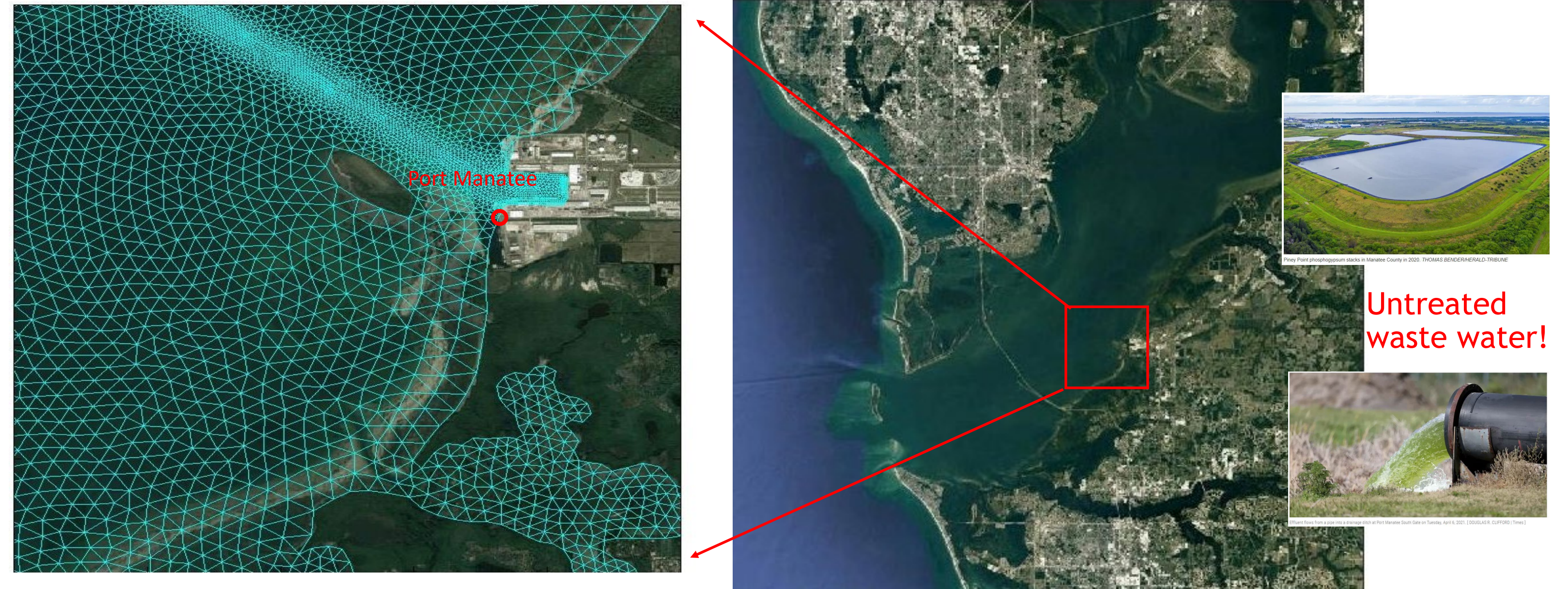


A tracer model nowcast/forecast study of the Tampa Bay, Piney Point effluent plume: Rapid response to an environmental hazard

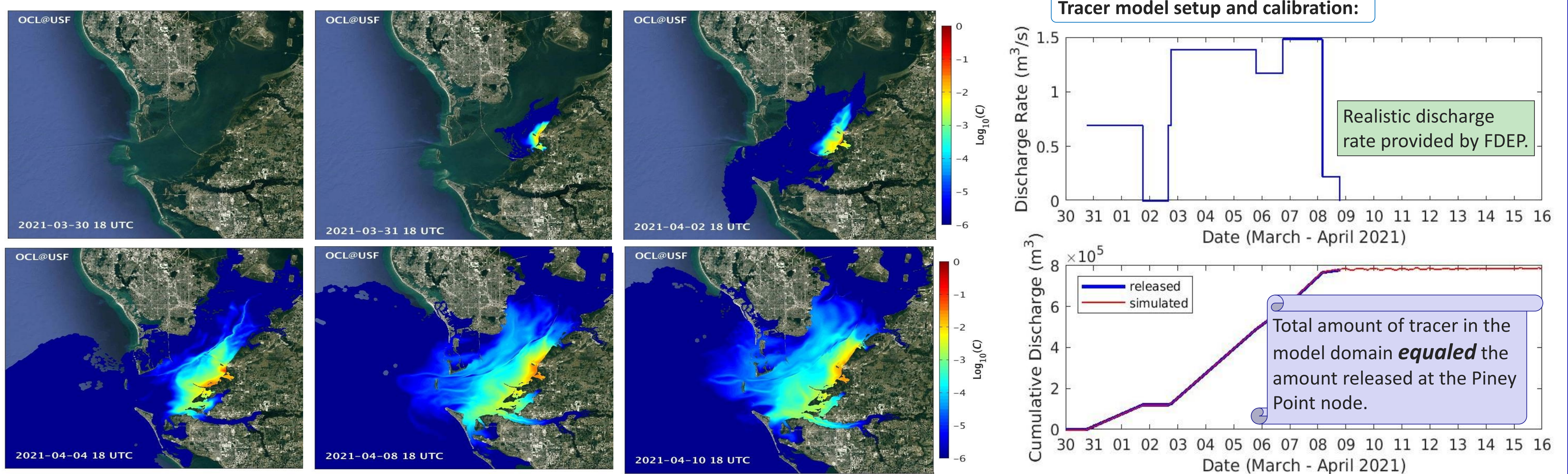
Y. Liu, R.H. Weisberg, L. Zheng, Y. Sun, J. Chen, J.A. Law, C. Hu, J.P. Cannizzaro, T.K. Frazer
College of Marine Science, University of South Florida, St. Petersburg, Florida, USA

1. Introduction

An emergency discharge of nutrient-rich, waste water effluent into Tampa Bay from the Piney Point fertilizer stack at Port Manatee occurred from 30 March - 8 April 2021, resulting in a pollutant plume that spread throughout Tampa Bay. As an immediate response to environmental concerns, the plume evolution was simulated using a high resolution, unstructured grid, Tampa Bay Coastal Ocean Model (TBCOM), providing 1-day hindcasts and a 3.5-day forecasts of tracer plume pattern evolution.



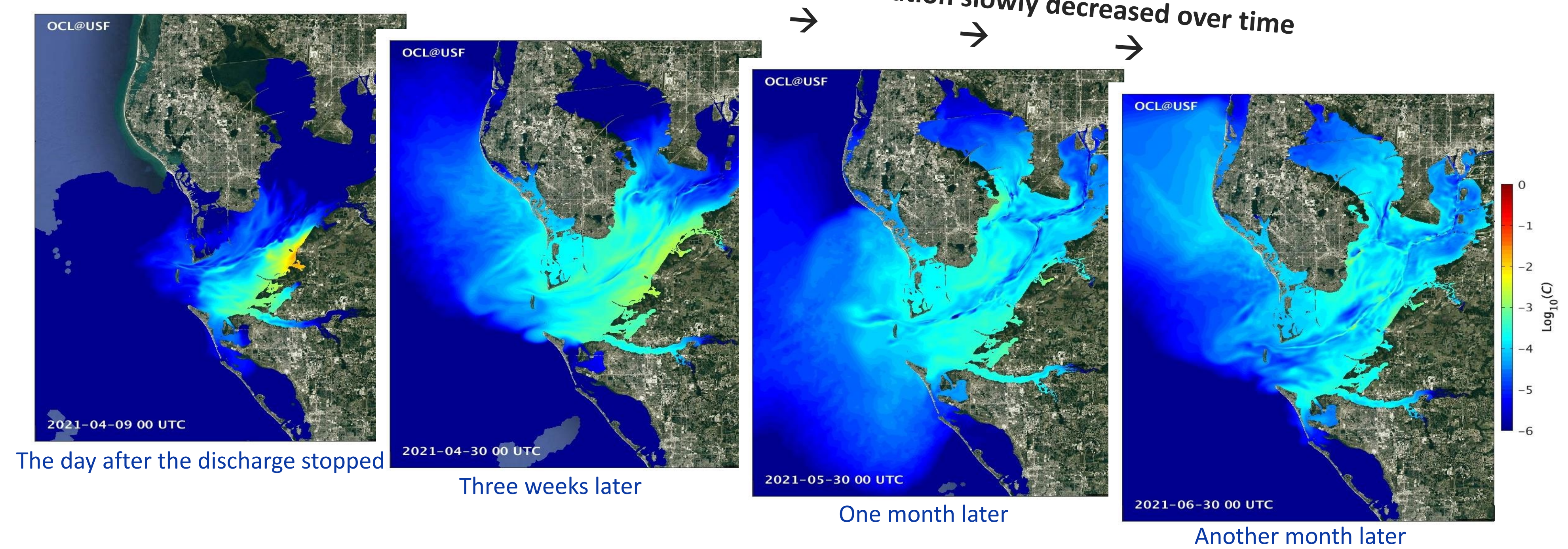
2. Tracer plume expansion in early days



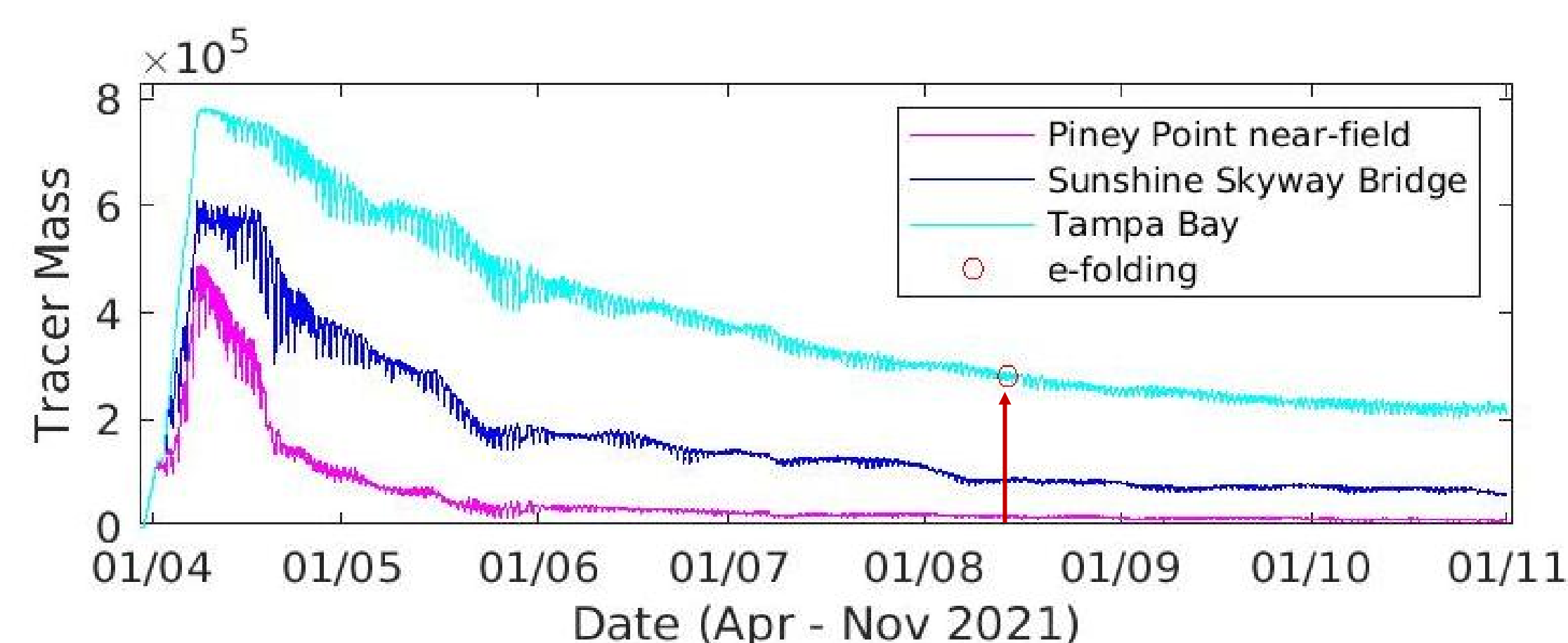
3. Tracer plume evolution, spreading & decay

TBCOM Tracer Model Simulation

- ✓ Passive tracer, only physical processes (advection & mixing) were included. Normalized initial concentration of 1.
- ✓ The discharge rates (fluxes) were realistic, continuous as given and time varying.
- ✓ Daily model updates, with 1-day hindcast & 3.5-day forecast.
- ✓ Publicly available online: <http://ocgweb.marine.usf.edu/~liu/Tracer>
- ✓ Served as principal guidance for coordinating environmental monitoring by state, local & academic personnel.



4. Residence time analysis



Tracer concentration was quickly reduced by two orders of magnitudes or more as the plume spread out. Highest tracer concentrations hugged the southeastern Tampa Bay shore in the first week. Lower tracer concentrations gradually spread throughout Tampa Bay, and were slowly flushed out of the bay. The e-folding date was 8/14/2021, or **127 days** after the end of the discharge.

Author affiliations:



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