Spin-up, Benchmark, Random Forest and SAV

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Model spin-up for scenario simulation

Phase 6

Spin-up: 1991-2000

Simulation: 1991-2000

Phase 7

N times (3, 5 and 10)

Spin-up: 1991

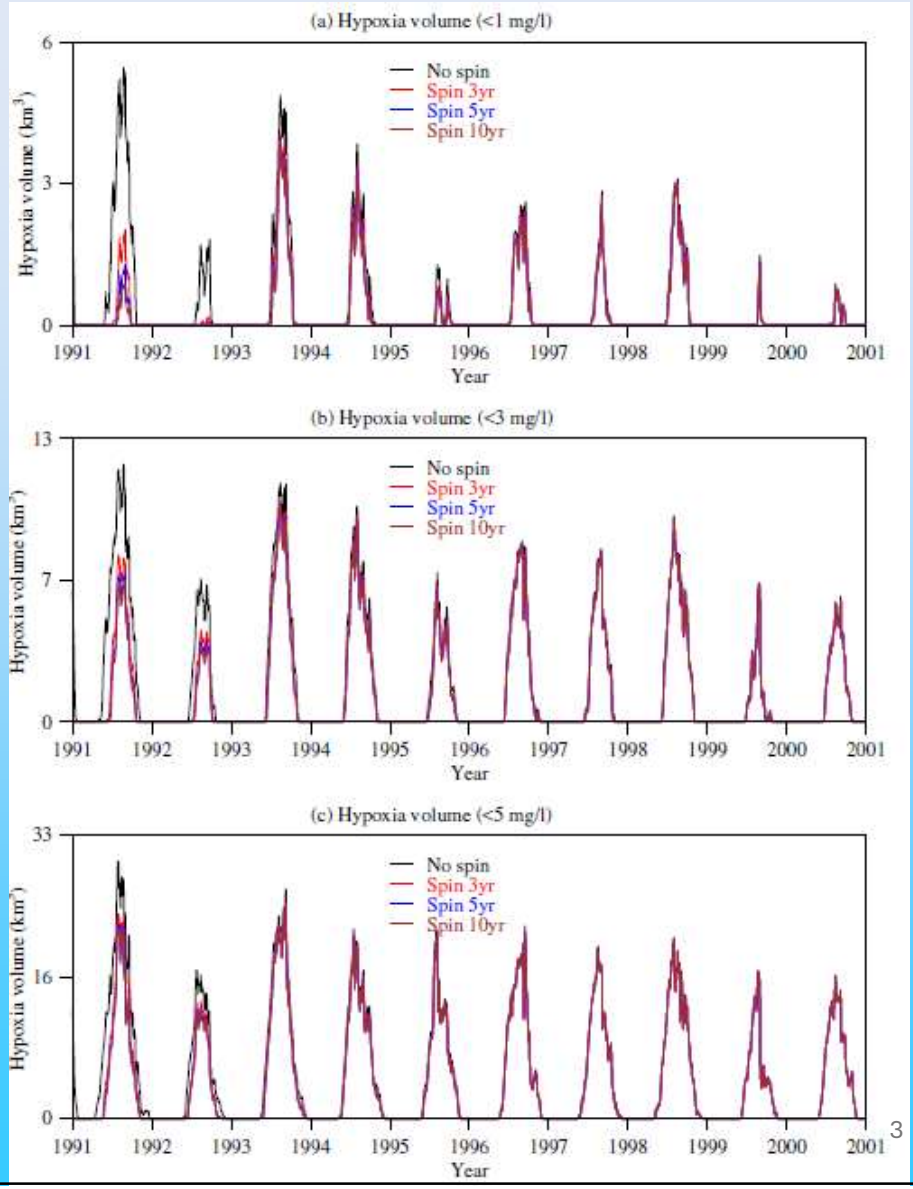
Simulation: 1991-2000

Timeseries of hypoxia volume of spin-up runs for the WIP scenario

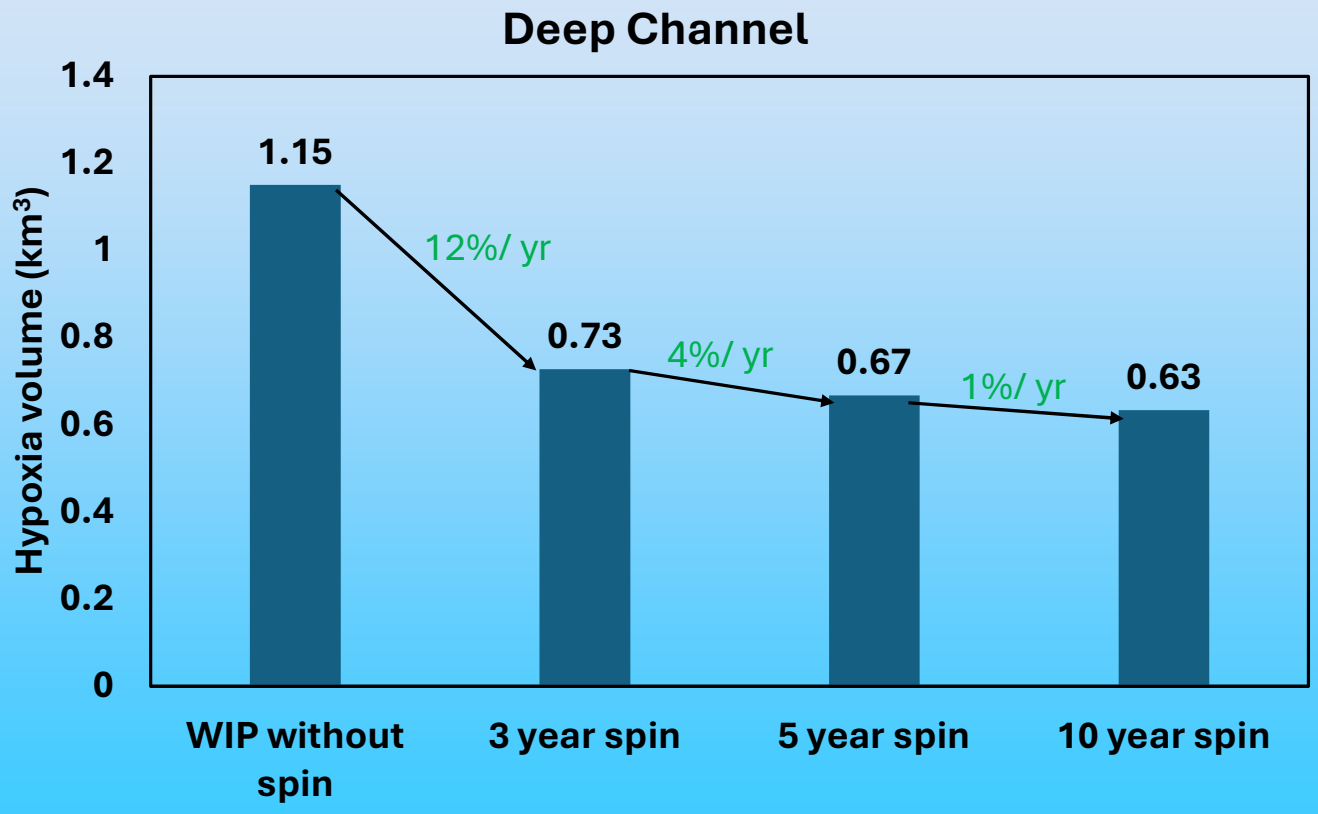
Deep Channel

Deep Water

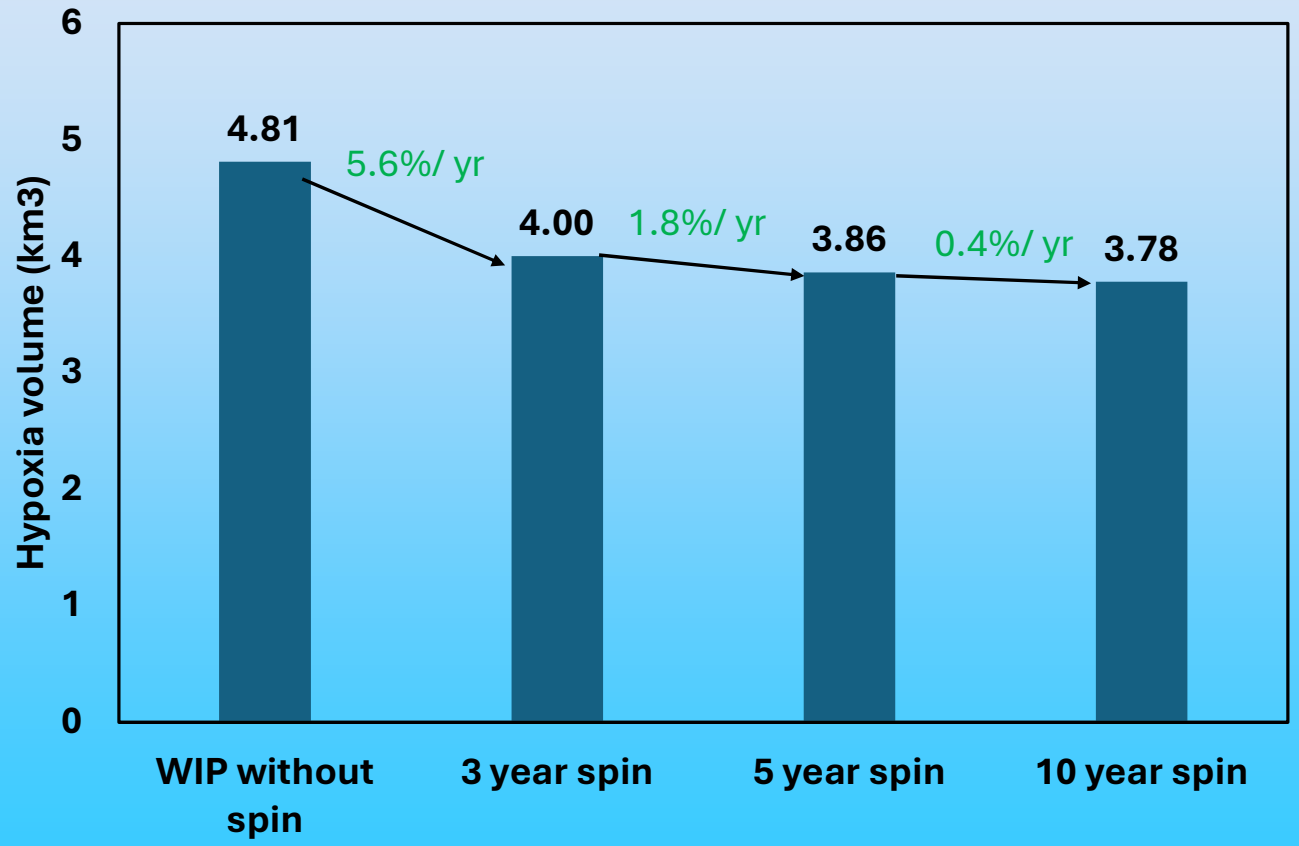
Open water



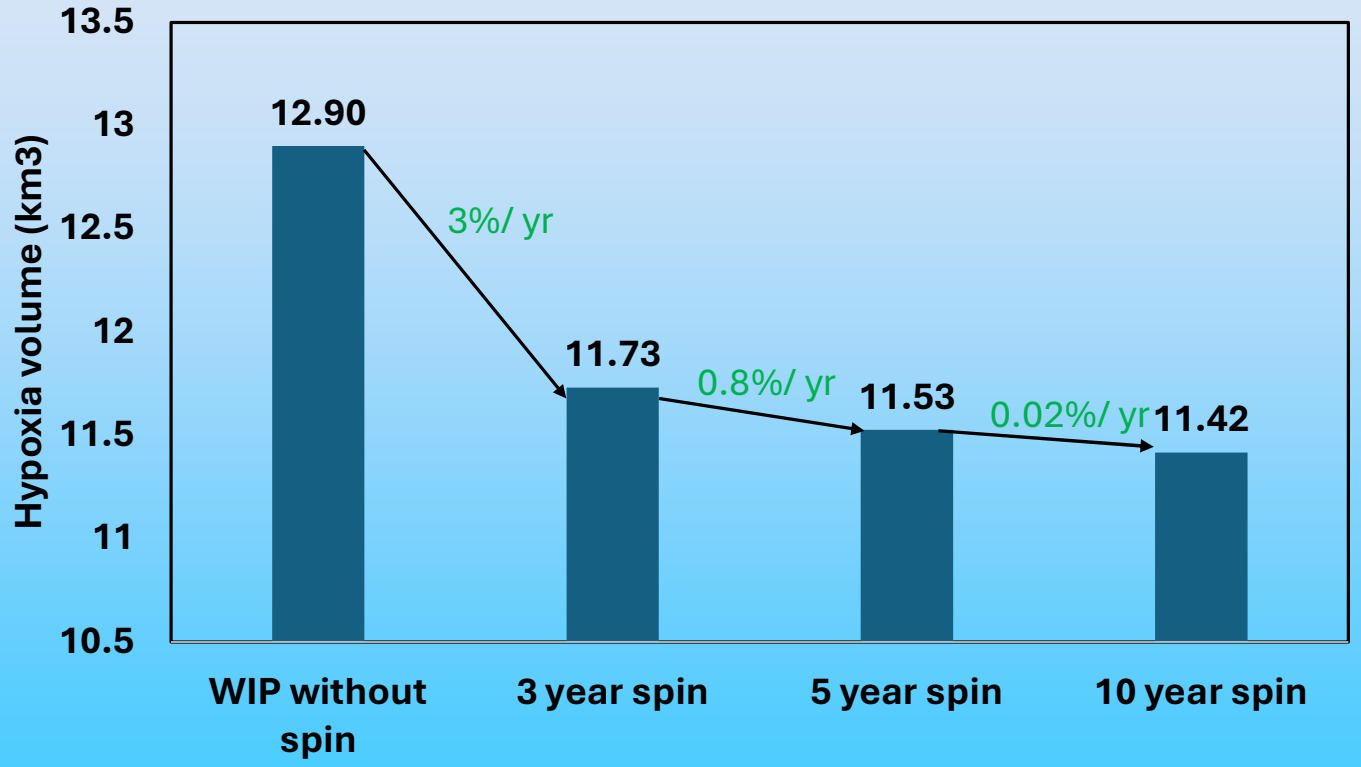
Average summer DC hypoxia volume of spin-up runs (Jun.-Sep., 1991-200)



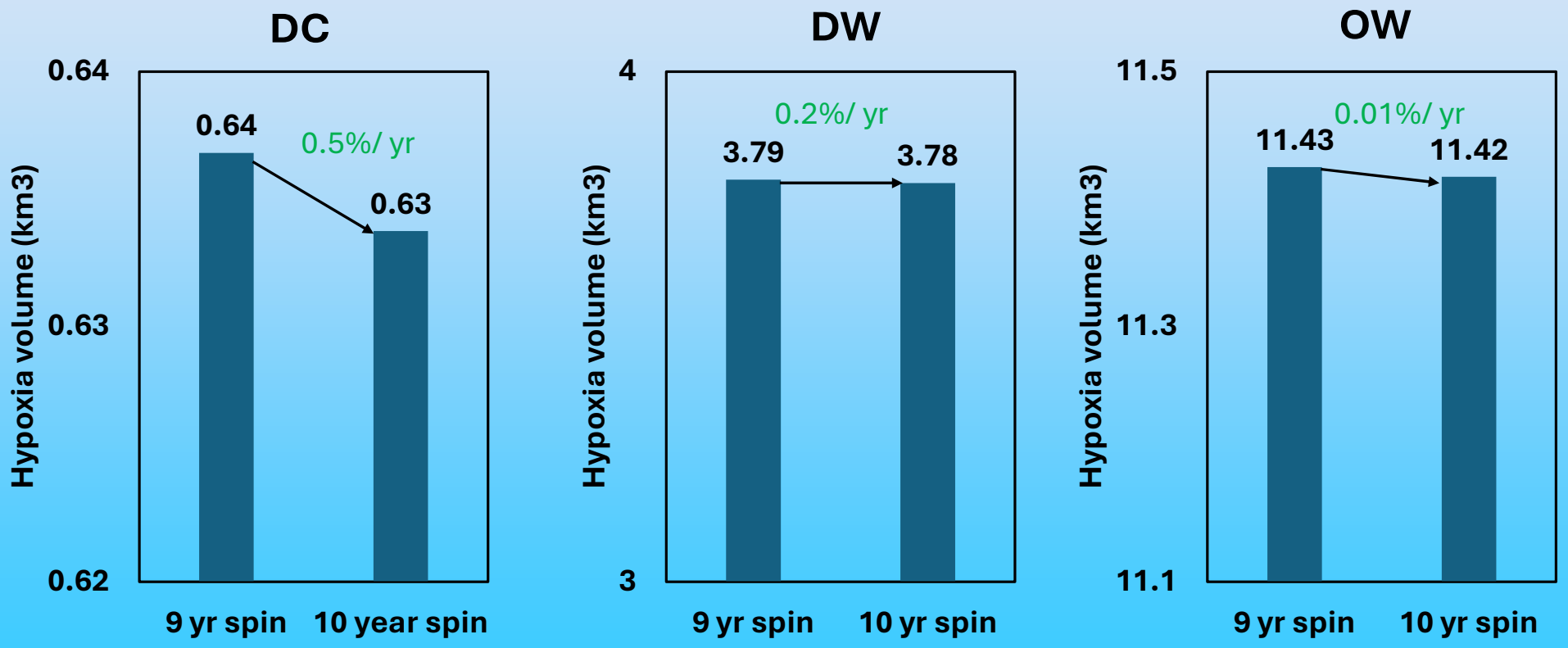
Average summer DW hypoxia volume of spin-up runs (Jun.-Sep., 1991-200)



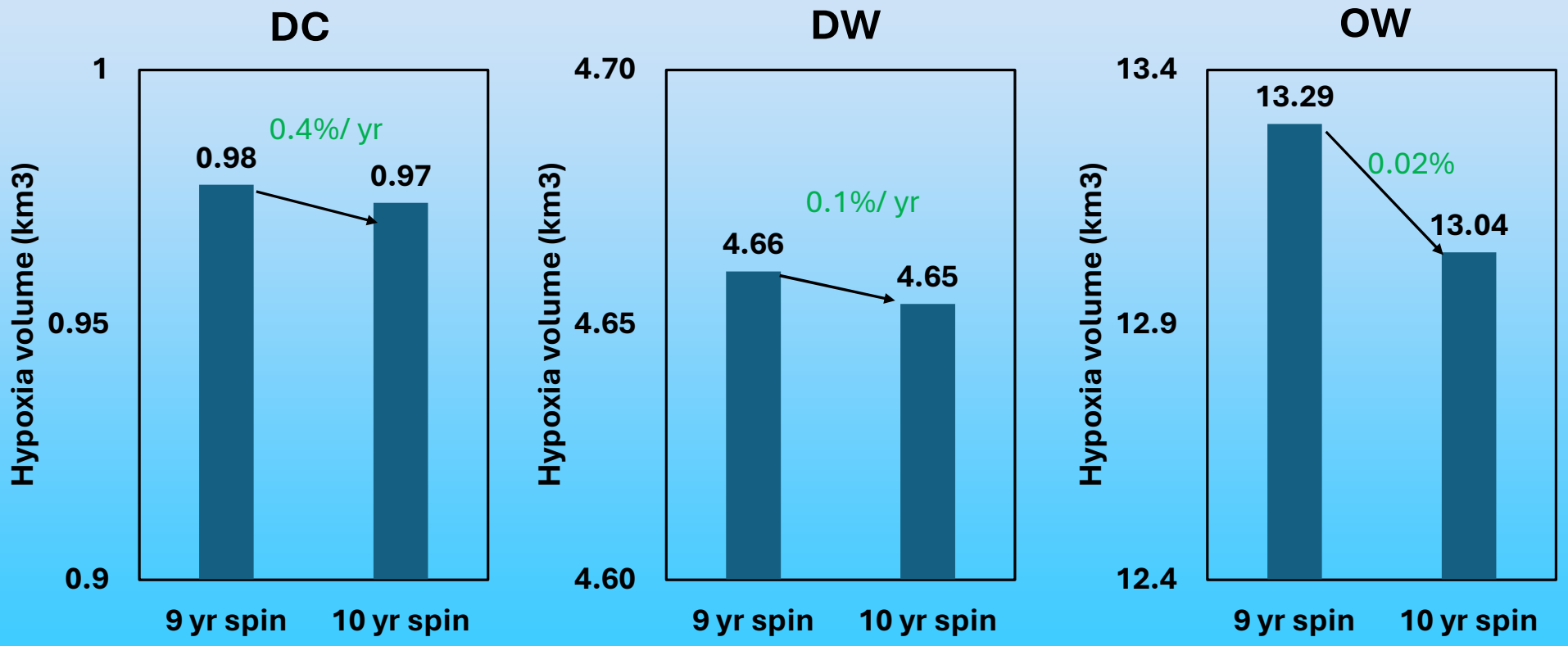
Average summer OW hypoxia volume of spin-up runs (Jun.-Sep., 1991-200)



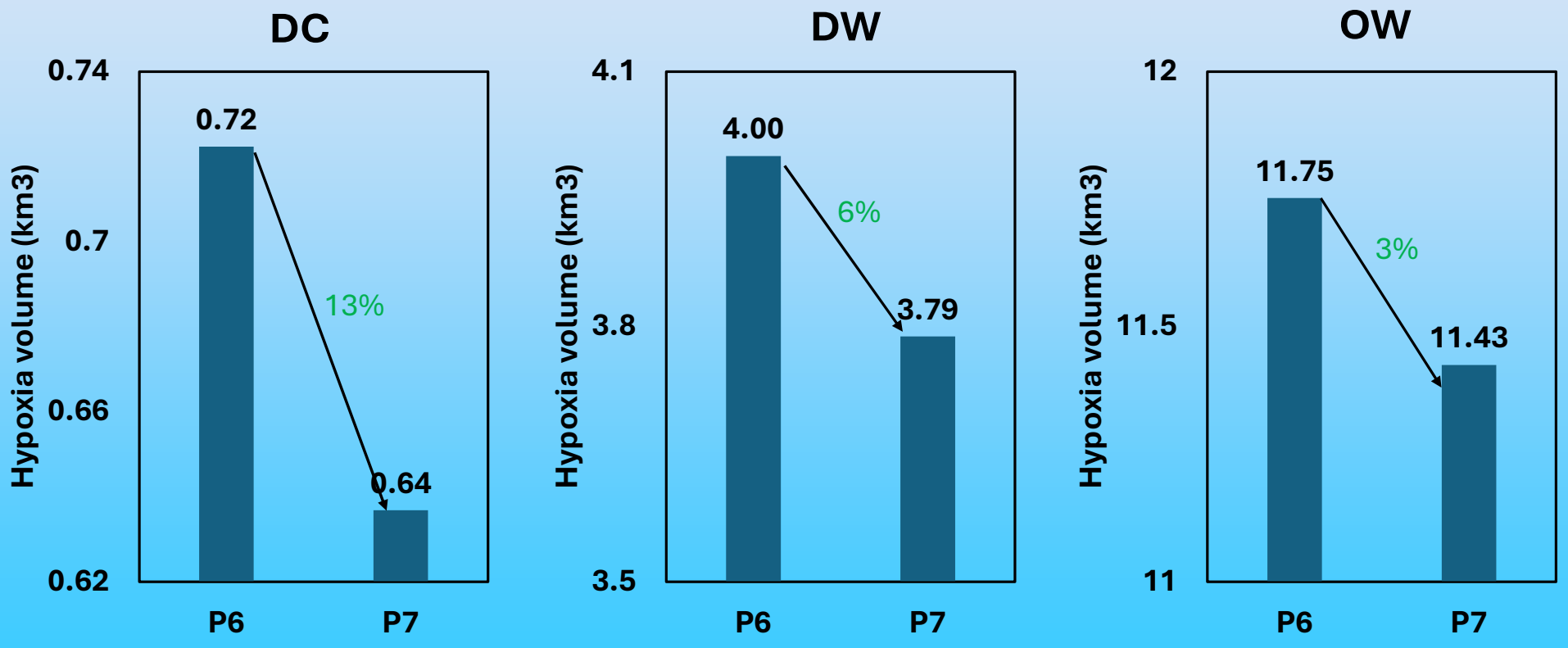
Average summer hypoxia volume of spin-up runs (Jun.-Sep., 1991-2000)



Average summer hypoxia volume of spin-up runs (Jun.-Sep., 1993-1995)



Average summer hypoxia volume of spin-up runs between Phase 6 and 7 (Jun.-Sep., 1991-2000)



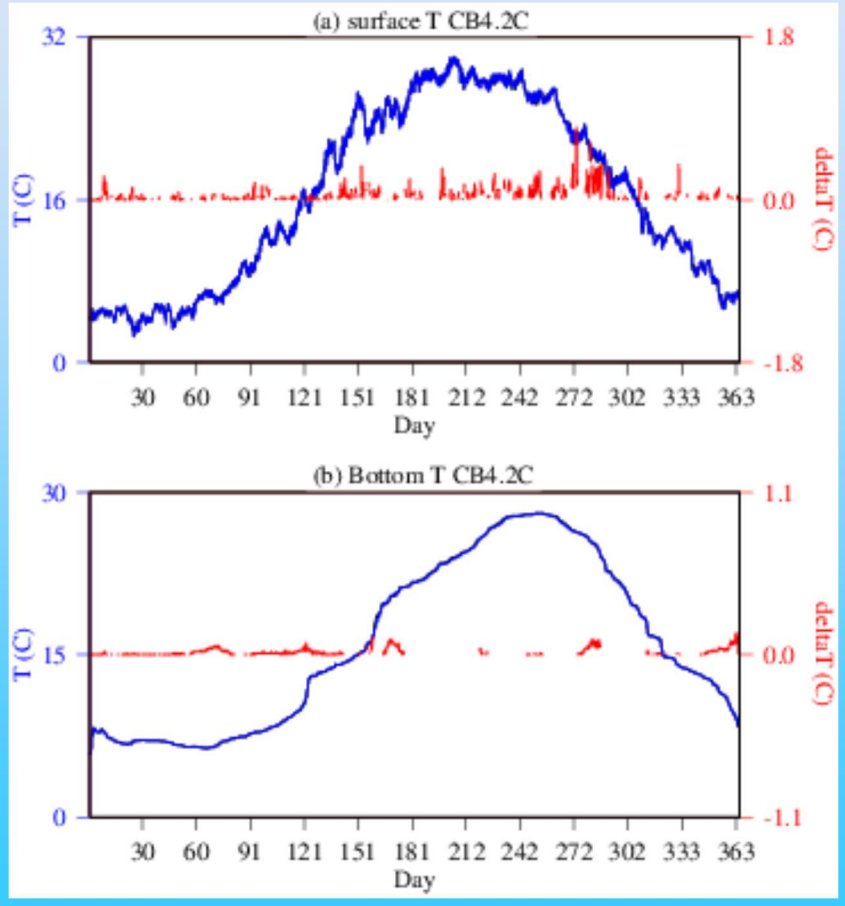
Benchmarking

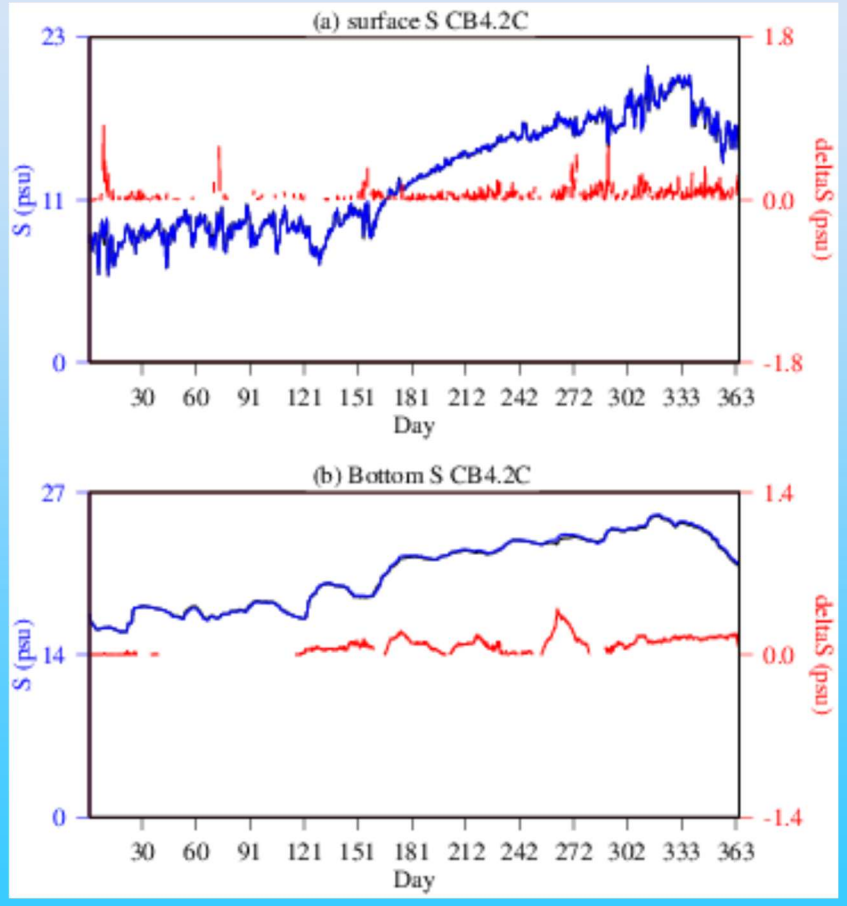
- We have been using the EPA HPC for free over 20 years.
- Now we have to pay, which we may not be able to.
- Need a backup cluster, the amazon cloud.
- Can we run the model on it?
- Are the results comparable?

Benchmark 1991 physical and water quality (ICM) simulation run time in hours (AWS: Amazon cloud; 128 cpus)

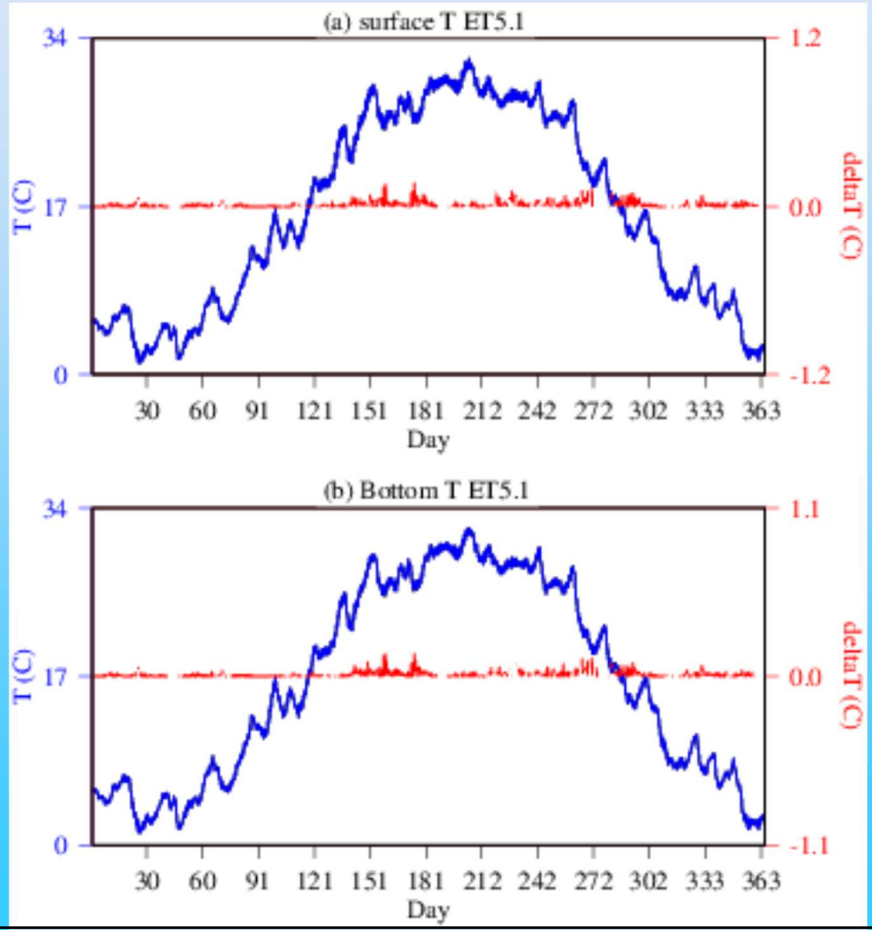
	HPC	AWS	AWS/HPC
Physics	28.7	52.2	1.82
ICM	13.5	20.6	1.52

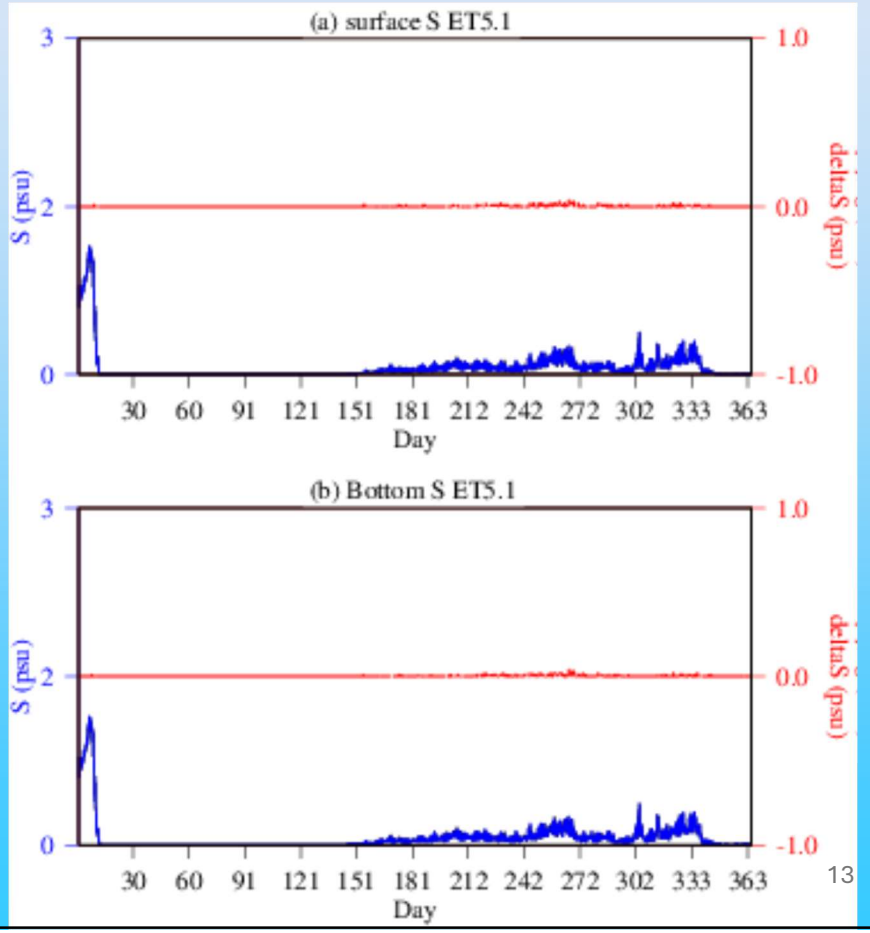
Temperature and salinity at Station CB4.2C, main stem of the Bay



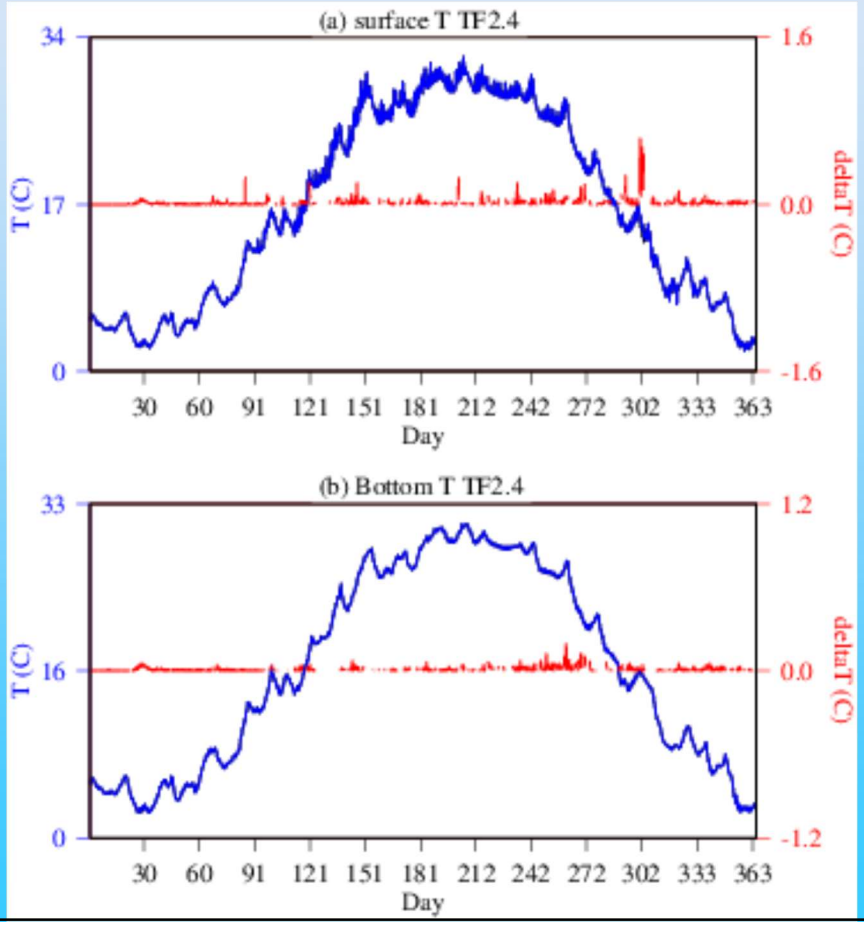


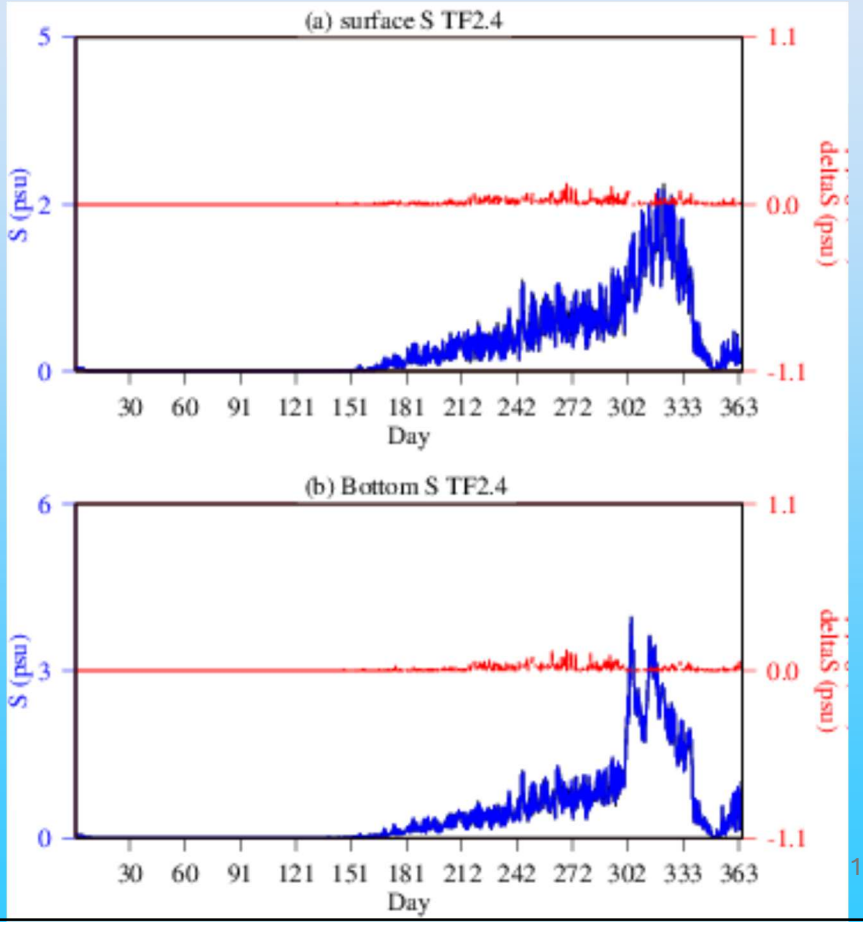
Temperature and salinity at Station ET5.1, Choptank River



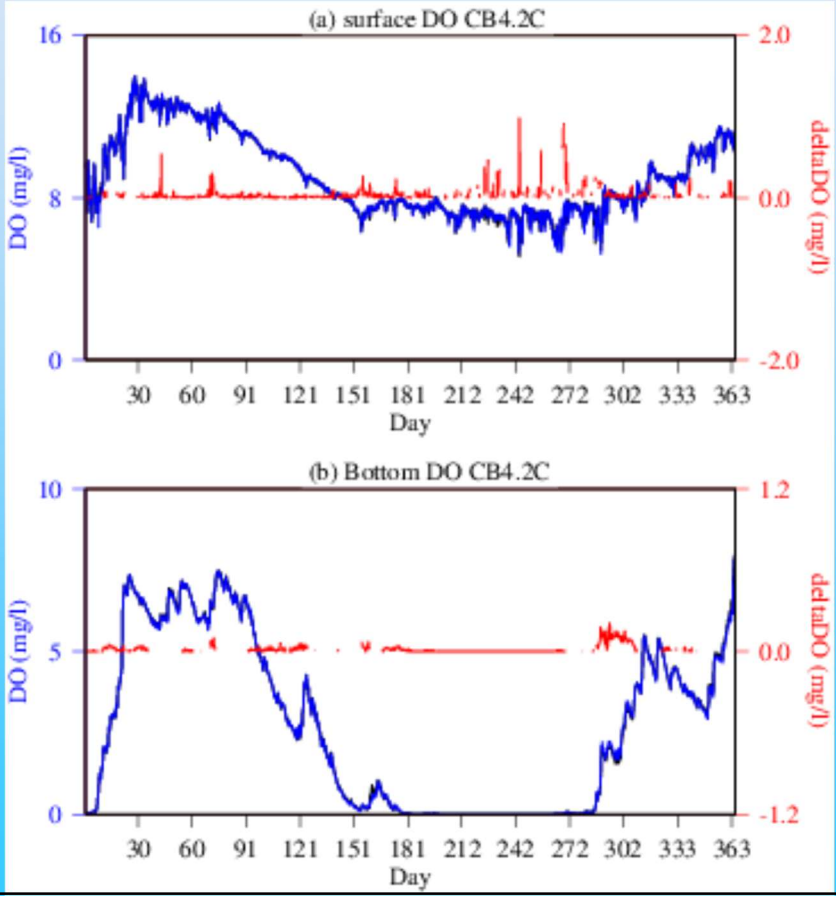


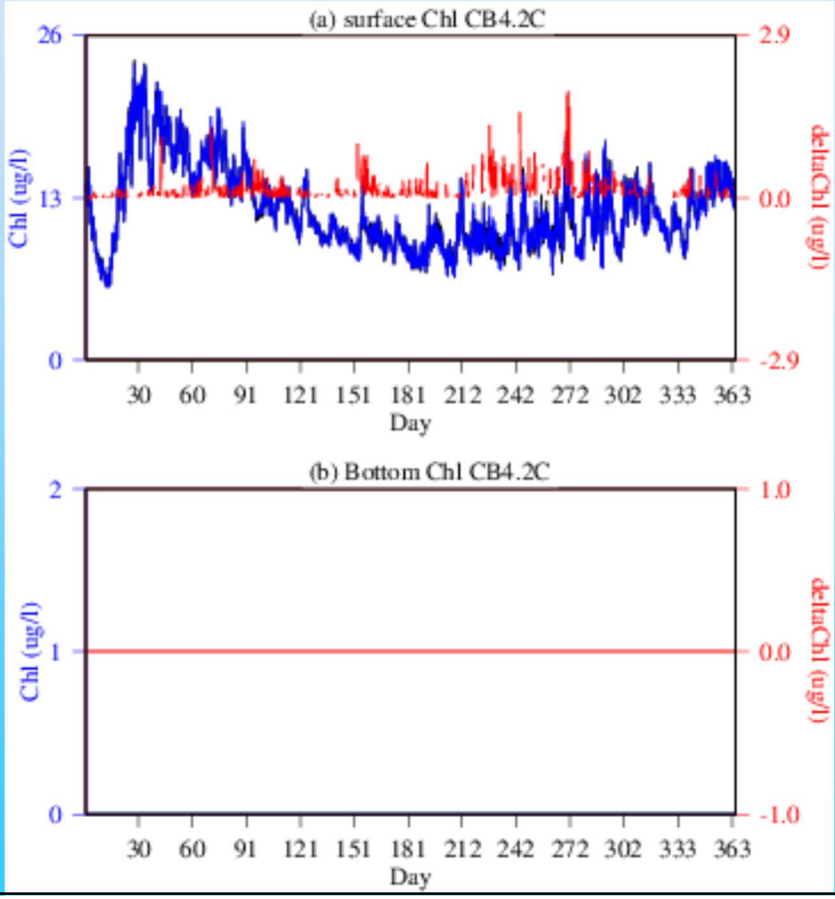
Temperature and salinity at Station TF2.4, Potomac River



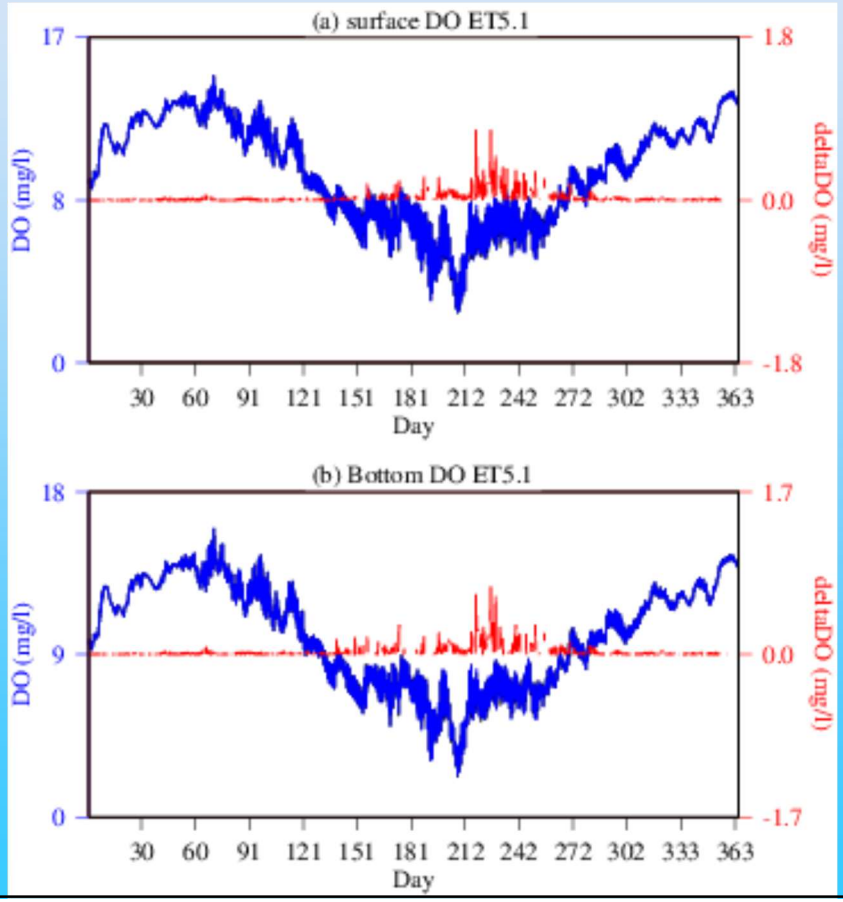


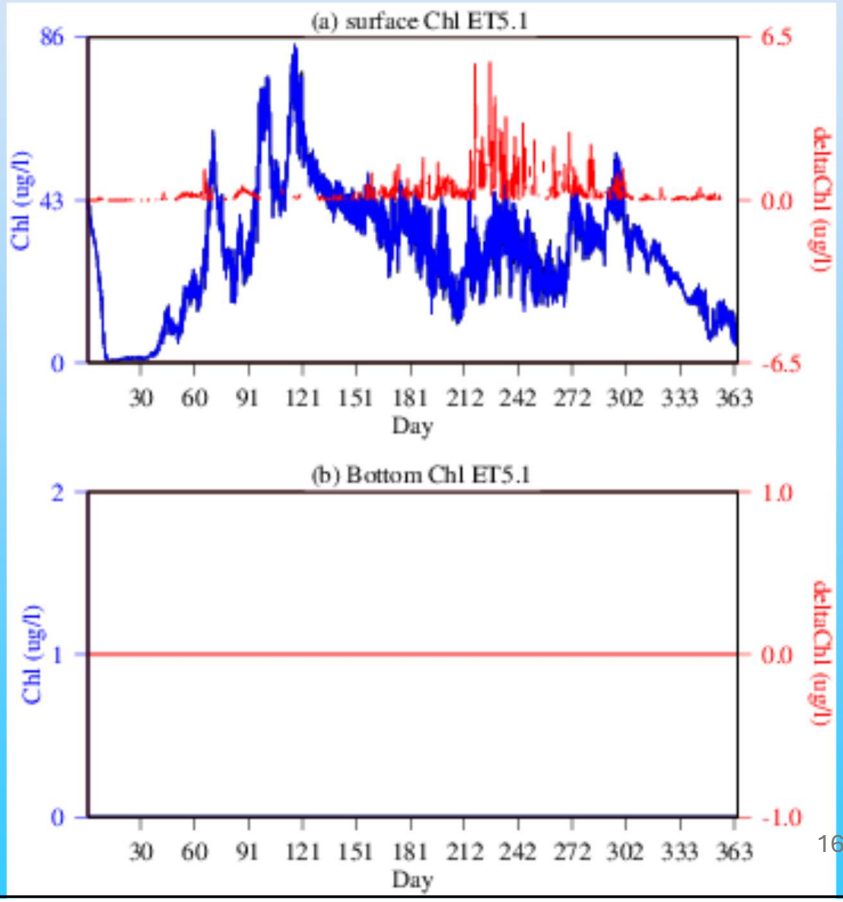
DO and Chlorophyll at Station CB4.2C, main stem of the Bay



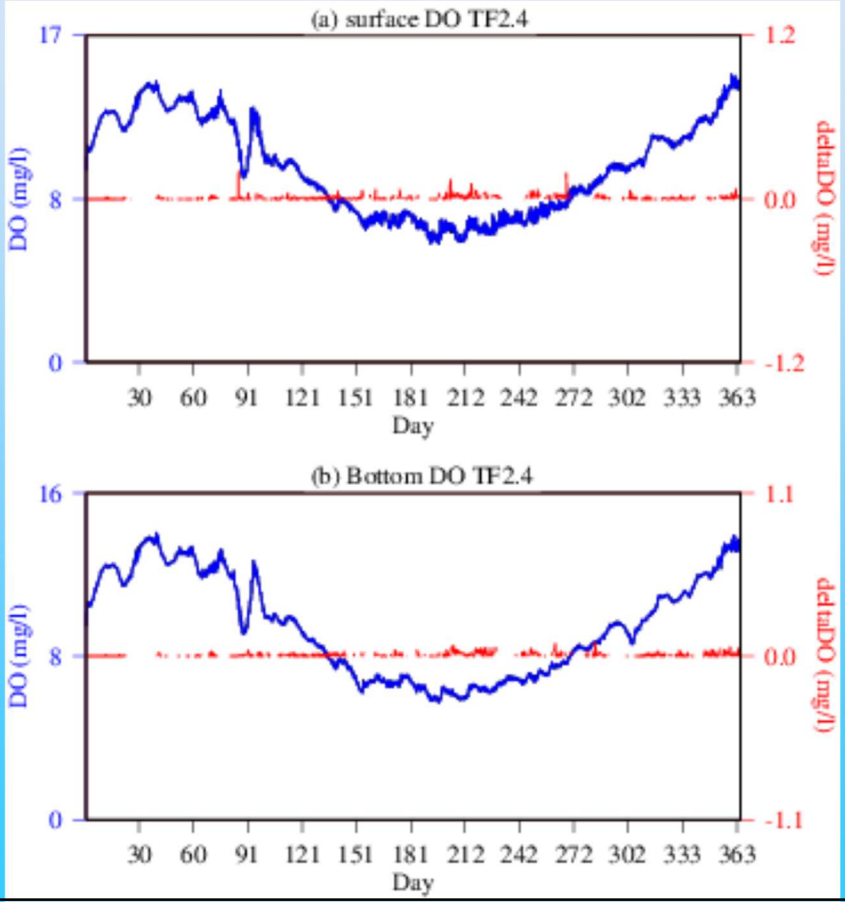


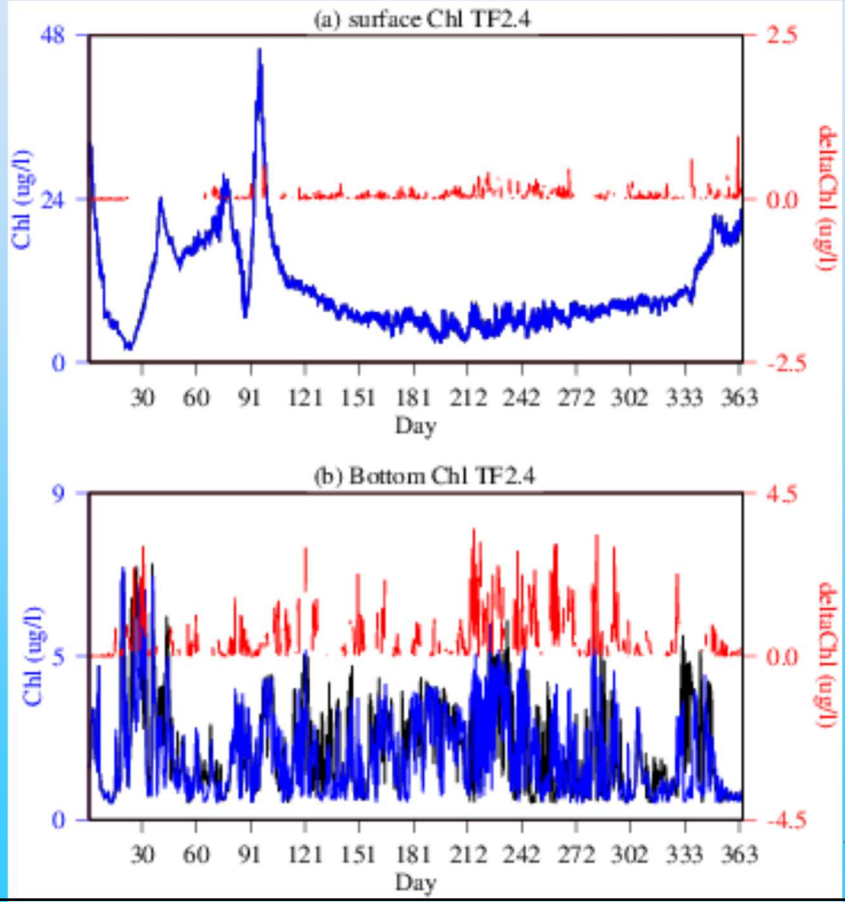
DO and Chlorophyll at Station ET5.1, Choptank River





DO and Chlorophyll at Station TF2.4, Potomac River





Why there are differences between the two platforms:?

ChatGPT thinks:

- CPU architecture
- Floating-Point Precision
- Parallel execution order
- Compilers
- OS
- Libraries
- RAM

SAV criteria assessment

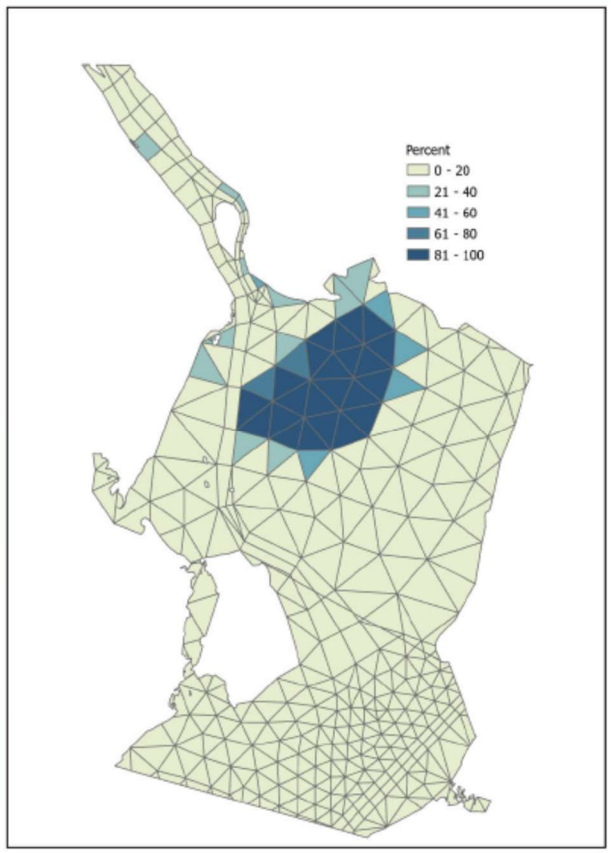
- Not assessed for Phase 6.
- Hope we can do it for Phase 7.
- Exploring alternative to model simulation.
- Any suggestion and comments are welcome.

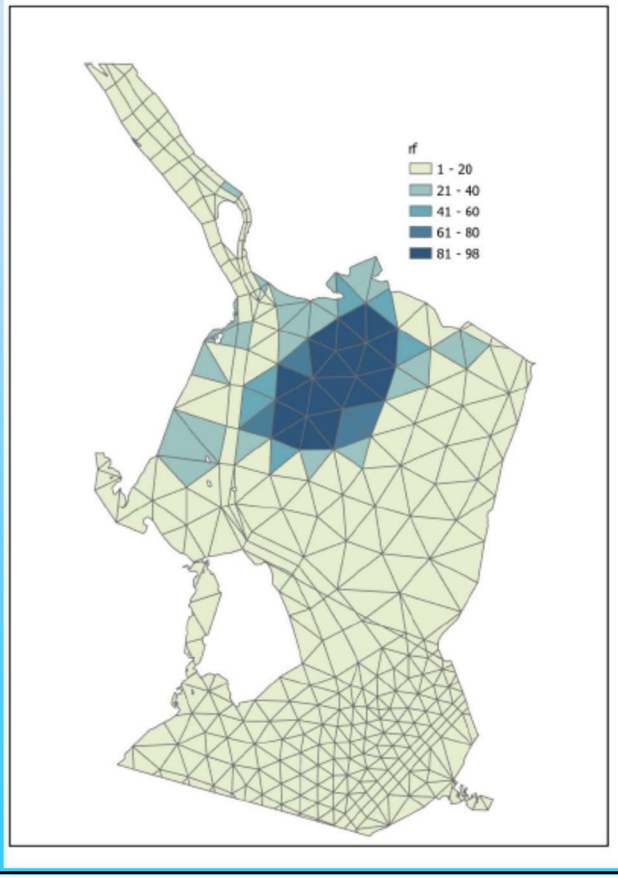
SAV Observation 1993

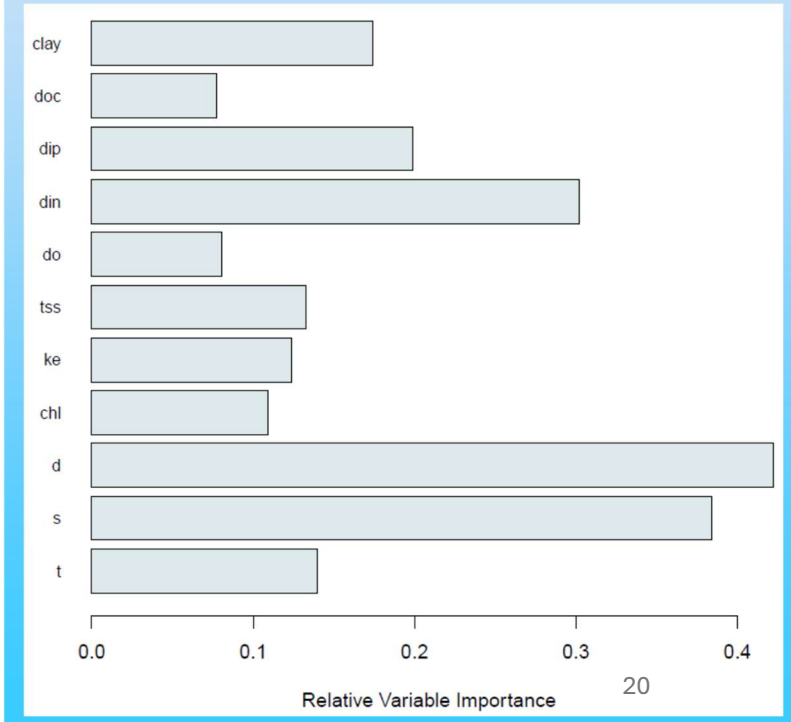
Random forest prediction 1993

R=0.98

Relative contribution of predictors







Messages

- 10 years spin-up is needed.
- Pre-spin-up runs with similar loads may help.
- SCHISM was successfully run on AWS.
- Limited differences between the two platforms.
- Make sure both calibration and scenario are run on the same platform.
- Looking for ways to assess SAV .