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Evolution of the sources of storm particulate organic matter along a forested nested catchment?



Impact of granulometry and climate

Laurent JEANNEAU¹, Richard D. ROWLAND² and Shreeram INAMDAR²



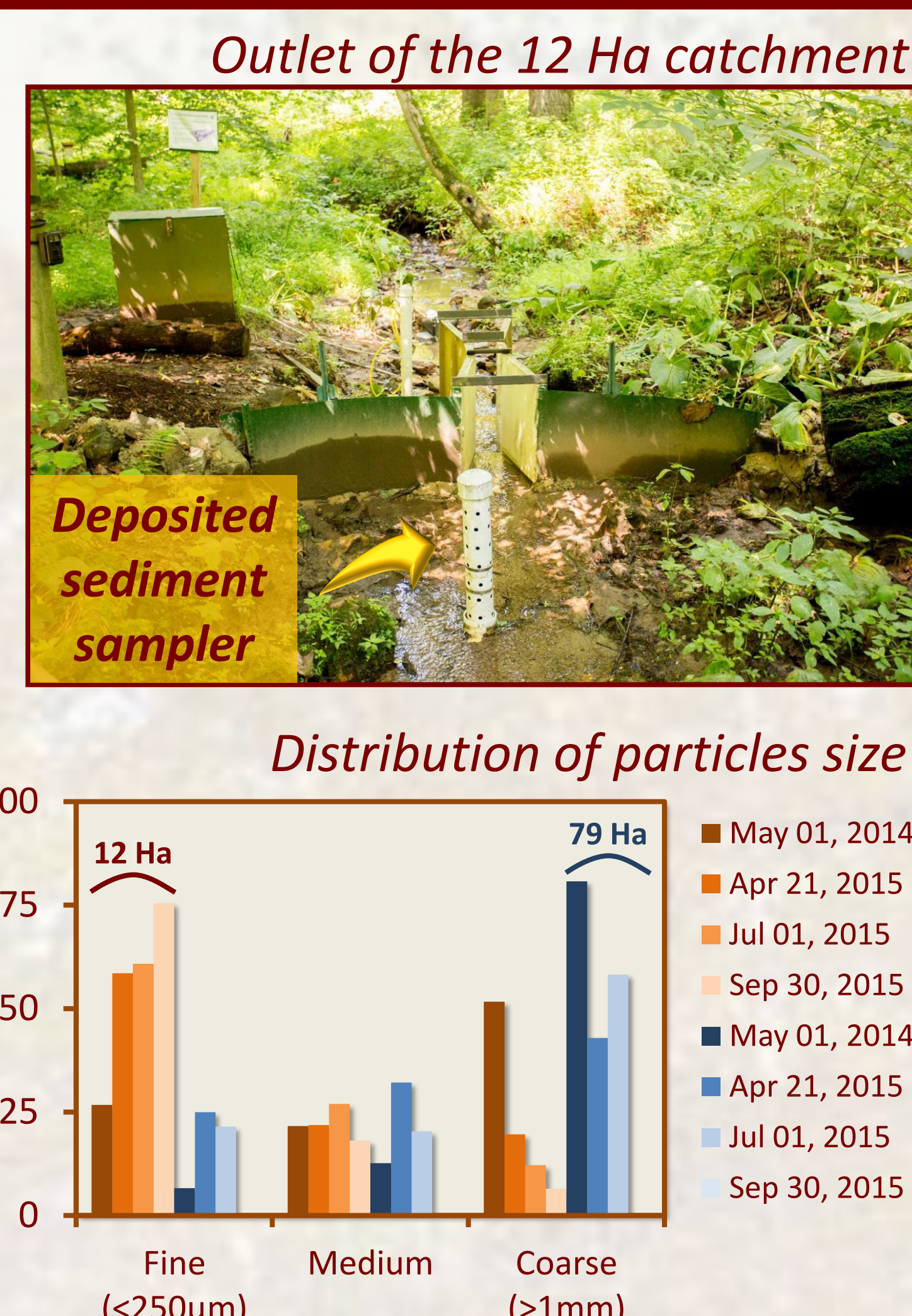
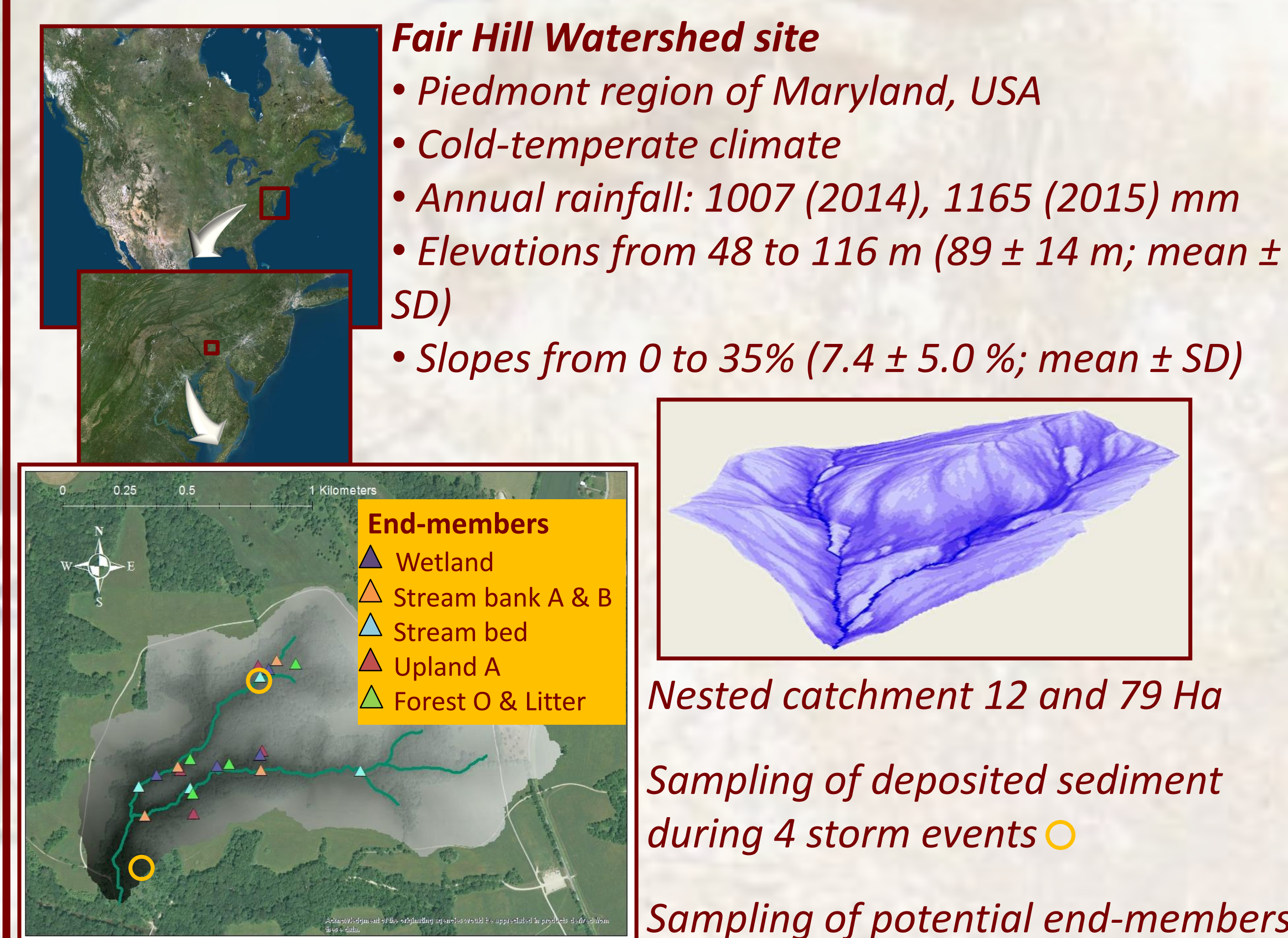
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Context and question

Particulate Organic Matter (POM) plays a key-role toward biodiversity, ecotoxicology and within the C cycle. POM exported within the fluvial suspended matter load during storm events may represent up to 80% of its annual load.

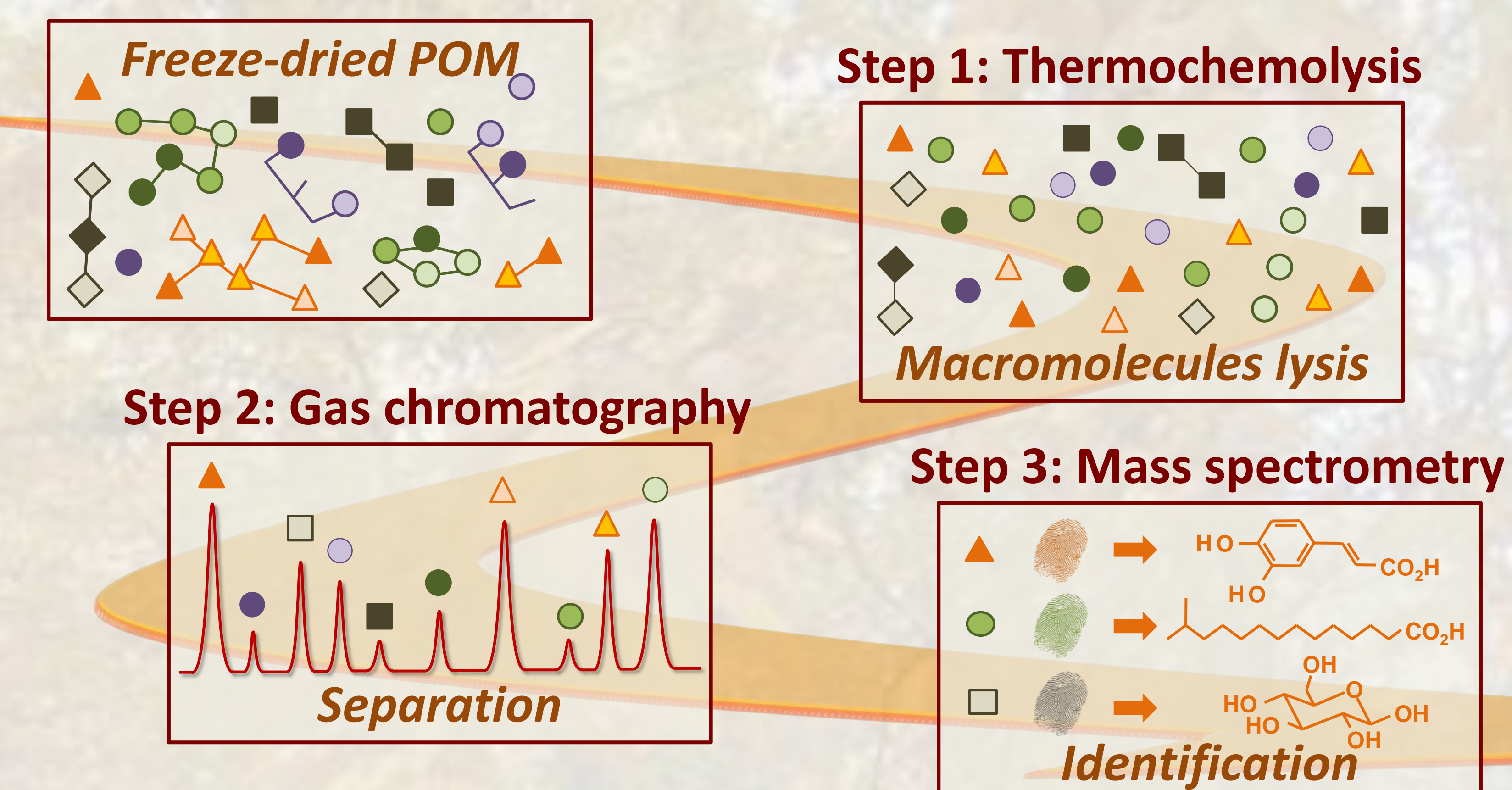
1. Where does this POM come from?
2. Is it homogeneous along the particle size continuum?
3. How its source may change down a continuum of catchment drainage locations?
4. Is there a seasonal effect?

Sampling area

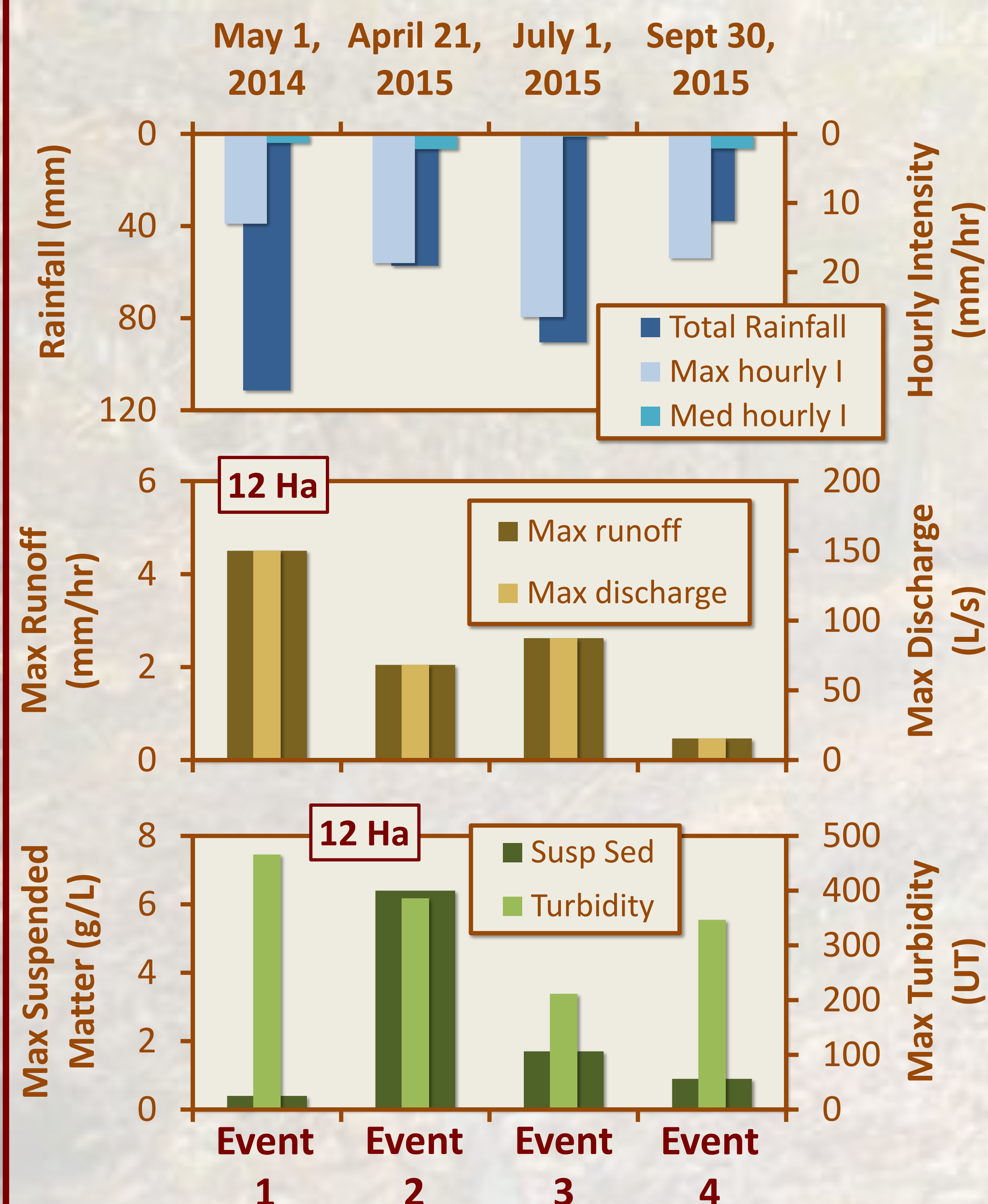


Investigation at the molecular scale

Thermally assisted hydrolysis and methylation



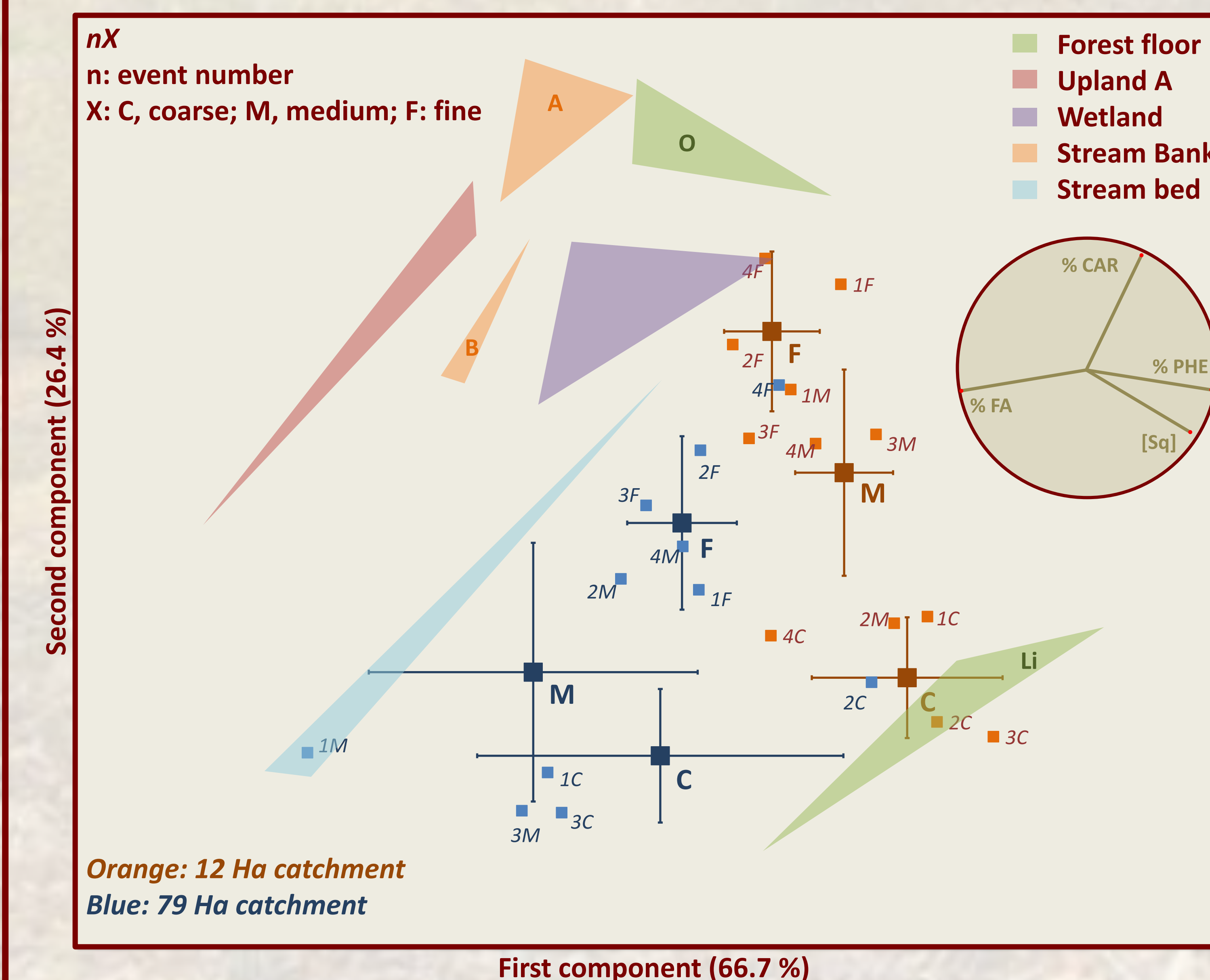
Hydrological data



Results of the molecular analysis

1. First PCA treatment based on the distribution of the type of molecules

Individuals: End-members
Variables: % of fatty acids (FA), carbohydrates (CAR), phenols (PHE) among the analyzed compounds and the sum of the area per gram of analyzed sample.



Differentiation between the potential end-members. Specific areas are increased by spatial heterogeneity.

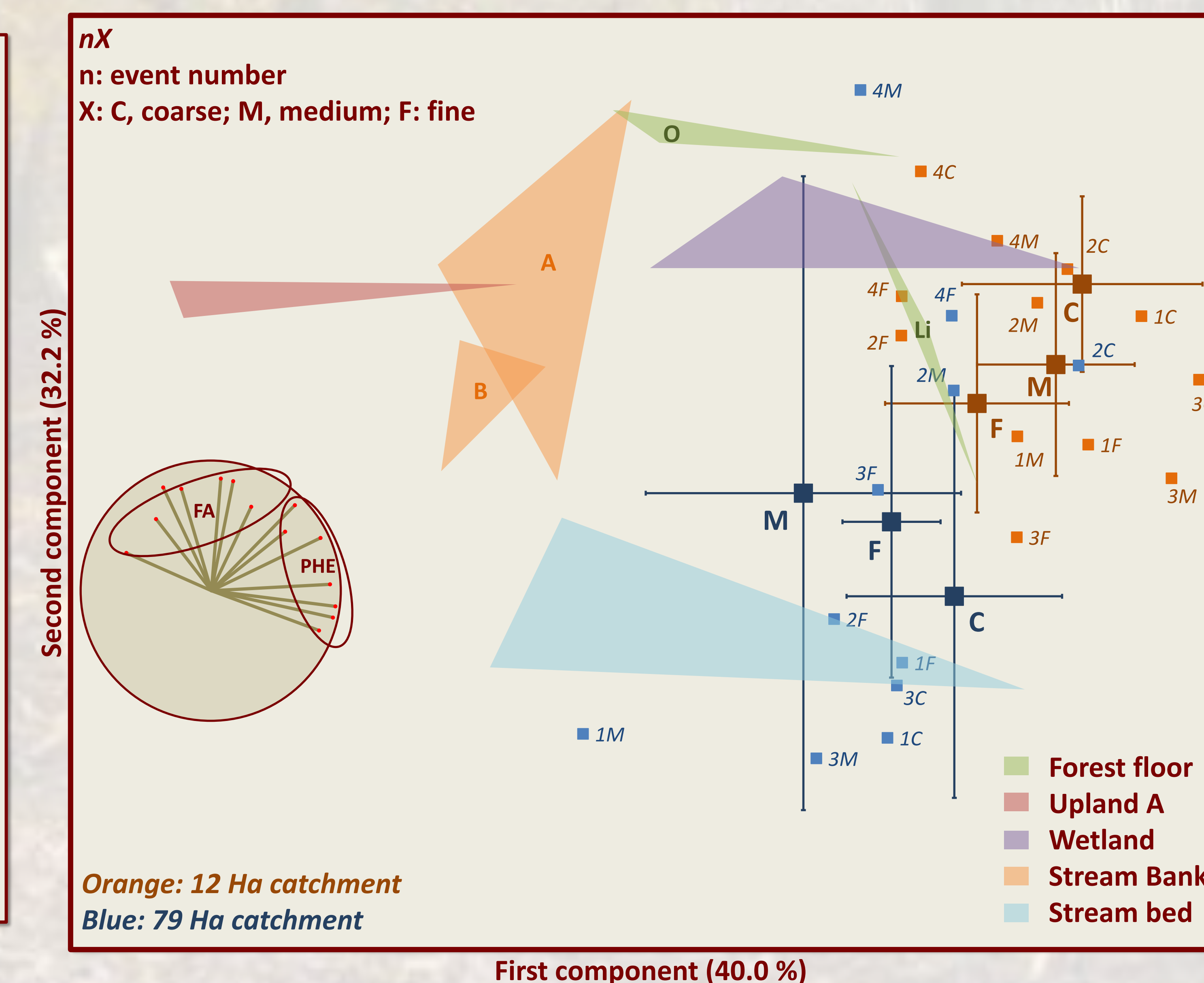
The composition of POM changed along:

- (1) the catchment (differentiation between the samples from the 12 Ha and the 79 Ha catchments),
- (2) the size continuum from coarse to fine fractions and
- (3) the year.

The 12 Ha catchment POM derived mainly from a combination of Litter, Forest O and Wetland A horizons. The contribution of stream bed increased downstream.

2. Second PCA treatment based on the distribution of plant-derived markers

Individuals: End-members
Variables: Relative proportion of the eight most abundant PHE and plant-derived FA.



Discussions and message to carry back

- In the 12Ha catchment, the POM mainly derived from litter, wetland A and forest O horizons. Their relative contributions changed along the particles size continuum and from one event to another.
- At the scale of the headwater catchment, the sources of POM changed with an increasing proportion of stream bed-derived POM downstream. Going downstream seems to decrease the differences along the particles size continuum.
- The composition of POC changed along the particle size continuum: different fractions from different sources.
- Investigation at the molecular scale using THM-GC-MS seems to provide fruitful data to determine the sources of POM transferred along nested catchments.

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