Preliminary assessment of the sea level rise scenario of the Phase 7 Main Bay Model

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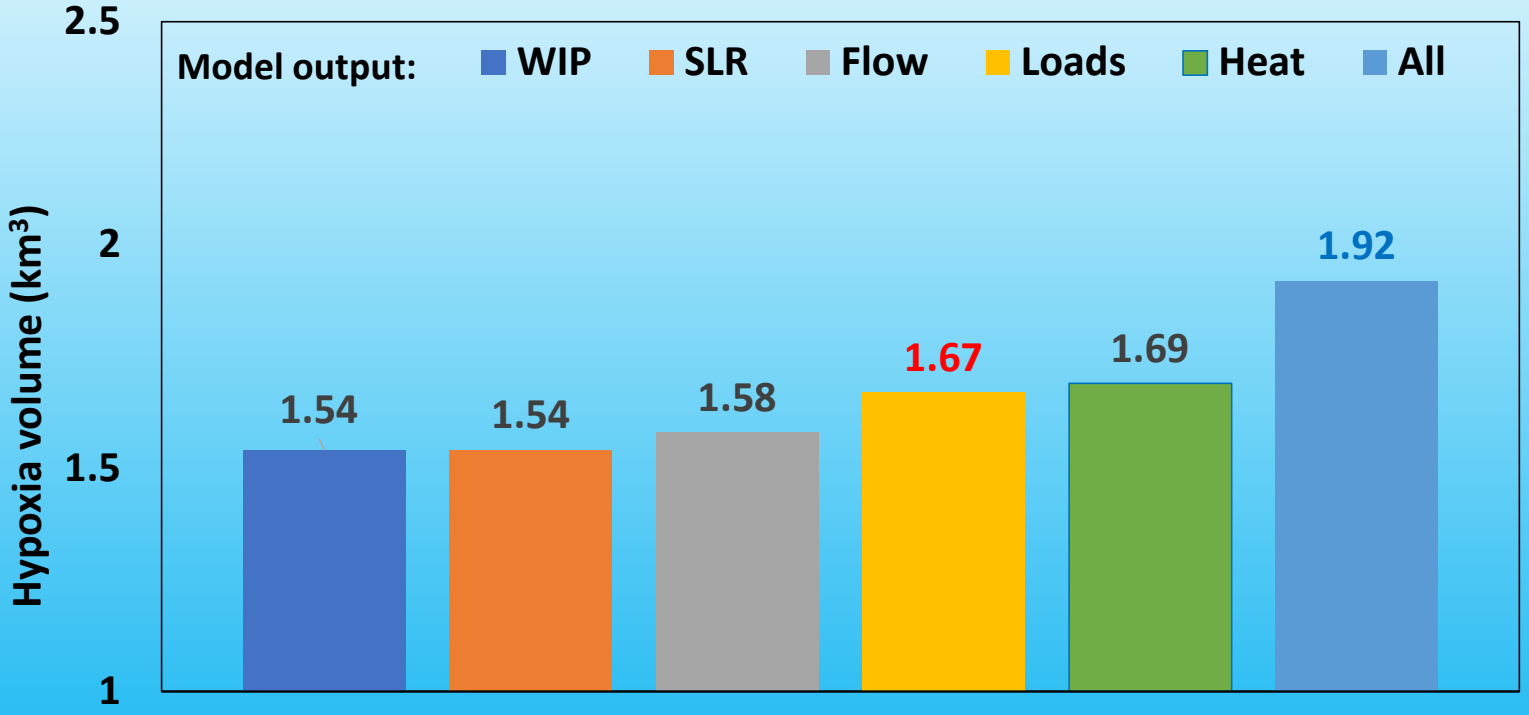
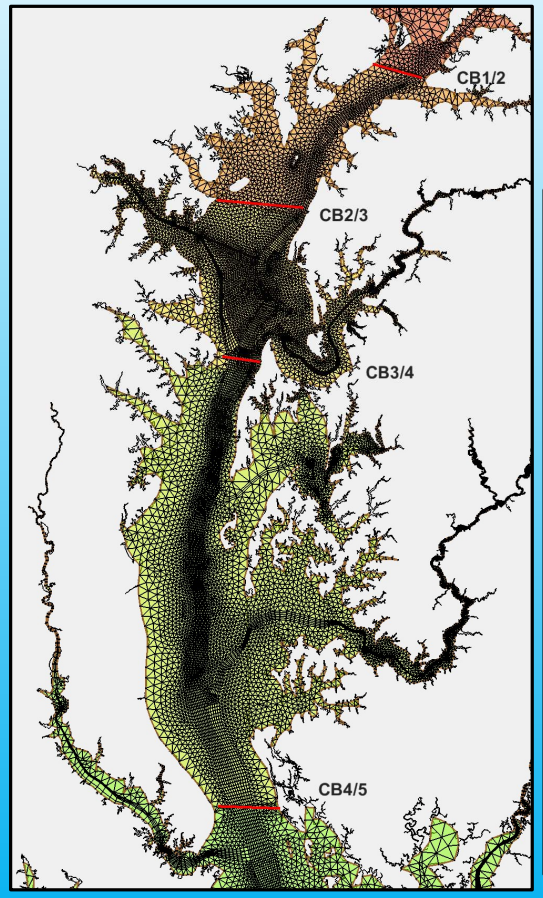
2035 summer (Jun.-Sep.) average hypoxia volume (<1 mg/l) in the Whole Bay under WIP condition

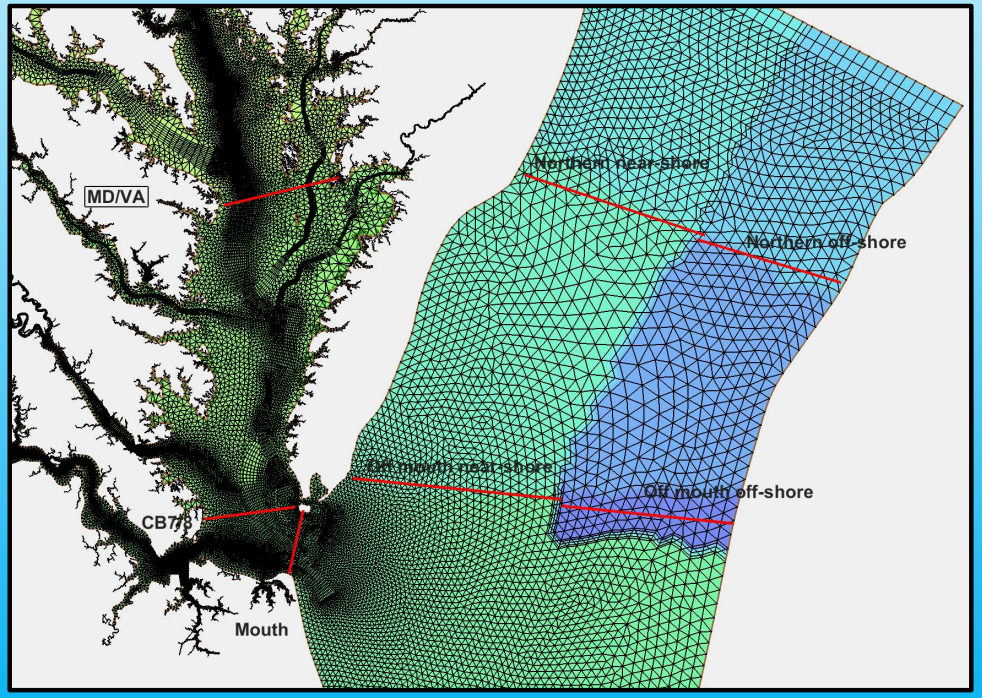


Sea level rise impact is lower as compared to the Phase 6 simulation.
Is there a proper response of the gravitational circulation to sea level rise?
Need the open boundary condition be adjusted?

Transect location

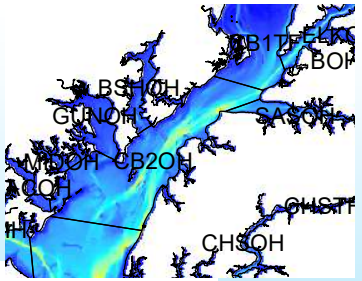
- Bottom residual current
- Cross section residual current
- Water fluxes crossing transect
- Potential adjustment of boundary condition
- Not all the transects are presented today

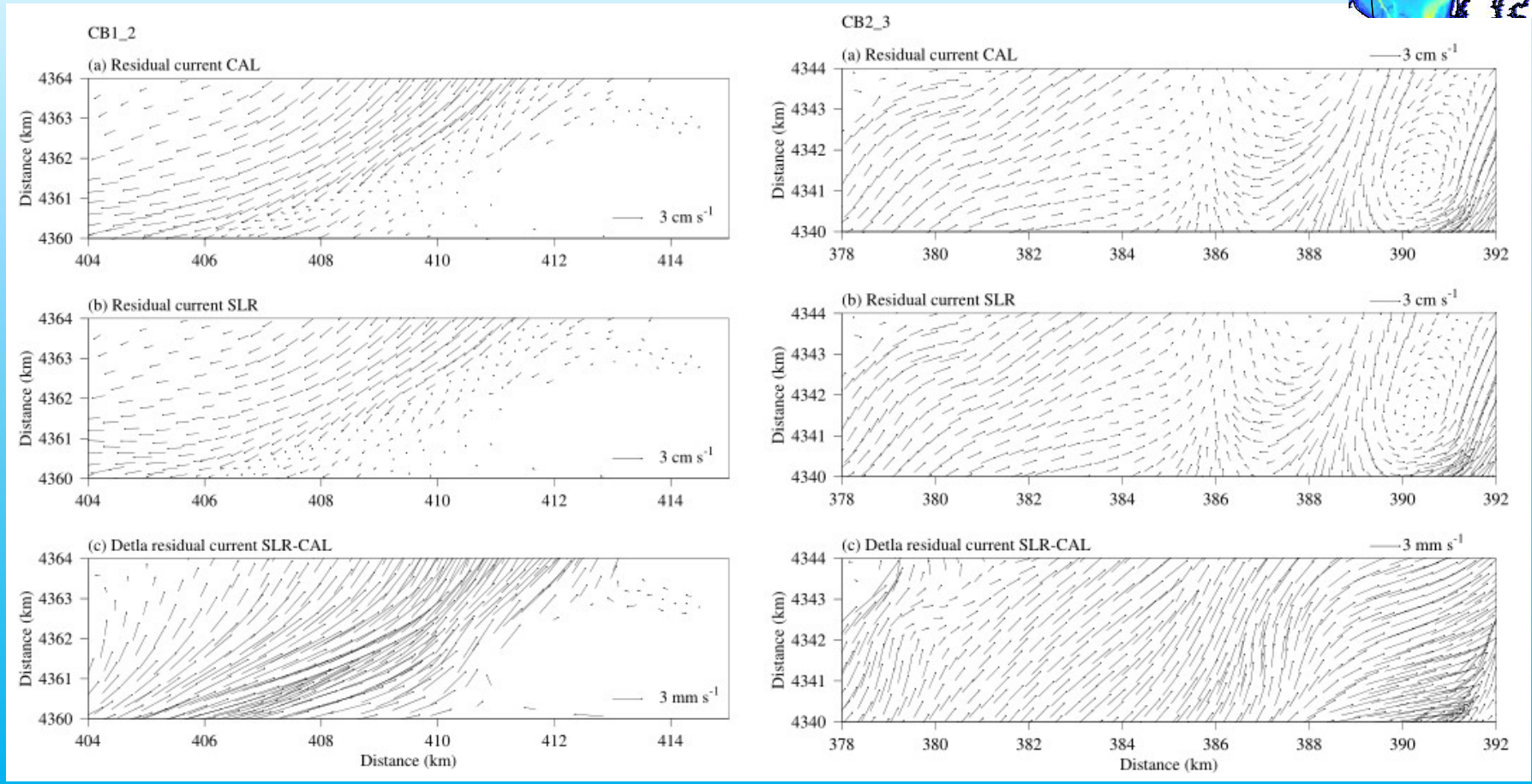




Bottom residual current (1991 average)

(Distance in UTM zone 18: equator=0; 75W=500 km)





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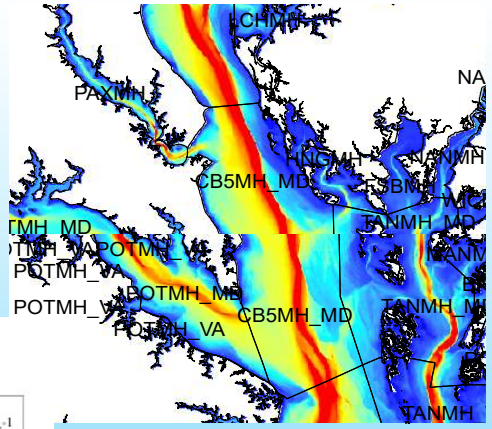

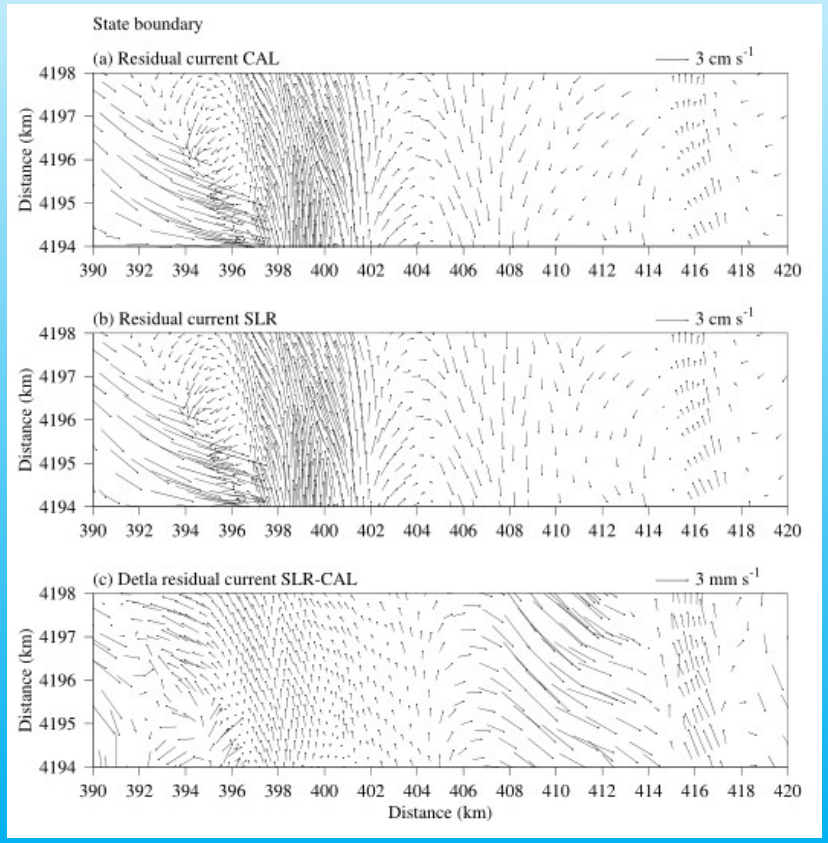

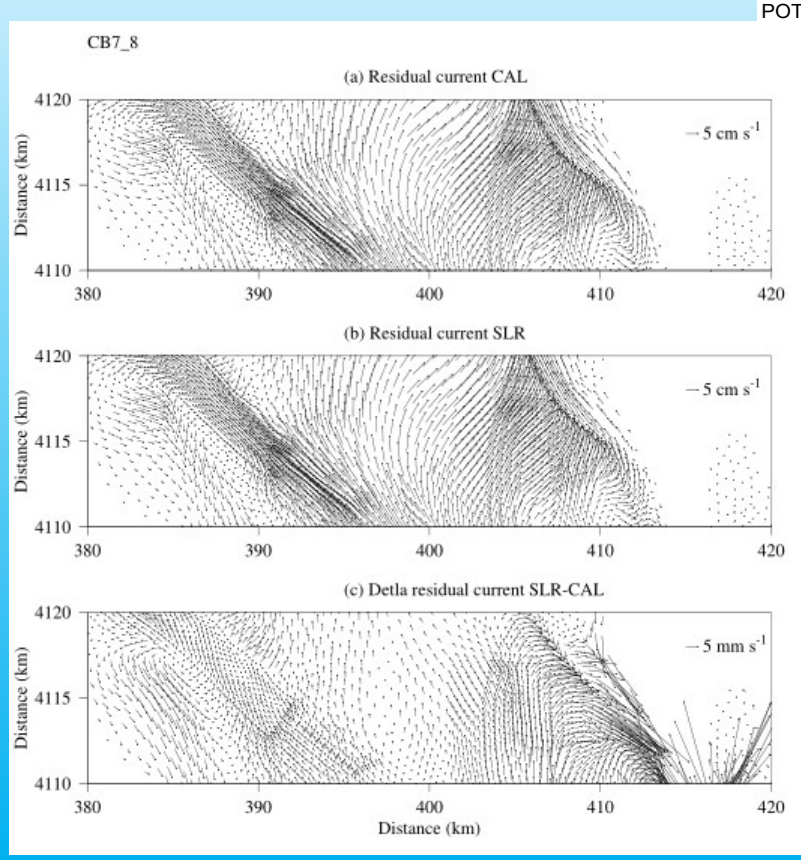

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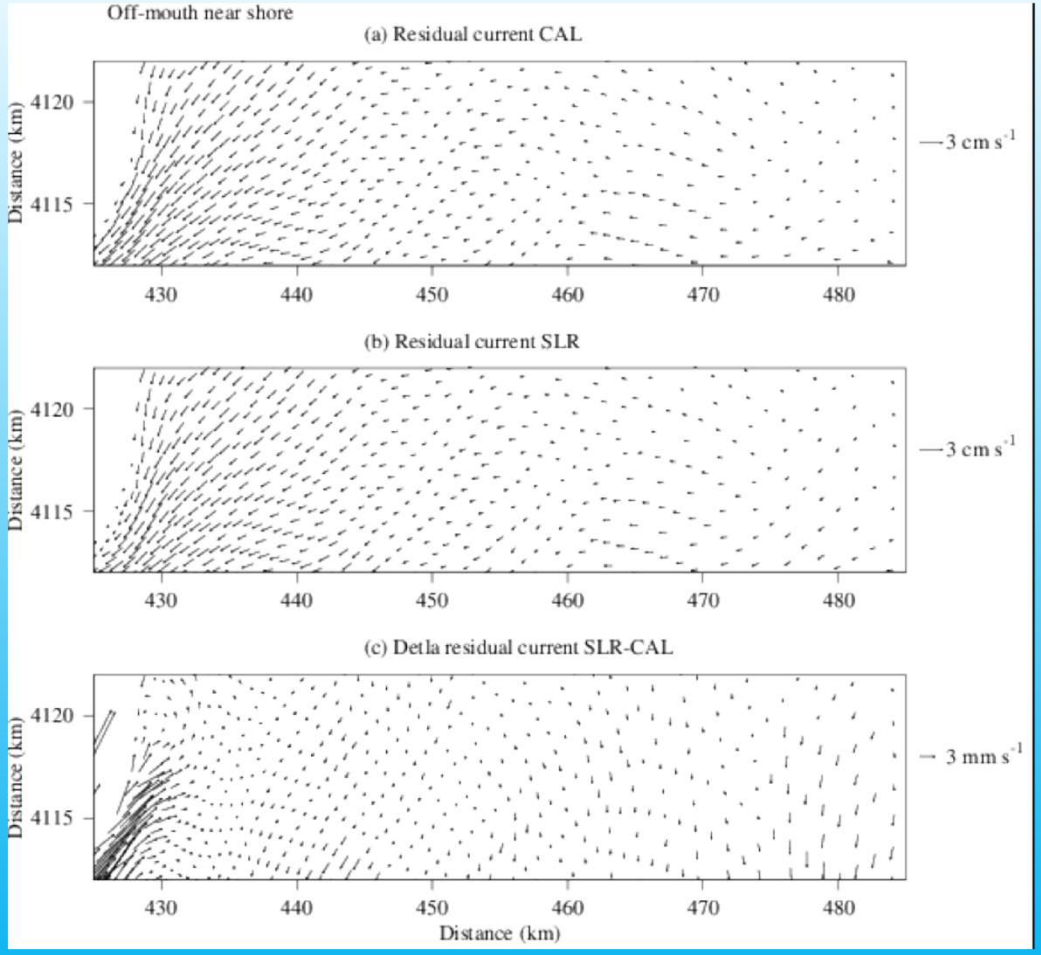
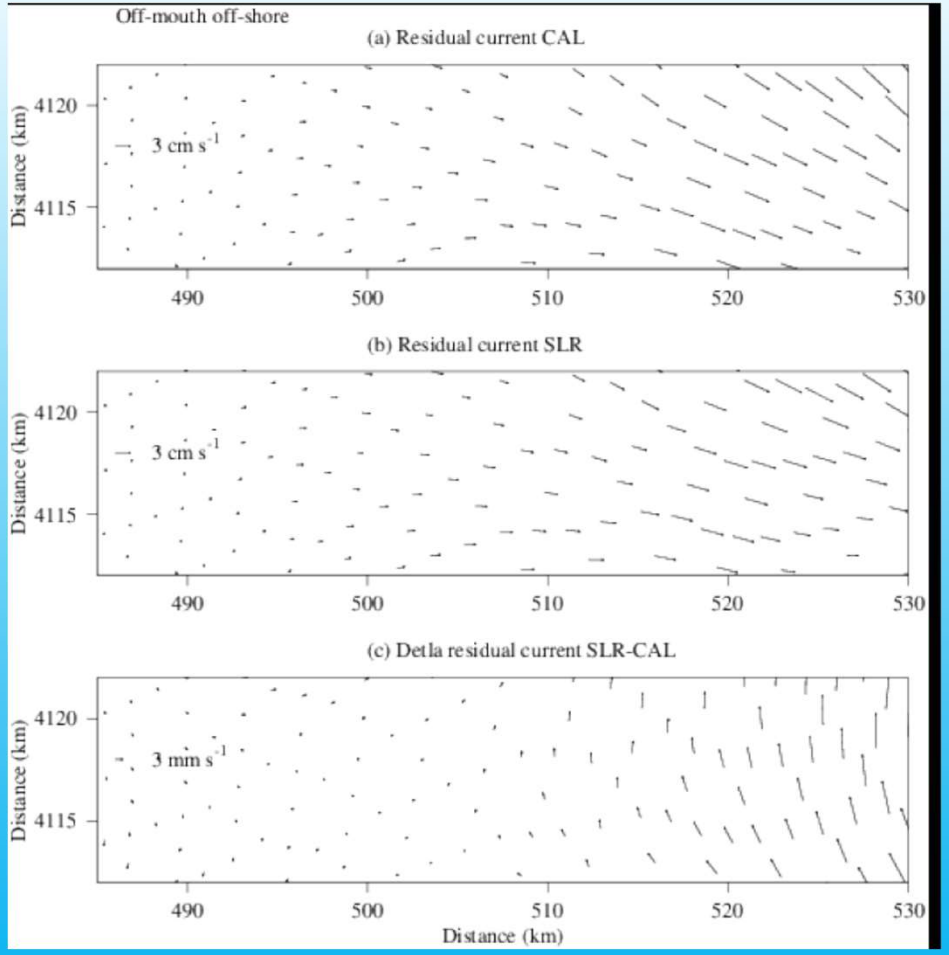
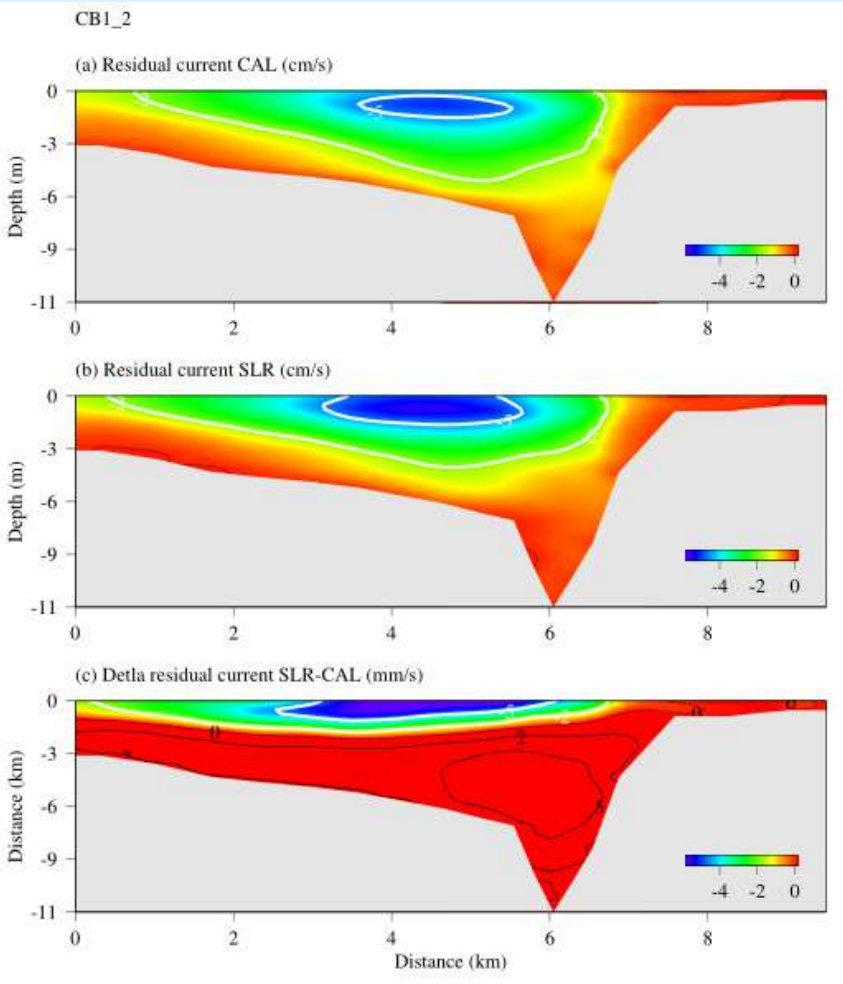
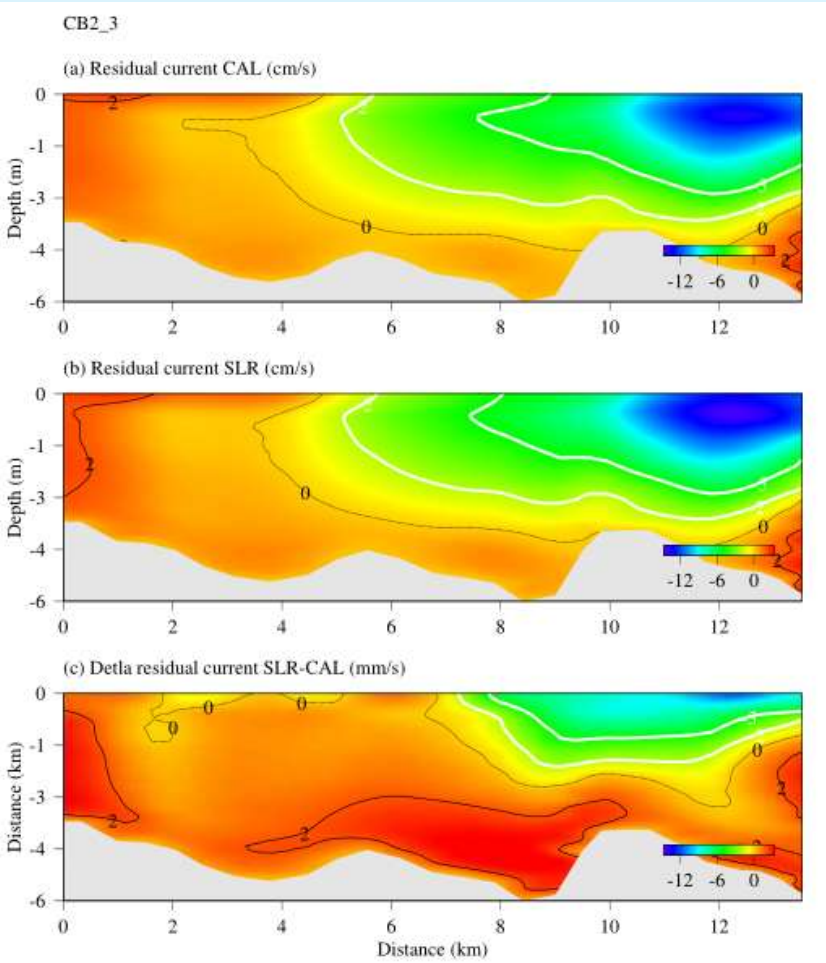
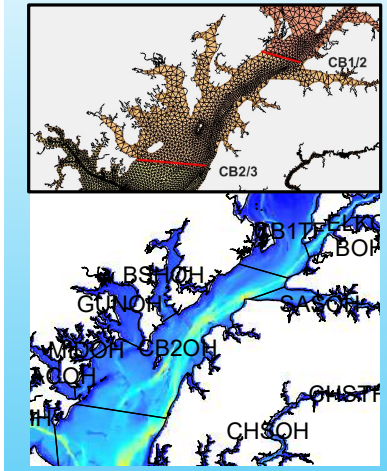




Cross section residual current (1991 average)







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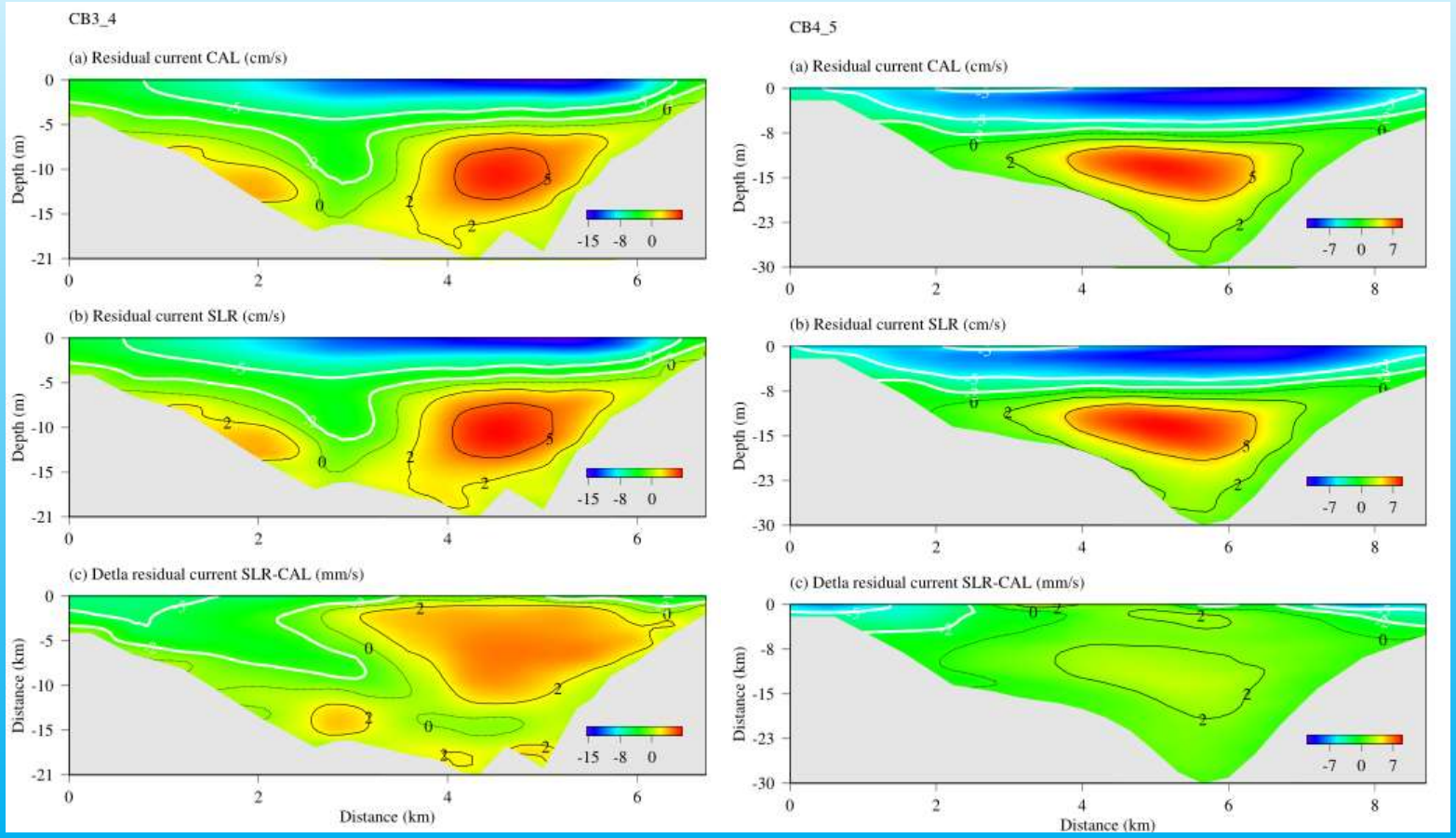

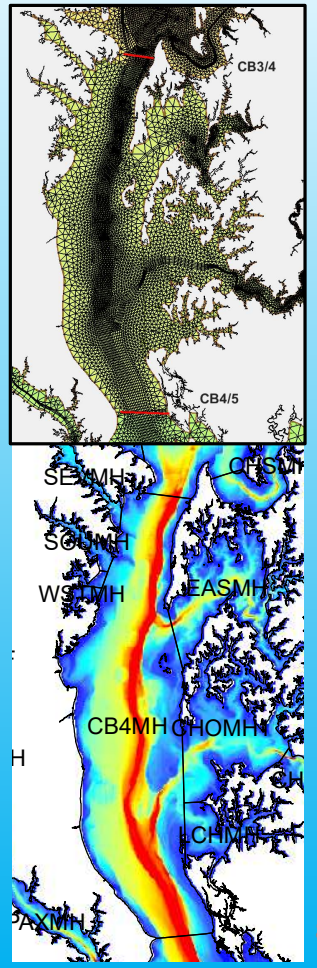

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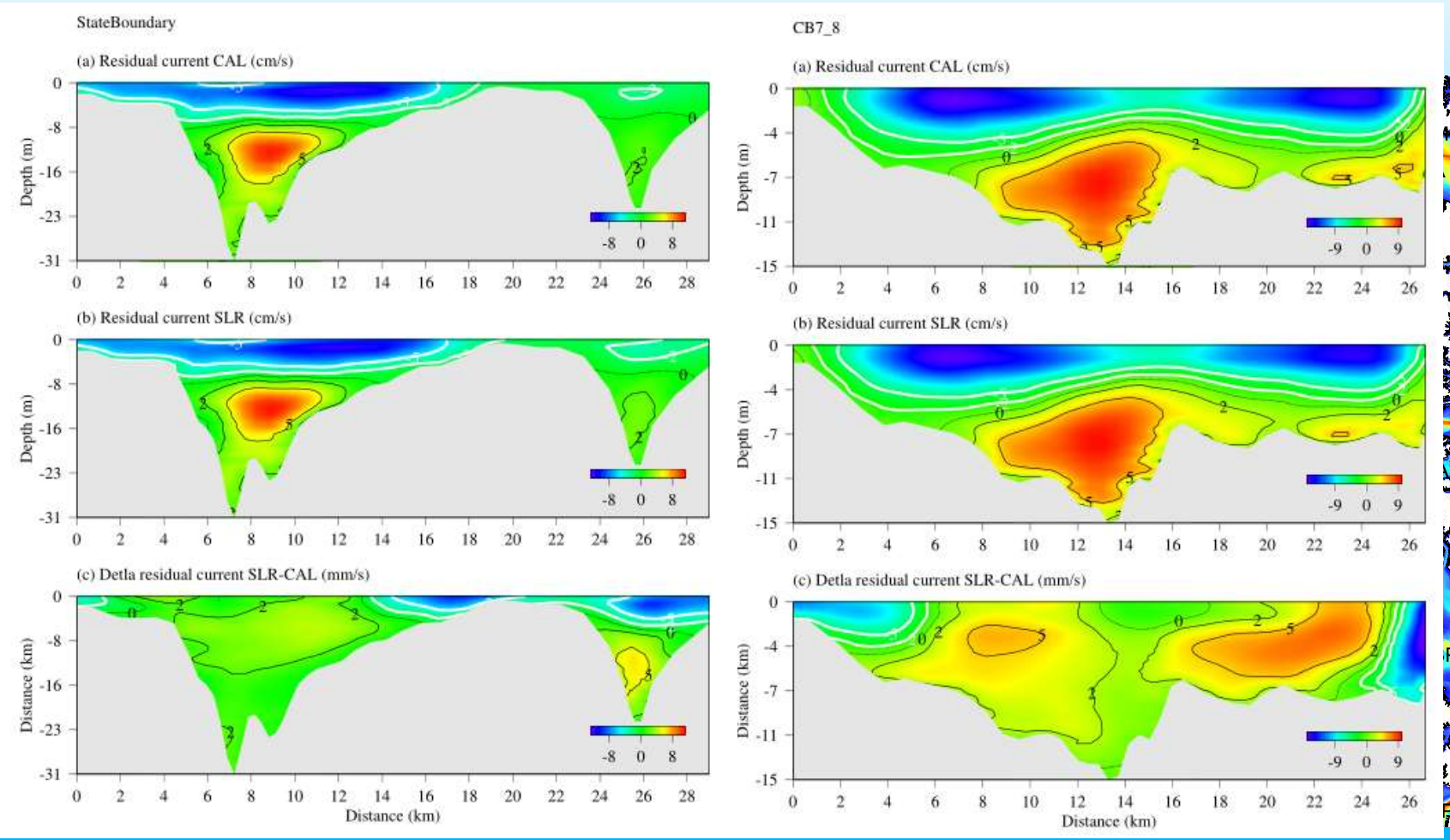
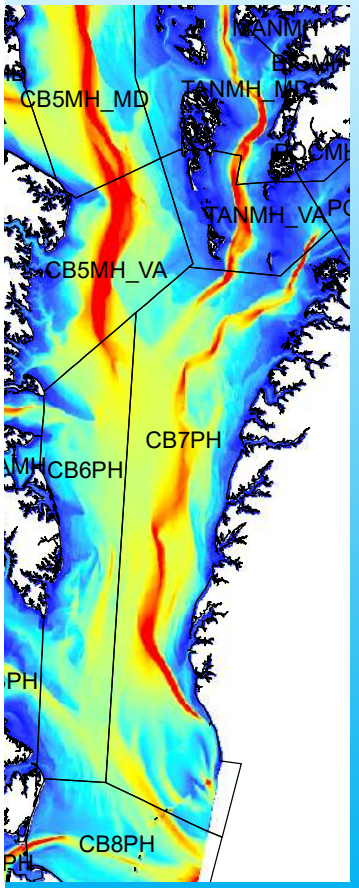
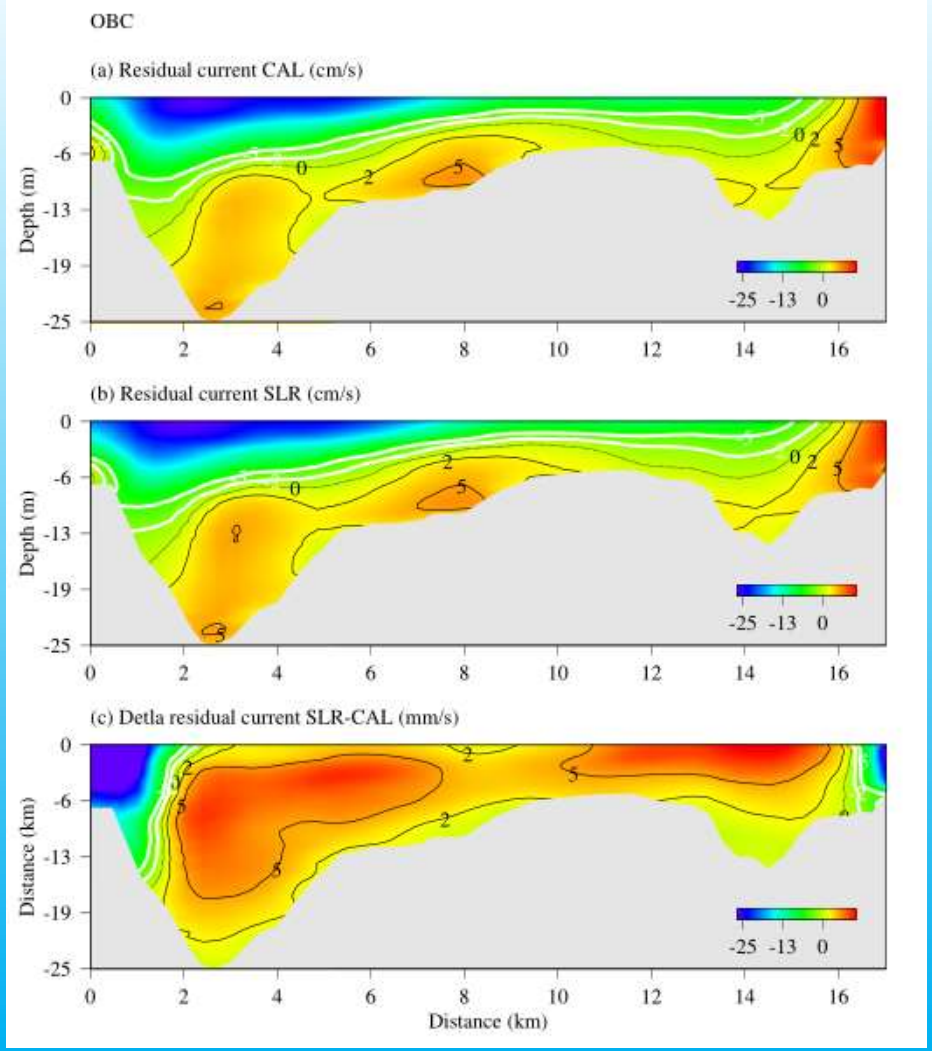




Cross section residual current (1991 average)



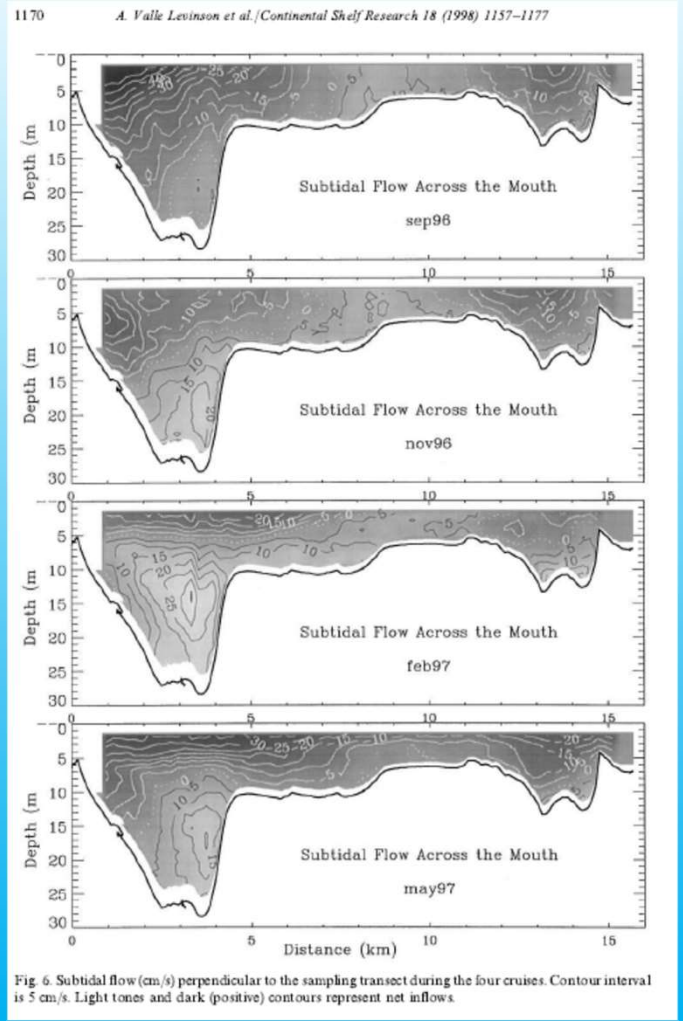
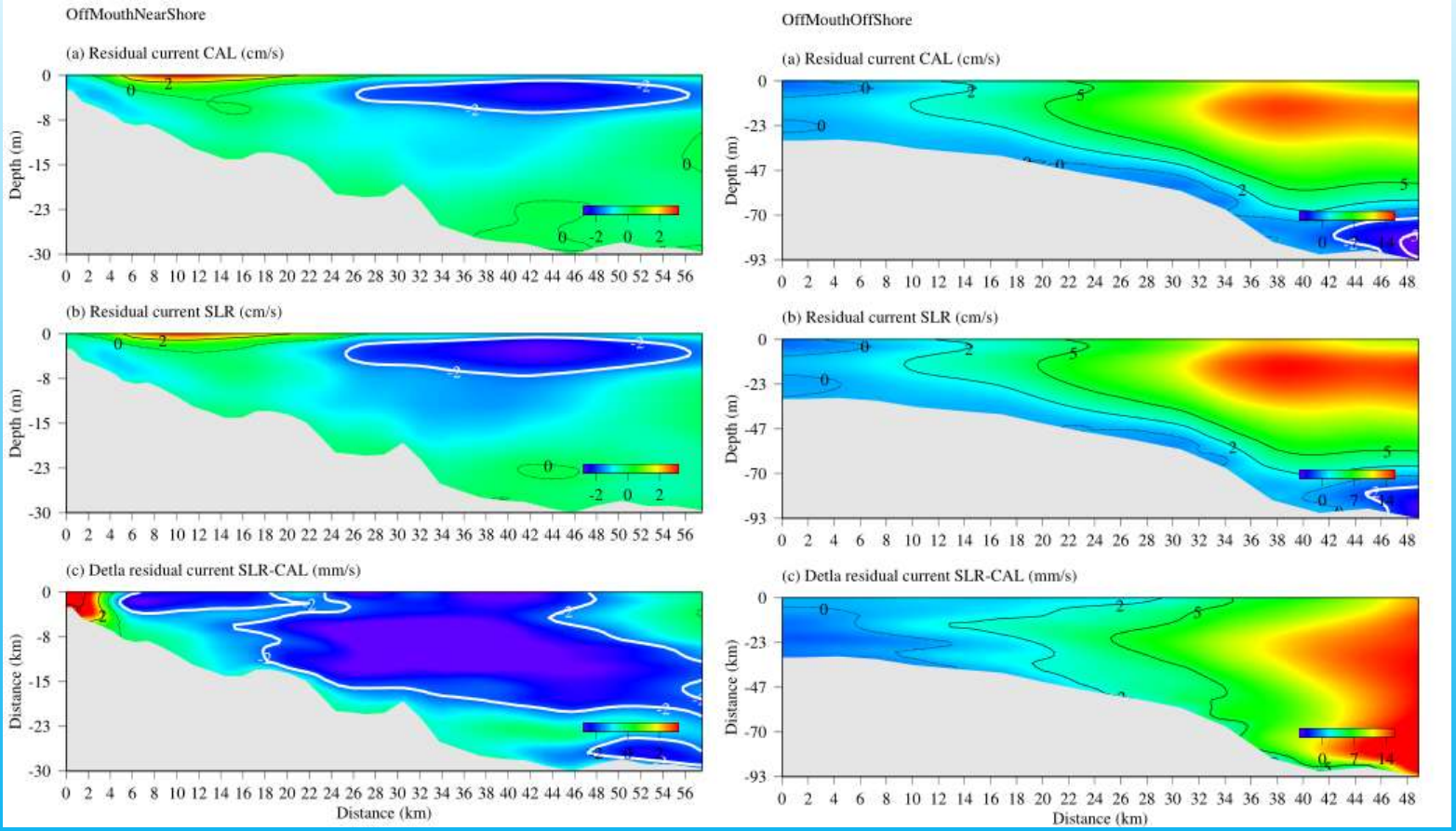
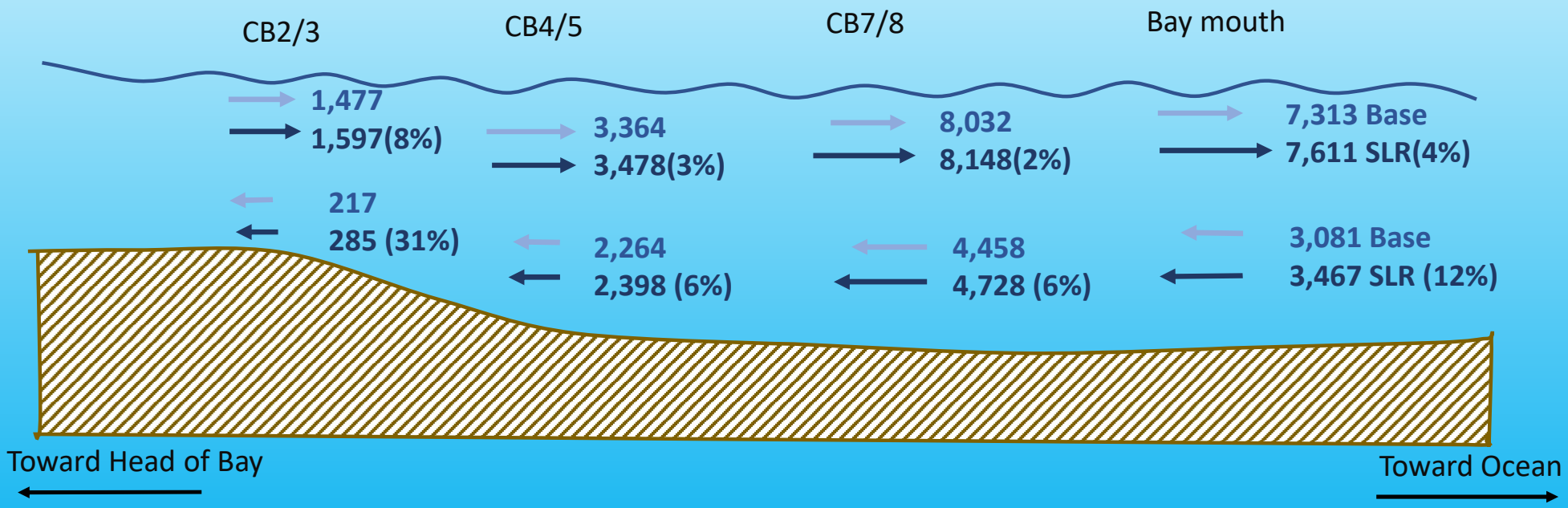


Fig. 6. Subtidal flow (cm/s) perpendicular to the sampling transect during the four cruises. Contour interval is 5 cm/s. Light tones and dark (positive) contours represent net inflows.

Cross section residual current (1991 average)

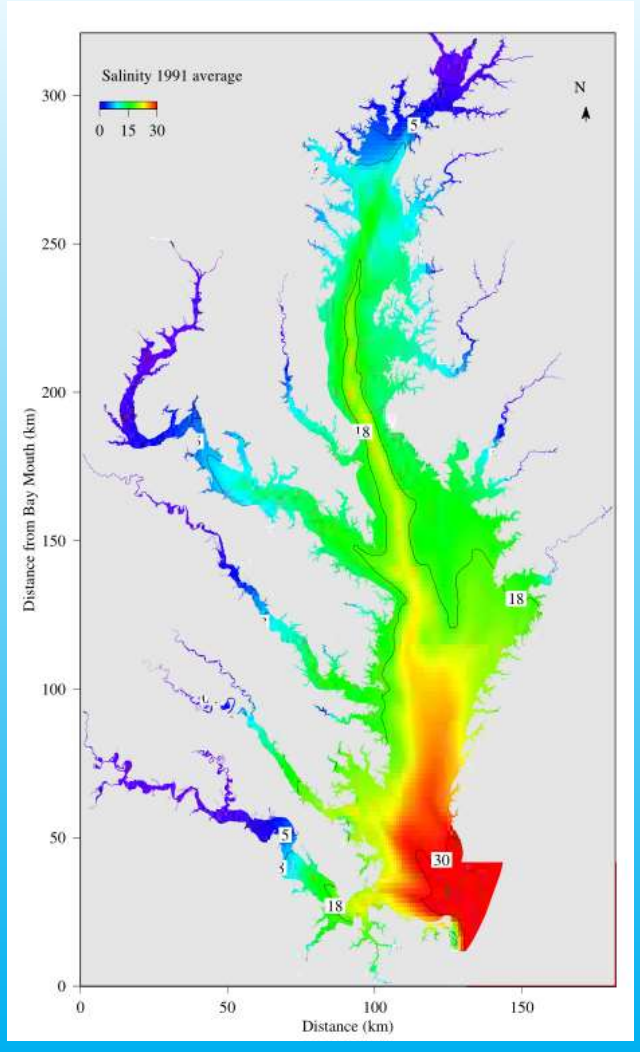


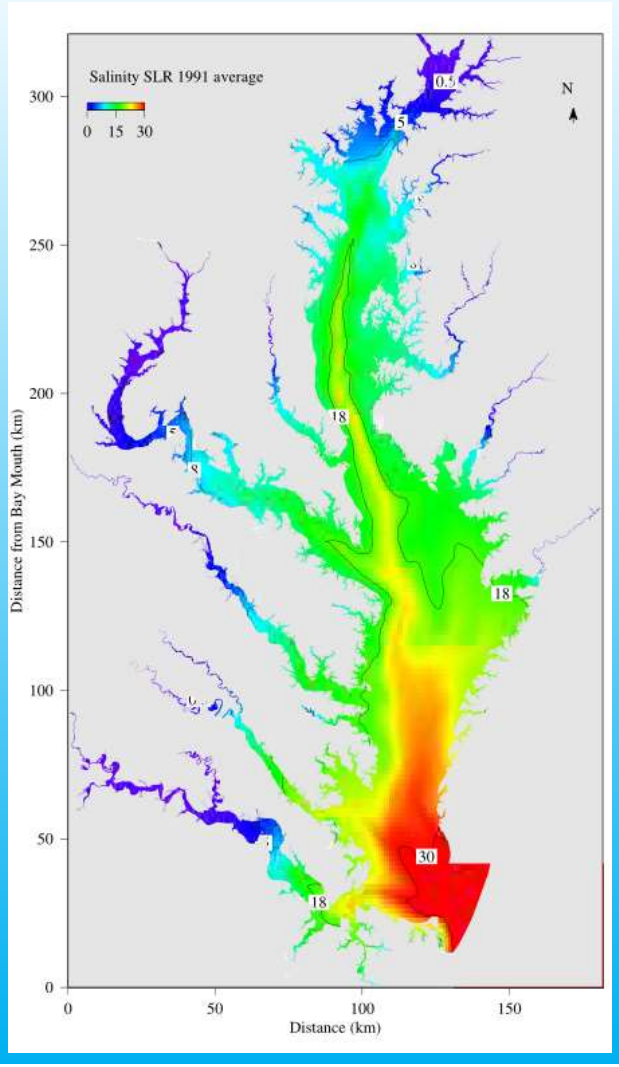
Cross-transect water fluxes (m^3/s) Base case versus sea level rise (SLR) of 0.31m, annual mean of 1991

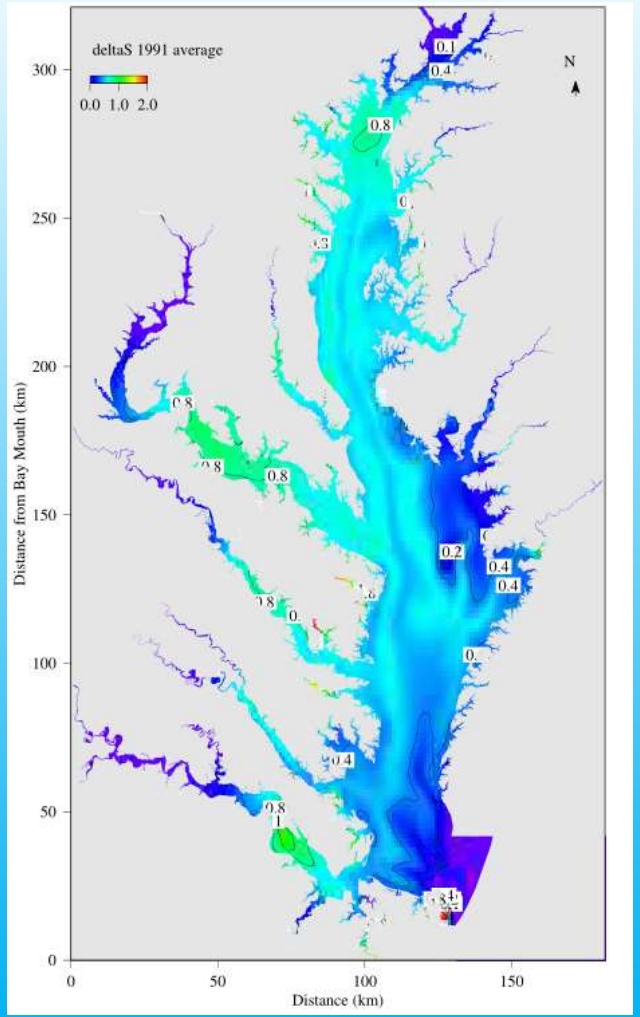


Base = RUN11 SCHISM, SLR = 0.31m representing relative Chesapeake sea level rise from 1995 to 2035. Fluxes are annual mean of 1991 in m^3/s

Comparison of bottom salinity distribution







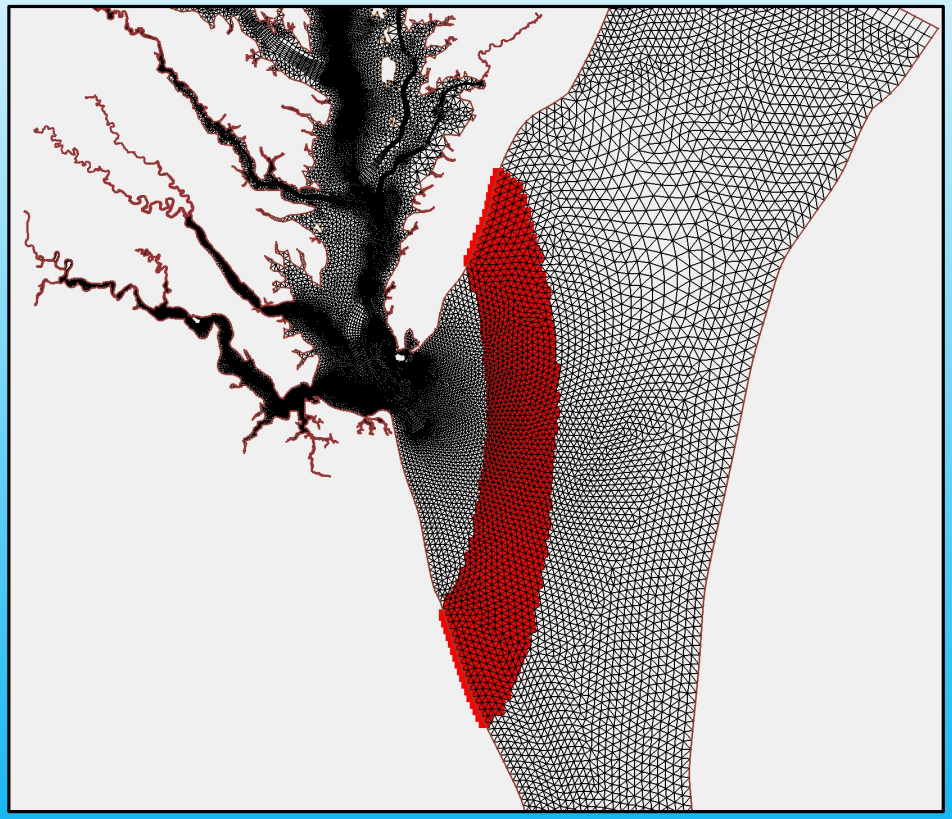
Saltwater intrusion distance caused by sea level rise (53 cm)

Minor: **<2 km (white)**
Moderate: **2-4 km (yellow)**
Severe: **>4km (red)**

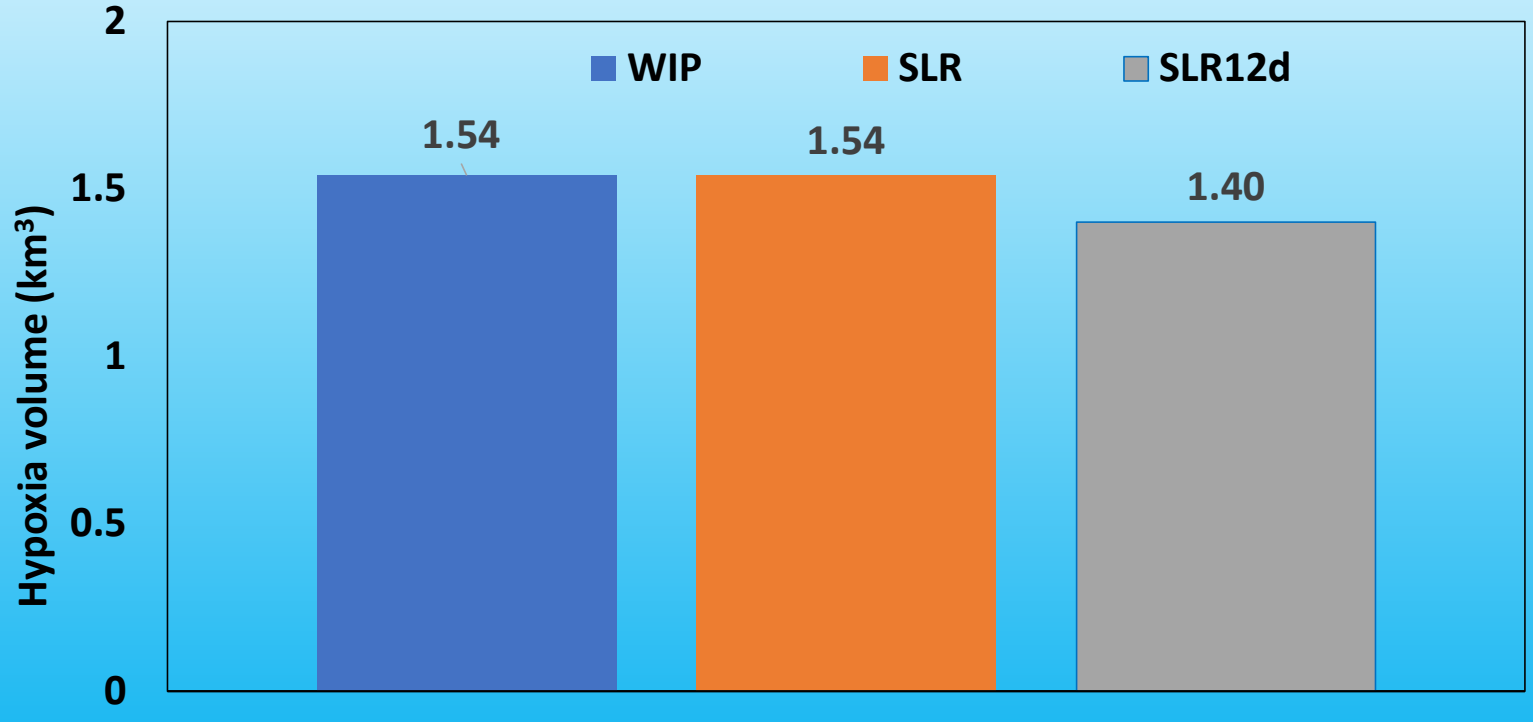
Salinity	0.5	1	2	5	10	18	
Main Bay	2.1	1.9	3.6	3	2.4	4.1	
Elk River	18.9	4.9	NA	NA	NA	NA	
Sassafras F	NA	20(total)	NA	NA	NA	NA	
Chester	0.4	1.1	5.2	2.9	9	NA	
Choptank F	3	3.3	2.5	3	3.8	2.3	
Pocomoke	2	1.8	2.2	0.5	2	3.4	
James R	4.2	4.8	7.3	4.3	3	2.4	
York R	NA	NA	NA	NA	2.5	4.8	
Pamunkey	1	1.2	1.2	1.4	NA	NA	
Mattaponi	0.6	0.3	0.8	1.2	NA	NA	
Rappahanr	2.6	2.4	3.9	3.4	4.4	12.1	
Potomac R	11.7	5.8	5.6	4.2	9.3	10	
Patuxent R	3.5	3.1	4.4	2.6	3.9	1.3	
Patapsco R	NA	NA	1.2	1.4	4.1	NA	
Back R.	NA	NA	NA	8.7	NA	NA	
Middle R.	NA	NA	NA	5.5	NA	NA	
Gunpowde	NA	1.7	NA	5.3	NA	NA	
Bush R.	NA	NA	7.6	NA	NA	NA	Average
Average	4.5	2.7	3.8	3.4	4.4	5.1	4.0

Potential adjustment of open boundary condition.

- **Reduce nudging concentration by 12%**
- **Without nudging of water quality variables**



Nudging concentration reduced by 12%, the percent increase in water flux cross the Bay mouth



Without water quality nudging