

NOAA Coastal Water-Level Anomaly Study

October 31, 2026

Planned research: compare simulations using real quantum computing hardware and classical computing systems, then evaluate results against measured physical construction applications. No such hardware benchmarking or field validation is claimed as completed.

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Experiment 4 | Conducted October 31, 2026 | Trident Build

Research question

Could a simple tidal baseline detect injected 22 cm water-level anomalies in NOAA observations, and would reducing simulated sensor noise improve detection?

Data and methodology

NOAA CO-OPS measured water levels from St. Petersburg, Florida, station 8726520, October 16–29, 2026. The study used 3,360 readings aggregated to 336 hourly values. The first 235 hours were used for model fitting and the final 101 for held-out evaluation.

The baseline modeled a constant, linear trend and 12.42-hour and 24-hour cycles. Simulated +22 cm events were injected in controlled trials. Sensor-noise scenarios of 10 cm and 5 cm were compared over 500 trials each.

Reported findings

Mean held-out baseline error: 16.5 cm. Alarm threshold used to suppress natural false alarms: approximately 39.6 cm. Without injected events, 4 of 101 held-out hours exceeded the threshold.

With conventional 10 cm sensor noise: precision 1.5%, recall 0.5%, false-alarm rate 4.7%. With reduced 5 cm noise: precision 0.0%, recall 0.0%, false-alarm rate 4.6%. These are trial averages, not deployed-system measurements.

Interpretation and limitations

The simple tidal baseline did not reliably distinguish the injected events from naturally varying water levels. Reducing simulated sensor noise alone did not improve detection. Model error was the dominant limitation in this study.

This is coastal water-level analysis, not measured stormwater flow. Anomalies and sensor channels were simulated; channels were replicas rather than independent monitoring stations. No sensor deployment or quantum hardware was tested.

Source and next steps

Source: NOAA CO-OPS station 8726520, https://tidesandcurrents.noaa.gov/stationhome.html?id=8726520 . The original Trident Build research page contains the detailed charts and the experiment summary.

Proposed work: add weather and neighboring-station inputs; improve uncertainty-aware thresholds; obtain actual drainage/stormwater event labels before operational claims.

Research documentation only. Results are limited to the specified data, assumptions and software methods. No operational field performance or quantum-hardware capability has been established.