



# Enhancing Monitoring With Real-Time Continuous Data

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## City of San Diego collects mooring data in partnership with Send lab at Scripps

### Goals:

- Track treated wastewater plumes from ocean outfalls
- Supplement quarterly monitoring and measure temporal variability in receiving waters
- Share data, such as to validate models

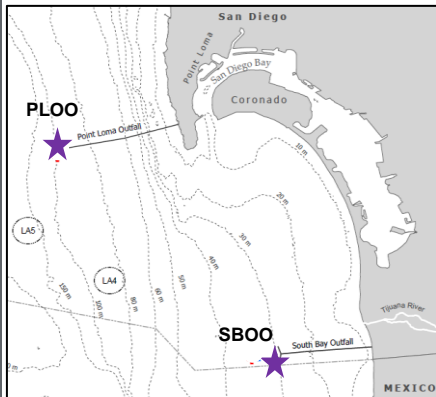
### Measure:

- Currents, temperature (T), salinity (S)
- Dissolved oxygen (DO), nitrate (+nitrite), xCO<sub>2</sub>, chlorophyll a, colored dissolved organic matter (CDOM), pH, turbidity, biological oxygen demand (BOD)

### Two sites:

- Near end of Point Loma ocean outfall (PLOO) in 95-m depth
- Near end of South Bay ocean outfall (SBOO) in 30-m depth

Fig. 1 Map of mooring locations



## Initial Findings

### Status of local receiving waters:

- Better understanding of ranges of variability and how they vary with water masses (Fig. 2)
- Improved monitoring of seasonal patterns, such as duration and extent of warm surface waters (Fig. 3)
- Along-coast currents tend to dominate

### Tracking wastewater plumes:

- Salinity likely captures plume signal at PLOO; harder to track at shallower SBOO
- CDOM will likely be a good indicator to use

### Other applications:

- Captures events such as large 2020 spring red tide and data can help understand bloom dynamics

Fig. 2 DO (left) at PLOO at mid-depth (30-m) and nitrate (right) at SBOO at near-bottom depth (26-m) by T-S from hourly-averaged 2018-19 data

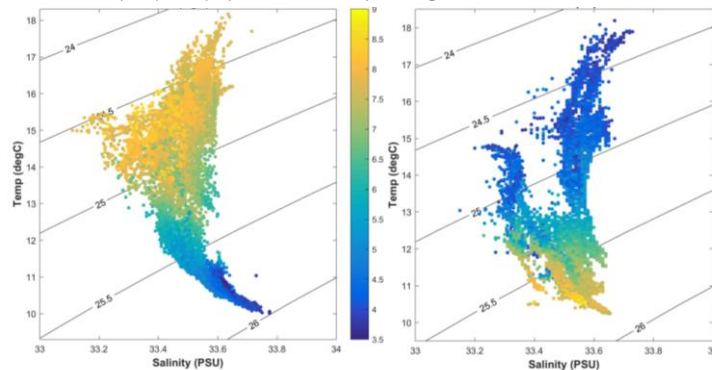
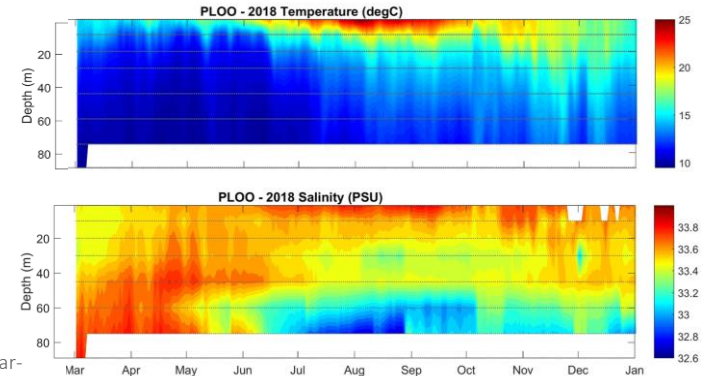


Fig. 3 Temperature (top) and salinity (bottom) profiles in 2018 at PLOO show seasonal thermal stratification and low salinities at deep depths



## Challenges

- Improving and automating data QA/QC process
- Data gaps due to instrument failures or calibration delays

## Next Steps

- Evaluate frequency of plume detections and associated currents and water masses
- Compare to data from towed vehicle (ScanFish) to produce plume maps
- Better understand local emerging issues like hypoxia, ocean acidification, and algal blooms

## Acknowledgements

Data would not be possible without the City's Marine Biology and Ocean Operations team and Uwe Send's lab at Scripps Institution of Oceanography

Provisional real-time data here: [mooring-dev.ucsd.edu/dev/](http://mooring-dev.ucsd.edu/dev/)