DOM: sources, variability and insights

Evaluation of dissolved organic matter occurrence, spatial and temporal variability through spectroscopic analysis and chlorophyll-a.

Context

Dissolved organic matter (DOM) qualitative and quantitative analyzes allow a better understanding of water quality dynamics in a reservoir.

Objectives/Goals

- Identify DOM sources, variability and decay
- Evaluate DOM spatial and temporal variability
- Identify algae occurrence and variability throught space, time and depth.

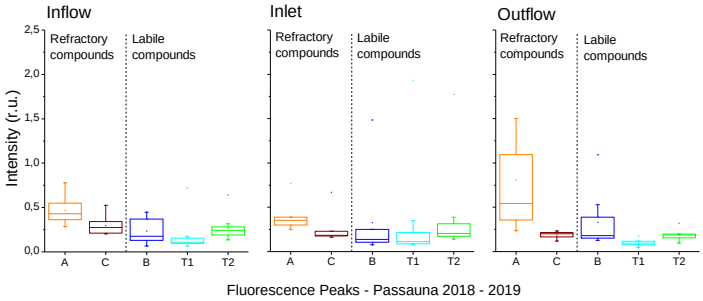
Methods

Dissolved organic carbon	Small sample volume (40 mL), membrane filtration (0,45 µm), NDIR high-temperature catalytic method (Shimadzu).
Organic matter characterizatioin	• Emission-excitation fluorescence and uv-vis absorbance spectroscopy techniques. • Small sample volume (10 mL), membrane filtration (0,45 µm). • Data treatment required for peaks identification (DOM classification).
Chlorophyll-*a*	• 3 L sample collection, dark mantainance and same day filtration. • Pigment extraction through 90% acetone with GF/C filters. • Absorbance measured at three wavelengths (664, 665, and 750 nm).

Results

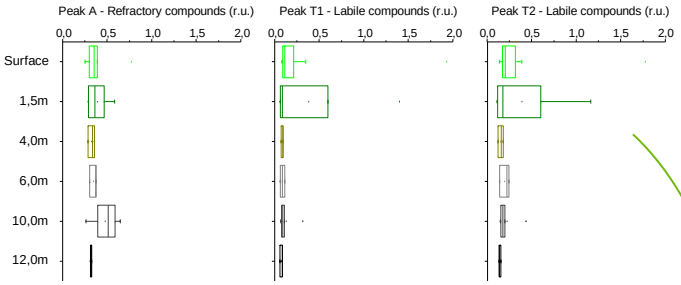
- Differentiation between **labile and refractory organic matter**.
- Ocurrence of **algae and primary production** throught the reservoir.
- Probable **algae death and sedimentation** (bottom labile DOM)

Figure 1: Variation of fluorescence peaks intensity for Inflow, Inlet and Outlet [Passaúna 20-18 -2019]

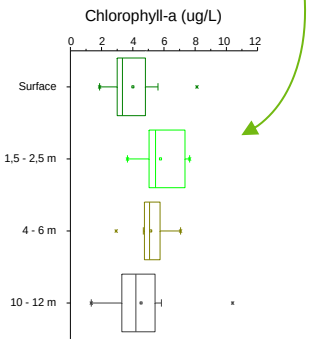


✓ Predominance of refractory compounds at Inflow (indicating pedogenic material loading) and at Outflow (humic substances from bottom layers of the reservoir)

Figure 2: Variation of peaks intensity for Inlet [Passaúna 20-18 -2019] in different depths



✓ Evidence of autochthonous production in the photic zone (higher intensity and variation of peaks T1 and T2, and presence of algae (higher concentration of chlorophyll-a)



Left : Image of Passaúna's Reservoir during a field trip (August/2018).

Right : Example excitation-emission matrix (EEM) and the identification of peaks related to different organic matter characteristics (labile and refractory).

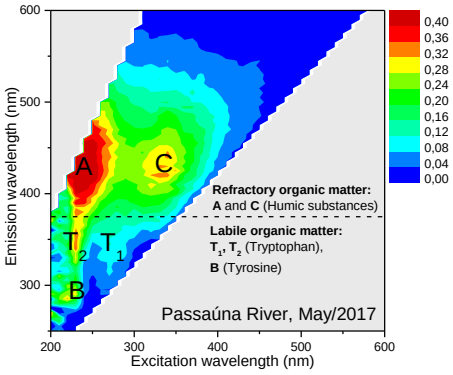
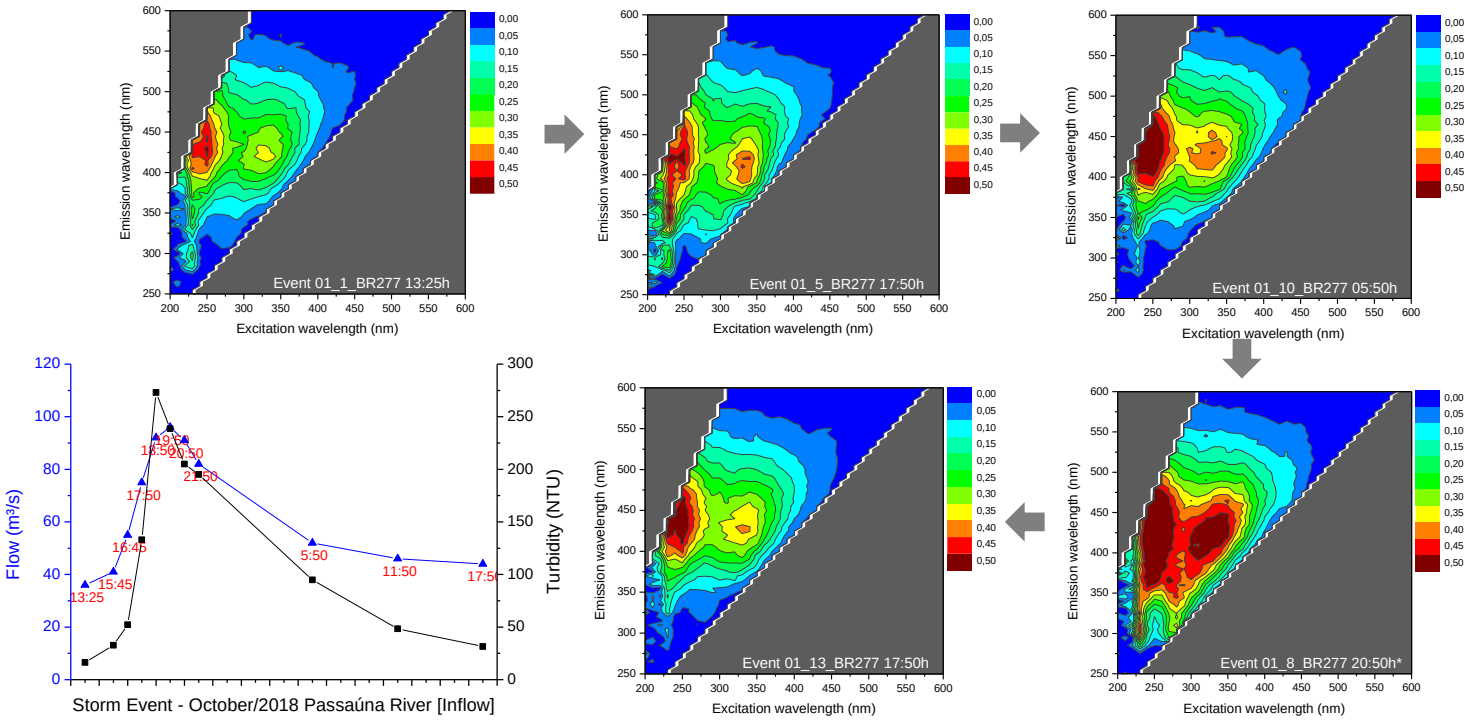
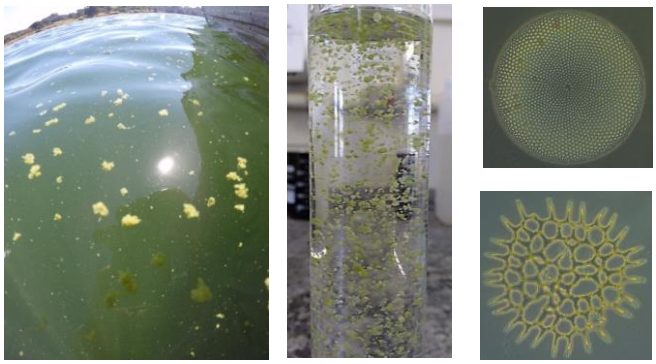


Figure 3: Variation of EEM during a storm event (October/18)



- ✓ Predominance of refractory compounds during the storm event (indicating pedogenic material loading) at Inflow.

Figure 4: Occurrence of algae at Passaúna's Reservoir



Innovation/Outlook

- ✓ Rapid organic matter sources identification (allochthonous x autochthonous x antropogenic).
- ✓ Improved information for reservoirs's operatin and management (DOM x algae occurrence x taste and odour in water).
- ✓ Potential use of DOM characteristics for in-situ probes calibration.

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