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Performance of a Hydrolab, YSI and Horiba Multiprobes: A Preliminary Assessment

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Real-Time Water Quality Monitoring Workshop 2007
St. John's, Newfoundland and Labrador
June 4-5, 2007

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Outline

- **Water Quality Problems related to Agricultural Activities**
- **Present Monitoring Procedures**
- **Feasibility of Replacing the Auto-sampling/Lab analyses with Multiprobes**
- **Preliminary Results and Conclusions**

- 20,000 ha of potato grown annually in New Brunswick
- 30-40 % of total provincial farm cash receipts
- Value added products

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Shallow Soils

Sloping Topography

Major Rain Storms

Intensive Management

Pollution

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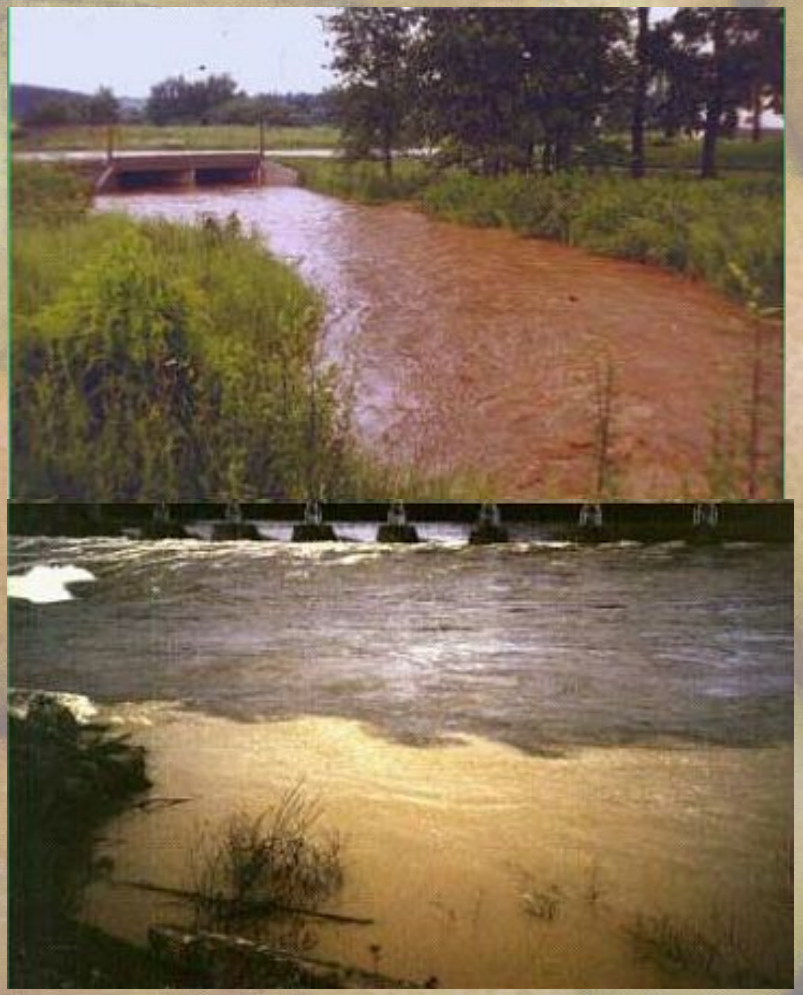
Surface Water Contamination



20+ Years of Soil Erosion Research in Potato Production in New Brunswick

On-farm

- **Rainfall simulator plots (1m x 1m);**
- **Permanent runoff-erosion plots (10m x 30m);**
- **Paired drainage basins (2-5 ha);**
- **Other field scale experiments (Buffer strip, Nutriment management, etc.)**

Off-farm

- **Experimental watersheds (15 and 340 km^2)**

General Scope of Research:

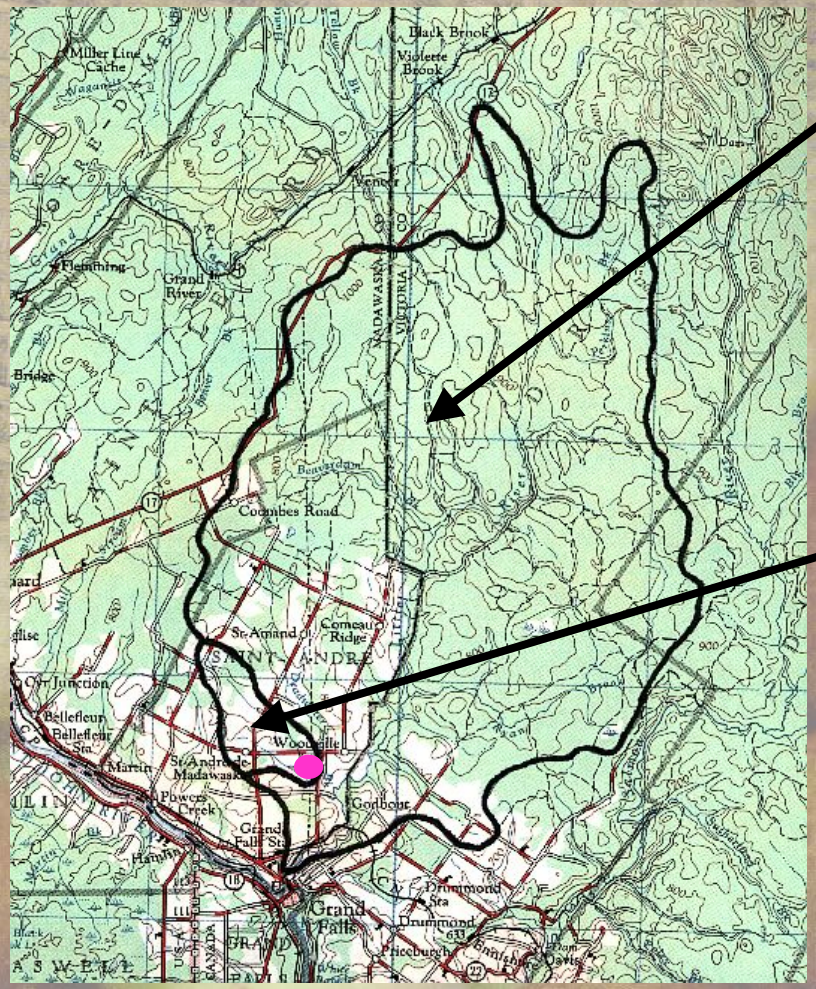
- **Impacts of intensive potato production on:**
  - **Runoff and soil erosion**
  - **Soil quality in terms of productivity**
  - **Water quality in terms of discharge, sediment and nutrient loading**

- **Beneficial Management Practices on:**
  - **Runoff and soil losses**
  - **Soil quality**
  - **Water quality**

Collaborators

- **Environment Canada**
- **NB Department of Agriculture, Fisheries and Aquaculture**
- **NB Department of Environment and Local Government**
- **Eastern Canada Soil and Water Conservation Centre**
- **University of New Brunswick (biology, engineering, forestry)**
- **Various farm agencies and associations**
  - **Potatoes New Brunswick**
  - **NB Soil and Crop Improvement Association**
- **Individual farmer/producers**

Experimental watersheds



Little River Watershed (est. 2000):

Size : 340 km^2

Land use:

Agriculture – 15%

Forestry – 85%

Black Brook Watershed (est. 1992):

Size : 15 km^2

Land use:

Agriculture – 64%

Forestry – 36%

● Monitoring station

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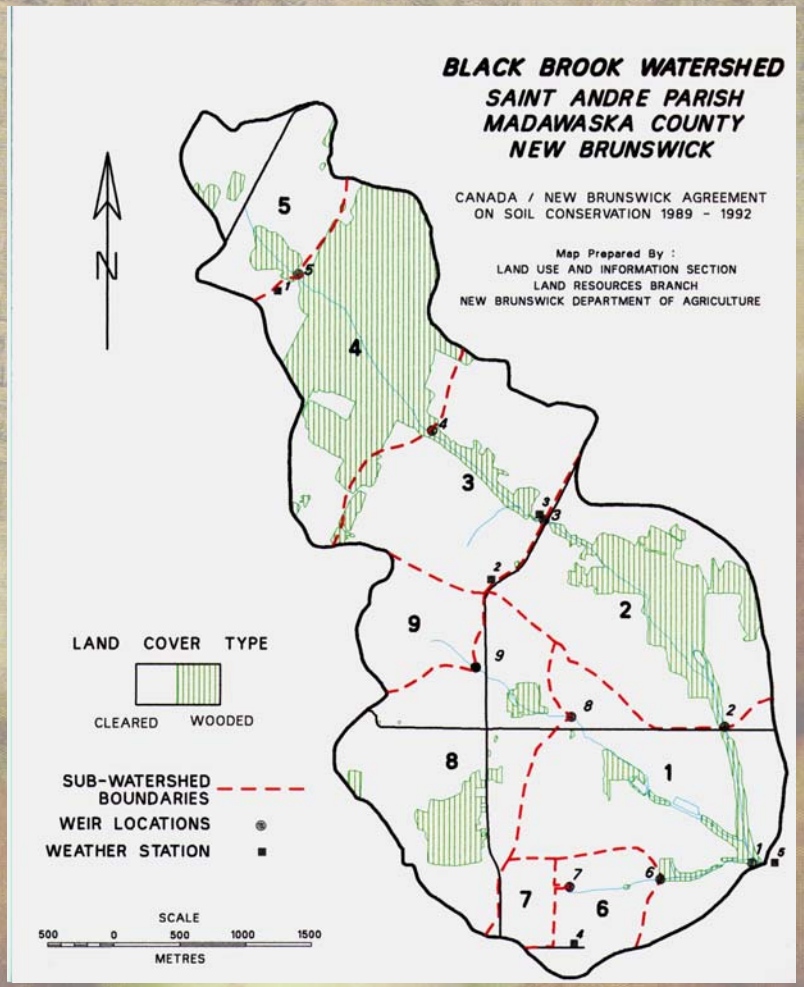
Experimental watersheds – Black Brook



Size = 1450 ha
(7.5 km long x 3.5 km wide)

Slope:
- Upper -- 1- 6%
- Central – 4-9%
- lower – 5-16%

1:10,000

Land use (survey):
- Potatoes – 38%
- Grain – 15%
- Pasture – 6%
- Forage – 4%
- Peas – 1%
- Non-agric. – 36%

Detailed soil survey data

5 Automated weather stations

Divided into 9 sub-basins for surface water monitoring

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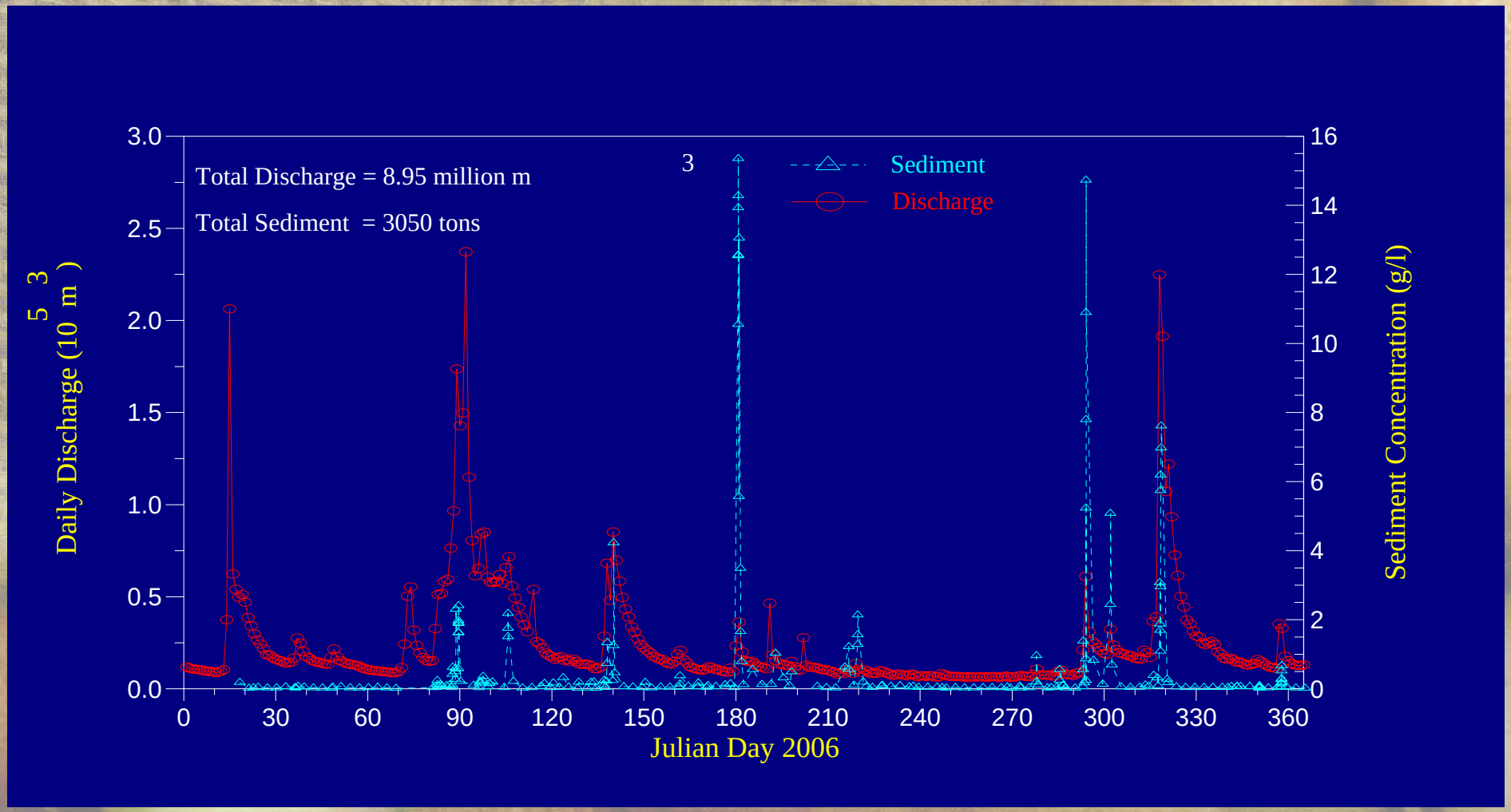
Black Brook Experimental Watershed

Surface water monitoring sites

Automated stage height recording and water sampling for flow, pH, conductivity, sediment loading, N, P, K, Ca, Mg

Black Brook Watershed



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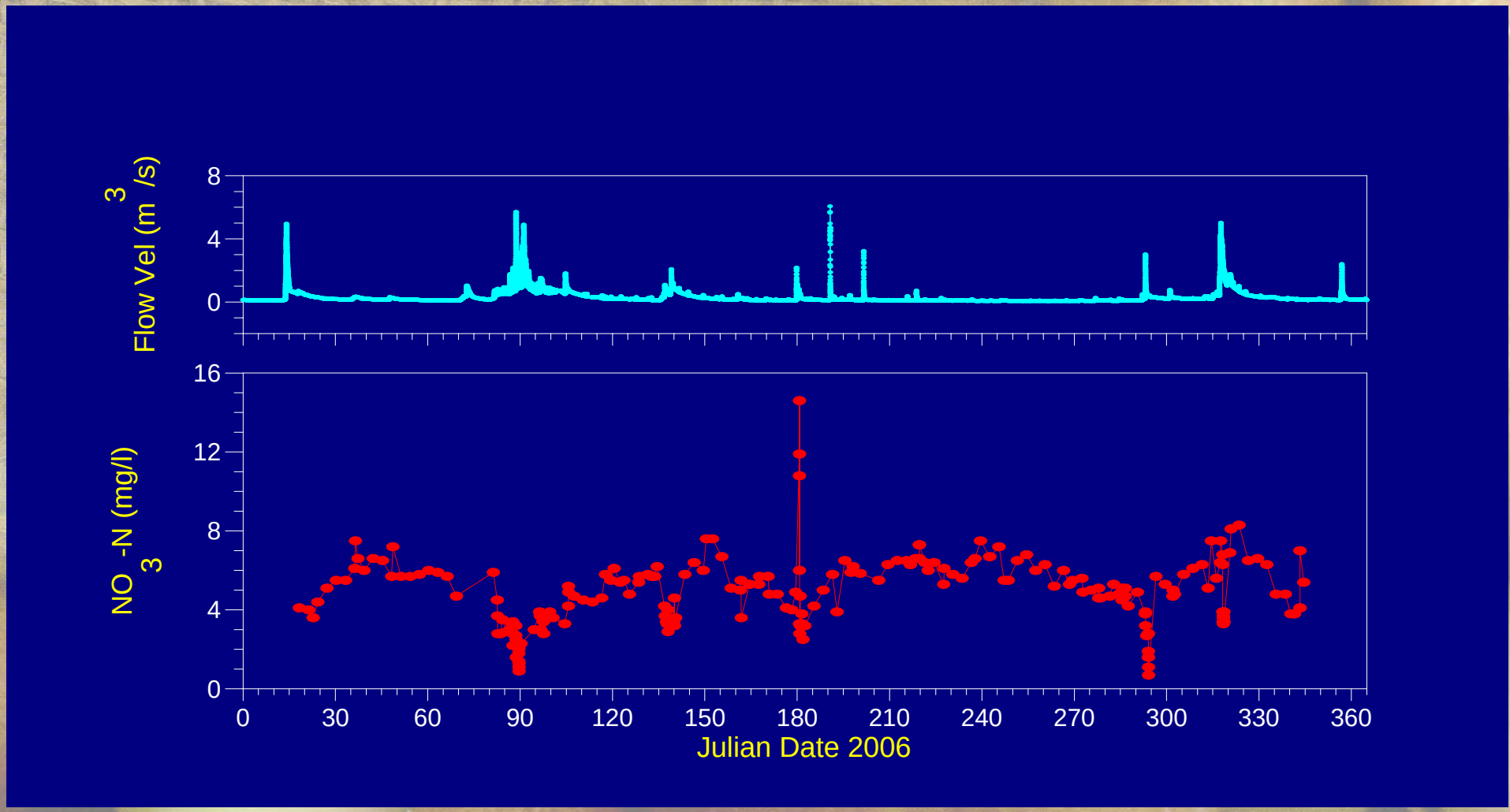
Black Brook Watershed



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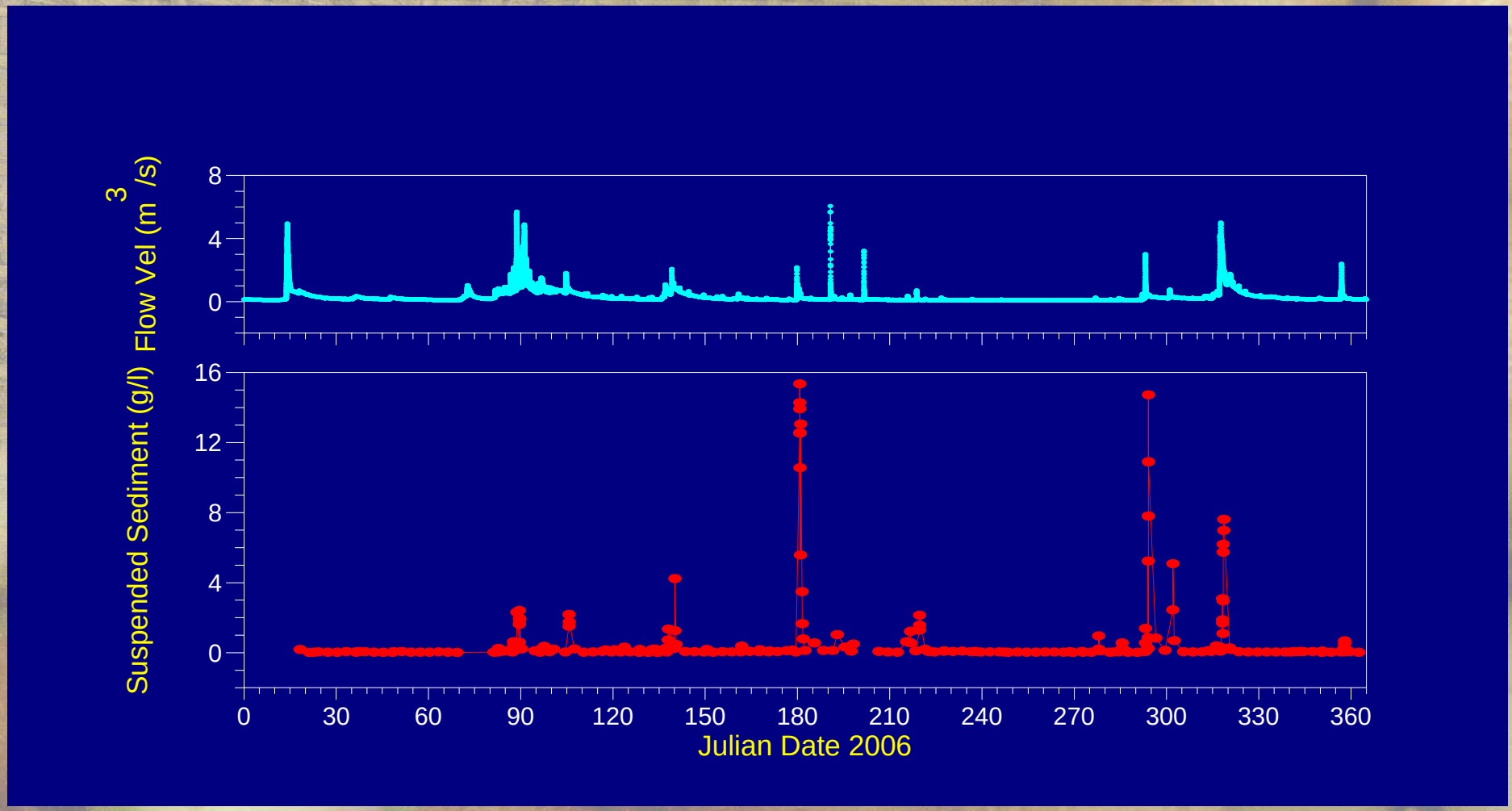

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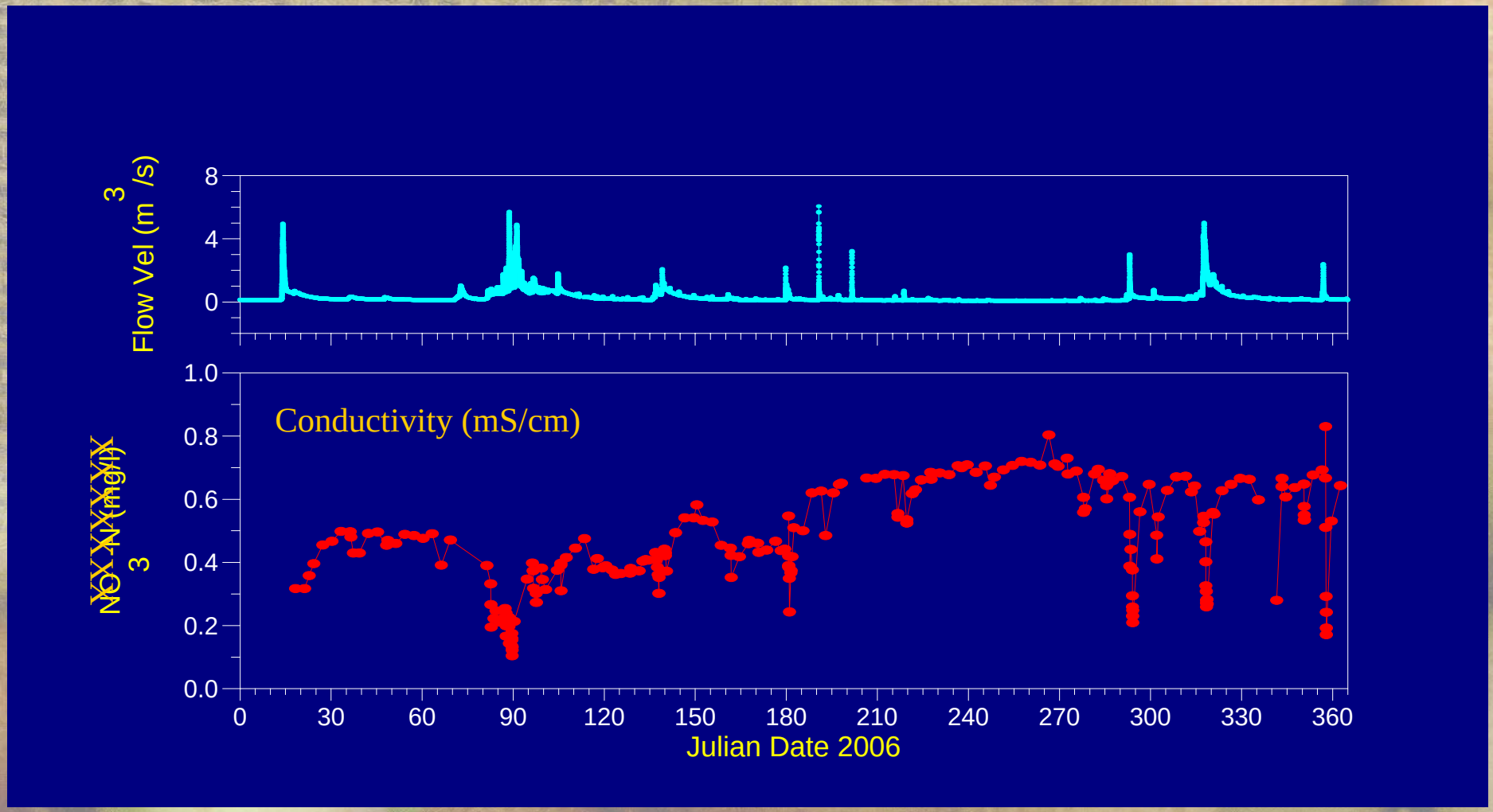

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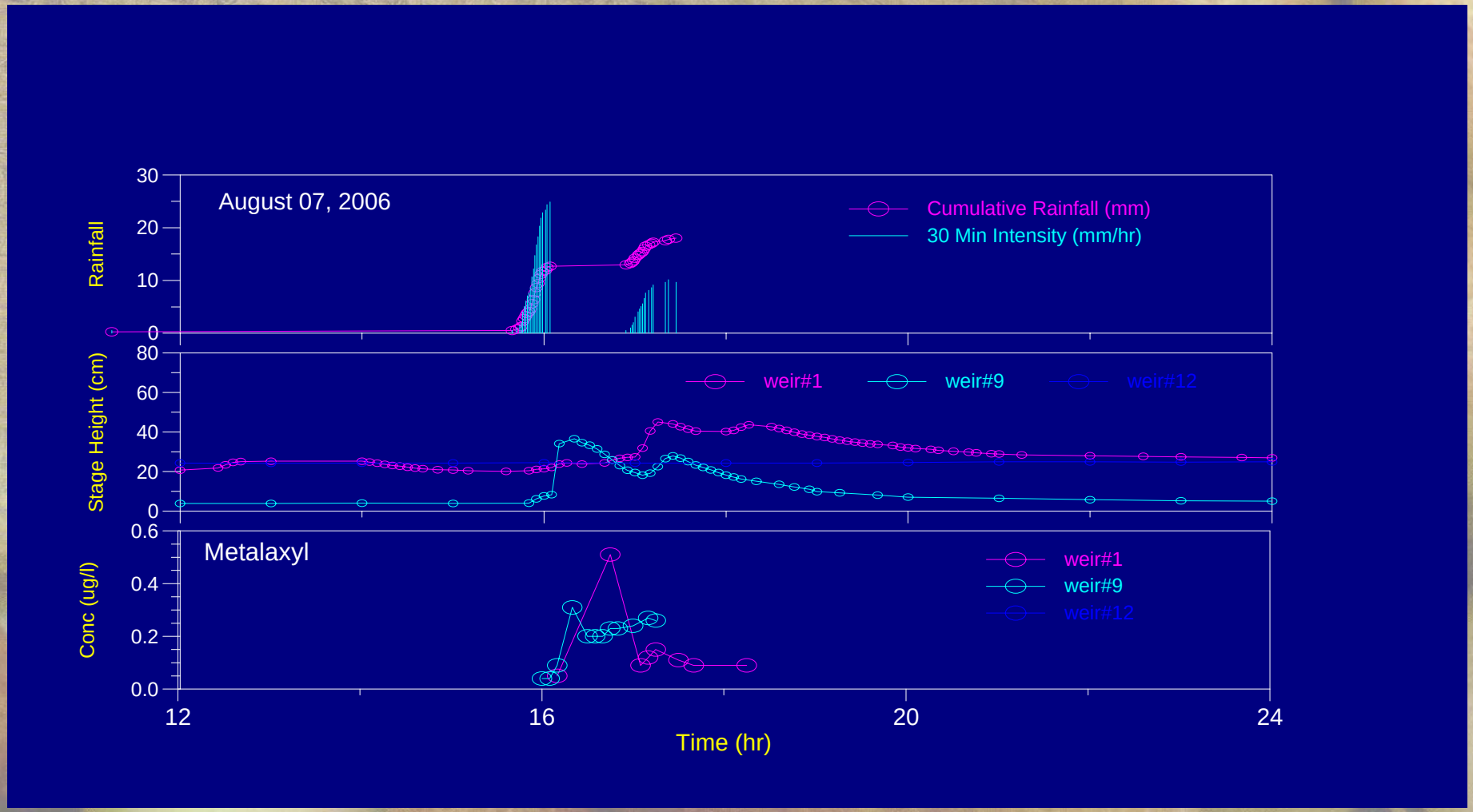

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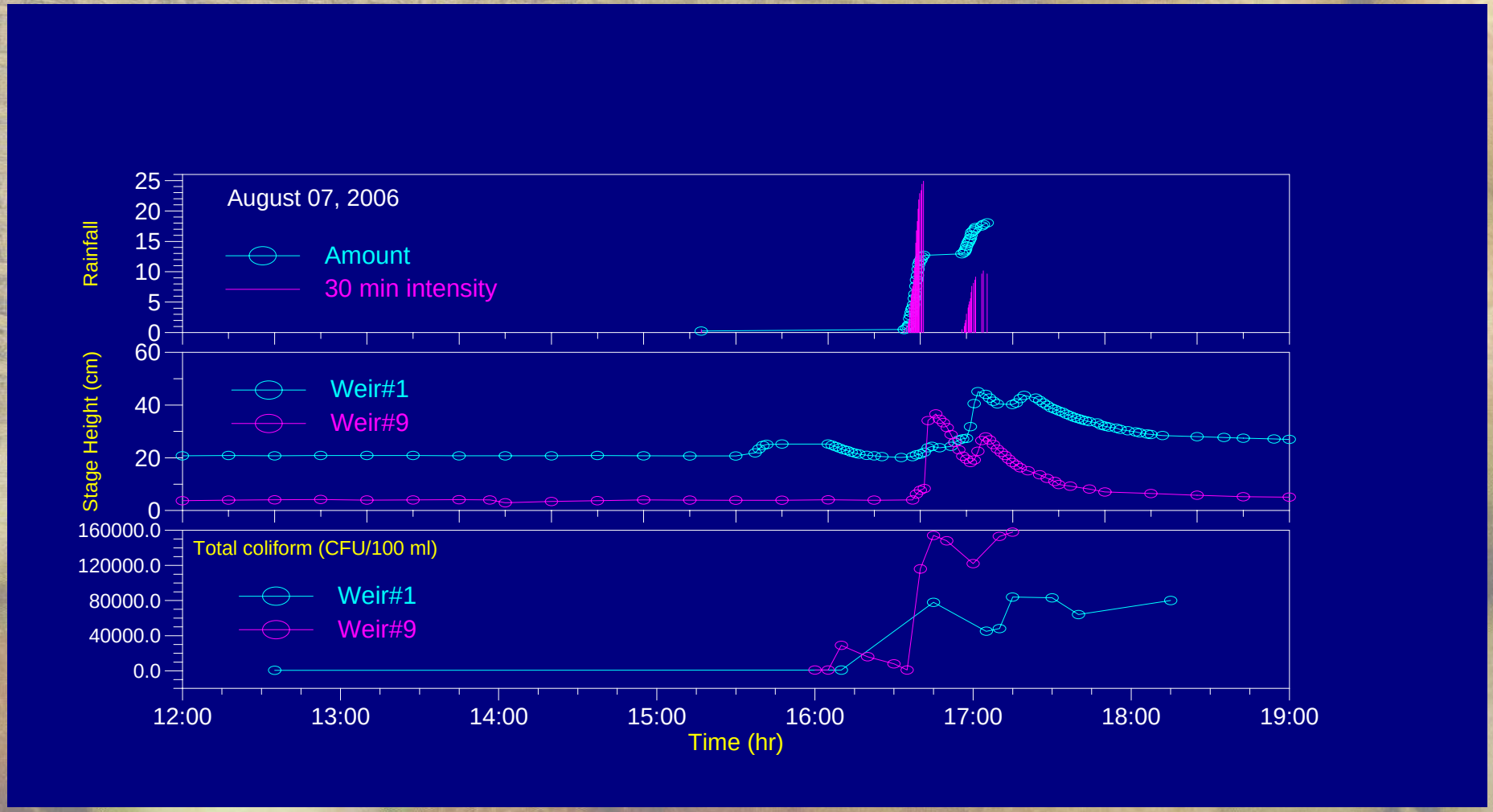

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Objectives

- **To evaluate the performance of a HYDROLAB, YSI and HORIBA multiprobe for real time water quality monitoring; and**
- **To study the feasibility of replacing auto-sampling/Lab-analysis with the multiprobes.**

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Methodology

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PARAMETER	HYDROLAB	YSI	HORIBA
Tem	X	X	X
pH	X	X	X
DO		X	X
CONDUCT	X	X	X
TURBIDITY	X	X	X
DEPTH	X		X
ORP	X	X	X
TDS	X	X	X
NITRATE	X	X	X
AMMONIA	X	X	X
POTASSIUM			X
CHLORIDE	X		
COST	16.1K	12.6K	9.0K

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Methodology

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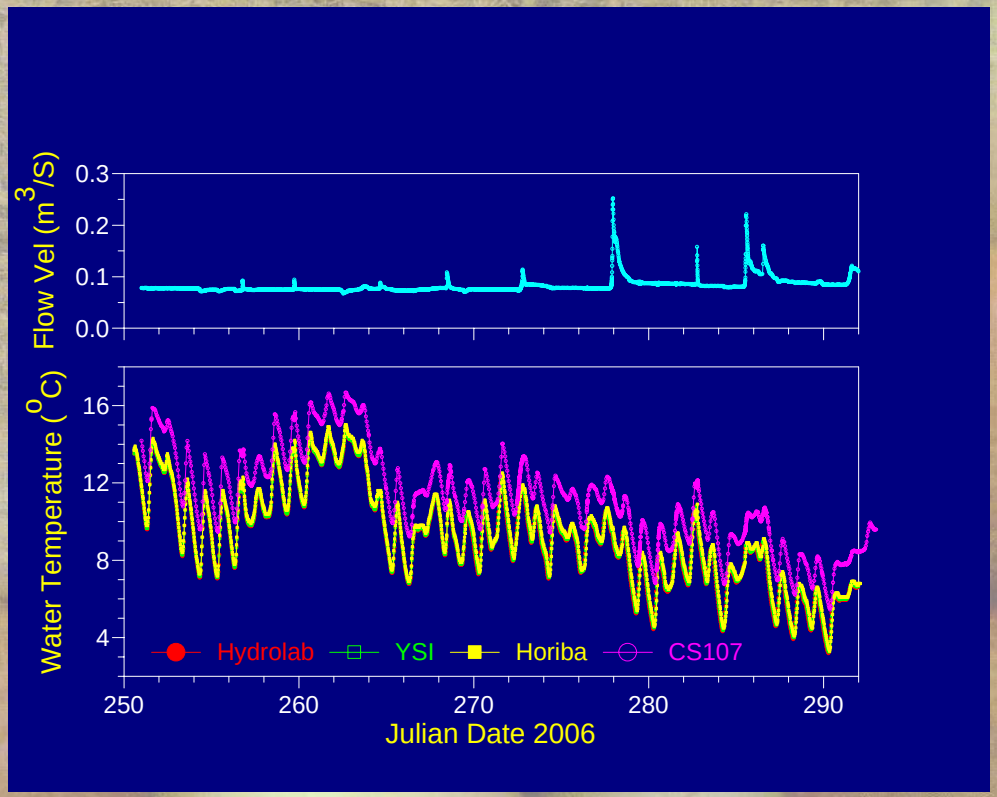
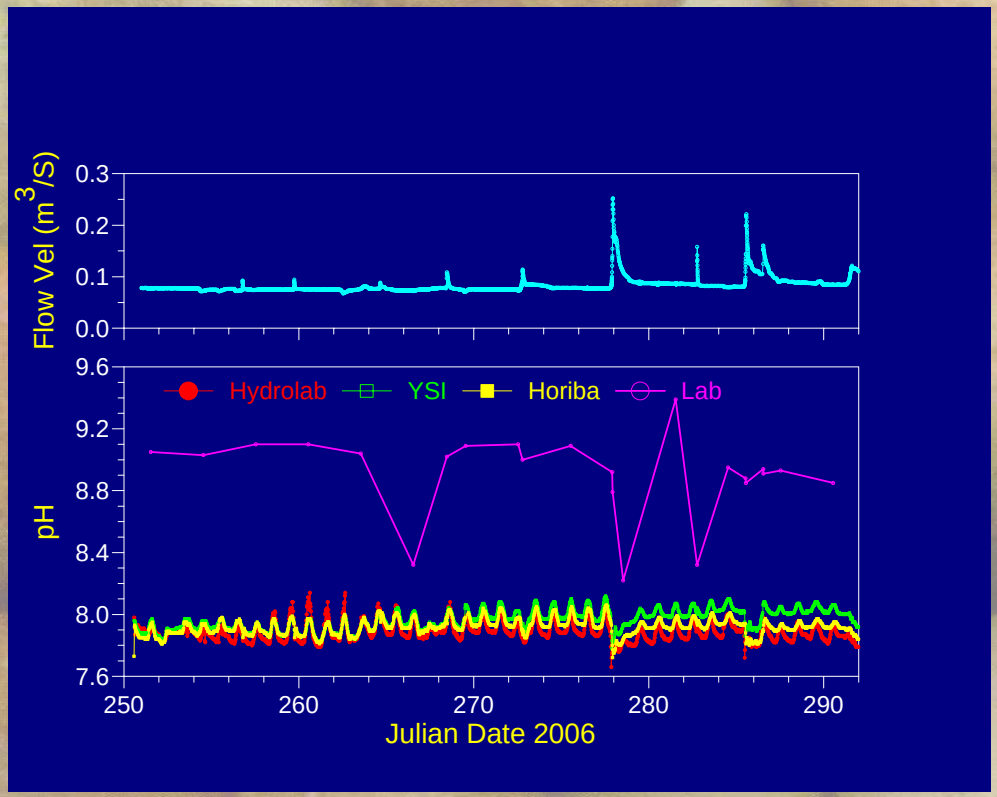
Results and Discussion





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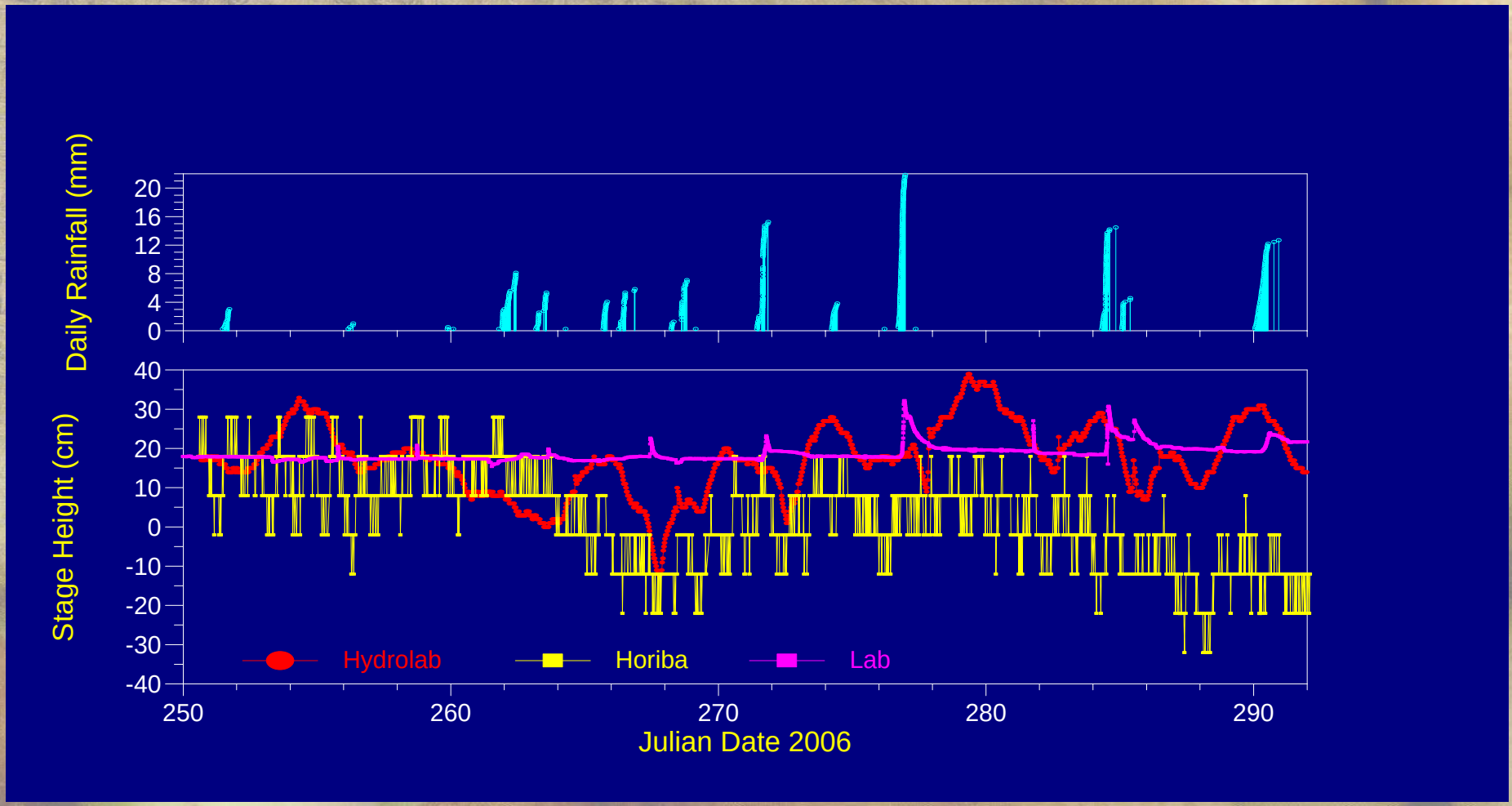

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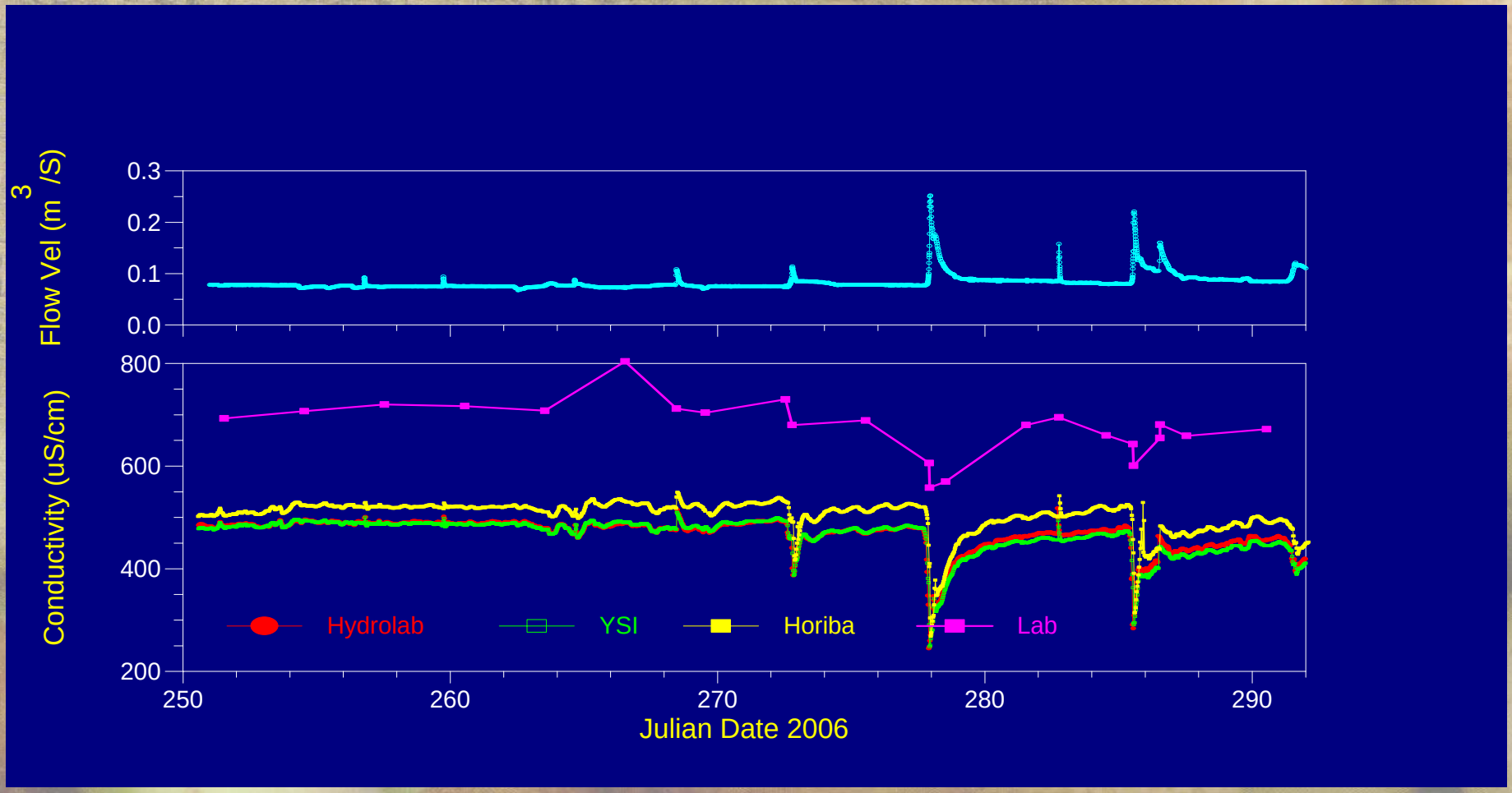

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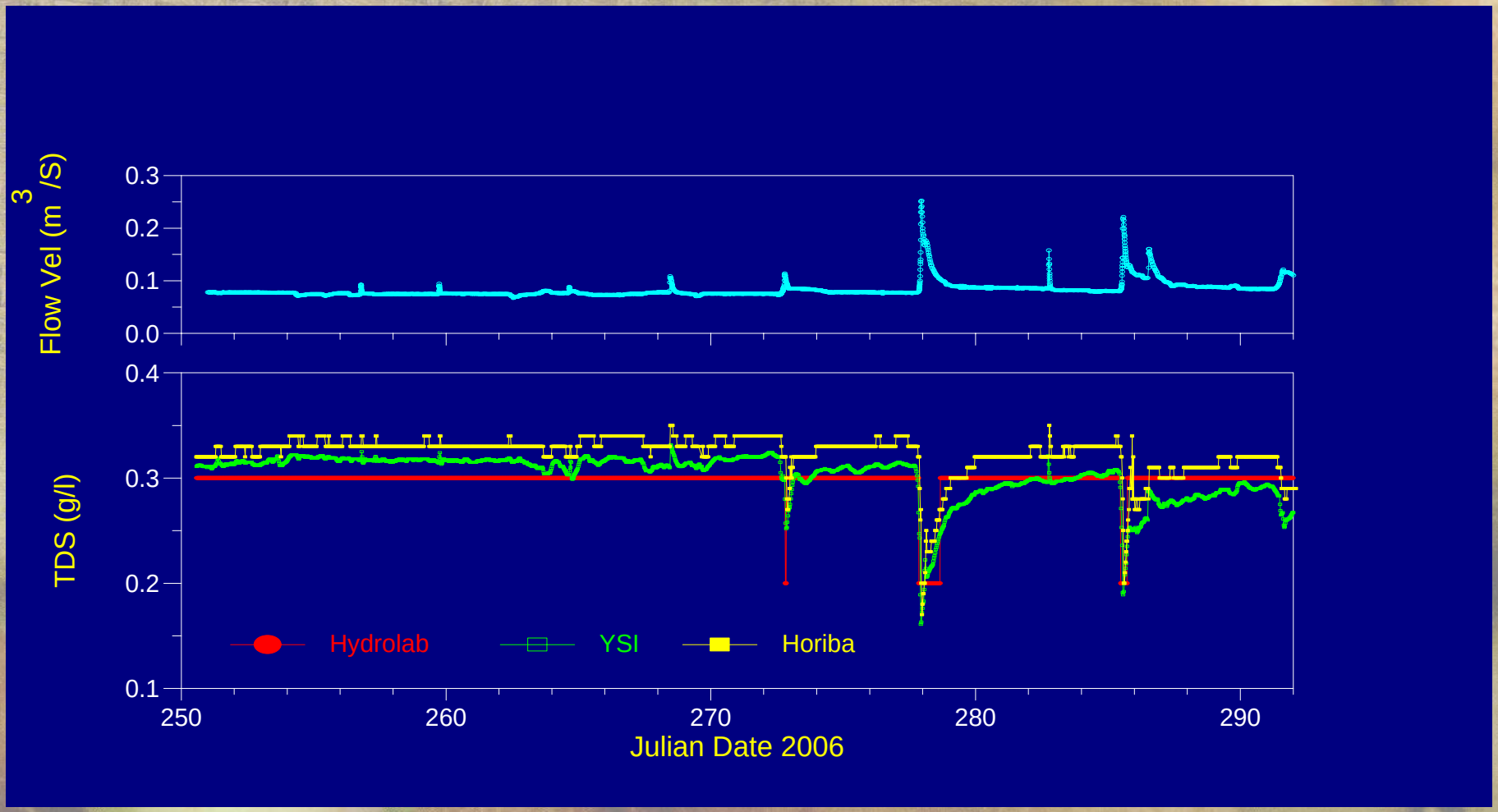

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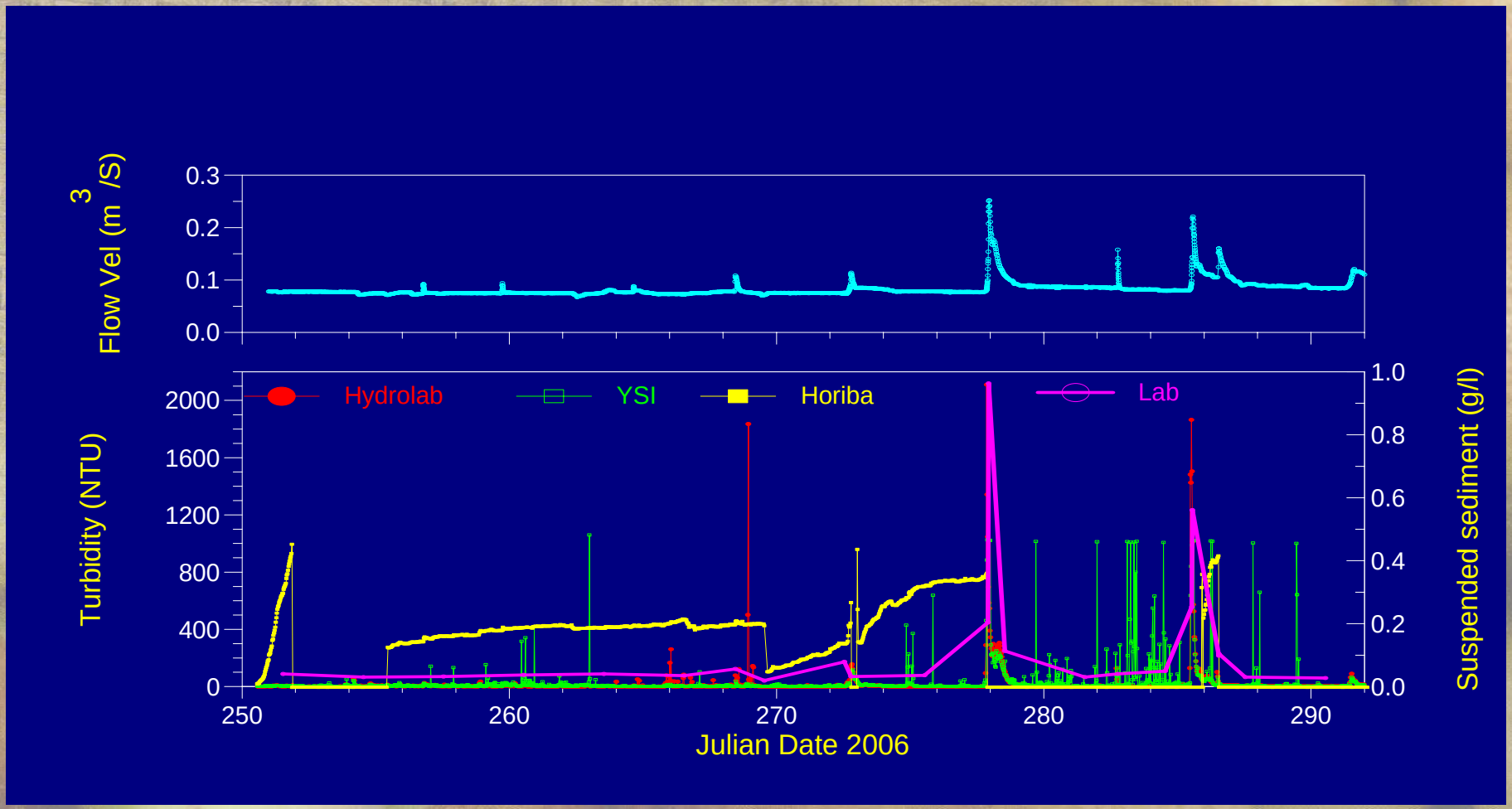

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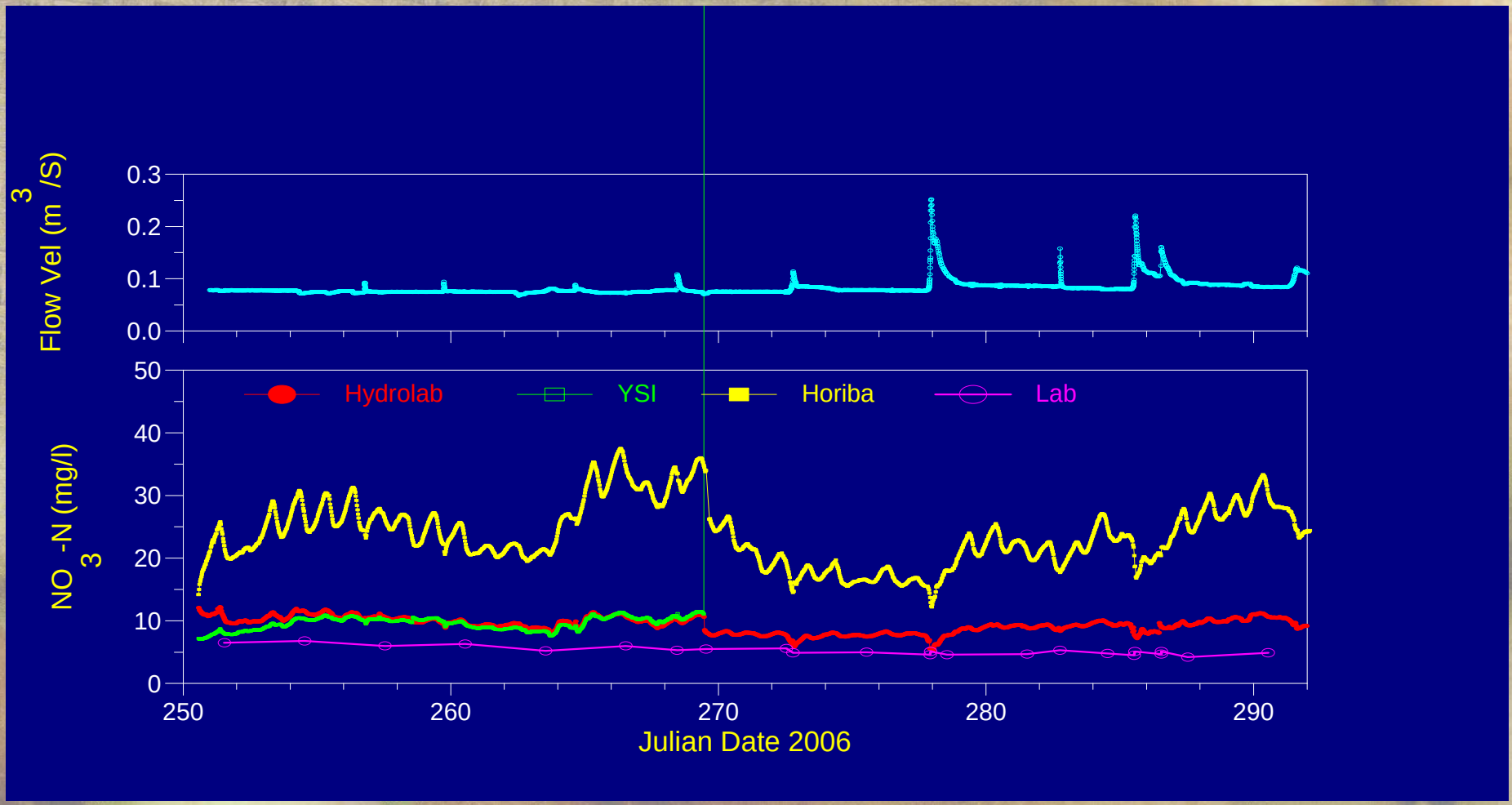

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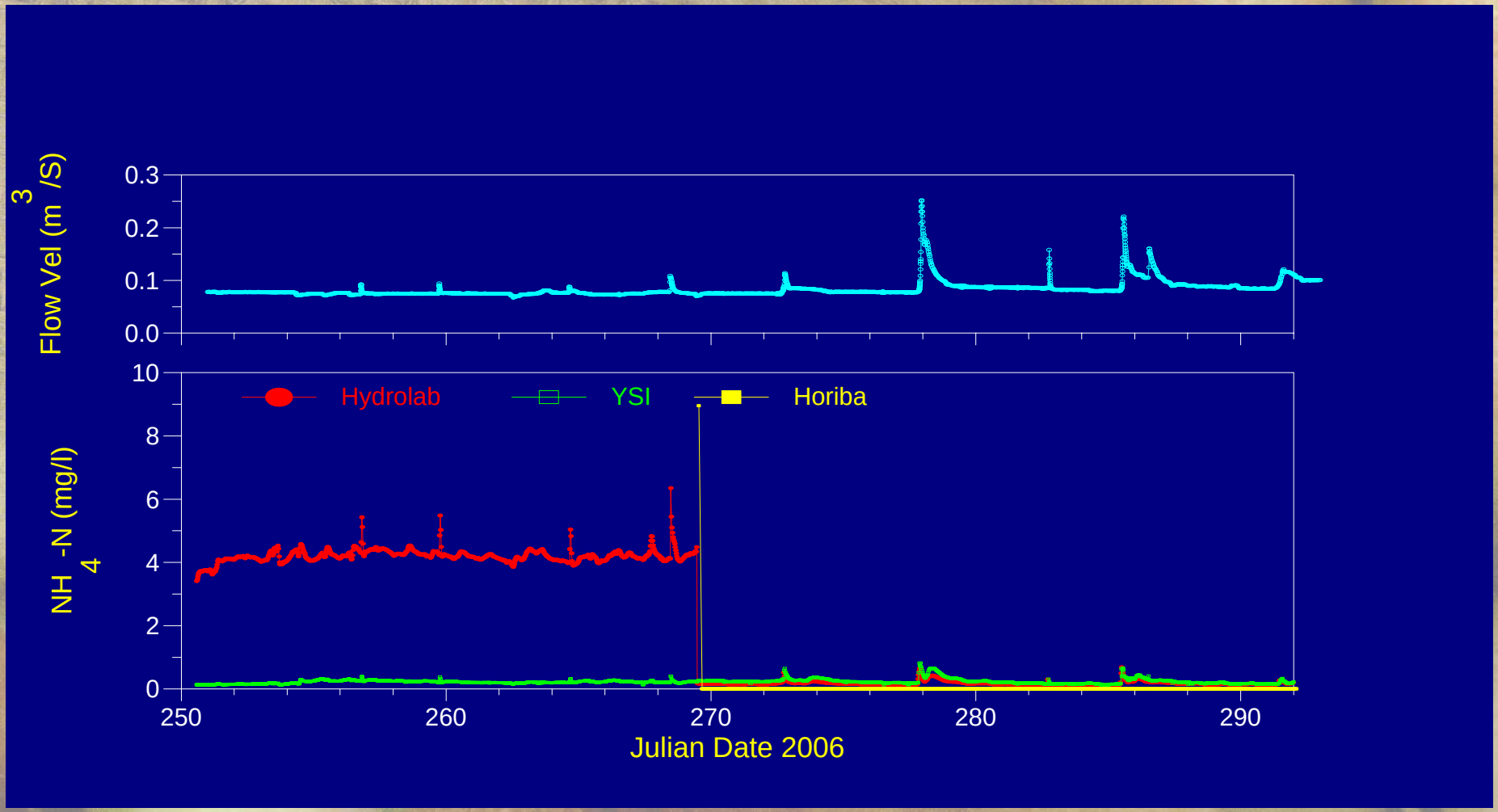

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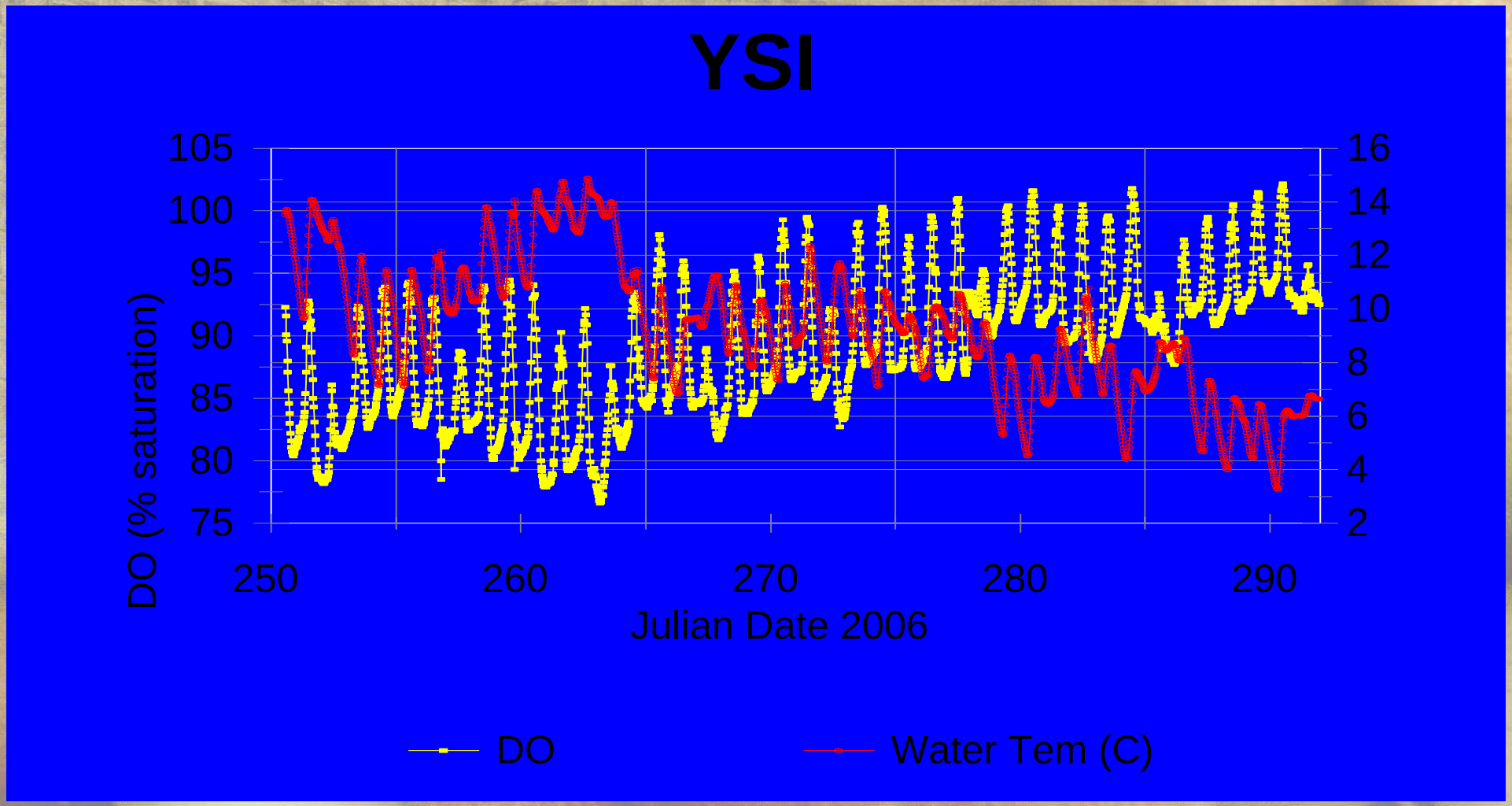

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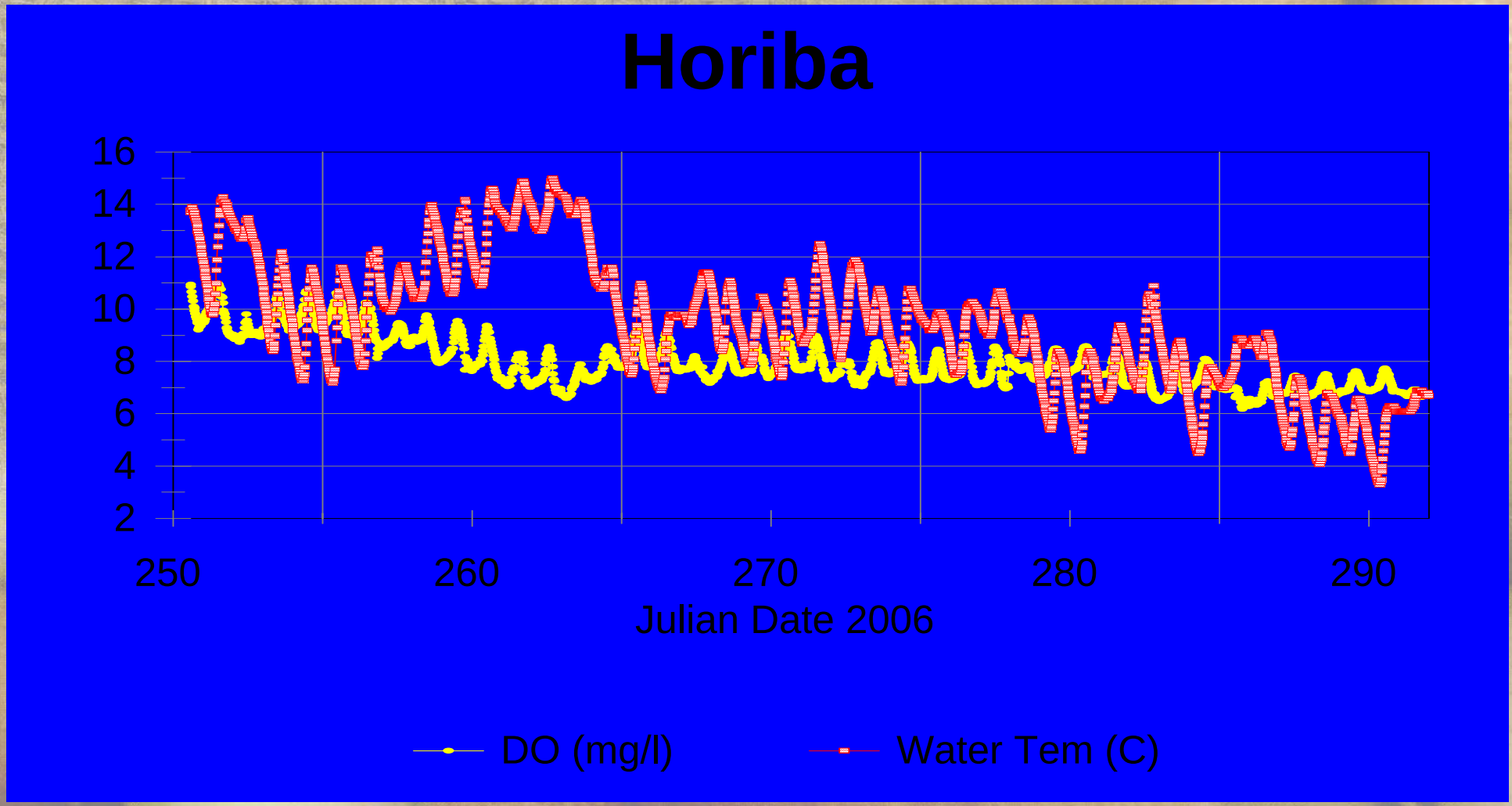

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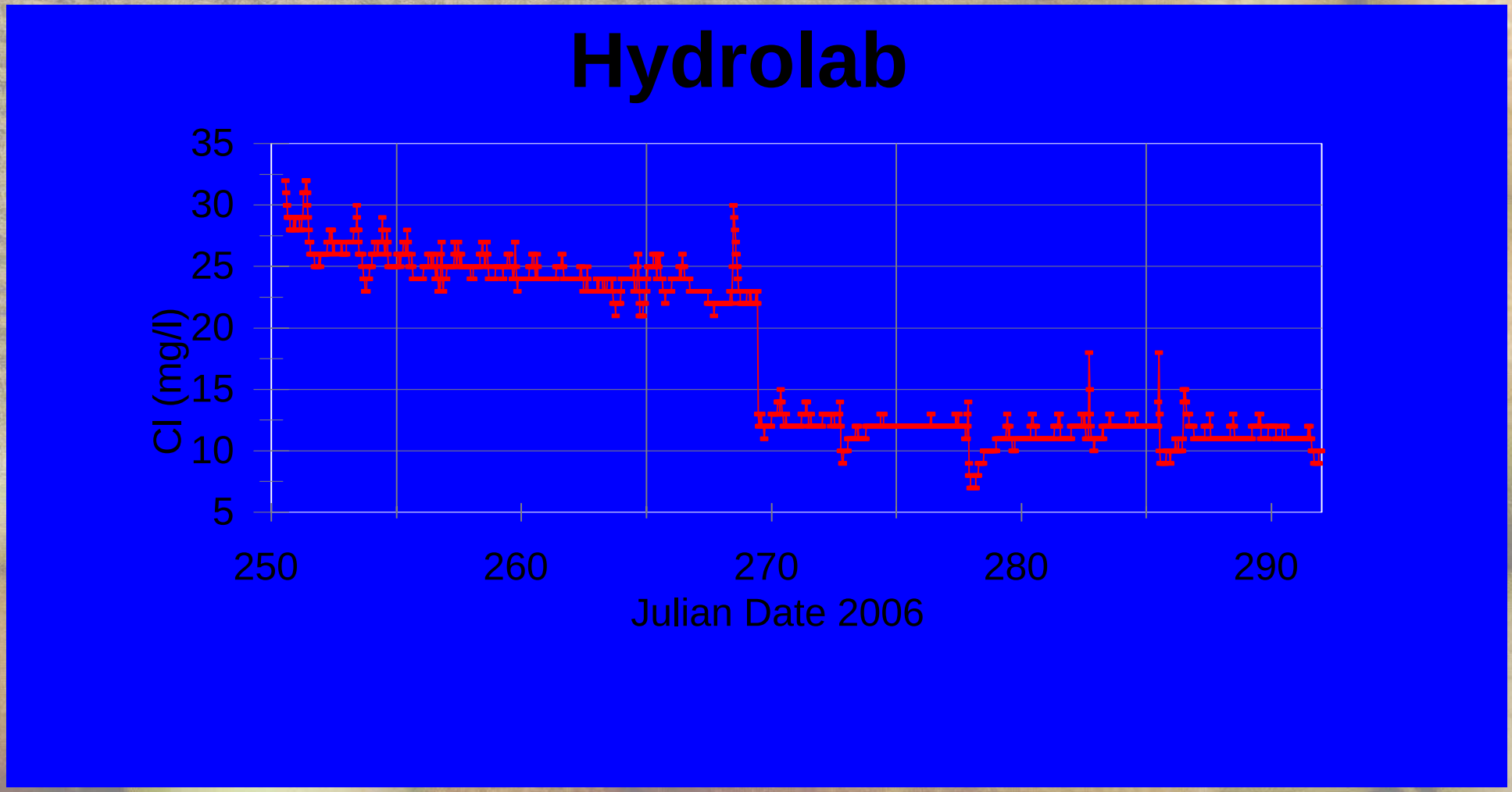

Preliminary Conclusions

- Water temperature, pH and specific conductivity compared favorably between sondes;
- Water temperature and conductivity monitored with sondes followed similar trend of the auto-sampling/lab-analysis results;
- Sondes failed to monitor small change in stage heights and may be attributed to barometric pressure changes;
- Turbidity monitored with sondes failed to reflect changes in suspended sediment concentration;
- Hydrolab and YSI seem to track nitrate and ammonia reasonably well, but with concentration higher than the lab data;
- Not recommend to replace the lab method with the sondes until such time when the results are more realizable.

Thank You

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