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Consequences of a dam flushing operation on concentration and fluxes of suspended sediment and associated contaminants in the Rhône River

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Management of a sediment observatory : specific case of the Rhône River in France

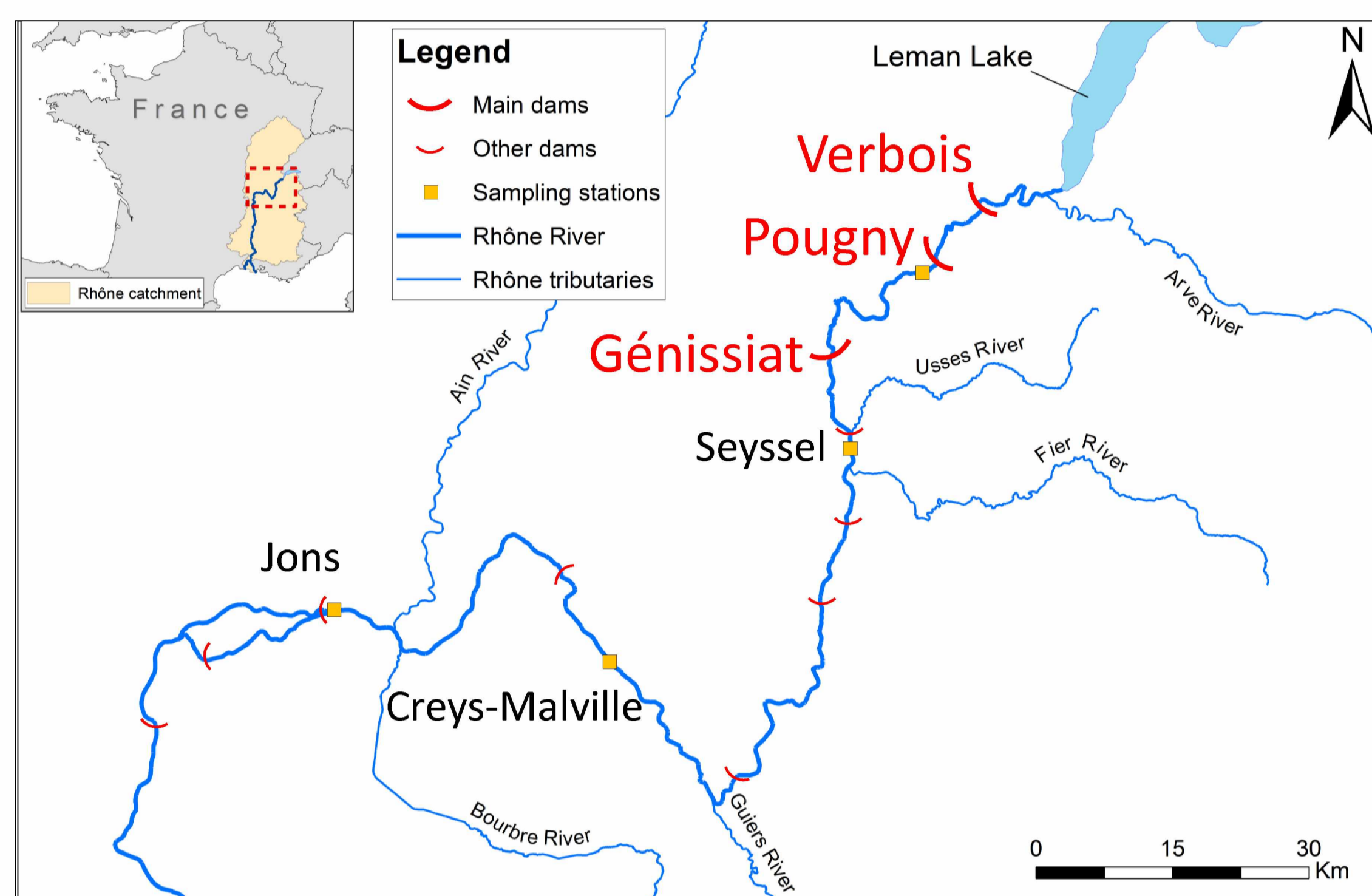
Context

- **Rhône Sediment Observatory (OSR):** investigate the dynamics of sediments and quantify suspended particle matters (SPM) and the associated contaminant fluxes (metals, radionuclides, organic compounds...).
- **Rhône River:** from Lake Geneva to the Mediterranean Sea (~500 km); 21 dams impact sediment transport and **dam flushing operations are regularly organized to remove sediments stored in reservoirs.**

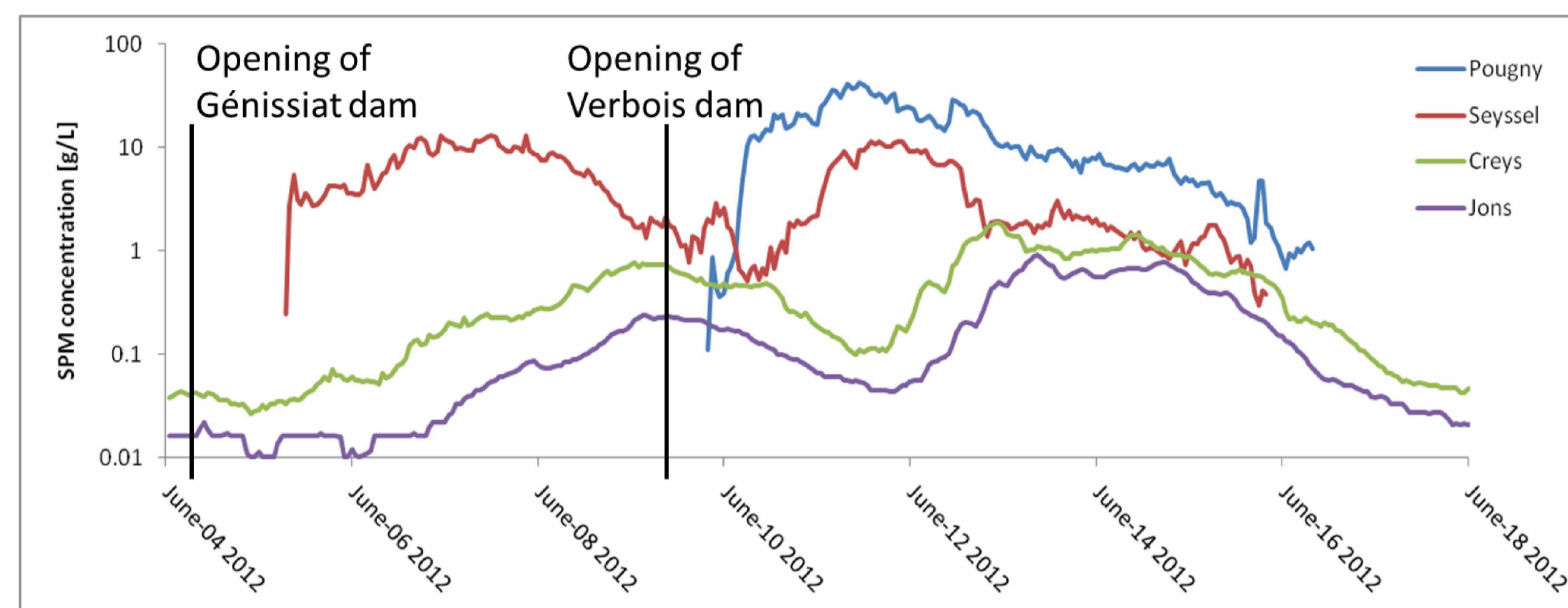
Objectives

- ☐ Evaluate the impacts of dam flushing operations on concentrations and fluxes of SPM and associated contaminants
- ☐ Investigate the origins of spatial and temporal variations of concentrations observed during dam flushing events

Flushing operations in June 2012



Flushing process (2 weeks)



Submerged sediment trap

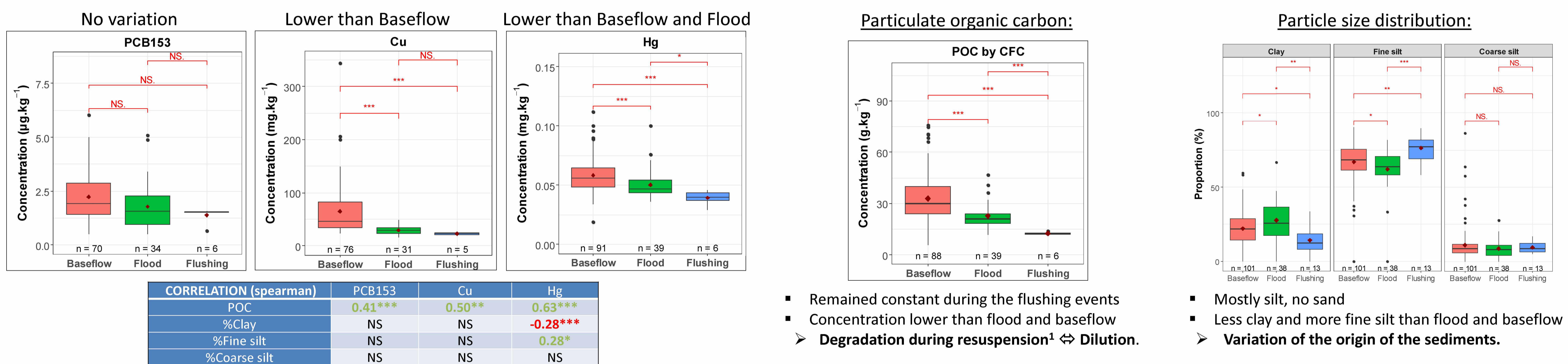


Continuous-Flow Centrifugation

Monitoring operations

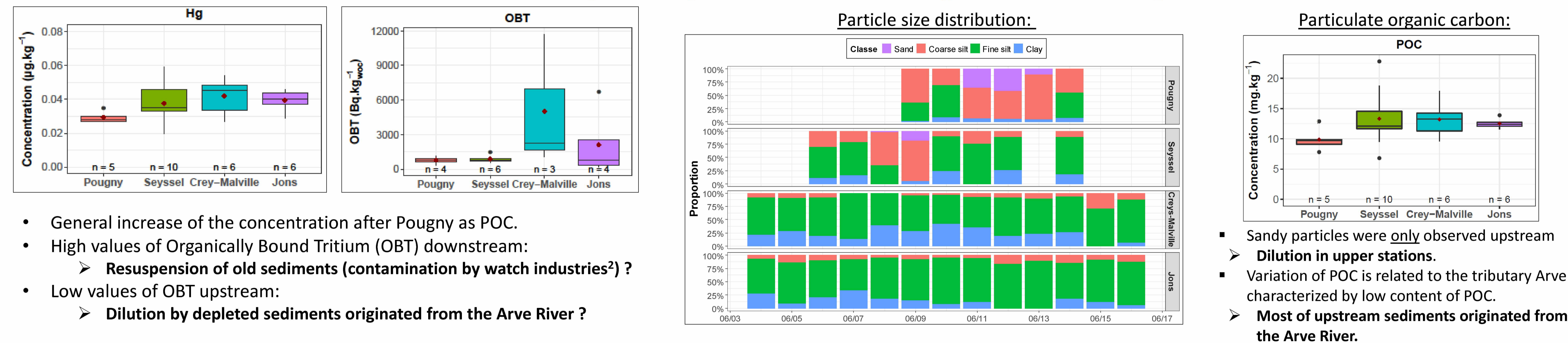
- Sampling location:**
- Near the dams : Pougny and Seyssel
 - Intermediate station : Creys-Malville
 - Permanent monitoring station : Jons
- Parameters measured:**
- Discharge
 - SPM content
 - Particle size
 - POC
- Contaminants characterized:**
- Heavy metals
 - Trace elements
 - Organic compounds
 - Radionuclides

Are the contaminant concentrations different during dam flushing than during flood or baseflow ?



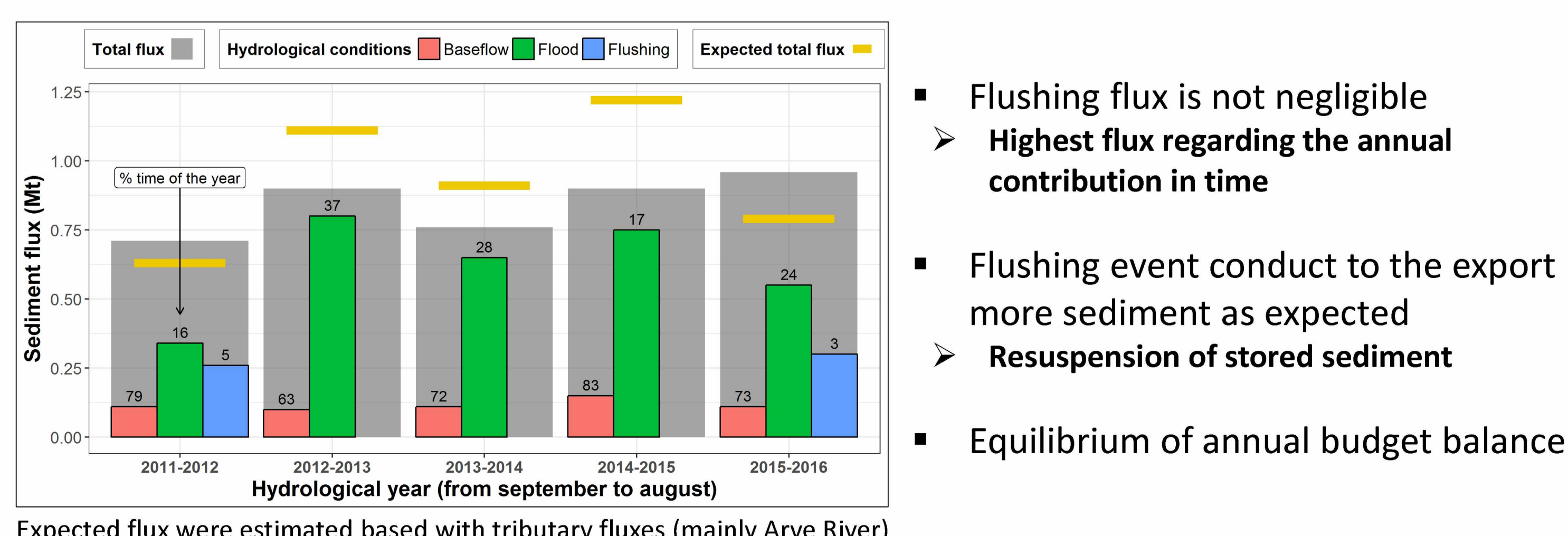
Most of the contaminant concentrations were constant or decreased during the flushing events. These variations are mainly related to POC content that were also lightly correlated with particle size.

Are the contaminant concentrations spatially different during dam flushing ?



Lower contaminant concentrations upstream were related to coarse particles as sand. Most of them were also correlated with POC and were originate from the Arve River depleted in POC.

What do dam flushes add to annual fluxes ?



Highlights

- Monitoring flushing event is necessary to understand sediments and associated contaminants transport and behavior,
- Variation observed are mainly related to the POC concentration,
- Particle size correlations were only observed when studying the spatial variation,
- In the vicinity of the dams => sediments are mostly newly eroded but were rapidly stored in the upstream reservoirs,
- For downstream stations => old sediment previously stored and resuspended by high discharge,
- Fluxes during flushing crucial to balance the annual budget.