NYHOPS v3 OFS
New Hydrodynamic & Water Quality forecasts include the Passaic River.

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NYHOPS: New York Harbor Observing and Prediction System

Integrated system of *observing* sensors and *forecast* models

**TO OBSERVE**
**TO PREDICT**
**TO COMMUNICATE**
Weather
Currents
Water Level
Salinity
Temperature
Waves
Water Quality

Bathymetry: Over 1M soundings!

One high-resolution model grid: 150,680 water cells.
From 7.5km to <50m variable resolution.
NYHOPS verification (3D hydro)

Based on NOAA OFS standards

>100 stations, 6 parameters, 2-year period of observations.

Forecast Model has moderate to high skill near the Passaic.

![Map showing bathymetry and stations](image)

- **Water Level**
  - 2yr: 0.98 skill, 16cm RMSE
  - 0.99 skill, 12cm RMSE
  - 0.99 skill, 1.8°C RMSE
  - 0.91 skill, 3.8psu RMSE

- **Water Temperature (°F)**
  - 0.99 skill, 1.2°C RMSE

- **Salinity (psu)**
  - 0.91 skill, 3.8psu RMSE

- **Hours local**
  - 24hr hindcast
  - 48hr forecast
Schematic of NYHOPS Allochthonous CDOM Bio-kinetic module

Model Output:
Allochthonous CDOM fluorescence and concentration
Labile DOC and DIC from CDOM photolysis
CDOM absorption at 355nm
Diffuse attenuation of downw. irradiance at 300nm

\[
E_d(0^-) \exp \left[ \int_0^z b(300, z) dz \right] 
\]
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\]

\[ K_d^b(300, z) = \left[ a_{CDOM+} + b(410) \right] \exp \left[ -S_{UV} \cdot (300 - 410) \right] + K_{d,w}(300) \]

\[ \alpha(410) = \alpha^*(410) \cdot [CDOM] \]

3D Transport and Diffusion of CDOM provided by NYHOPS forecasts.
NYHOPS verification in the Passaic River Salinity (psu)

- Two multi-day Eco-Shuttle surveys, two very different years
- One dry and one very wet ("Tax Day flood").
- CC: 0.88 ("Dry")
- CC: 0.93 ("Wet")
NYHOPS verification
CDOM fluorescence (QSU)

- CDOM diluted from runoff during Tax Day storm
- CC: 0.95 (“Dry”)
- CC: 0.67 (“Wet”)
- $R^2=0.86$
- Passaic Rel. error: 5.9% (“Dry”), 9.0% (“Wet”)
FUTURE PASSAIC PRODUCTS?

Storm Surge Warnings Incl. Overland Flow And Inland Flooding!

Expanding North of the Dundee Dam

Incl. CSO/SW loads Pathogen, Contact Recreation Forecasts

STEWENS Institute of Technology
Thank you!
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