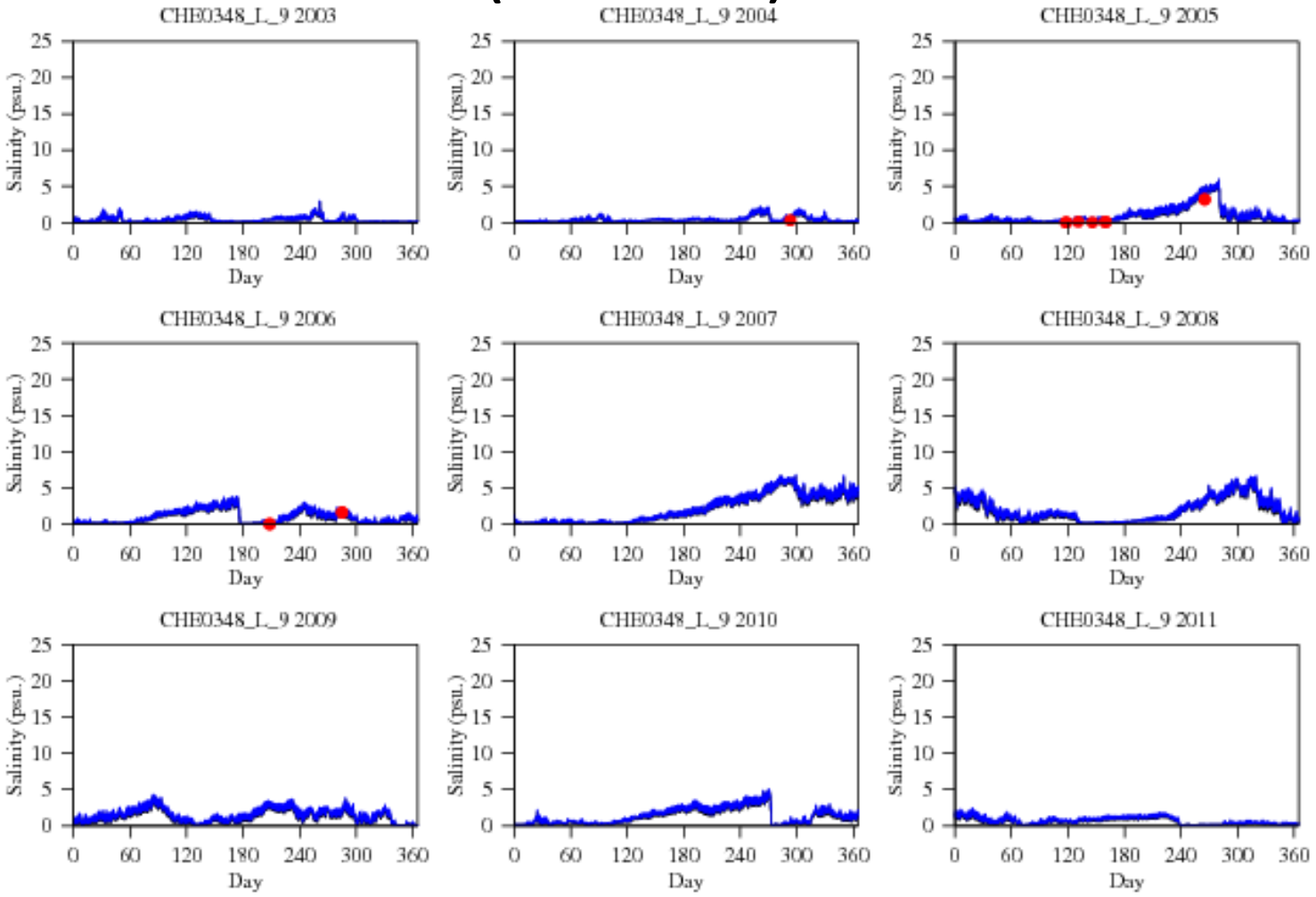
SCHICM (green) VS. CH3D (blue) boundary condition, salinity at Station CB3.3E (bottom)



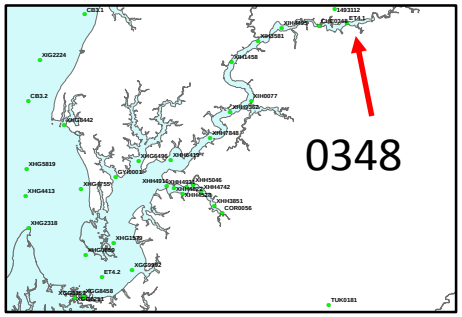


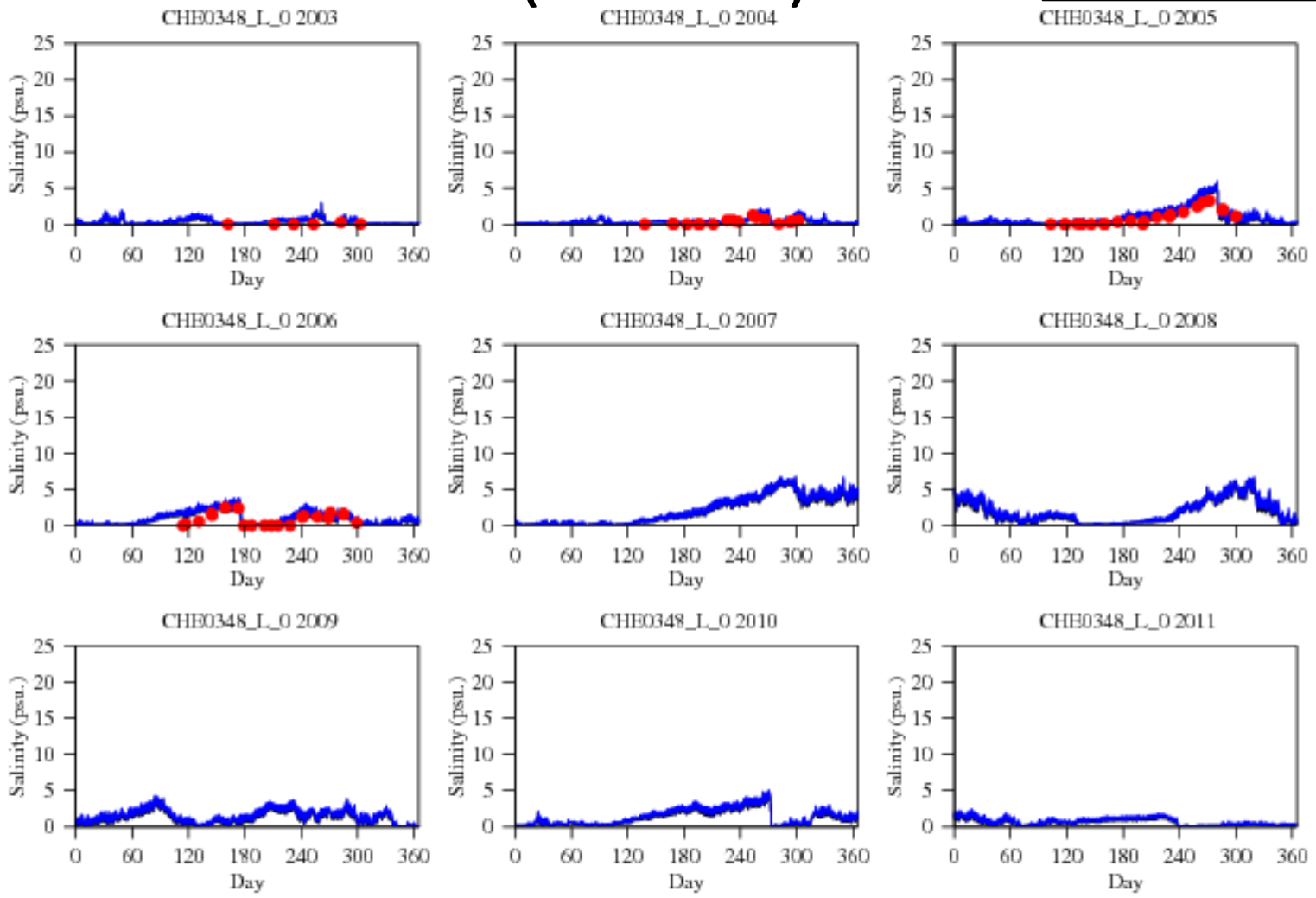
10% decrease (blue) VS. base (black) flow, salinity at Station CHE0438 (bottom)



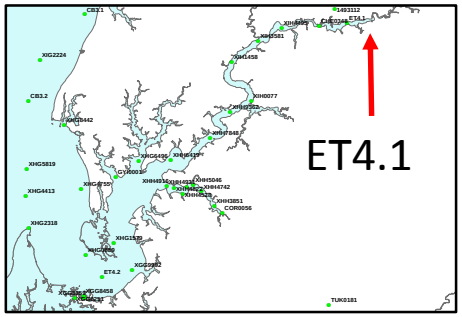


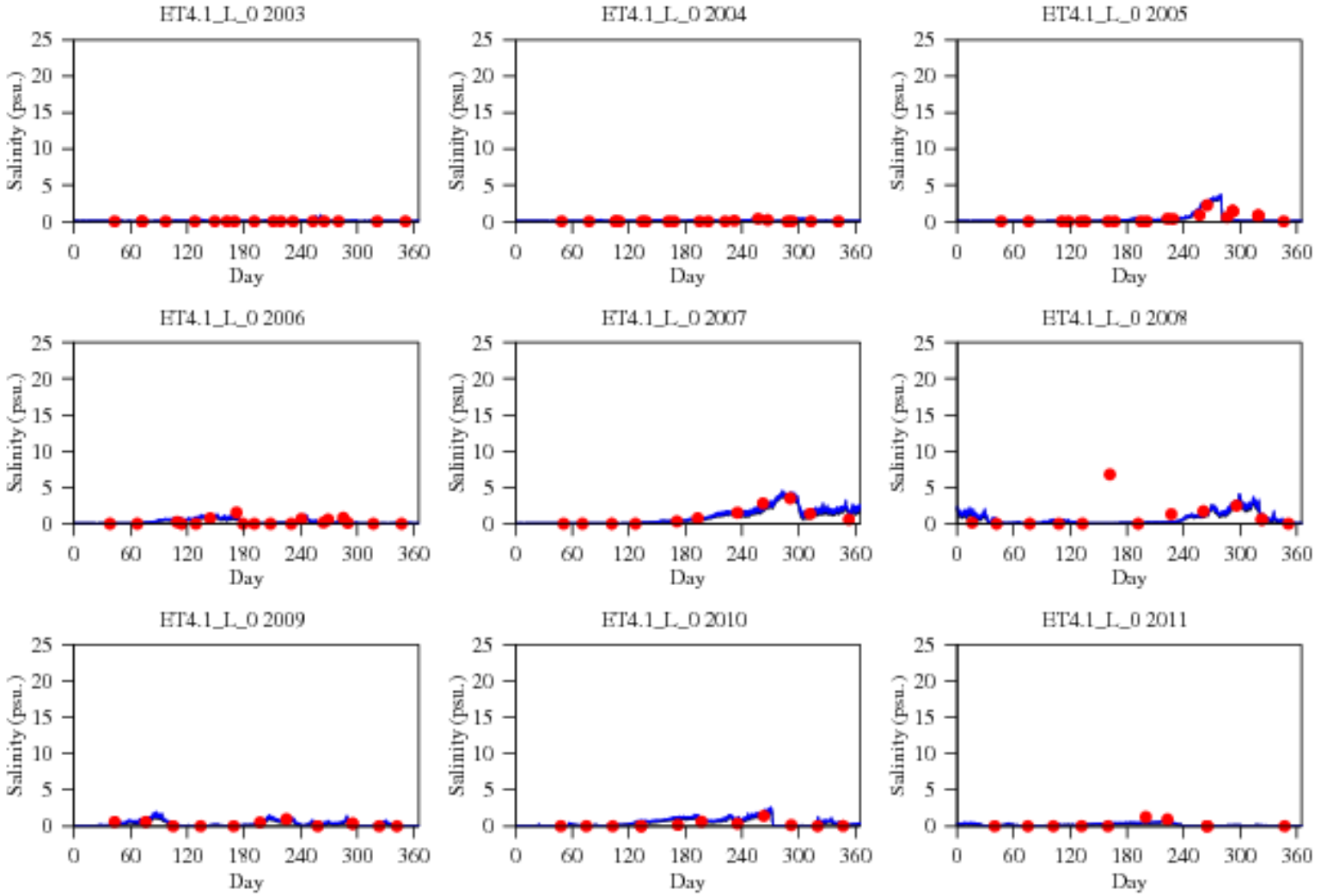
10% decrease (blue) VS. base (black) flow, salinity at Station CHE0438 (surface)



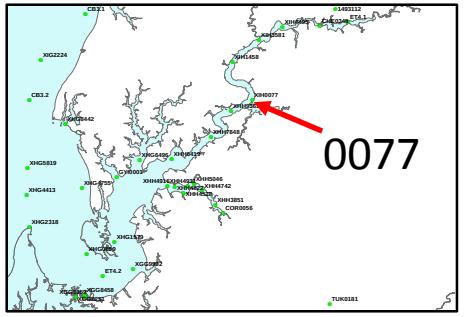


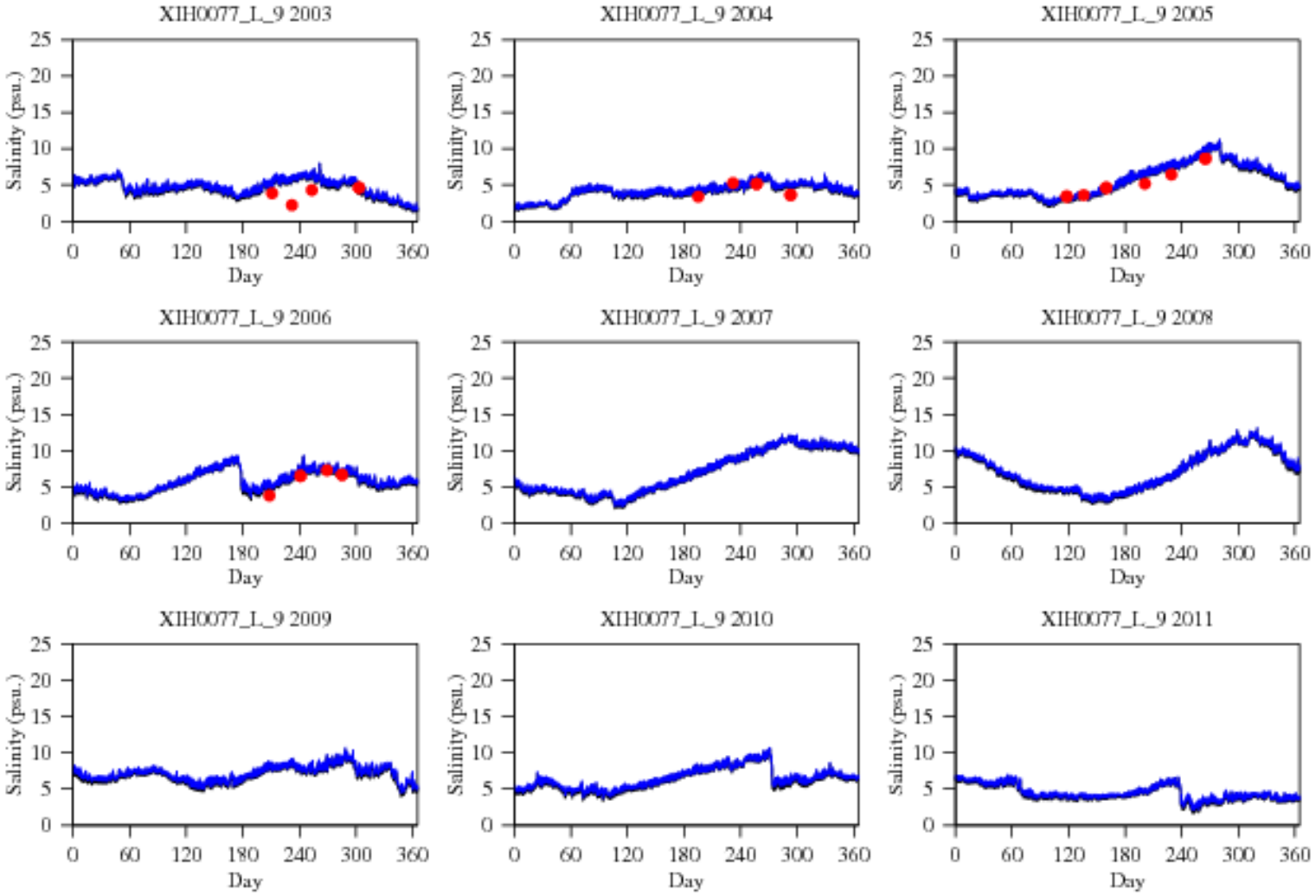
10% decrease (blue) VS. base (black) flow, salinity at Station ET4.1 (surface)



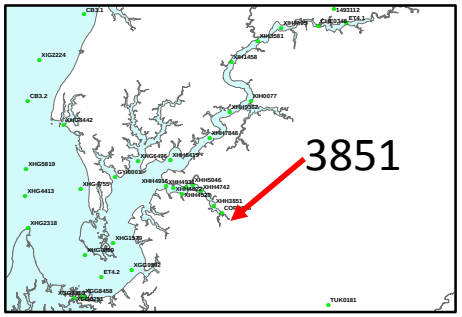


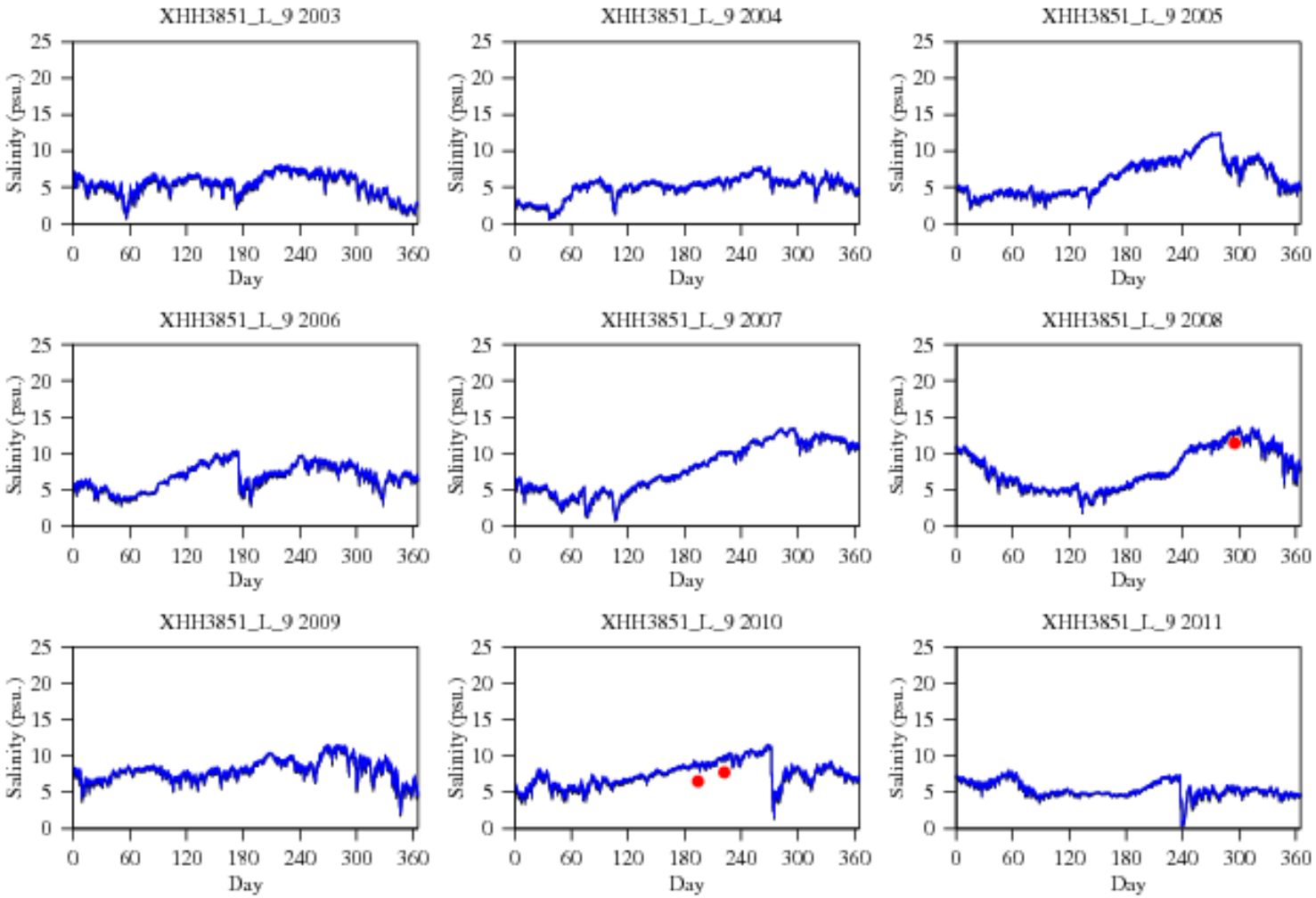
10% decrease (blue) VS. base (black) flow, salinity at Station 0077 (bottom)



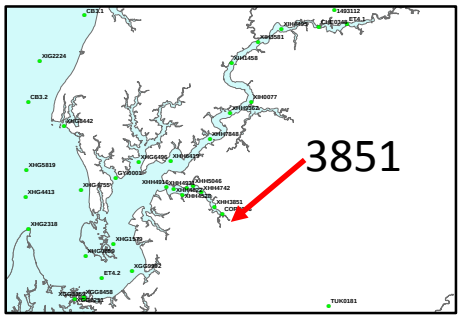


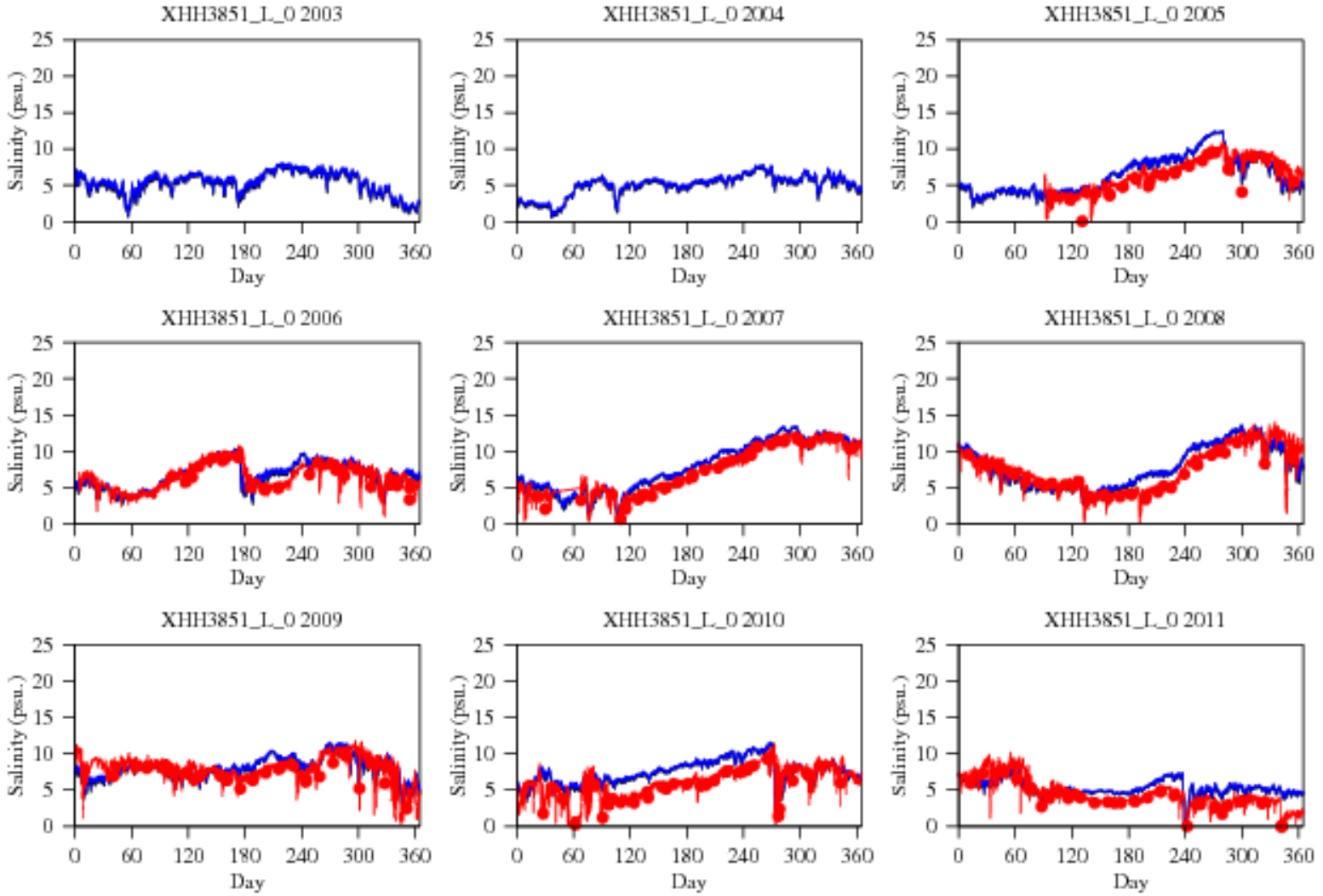
10% decrease (blue) VS. base (black) flow, salinity at Station 3851 (bottom)



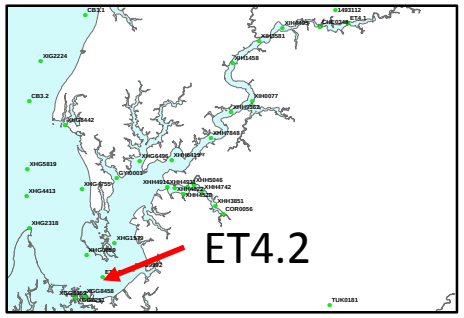


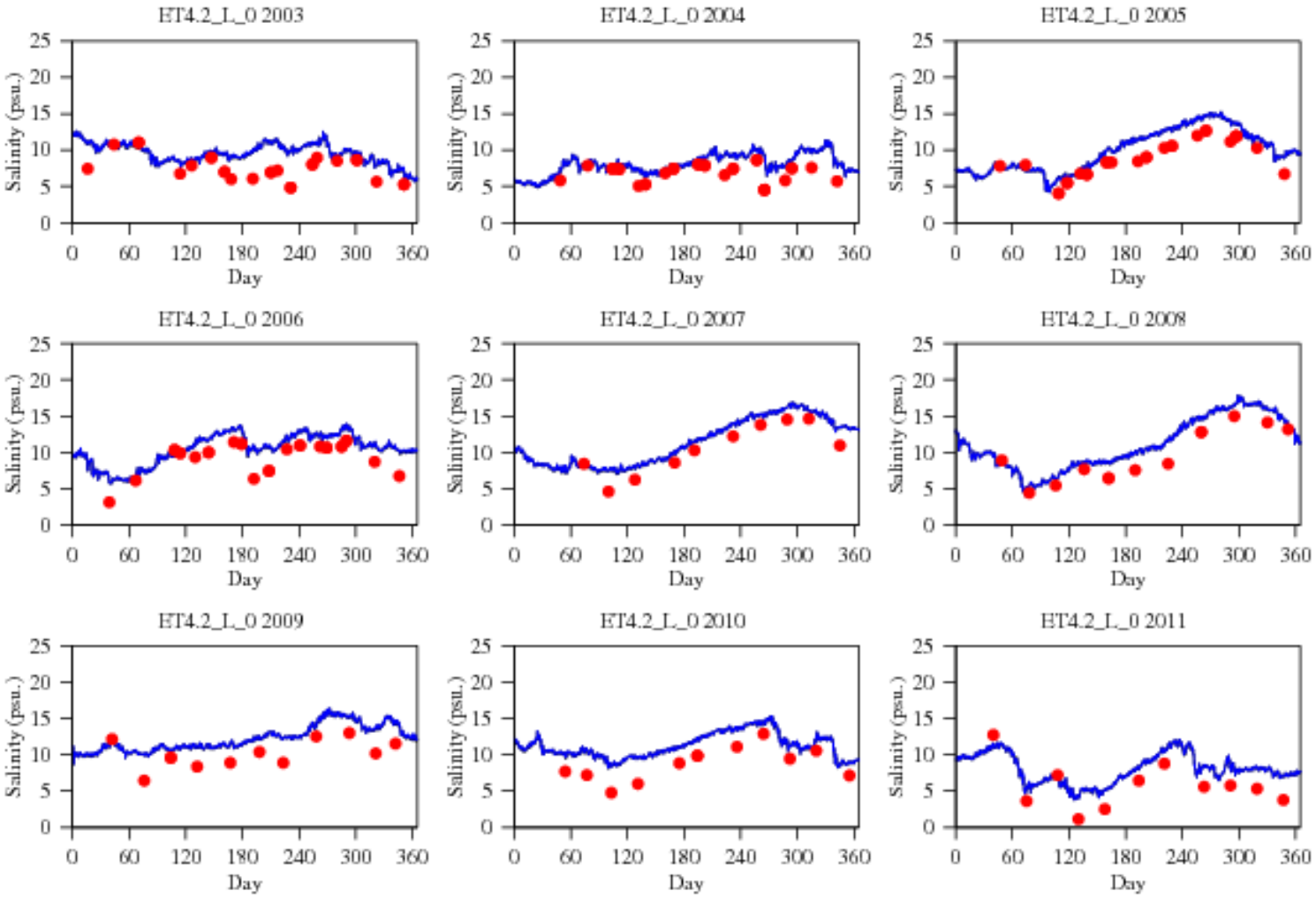
10% decrease (blue) VS. base (black) flow, salinity at Station 3851 (surface)





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



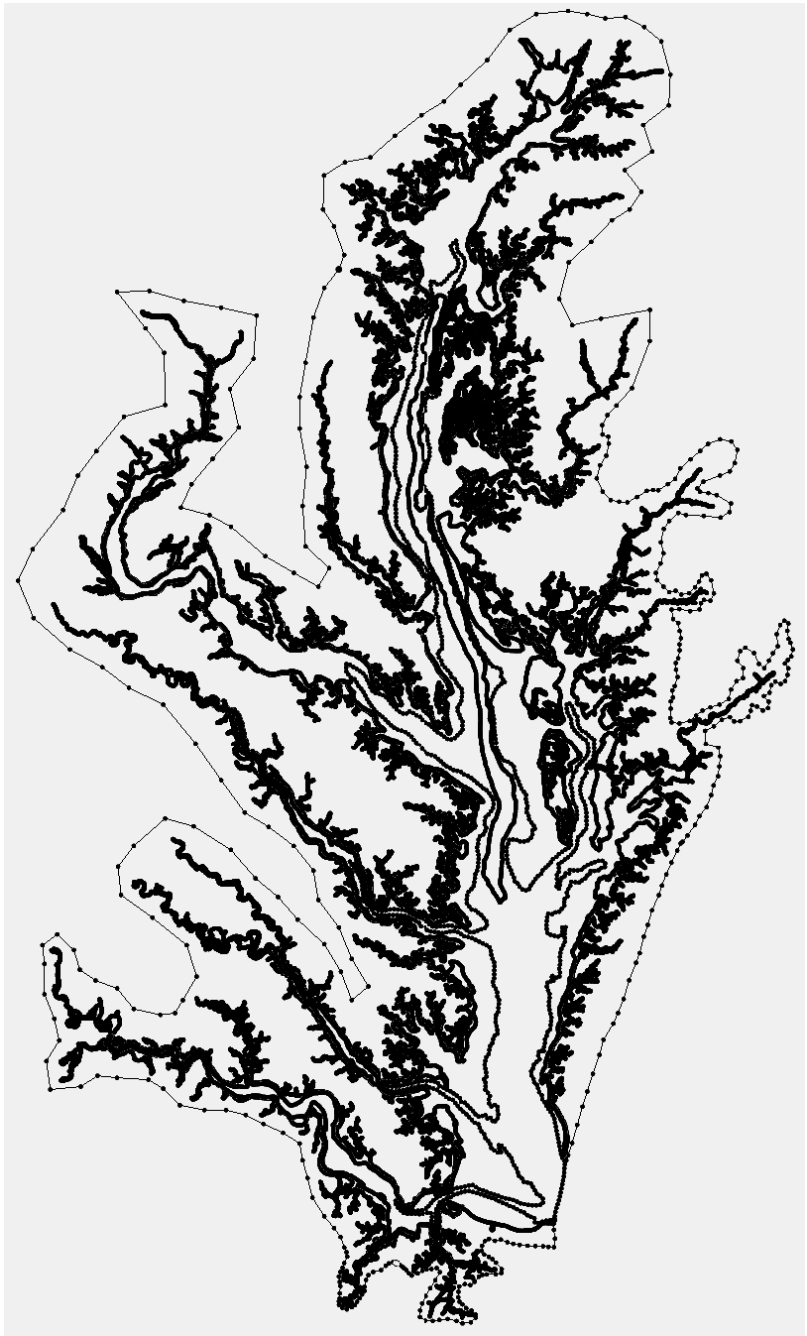


Future improvement

- 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