Progress on the MTM in the Potomac River

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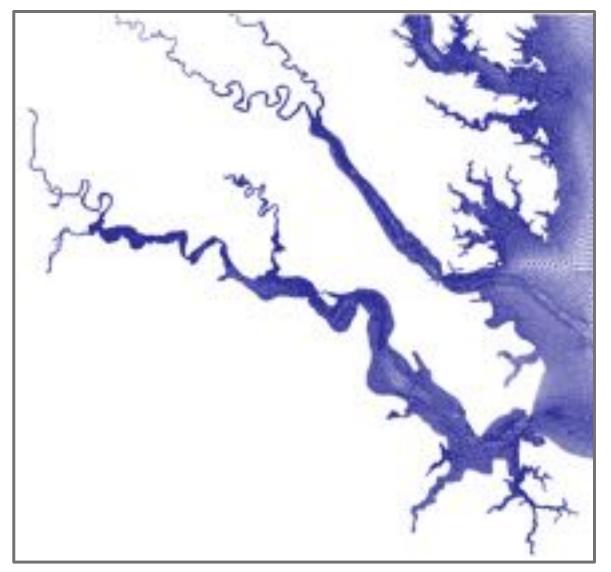


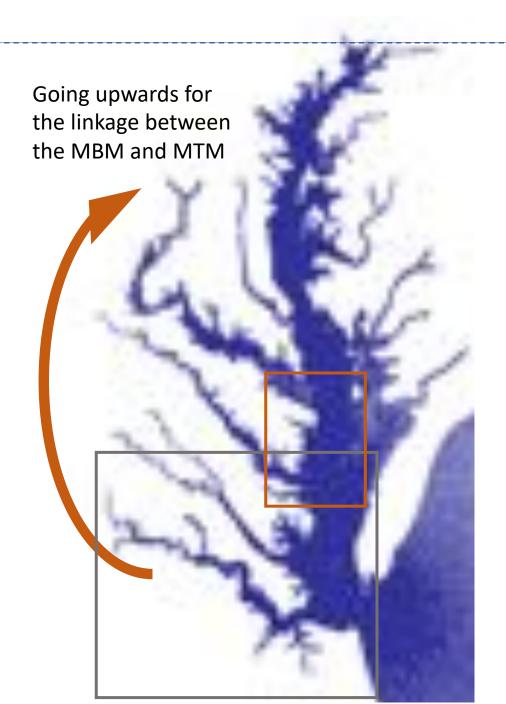




Progress of MTM development

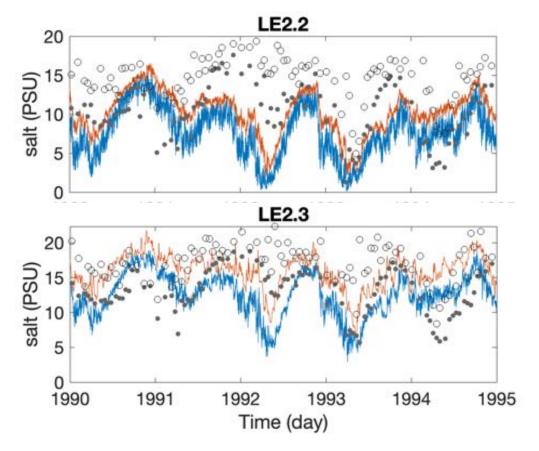
Tidal James and York Rivers



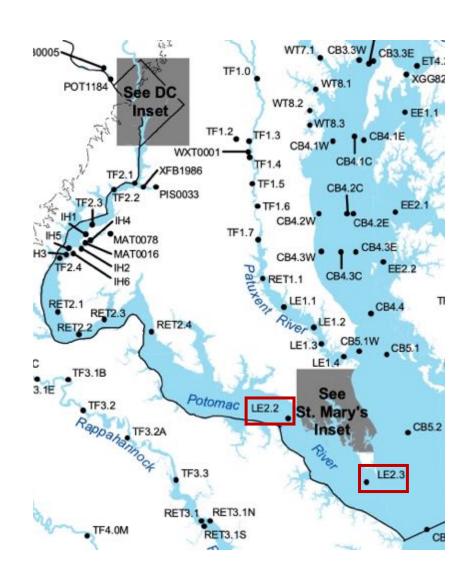


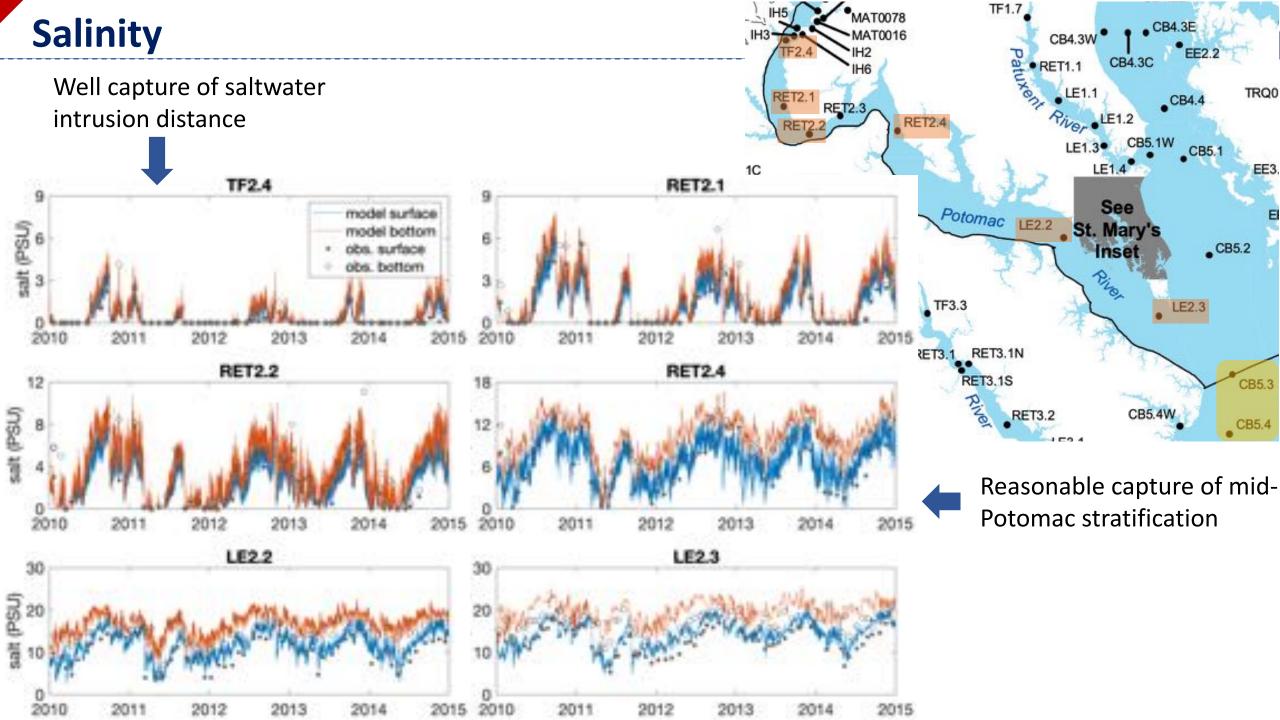
Improvement from grid refinements

Overall insufficient stratification from the mouth

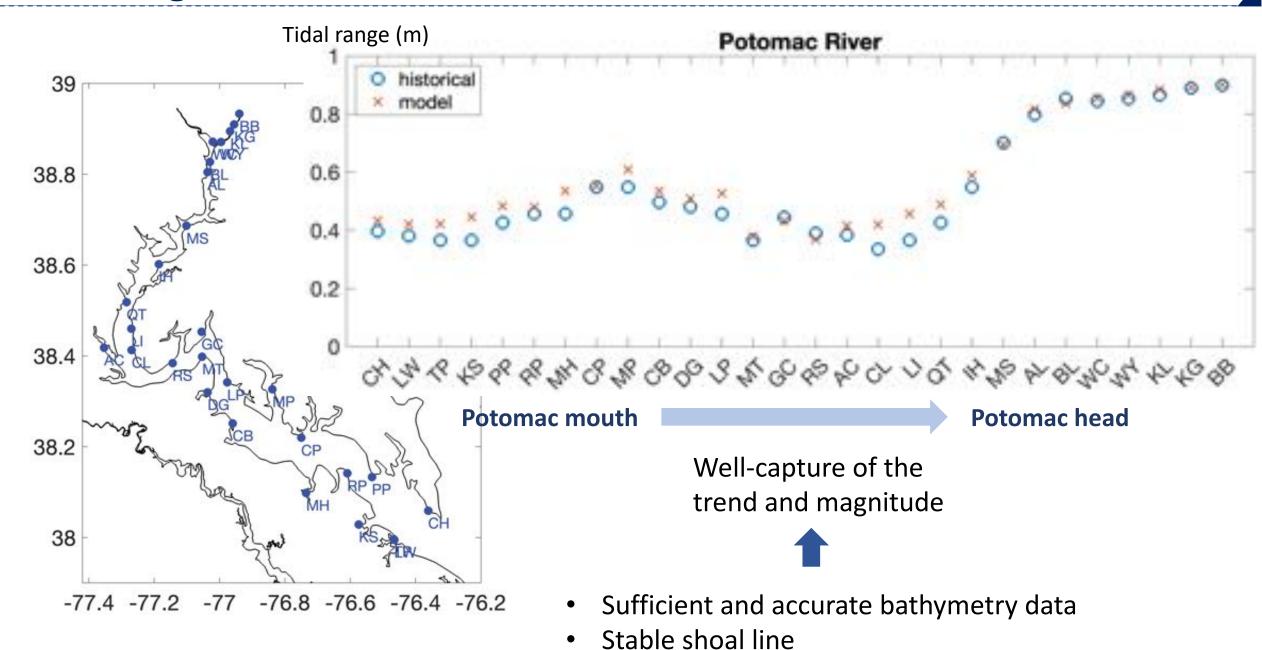


Before grid refinements

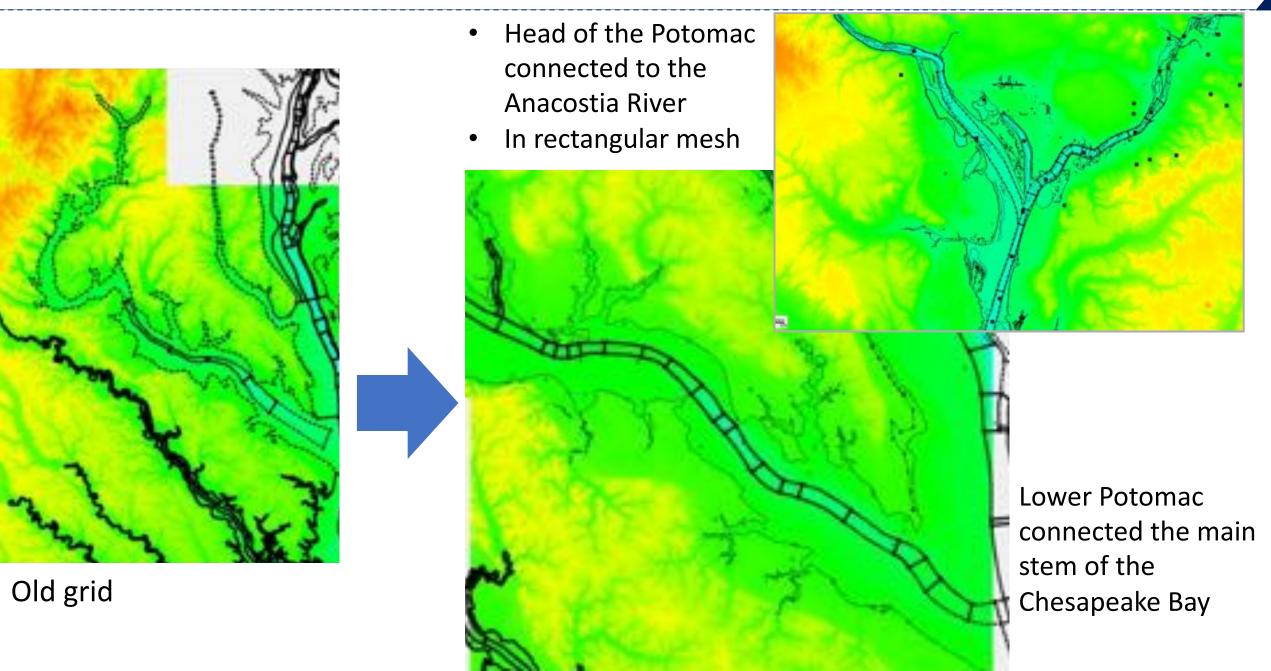




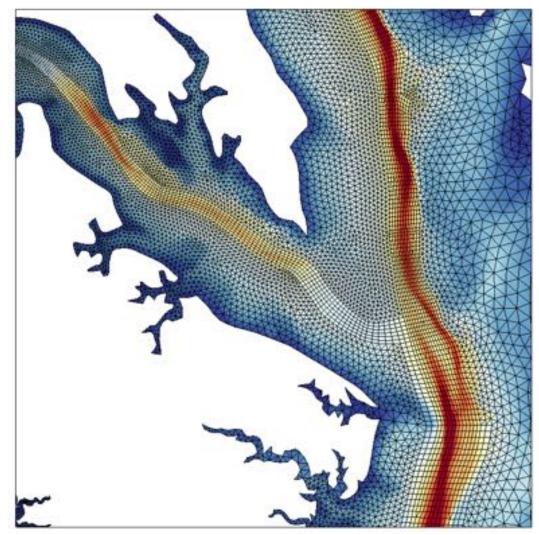
Tidal range



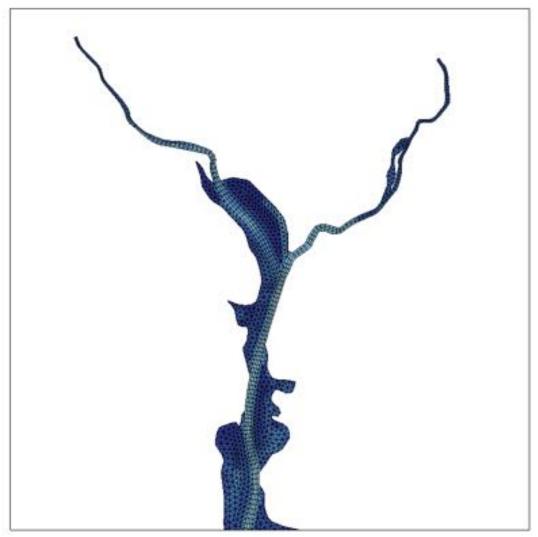
Grid construction screenshots



Potomac horizontal grid



Potomac mouth



Potomac head

Interactions between each tributaries

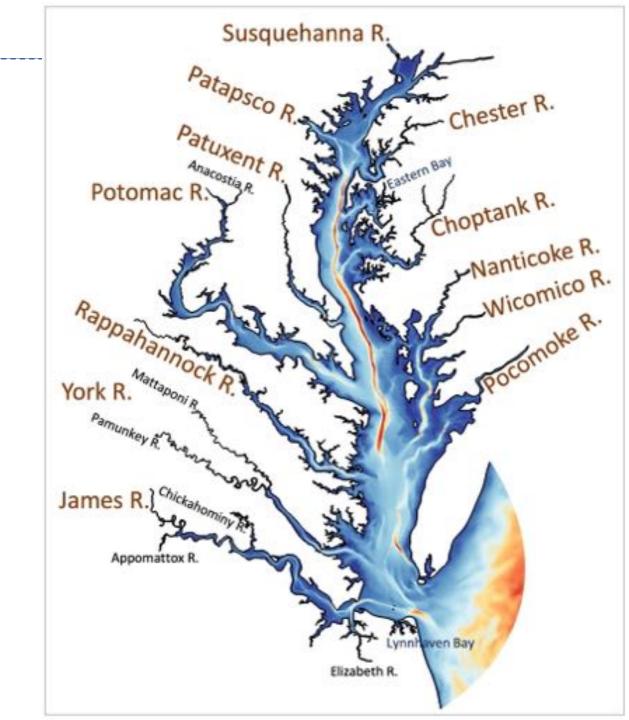
-- Generic tracer study

Introduction

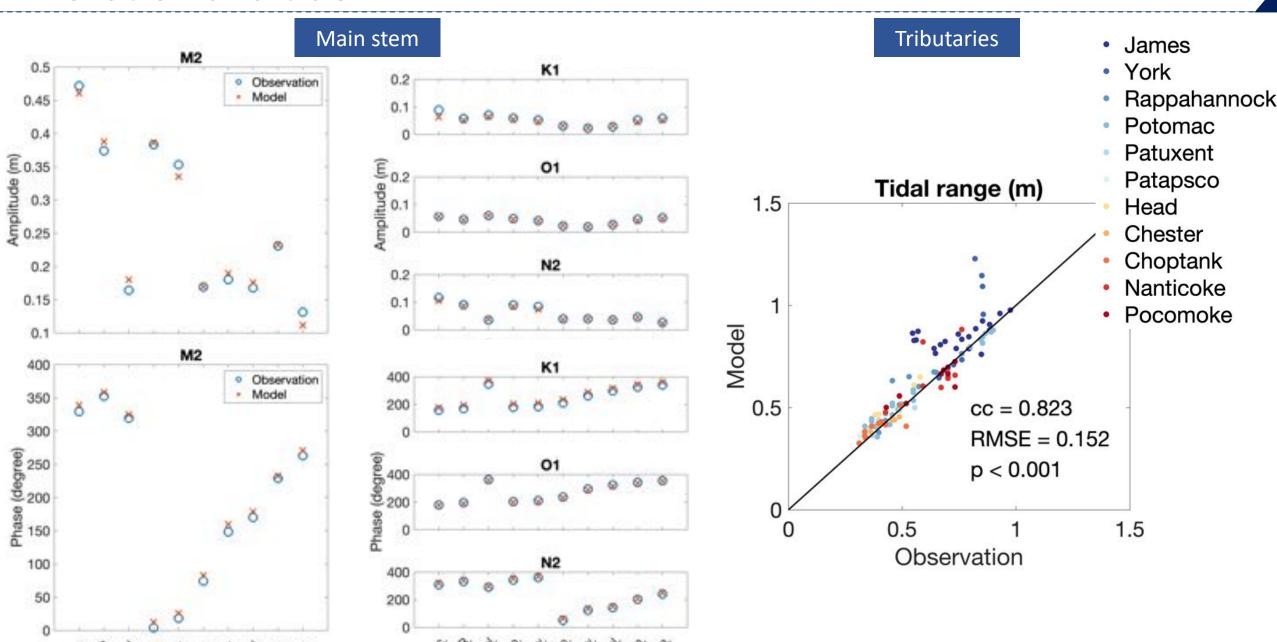
- Parallel to the revamping of SCHISM-ICM
- Accompany the development of MBM
- A test to exclude grid-induced errors or hidden transport issues

Motivation

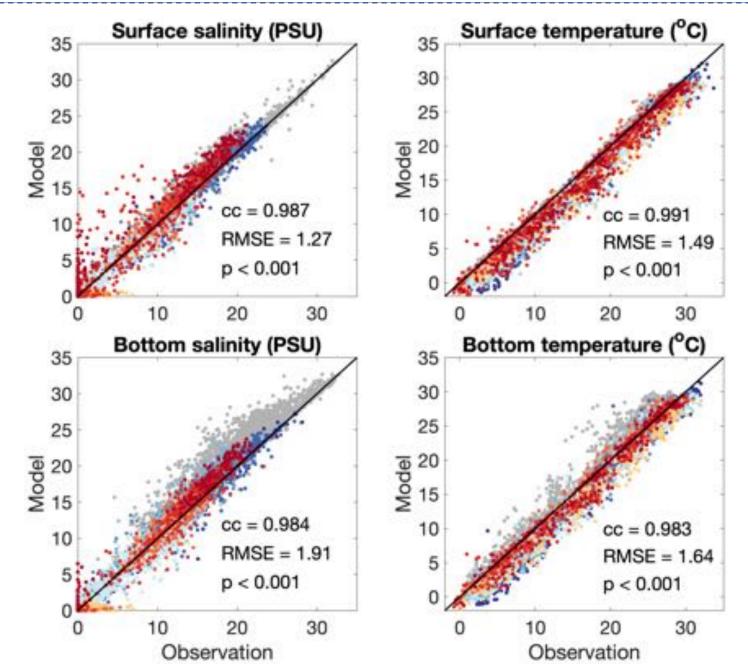
- First time to have a fine grid covering all the tributaries and shallow regions
- Quantitatively synthesize the interactions between each subtributaries



Elevation and tide

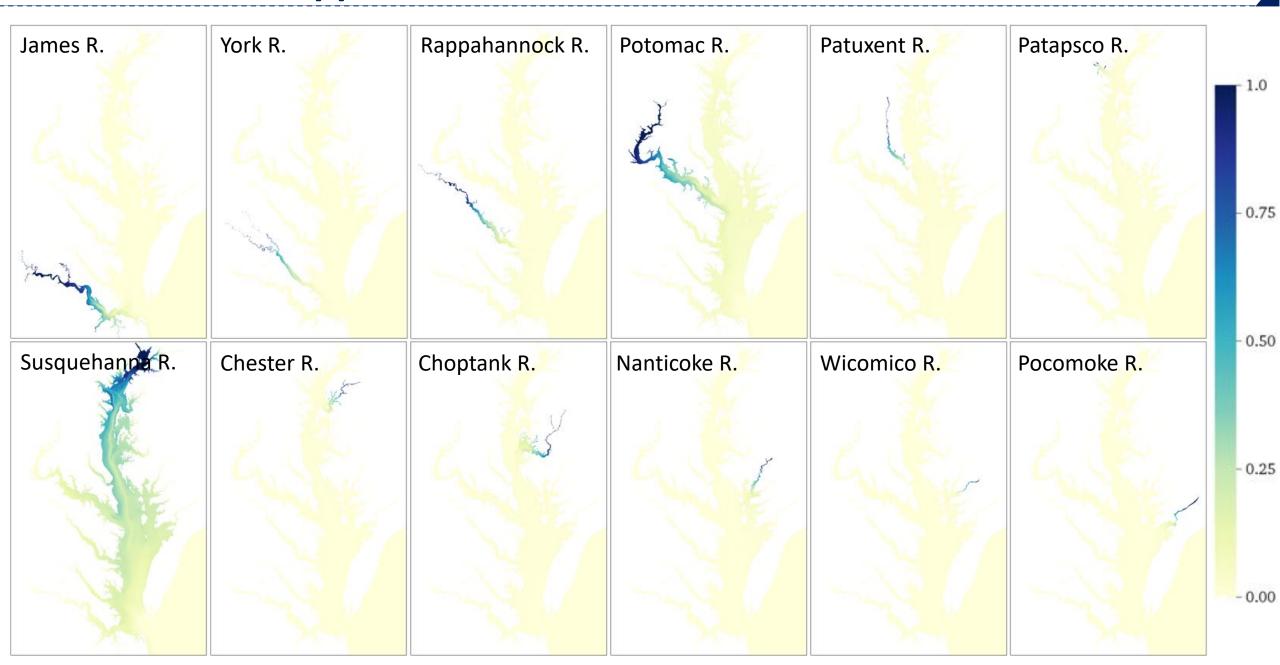


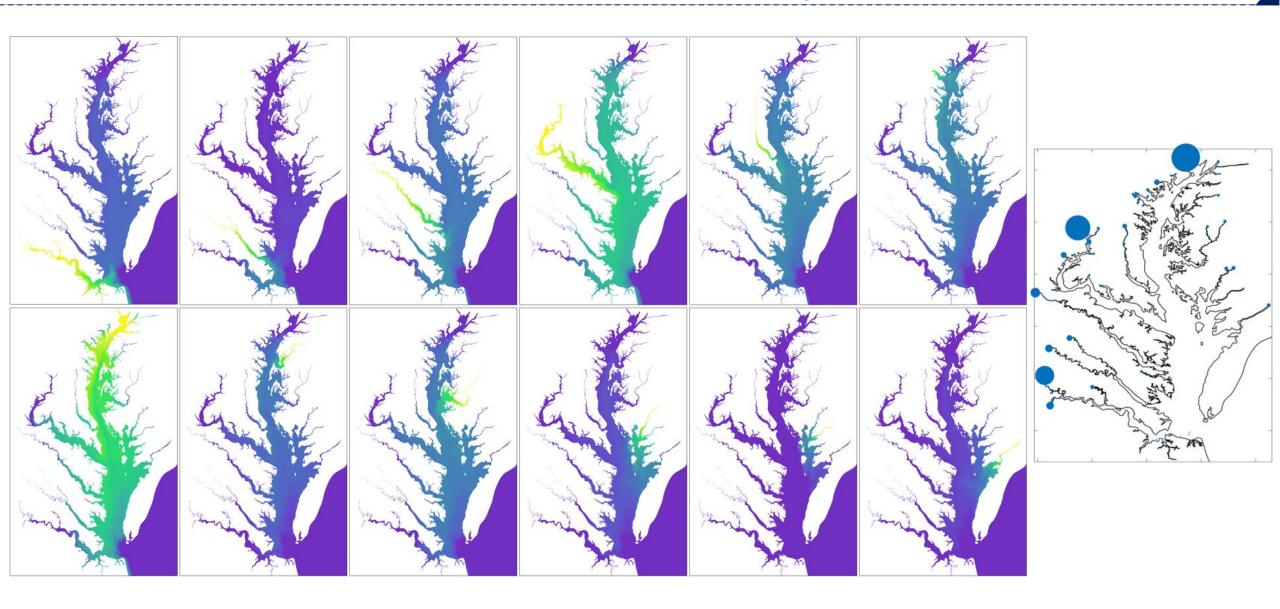
Salinity and temperature



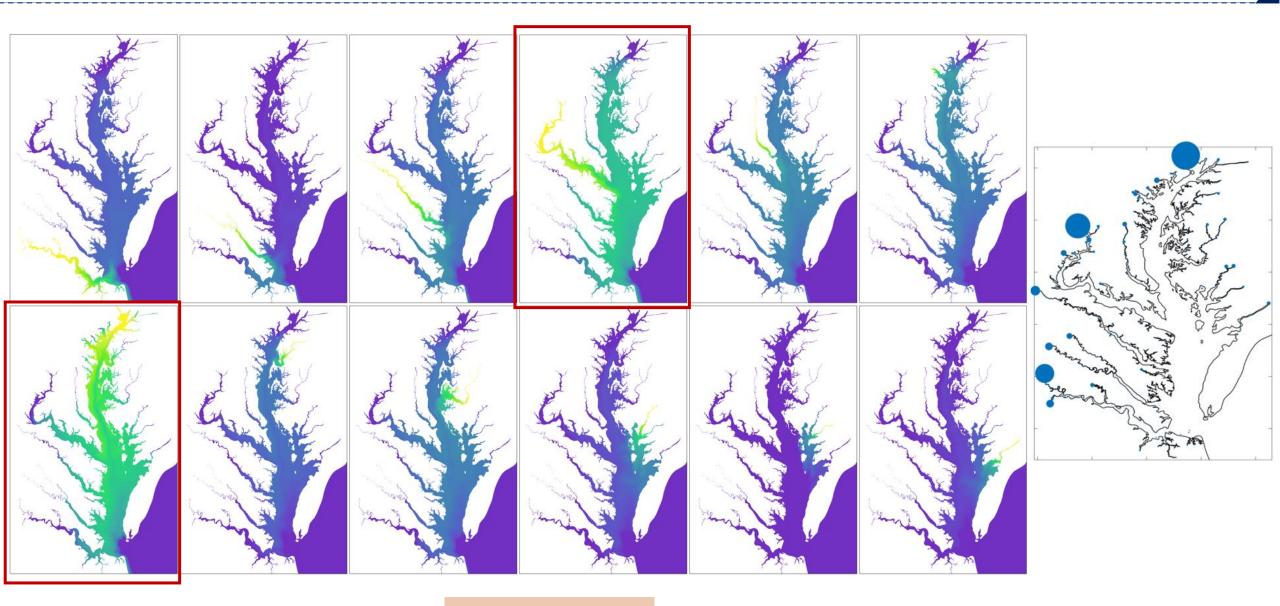
- Main stem
- James
- York
- Rappahannock
- Potomac
- Patuxent
- Western head
- Eastern head
- Chester
- Choptank
- Nanticoke
- Pocomoke

Generic tracer application and distribution

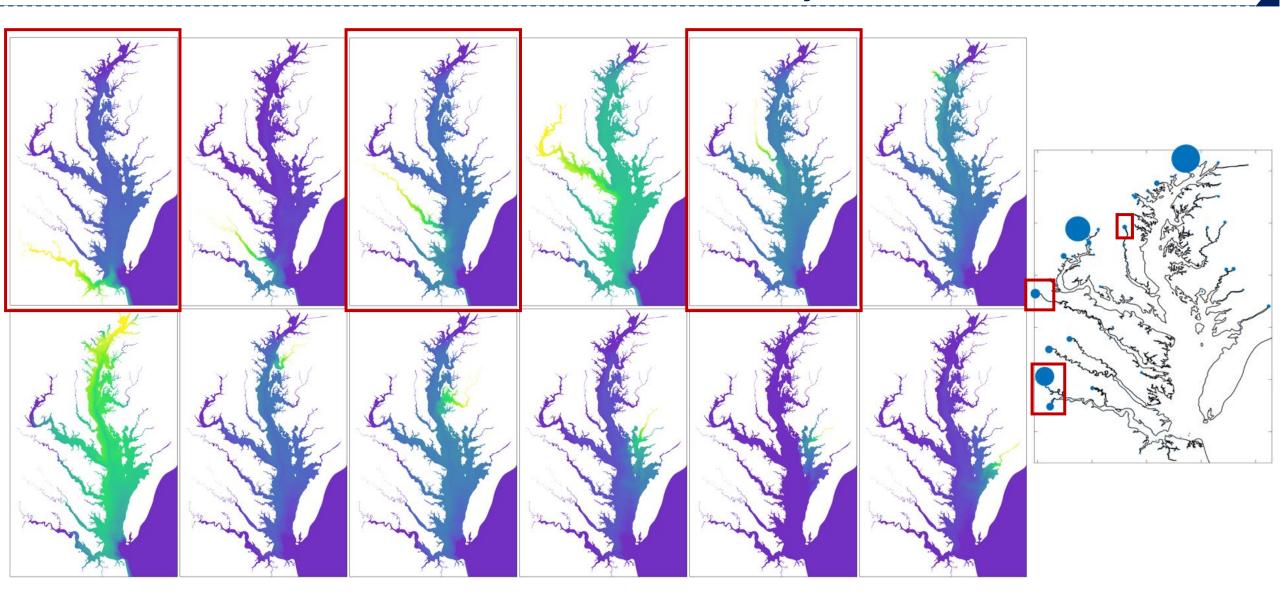




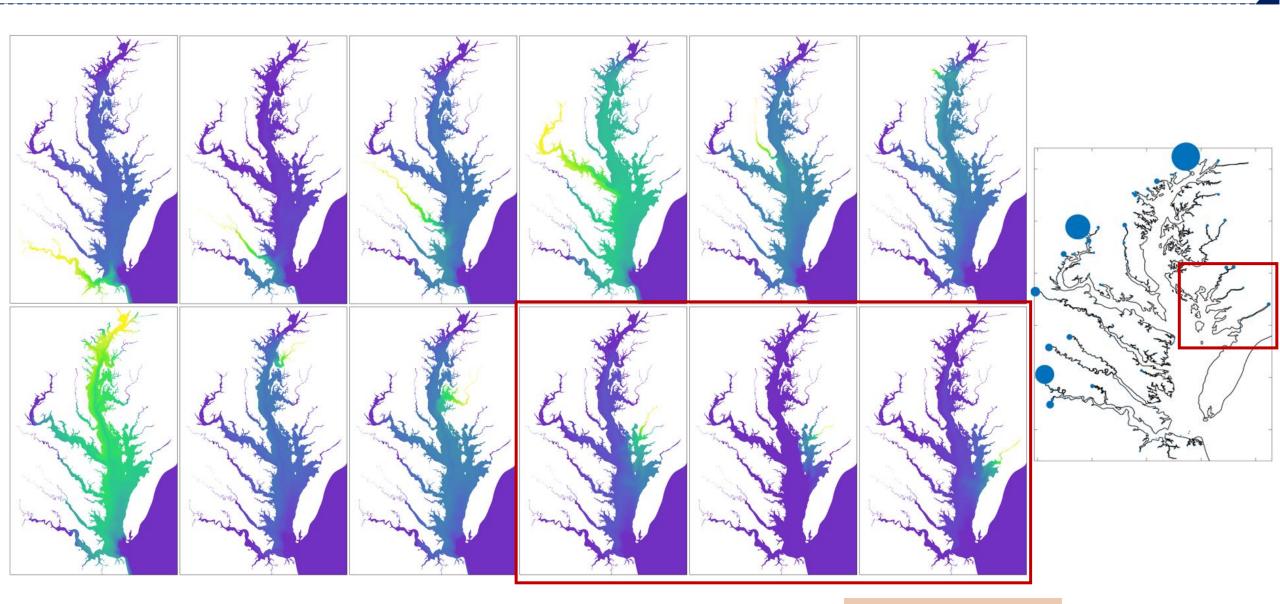
Source amount, location, and other processes



Source amount, location, and other processes



Source amount, location, and other processes



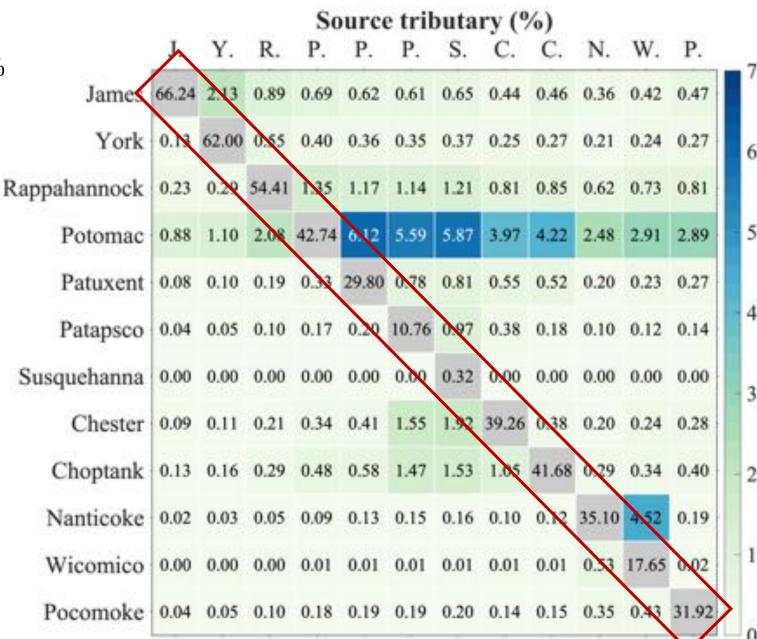
Source-sink connectivity matrix

	Source tributary (%)												
$M_{trib} = \frac{\sum_{trib} G_{tracer} \cdot V}{\sum_{total} G_{tracer} \cdot V} \cdot 100\%$	J.	Y.	R.	P.	P.	P.	S.	C.	C.	N.	W.	P.	
$\sum_{total} G_{tracer} \cdot V$ James	66.24	2.13	0.89	0.69	0.62	0.61	0.65	0.44	0.46	0.36	0.42	0.47	
York	0.13	62.00	0.55	0.40	0.36	0.35	0.37	0.25	0.27	0.21	0.24	0.27	
Rappahannock	0.23	0.29	54.41	1.35	1.17	1.14	1.21	0.81	0.85	0.62	0.73	0.81	
Potomac	0.88	1.10	2.08	42.74	6.12	5.59	5.87	3.97	4.22	2.48	2.91	2.89	5
Patuxent	0.08	0.10	0.19	0.33	29.80	0.78	0.81	0.55	0.52	0.20	0.23	0.27	
Patapsco	0.04	0.05	0.10	0.17	0.20	10.76	0.97	0.38	0.18	0.10	0.12	0.14	4
Susquehanna	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	3
Chester	0.09	0.11	0.21	0.34	0.41	1.55	1.92	39.26	0.38	0.20	0.24	0.28	
Choptank	0.13	0.16	0.29	0.48	0.58	1.47	1.53	1.05	41.68	0.29	0.34	0.40	- 2
Nanticoke	0.02	0.03	0.05	0.09	0.13	0.15	0.16	0.10	0.12	35.10	4.52	0.19	
	2000										Marian Contract		1

Source-sink connectivity matrix

$$M_{trib} = \frac{\sum_{trib} G_{tracer} \cdot V}{\sum_{total} G_{tracer} \cdot V} \cdot 100\%$$

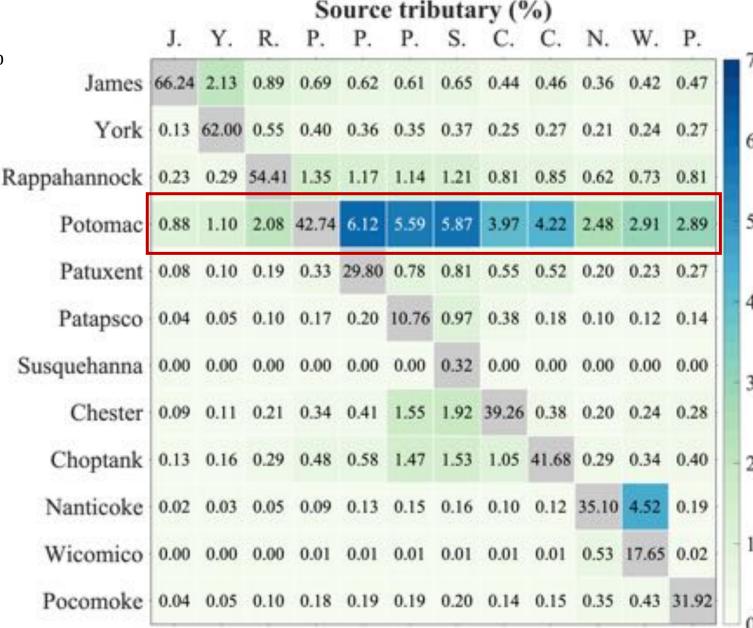
On the western side of the Bay, Lower Bay tributaries tend to have a large local retention than Upper Bay tributaries



Source-sink connectivity matrix

$$M_{trib} = \frac{\sum_{trib} G_{tracer} \cdot V}{\sum_{total} G_{tracer} \cdot V} \cdot 100\%$$

Mostly, Potomac R. is the largest receiver of the sources from the other tributaries, except the sources from the York R. and Wicomoco R.

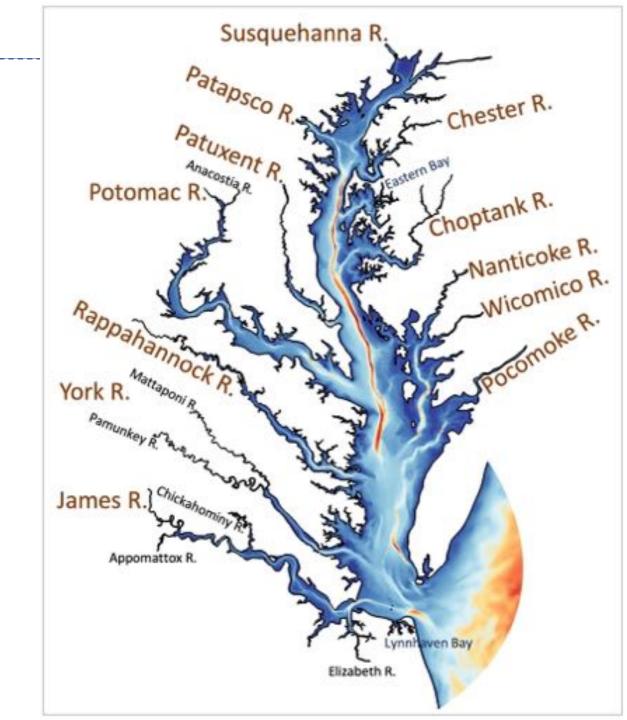


EOF analysis: spatial vector

	Source tributary												
	J.	Y.	R.	P.	P.	P.	S.	C.	C.	N.	W.	P.	
James	×	0.94	0.31	0.46	0.09	0.11	0.12	0.11	0.11	0.13	0.08	0.14	
York	0.07	×	0.15	0.22	0.04	0.06	0.06	0.06	0.06	0.06	0.04	0.07	ľ
Rappahannock	0.22	0.07	×	0.68	0.16	0.19	0.20	0.20	0.19	0.21	0.12	0.24	ŀ
Potomac	0.95	0.31	0.91	×	0.98	0.92	0.94	0.93	0.96	0.95	0.51	0.93	ŀ
Patuxent	0.09	0.03	0.09	0.21	×	0.12	0.11	0.12	0.12	0.07	0.04	0.09	
Patapsco	0.05	0.02	0.05	0.13	0.03	×	0.02	0.08	0.05	0.04	0.02	0.05	
Susquehanna	0.00	0.00	0.00	0.00	0.00	0.00	×	0.00	0.00	0.00	0.00	0.00	
Chester	0.11	0.04	0.11	0.27	0.07	0.20	0.05	×	0.10	0.08	0.04	0.10	
Choptank	0.14	0.05	0.14	0.35	0.08	0.24	0.22	0.23	×	0.10	0.05	0.14	H
Nanticoke	0.02	0.01	0.03	0.08	0.02	0.03	0.04	0.03	0.03	×	0.84	0.11	-
Wicomico	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.09	×	0.01	- 1
Pocomoke	0.05	0.02	0.04	0.12	0.02	0.03	0.03	0.03	0.03	0.03	0.02	×	

Summary

- Initial grid prepared for the other MTMs from the Potomac Model
- Fully coupled MTM shows reasonable preliminary calibrations
- A generic tracer study is conducted to study the connectivity between each tributary



To be continued ...

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