SCHISM: Drought Applications

Eli Ateljevich, PhD, PE
Delta Modeling Section, DWR
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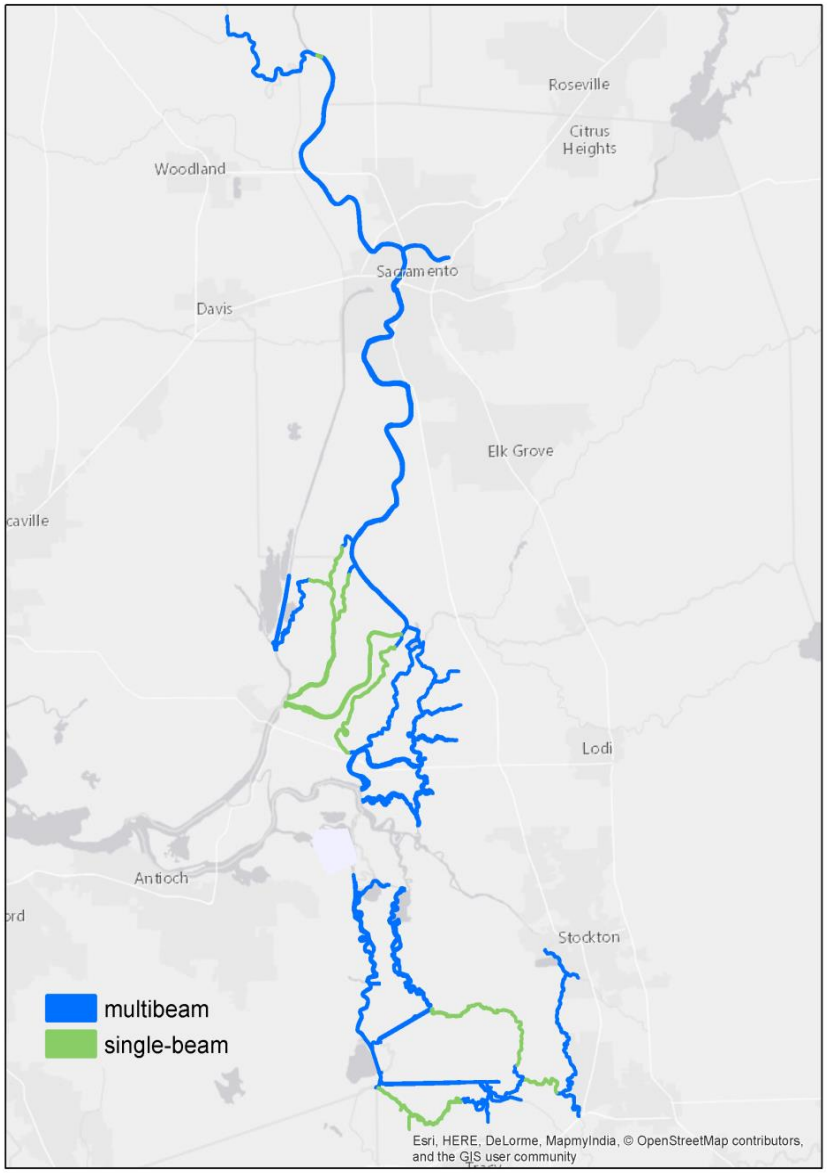
Update: SCHISM 2016 Release

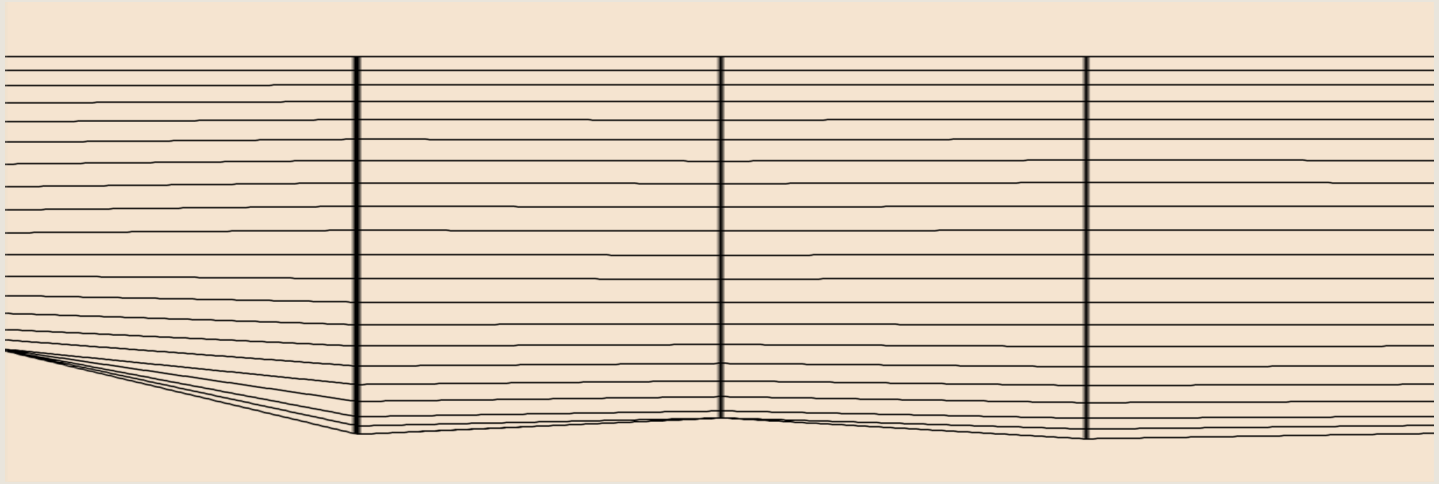
- Bathymetry update
- LSC2 Vertical grid: adaptive vertical resolution,
  - More efficient in shallows
  - 2D flood plus 3D estuary
- Algorithm dev: quads, faster transport
- Temperature calibration
- Flood calibration for 2006

Bathymetry Development

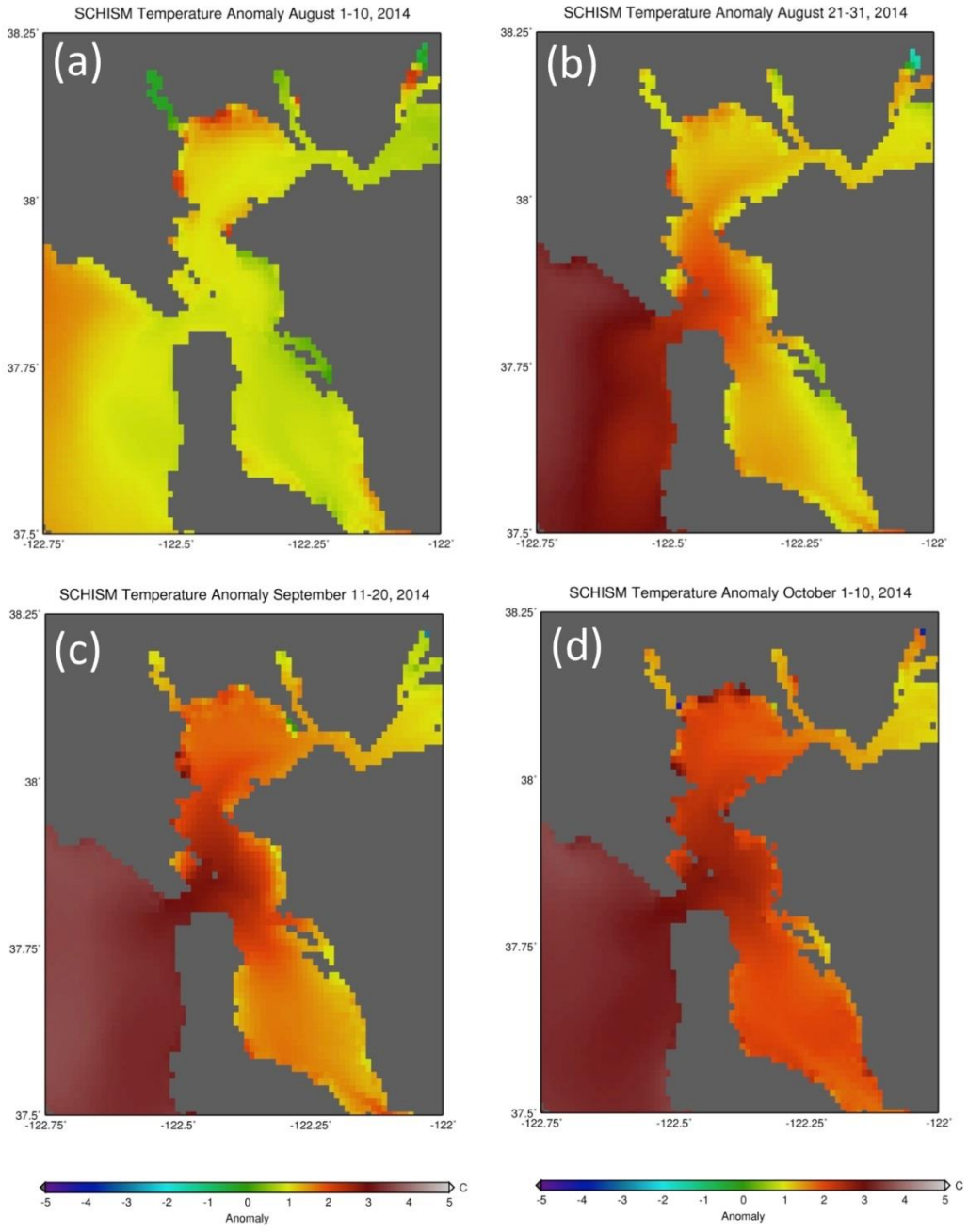
- More 2m
- Extensive New Data
- USGS collaboration



LSC2 Adaptive Vertical Mesh

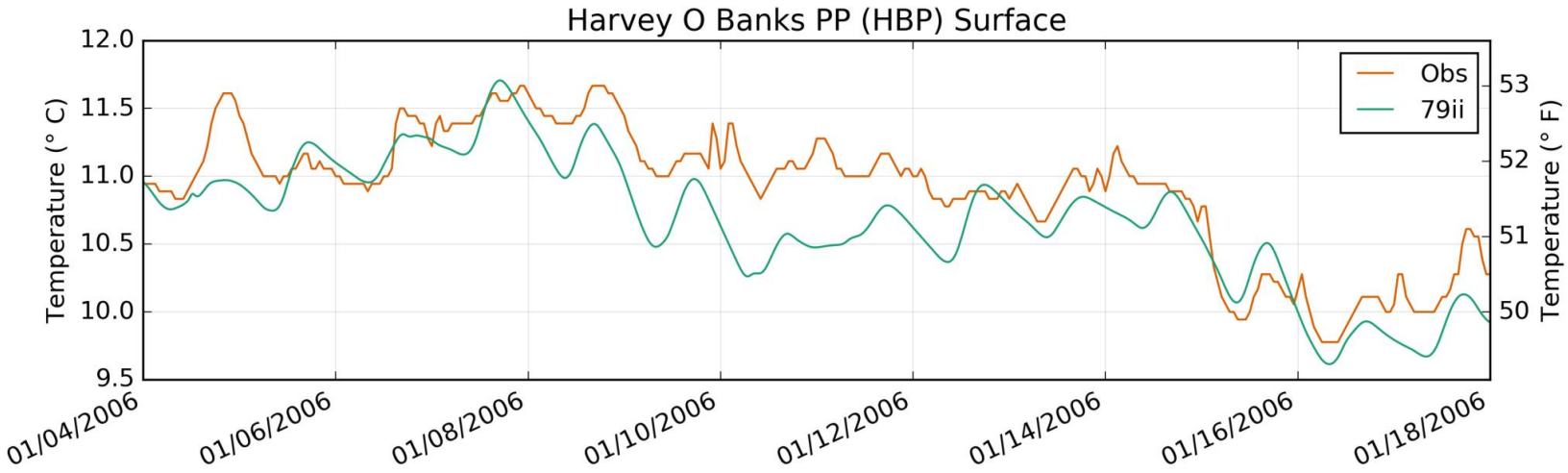


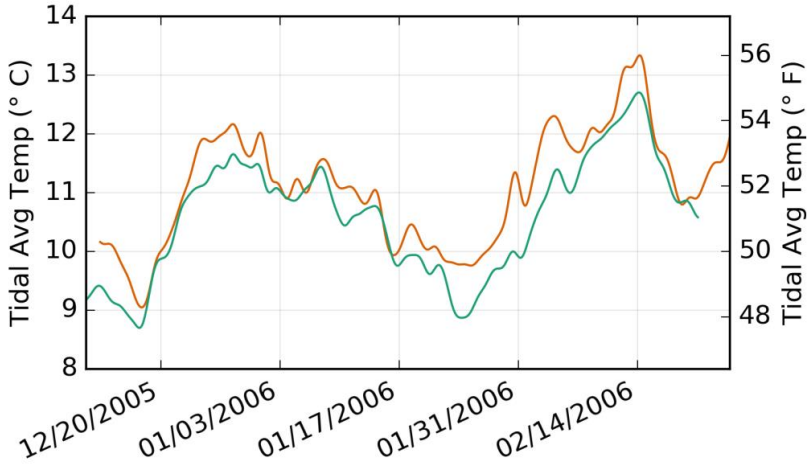
- Originally a terrain conforming "S" grid
- Helps with diapycnal mixing/pressure discretization
- Also fixes cross-scale problem deep-shallow

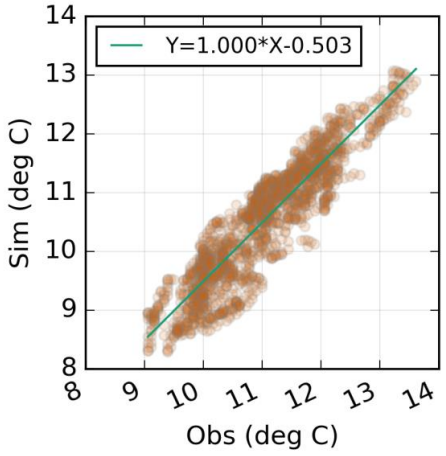


Chao et al submitted

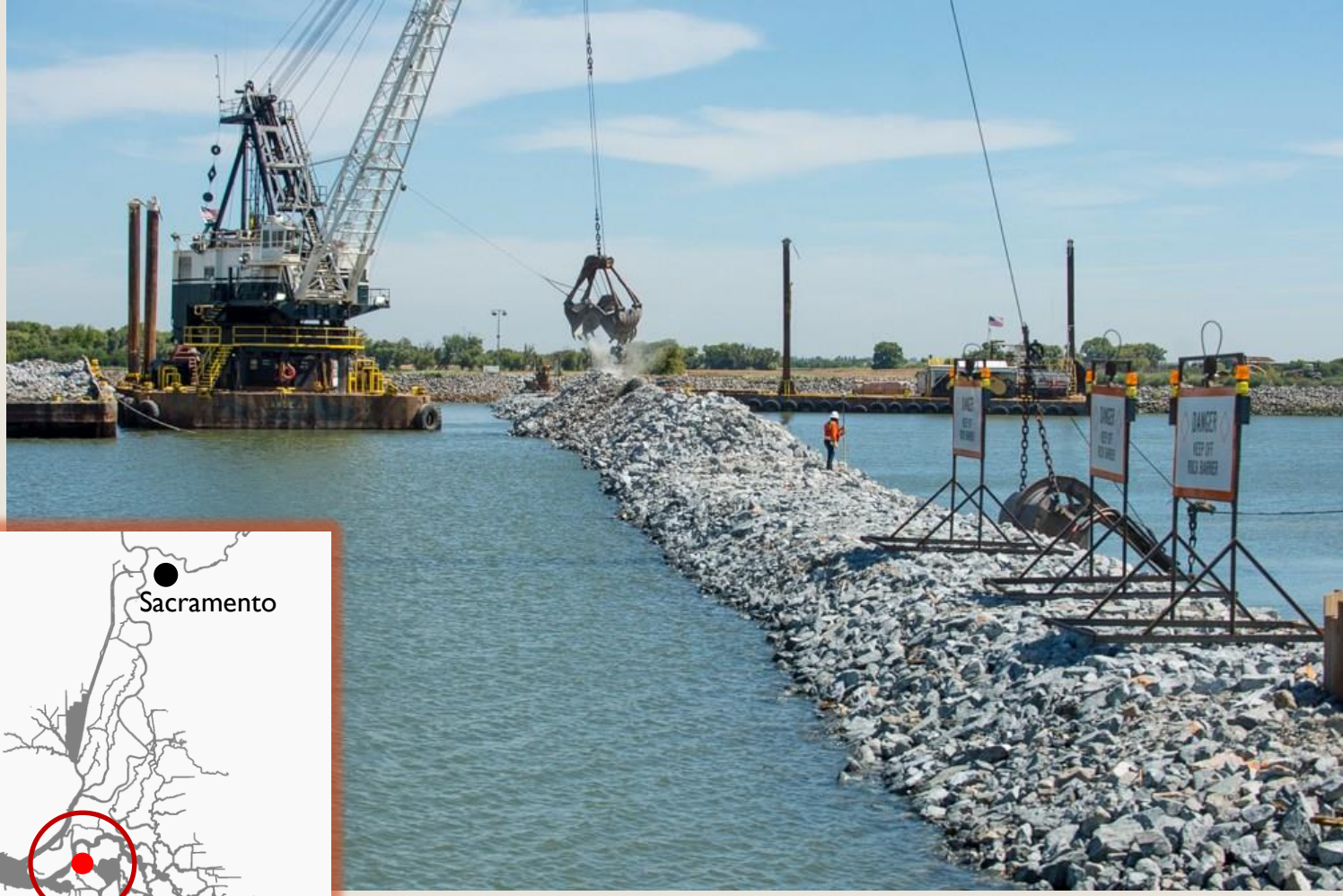
Temperature



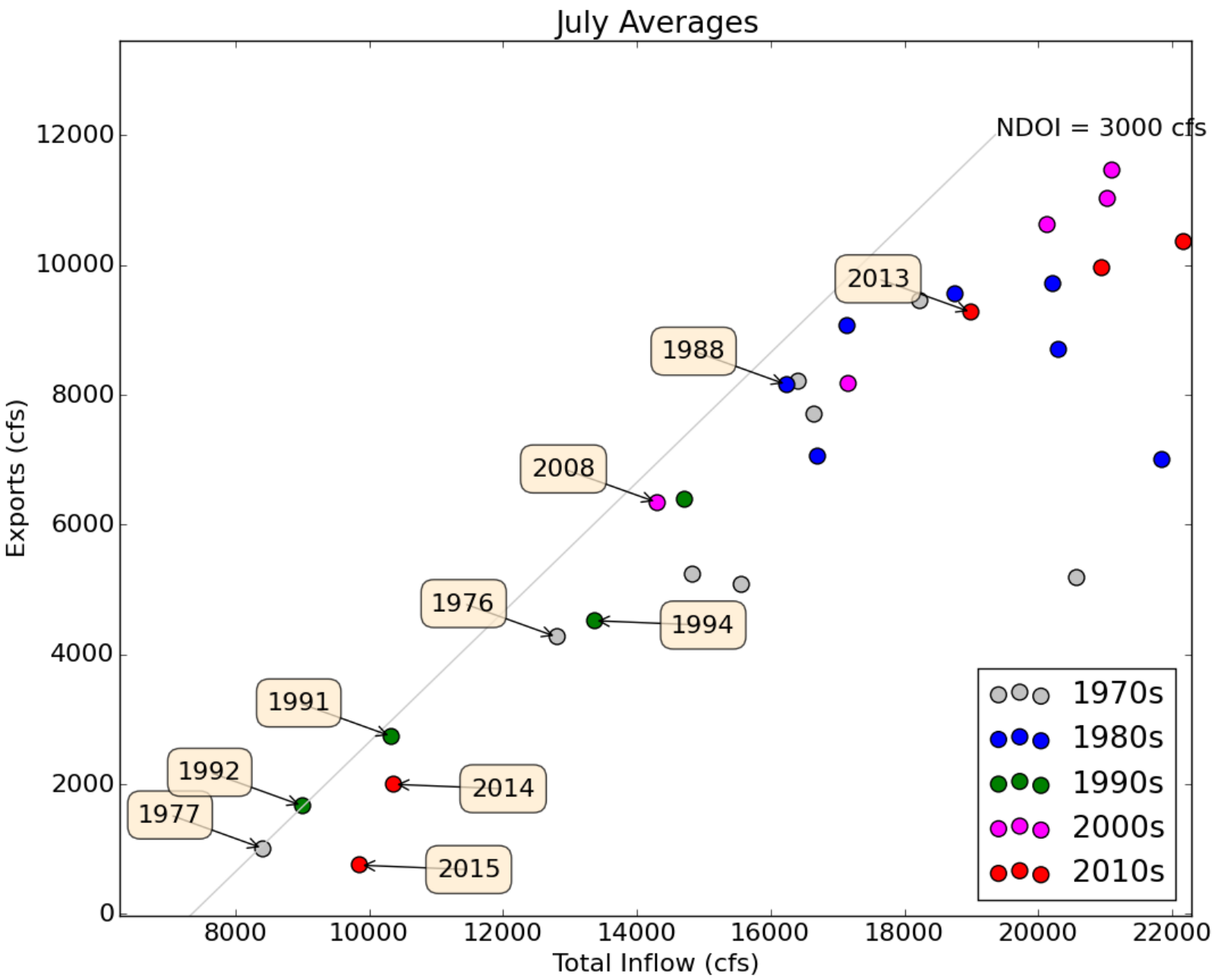




79ii: RMSE=0.652 deg C Lag=119 min $Bias_{\phi}$=-0.449 NSE_{ϕ}=0.539 R_{ϕ}=0.923

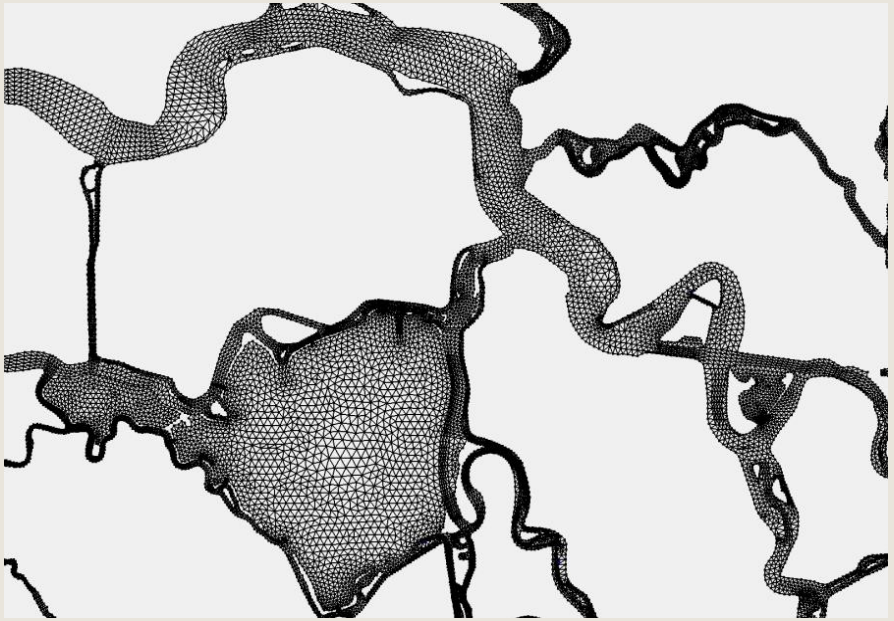


False River Emergency Barrier 2015

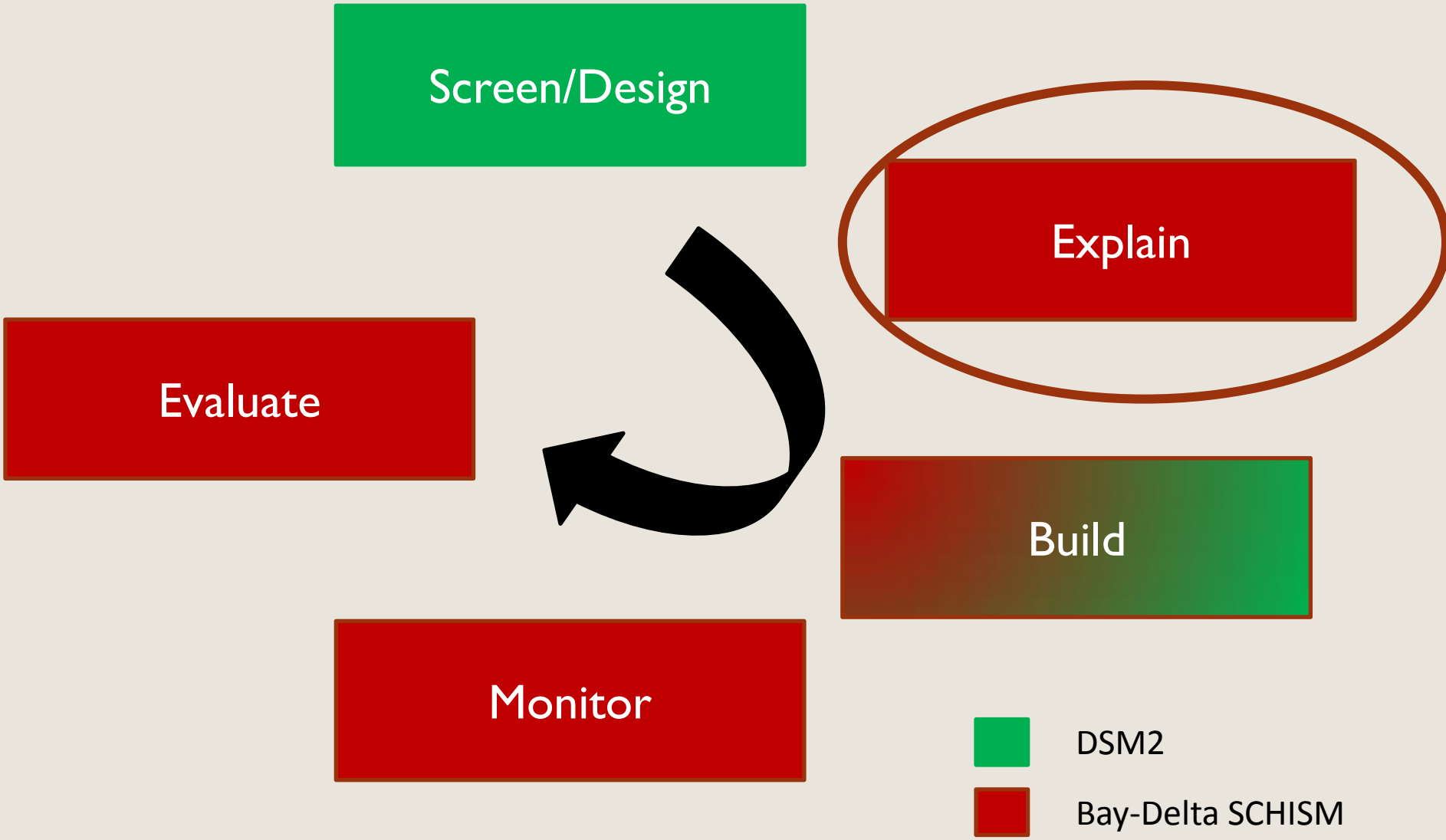

July Averages
NDOI = 3000 cfs
Exports (cfs)
Total Inflow (cfs)
0
2000
4000
6000
8000
10000
12000
8000
10000
12000
14000
16000
18000
20000
22000
2013
1988
2008
1976
1994
1991
1992
2014
1977
2015
1970s
1980s
1990s
2000s
2010s

Delta Modeling Drought Tools

- DSM2
  - 1D
  - Long history
  - Screening/design
- Bay-Delta SCHISM
  - 3D
  - Farallones to Knights Landing
  - 3 years of production use
- 6-10 additional monitoring stations for flow/wq



Drought Modeling and Data Analysis

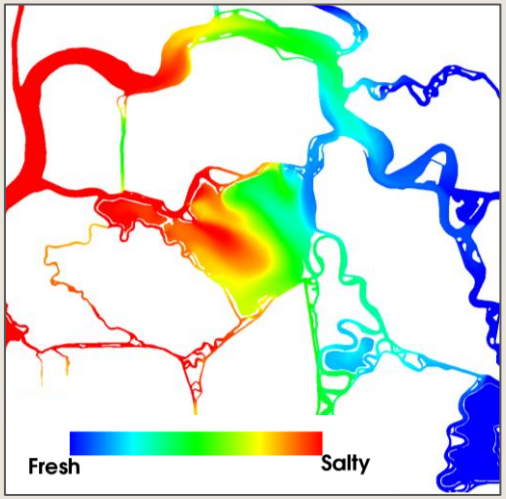


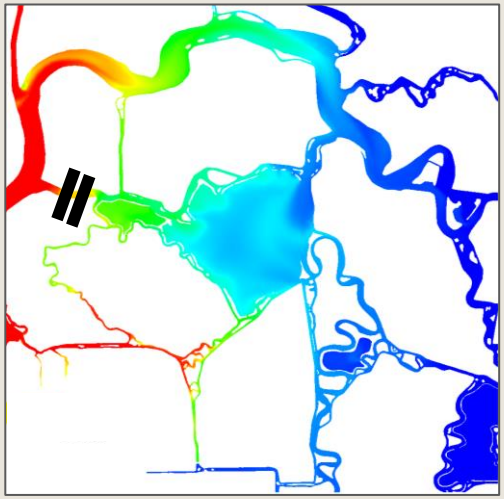
Tidal Pumping

No Barrier

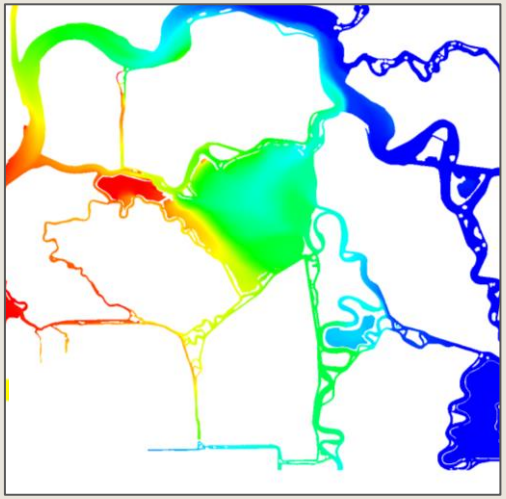
Barrier

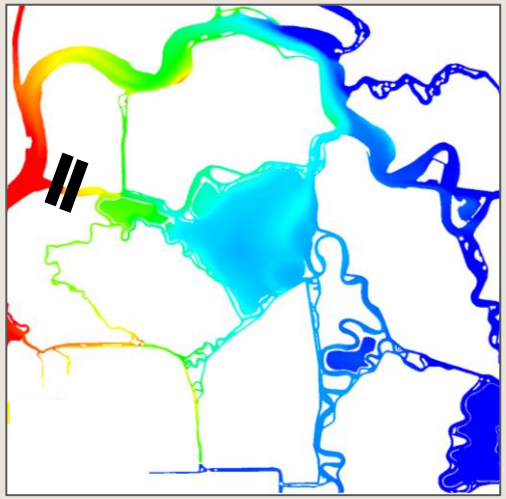
Flood





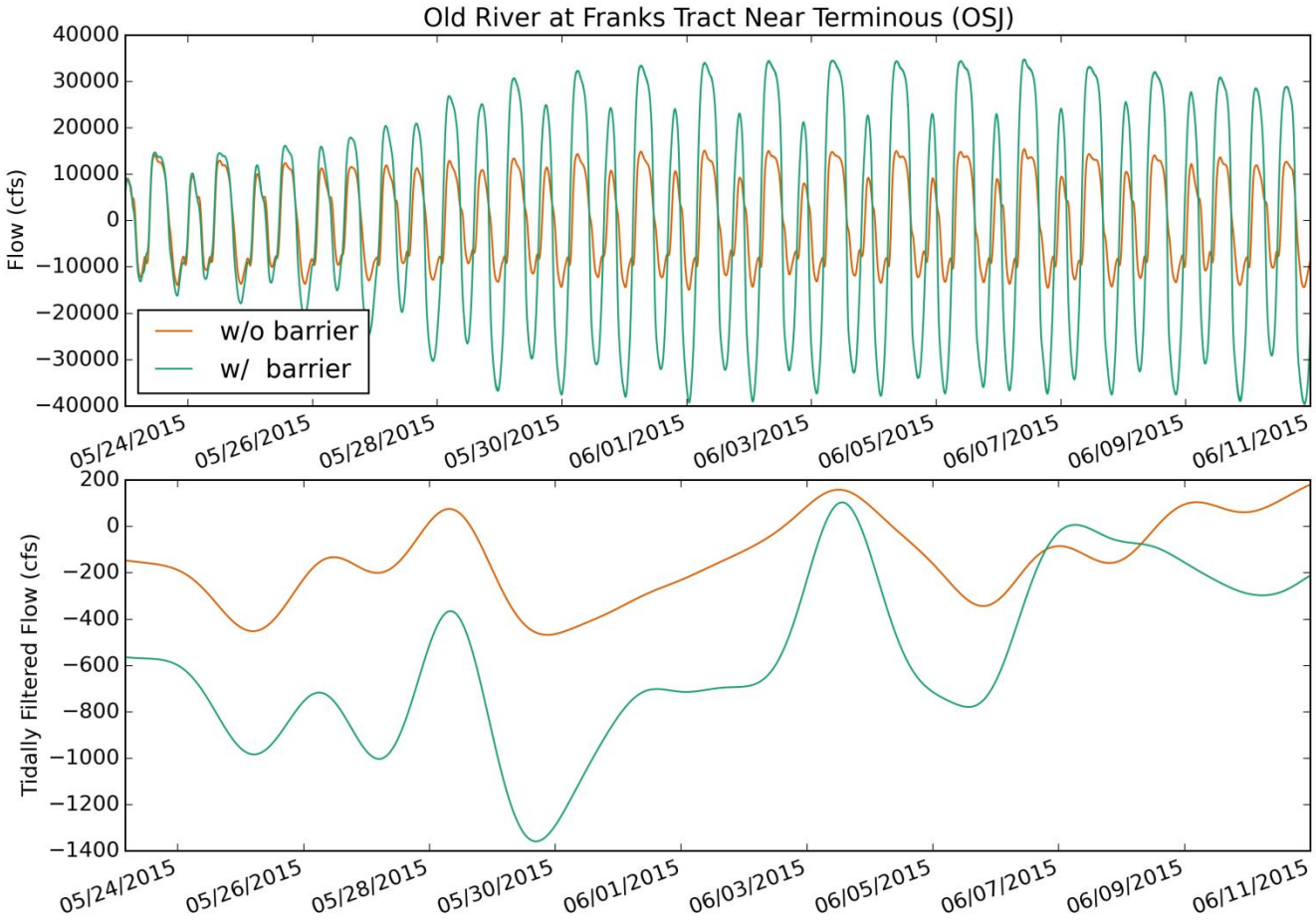
Ebb



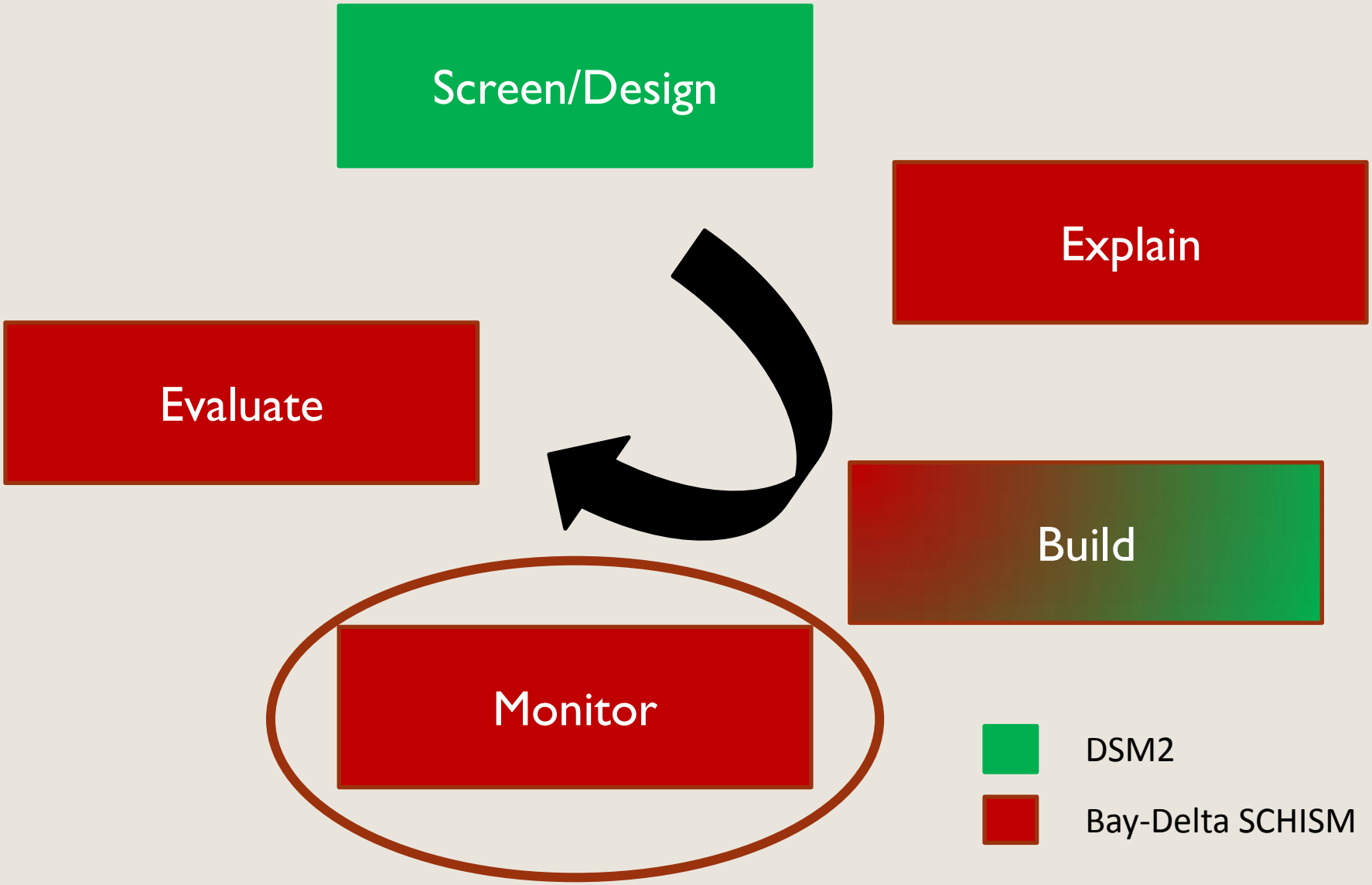


Bay-Delta SCHISM Model, Low NDOI Forecast

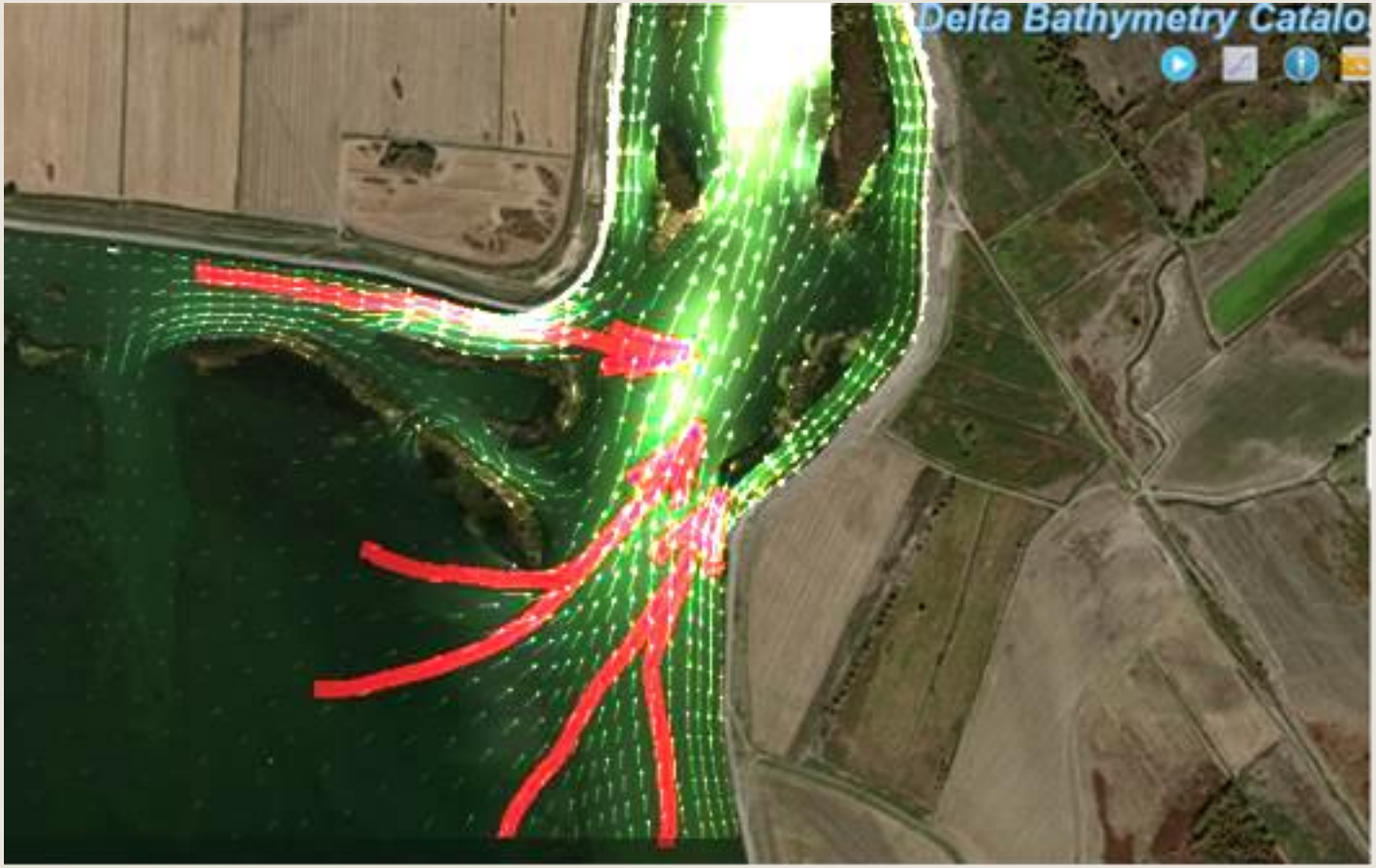
Change in Tidal Flow/Range



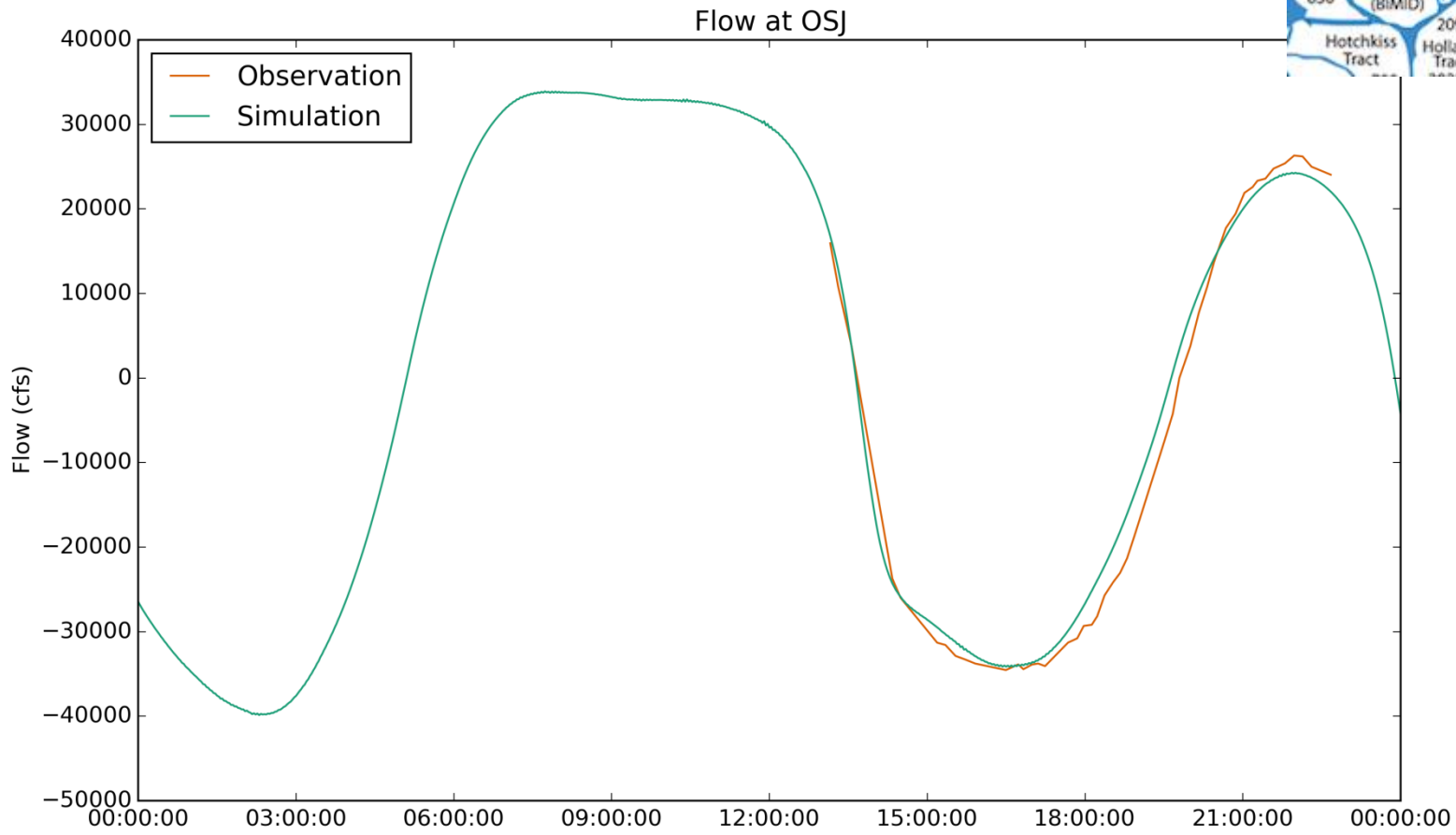
Drought Modeling and Data Analysis



Prioritize Bathymetry Monitoring

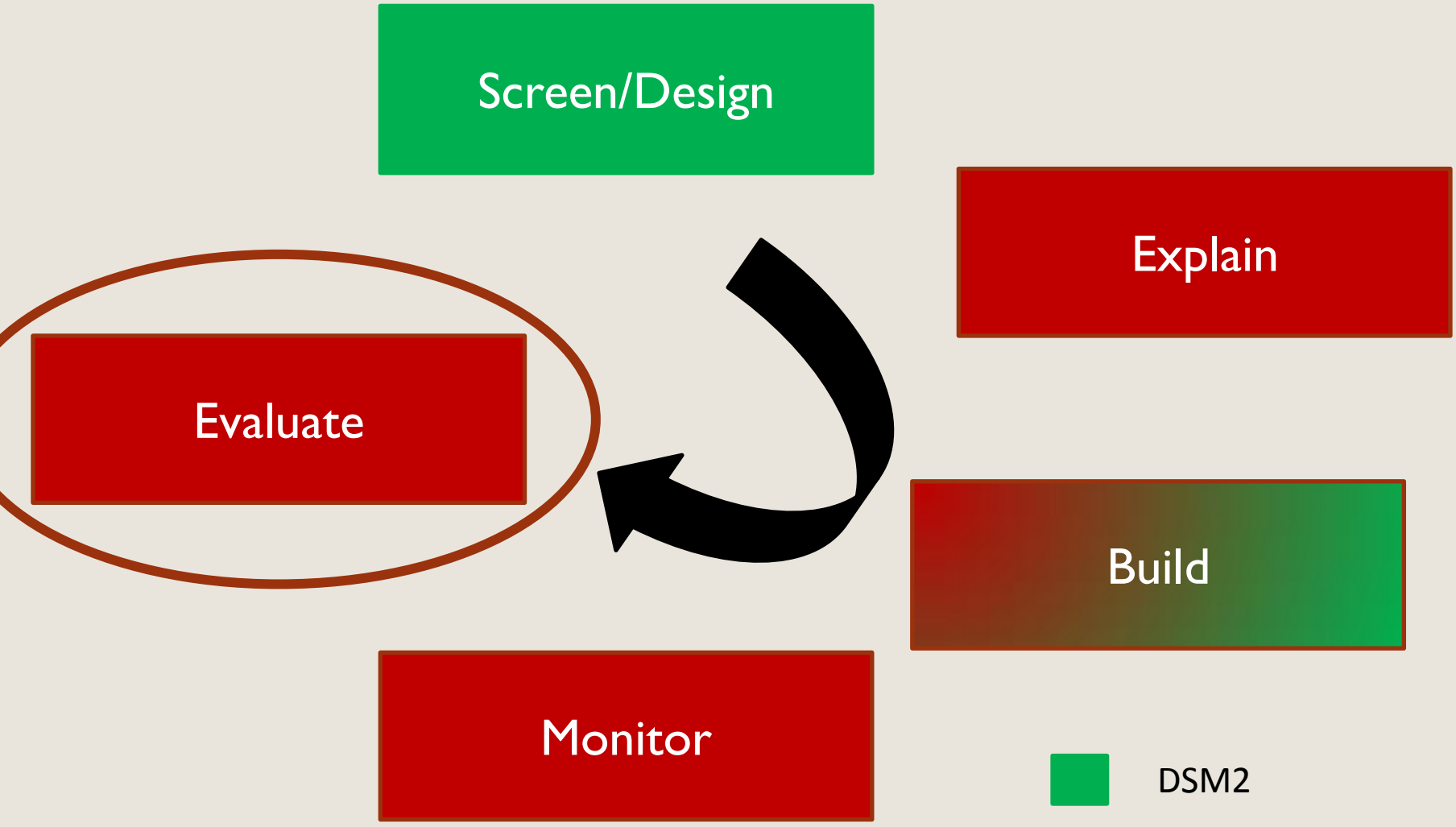


Flow Measurement

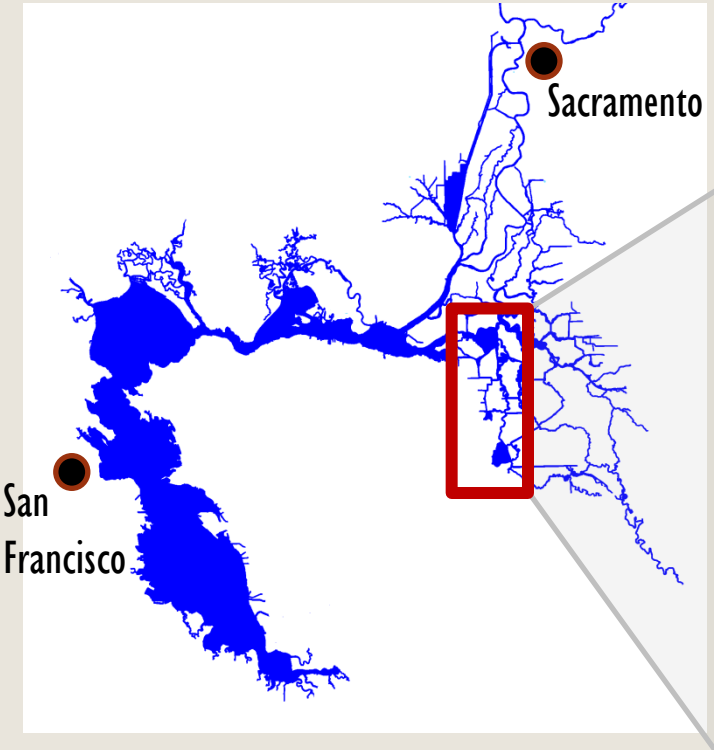


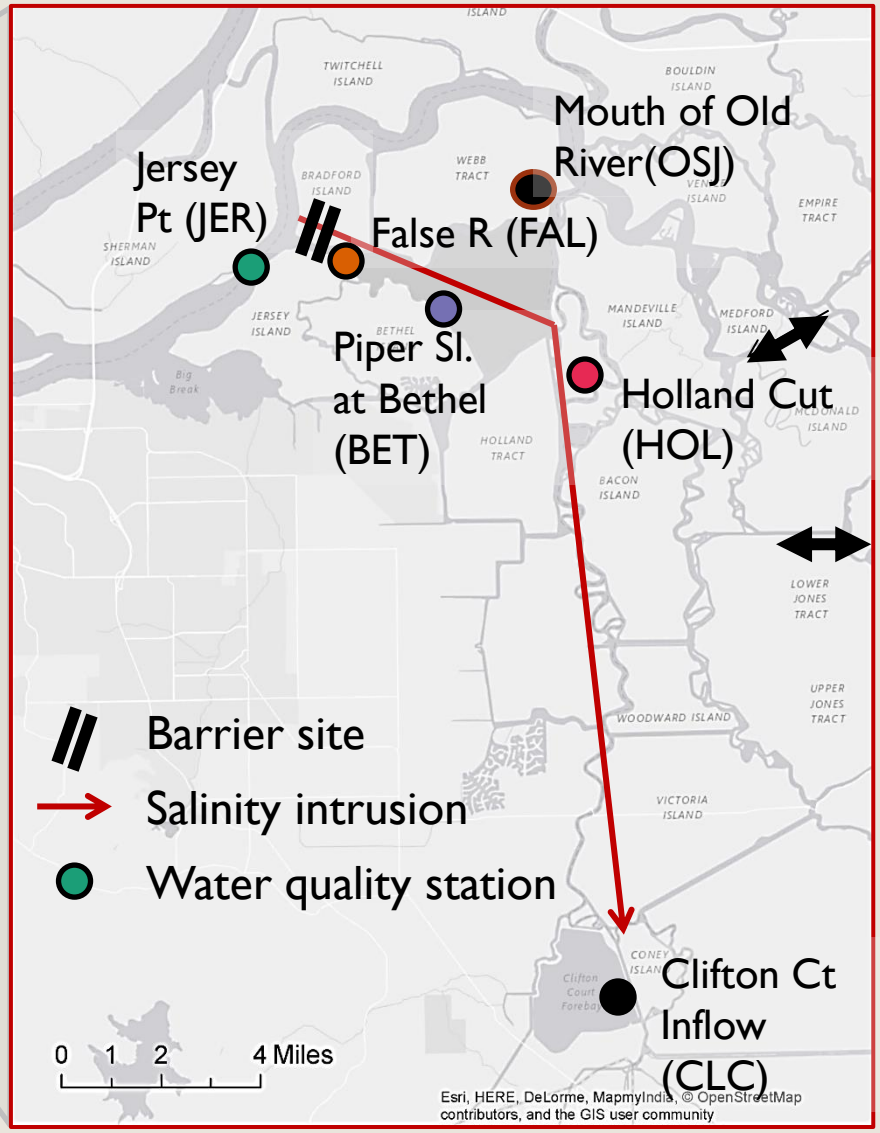
ADCP Calibration Data

Drought Modeling and Data Analysis

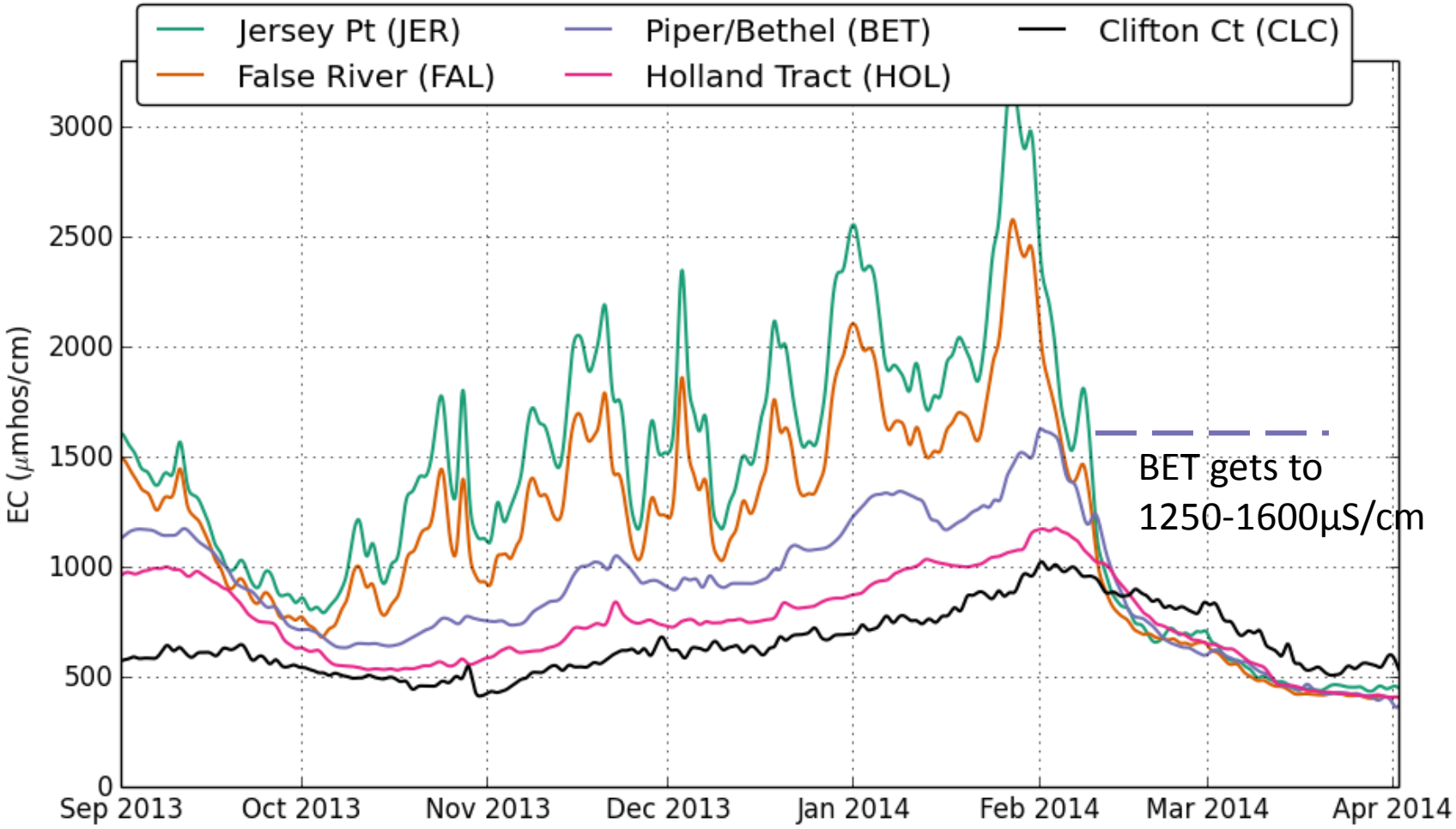


Salinity Propagation



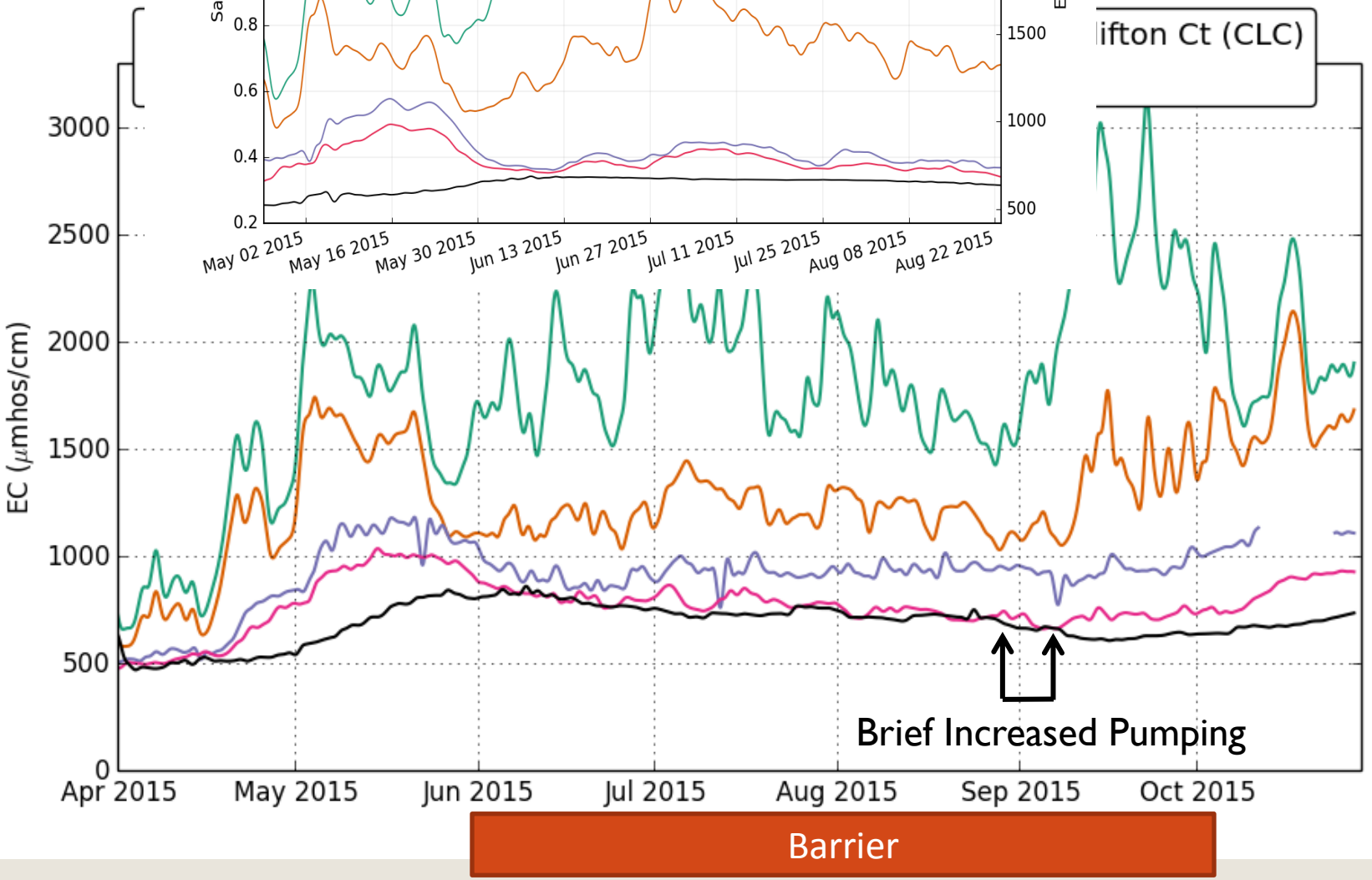


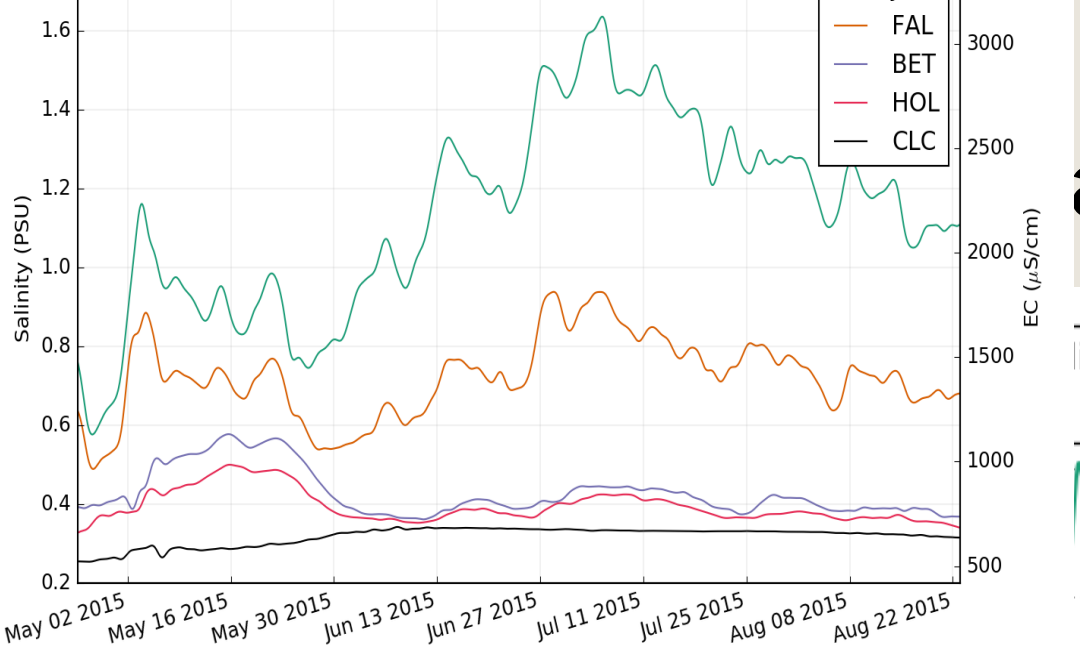
Salinity Intrusion 2014 (no barrier)



All values tidally filtered

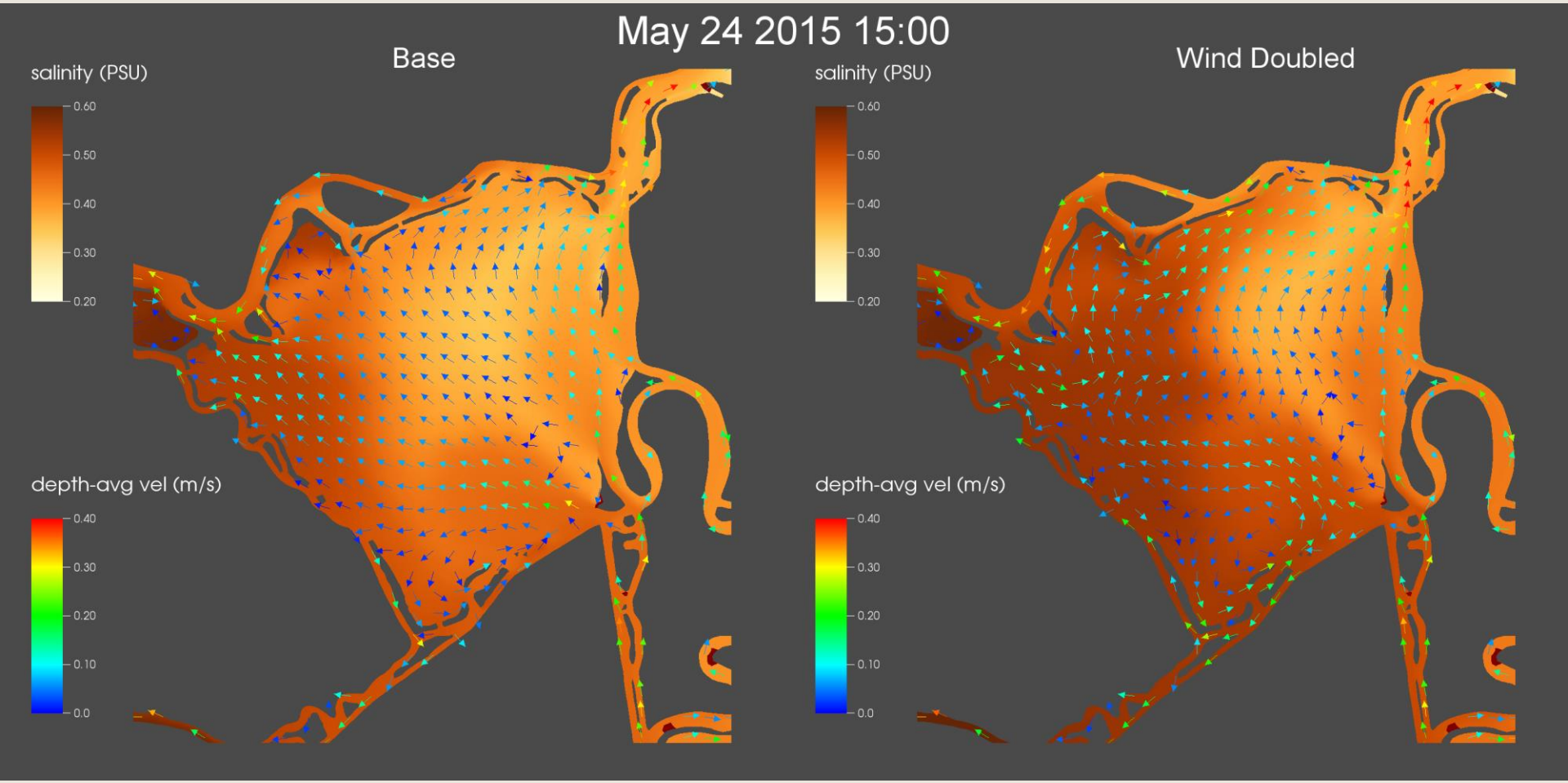
Sa arrier)





All values tidally filtered

Wind & Mixing


May 24 2015 15:00
Base
salinity (PSU)
0.60
0.50
0.40
0.30
0.20
depth-avg vel (m/s)
0.40
0.30
0.20
0.10
0.0
Wind Doubled
salinity (PSU)
0.60
0.50
0.40
0.30
0.20
depth-avg vel (m/s)
0.40
0.30
0.20
0.10
0.0

Some Conclusions

- Barrier halted salinity intrusion in 2015
- Also a great science experiment
- Models played many roles
  - Bar for each was a different height
- Limiters to barrier + modeling are subtle:
  - Short season, long residence: sensitive to IC
  - Circulation in Franks Tract … veg and wind
  - Lateral mixing between Old/Middle River

Tidy Up

- Synthesis with Delta Science:
  - Residence time
  - Nutrient modeling with CoSINE group
- Follow up with OMR experts about Old/Middle exchange
- Study design for Franks Tract
  - … and some discussion of mobilization
- A good write-up

Acknowledgements

The DWR SCHISM team is:

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- Dick Dugdale, RTC
- Frances Wilkerson, RTC
- Yi Chao, NASA JPL
- Eric Danner, NOAA/NMFS

….sorry out of room

Tara Smith Chief, Delta Modeling Section

Francis Chung Chief, Modeling Support Branch