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2016 Optically-based Monitoring South River, VA

Preliminary Results

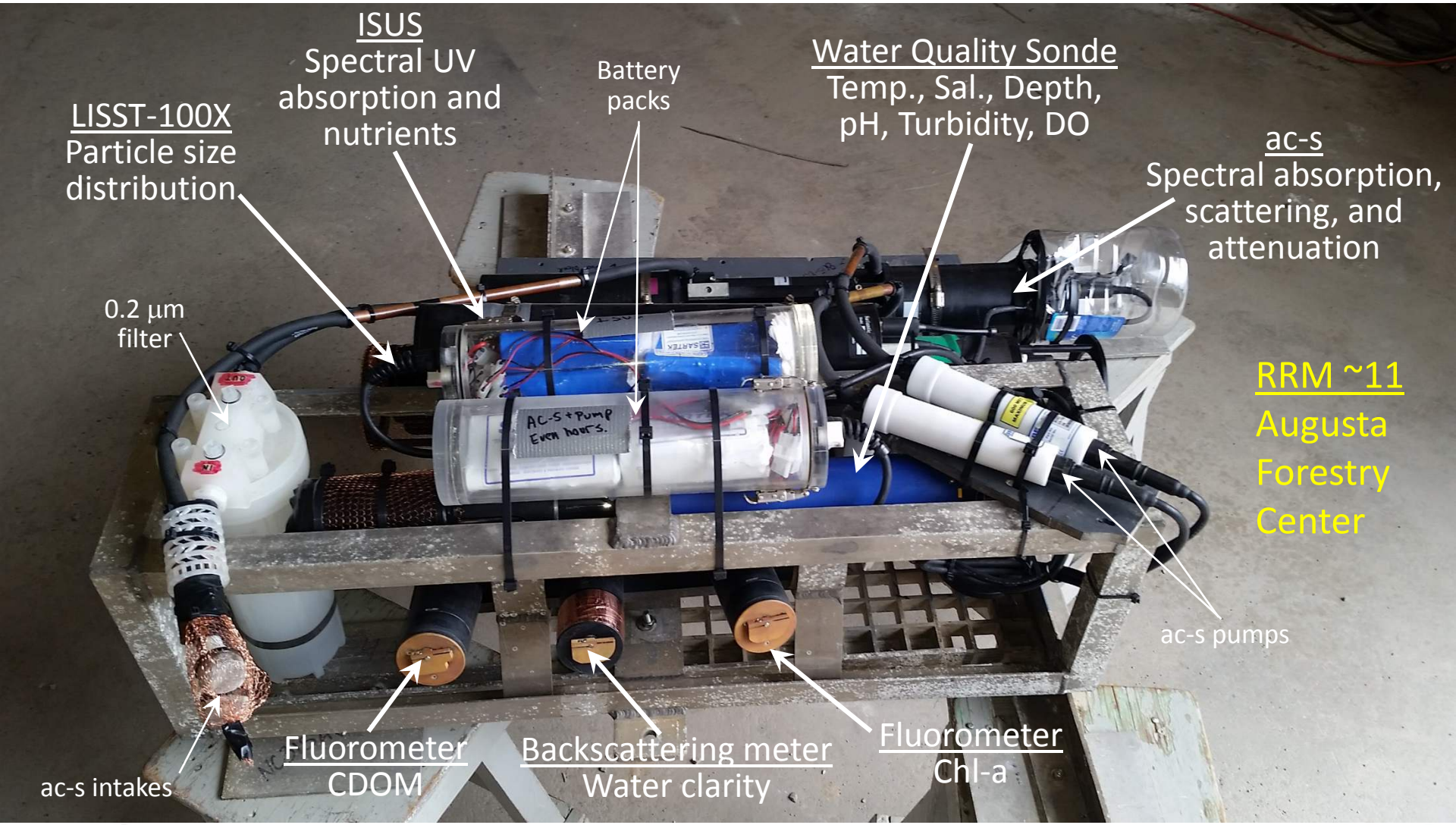
Draft

July 26, 2016

South River Pilot Study

- Deployed at RRM 11 (Augusta Forestry Center)
- One to two month
- AECOM sampling for calibration/validation

Field Study – *In Situ* Monitoring



March 31, 2016 – May 17, 2016

Field Study – Discrete Sampling

April 1: 08:00 – 18:00 (8 samples, 2 field duplicates)

April 7: 10:00 – 14:00 (4 samples, 1 field duplicate)

April 14: 10:00 – 14:00 (4 samples, 1 field duplicate)

April 21: 10:00 – 14:00 (4 samples, 1 field duplicate)

April 28: 08:00 – 18:00 (8 samples, 2 field duplicates)

May 3: 10:00 – 14:00 (4 samples, 1 field duplicate)

May 5: 08:00 – 18:00 (4 samples, 2 field duplicates) STORM

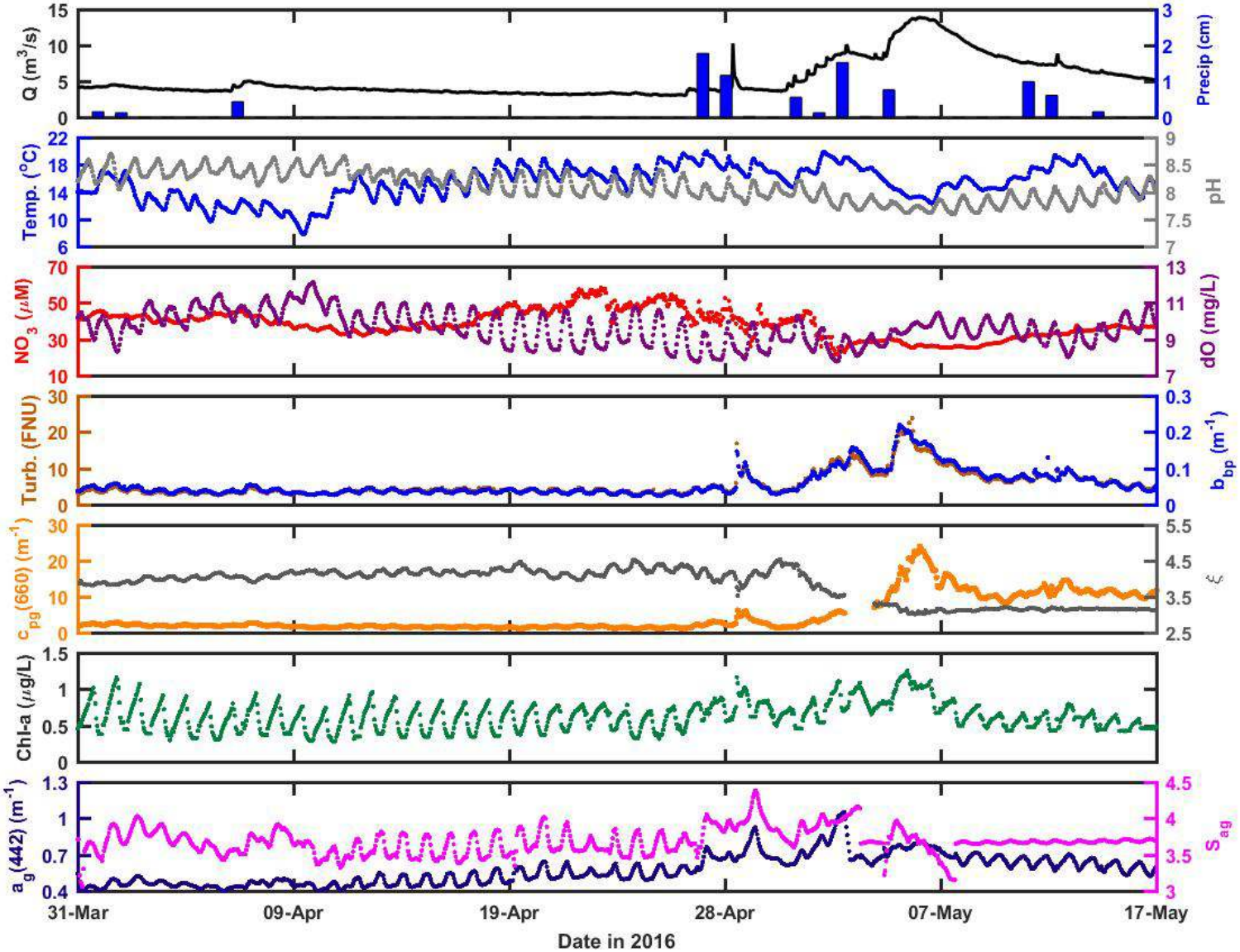
May 6: 10:00 – 14:00 (4 samples, 1 field duplicate) STORM

May 10: 12:00

May 11: 08:00

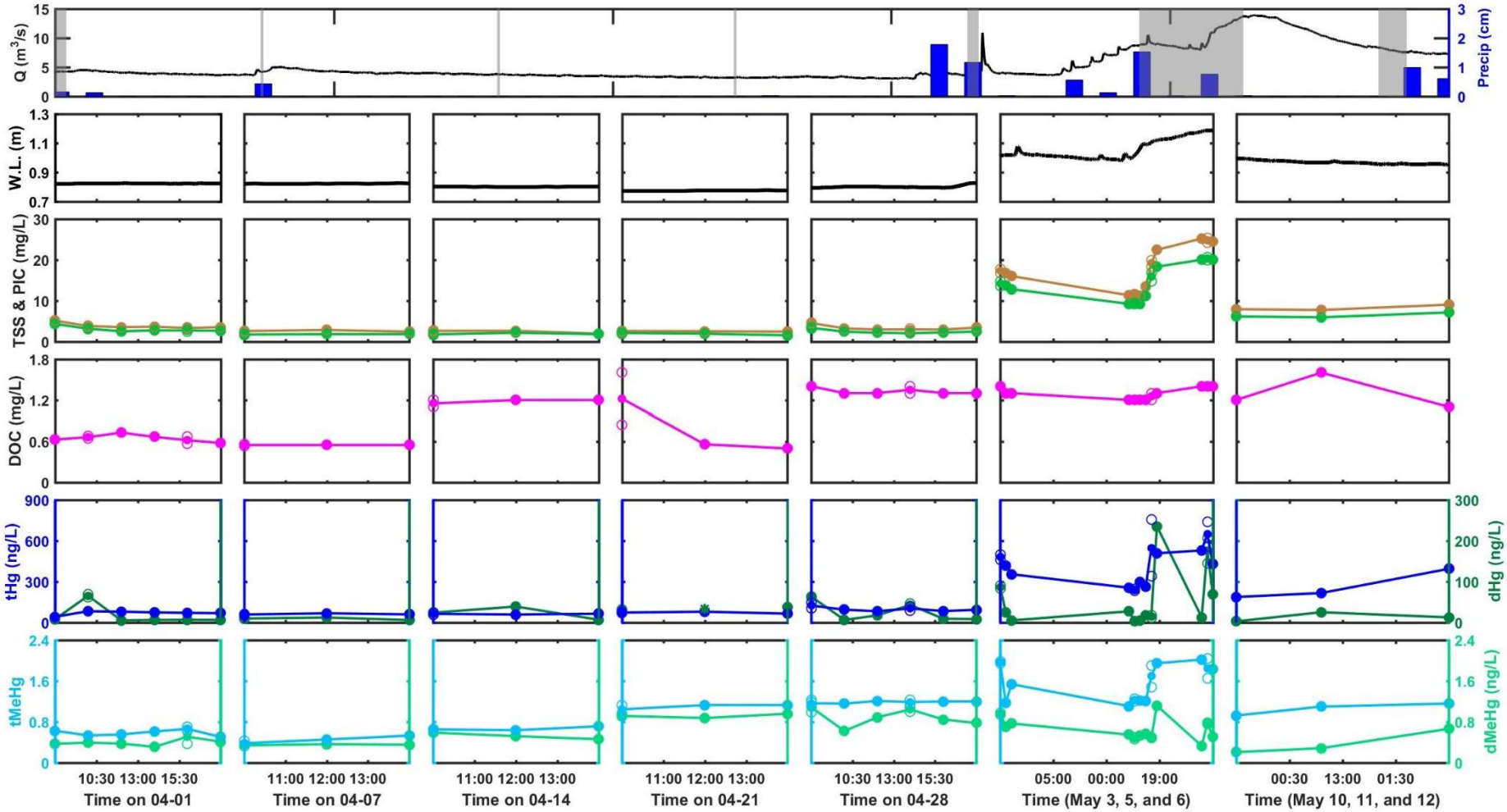
May 12: 14:00

Prediction (Optical) Variables



● = Discrete Samples
○ = Discrete Field Duplicates

Observation (Discrete) Variables

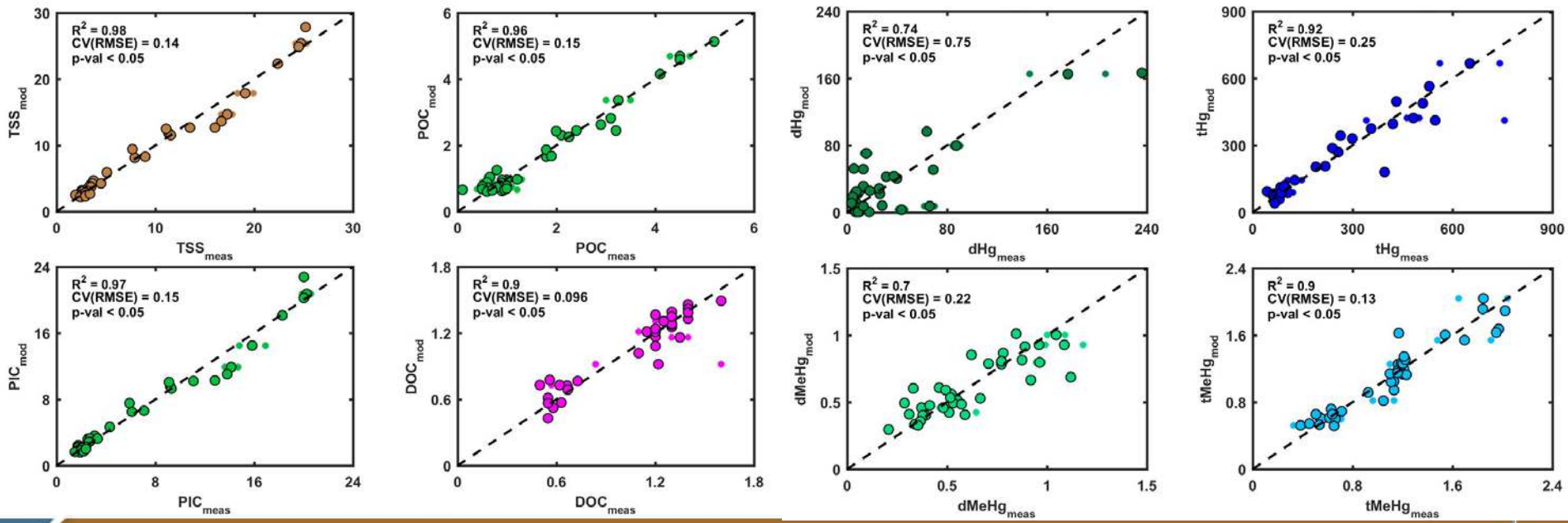


Optical Model Results

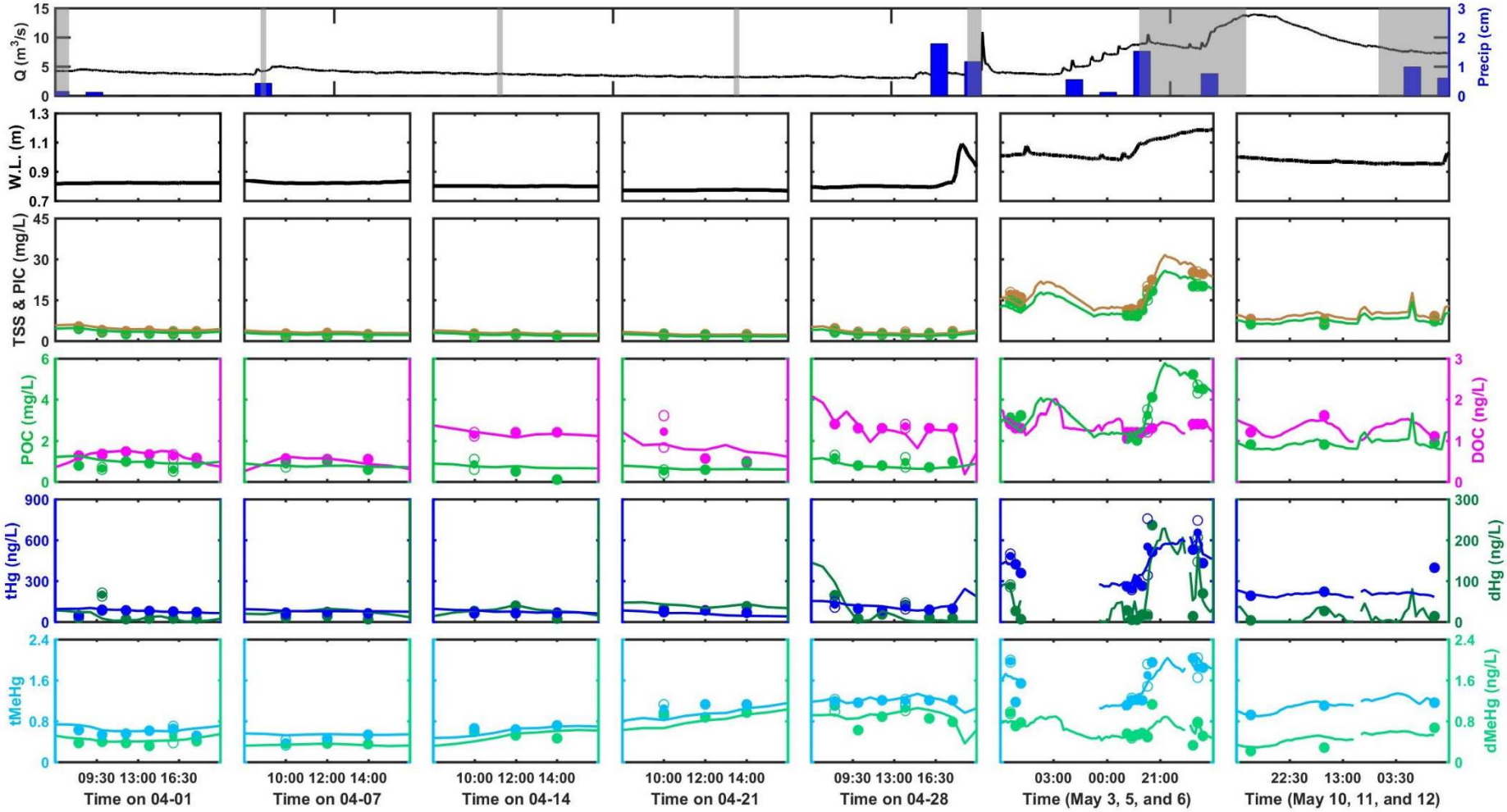
Constituent	Model R^2	*p*-value	%Error	CV(RMSE)	Analytical CV(RMSE)
TSS	0.98	< 0.05	3.40	0.14	0.08
POC	0.96	< 0.05	17.92	0.15	0.19
PIC	0.97	< 0.05	4.17	0.15	0.12
DOC	0.90	< 0.05	1.46	0.10	0.22
dHg	0.74	< 0.05	70.75	0.75	0.57
tHg	0.92	< 0.05	6.75	0.25	0.67
pHg	0.85	< 0.05	16.92	0.34	0.83
dMeHg	0.70	< 0.05	5.56	0.22	0.17
tMeHg	0.90	< 0.05	2.14	0.13	0.18
pMeHg	0.86	< 0.05	28.80	0.32	0.43

Discrete samples generally below MDL

pHg and pMeHg errors from differences between total and dissolved

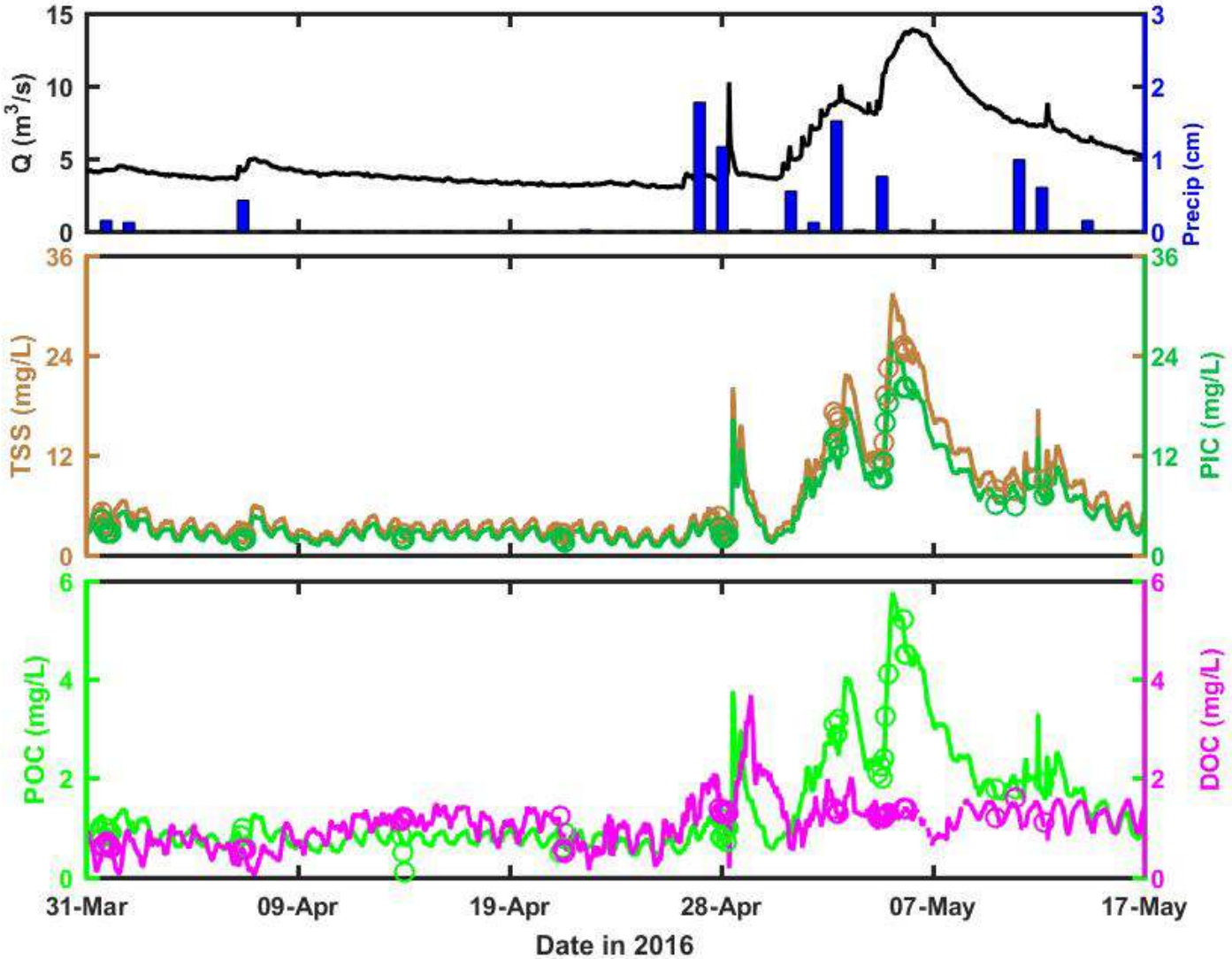


Optical Model Results



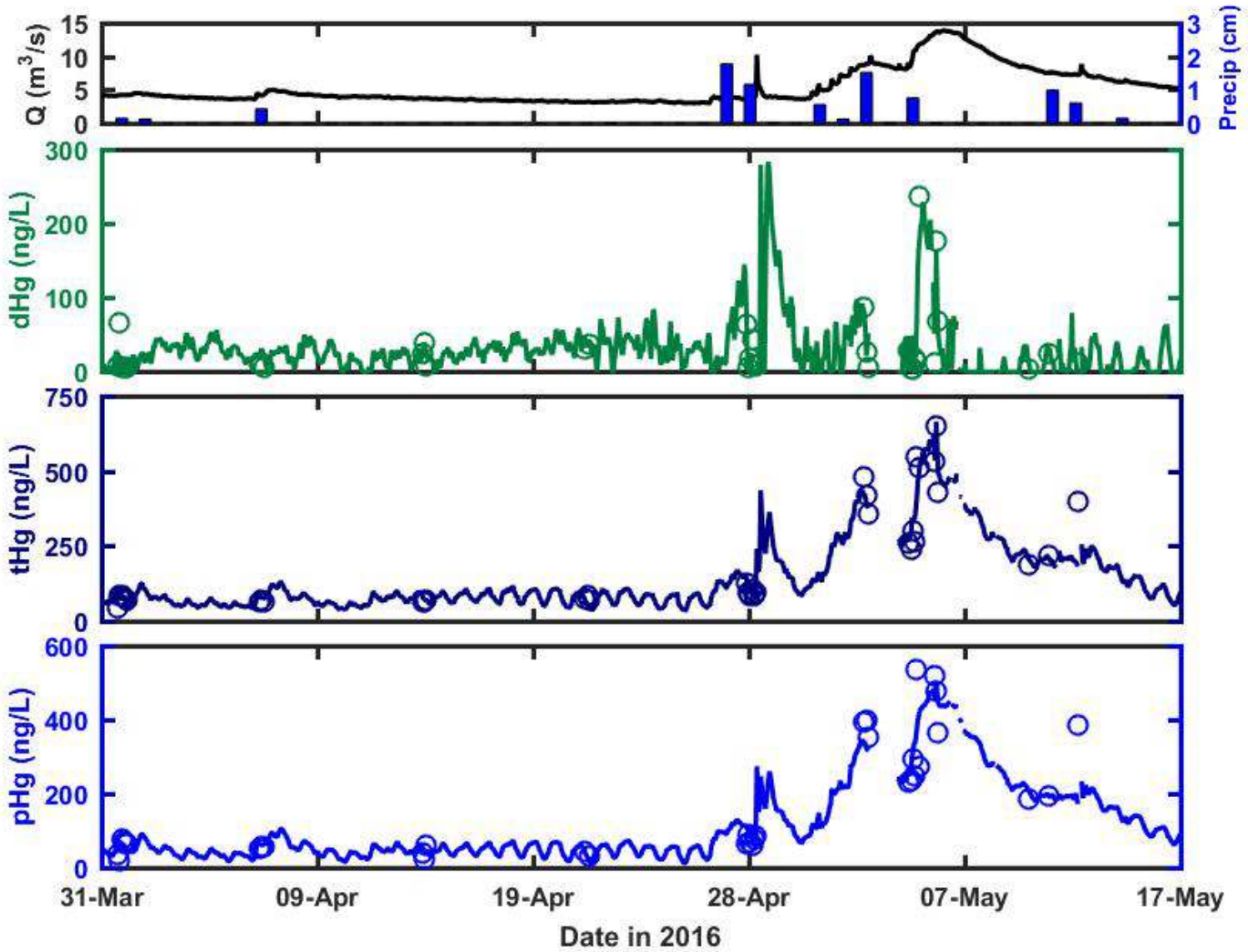
● = Discrete Samples
○ = Discrete Field Duplicates
▬ = Model Results

Total Suspended Solid, Particulate Inorganic and Organic Carbon, Dissolved Organic Carbon



O = Discrete Samples
━ = Model Results

Mercury



○ = Discrete Samples
▬ = Model Results

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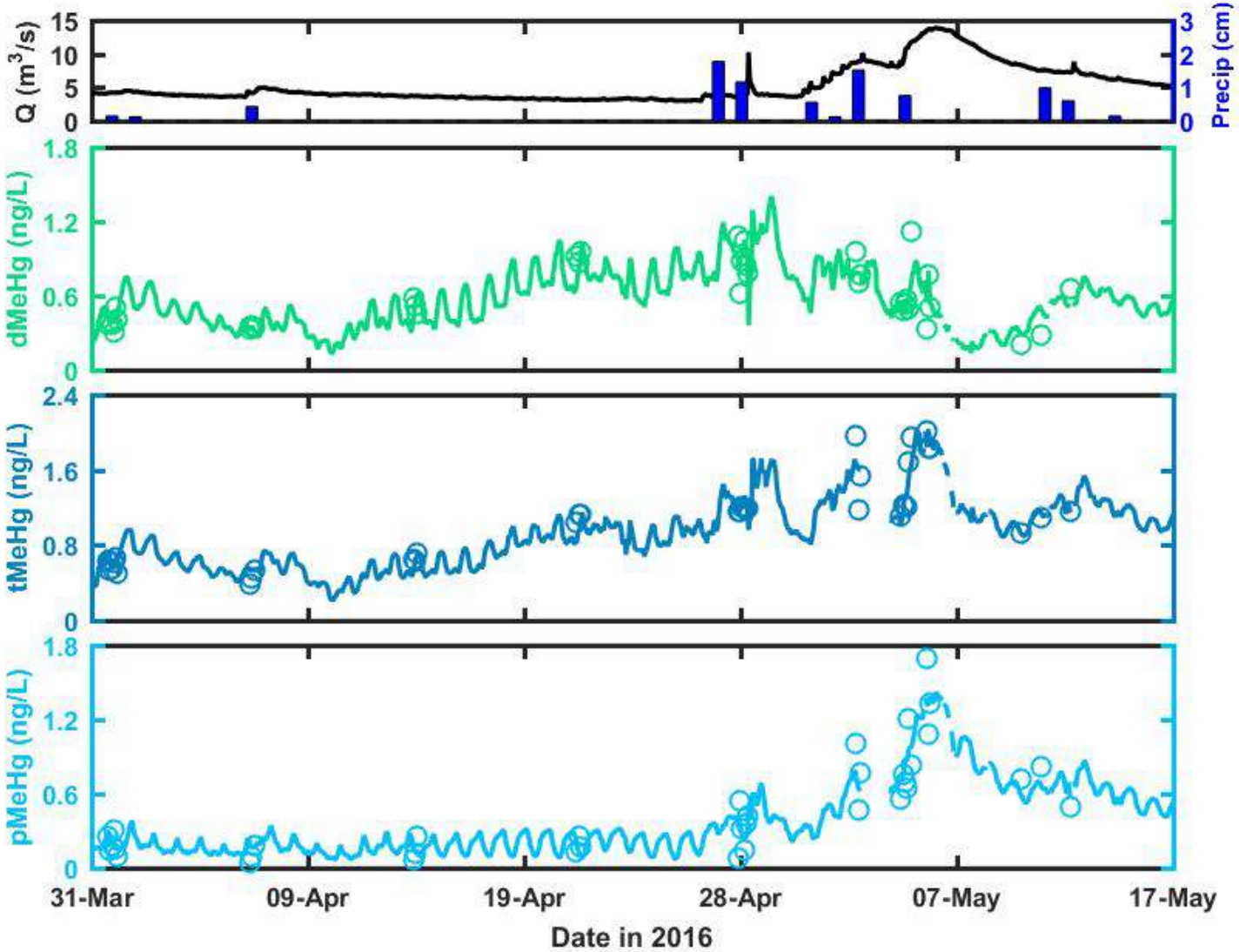
Methyl Mercury



○ = Discrete Samples
▬ = Model Results

Summary of Preliminary Findings

- Successful development of robust optical models with model error within the range of analytical error except for dissolved Hg
- Large instruments (ac-s, LISST) not necessary for robust PLS models for particulates and, potentially for dissolved
  - Smaller, less costly, more versatile instrument suite can be deployed
- Particulates and particulate phase Hg and MeHg concentrations closely tied to flow
  - Suggests engagement of bank and bar areas during higher water/flow events is important
- Methyl Mercury
  - Majority of MeHg is dissolved under baseflow; concentrations possibly related to temperature
  - During peak storm flows, particulate MeHg is more prominent and dissolved MeHg concentrations decrease

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