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Are human activities main drivers of soil organic carbon losses in mountain rainfed agroecosystems?

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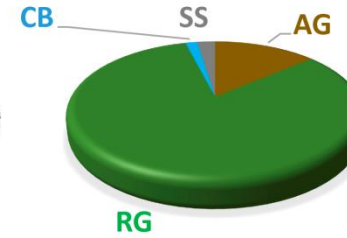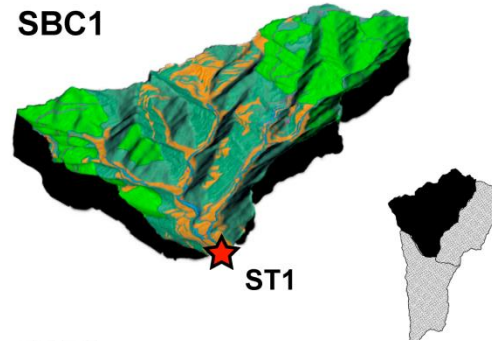 Earth and Life Institute, Belgium
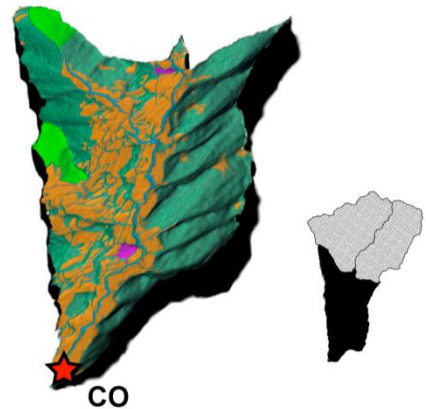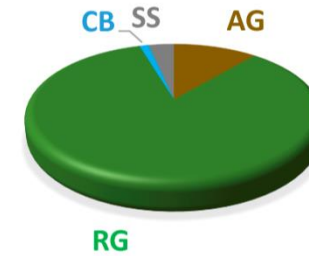[3] University of Lleida, Environment and Soil Sciences, Lleida, Spain

EEAD
Estación Experimental de Aula Dei
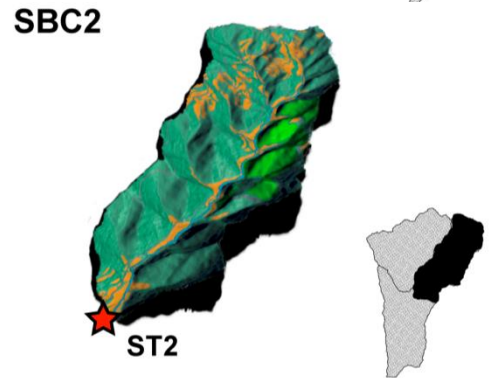
1 UCL Université catholique de Louvain
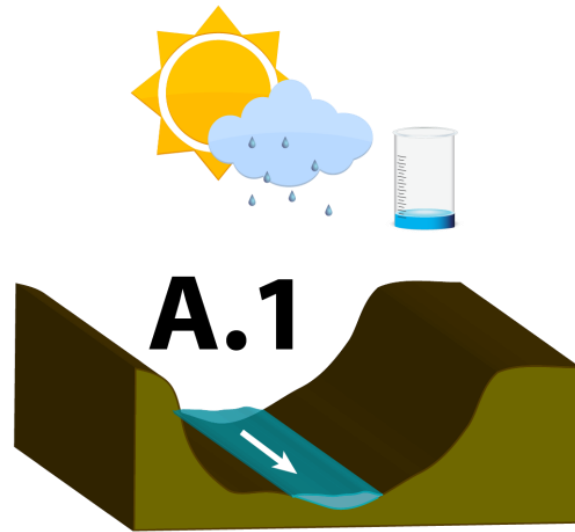
2

3
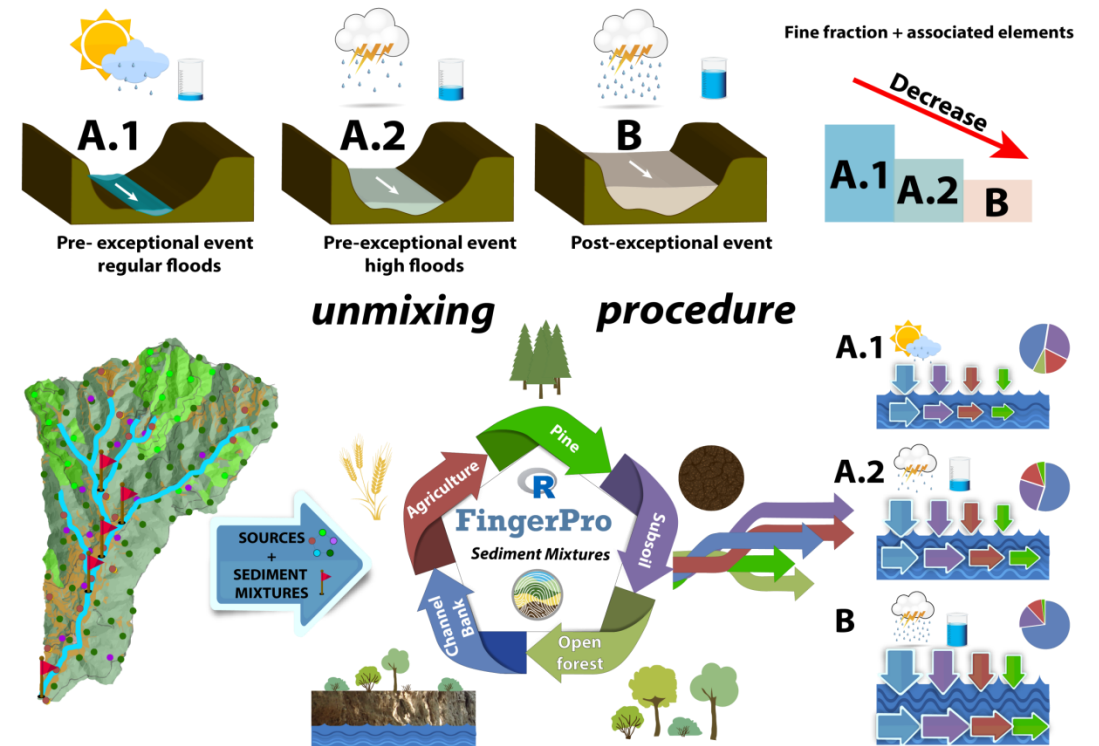
Study area

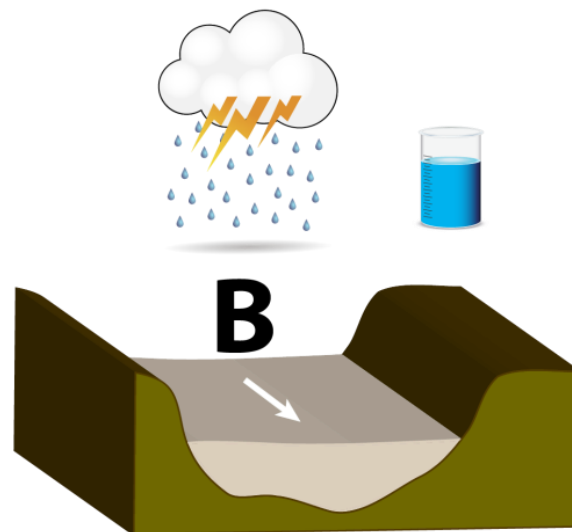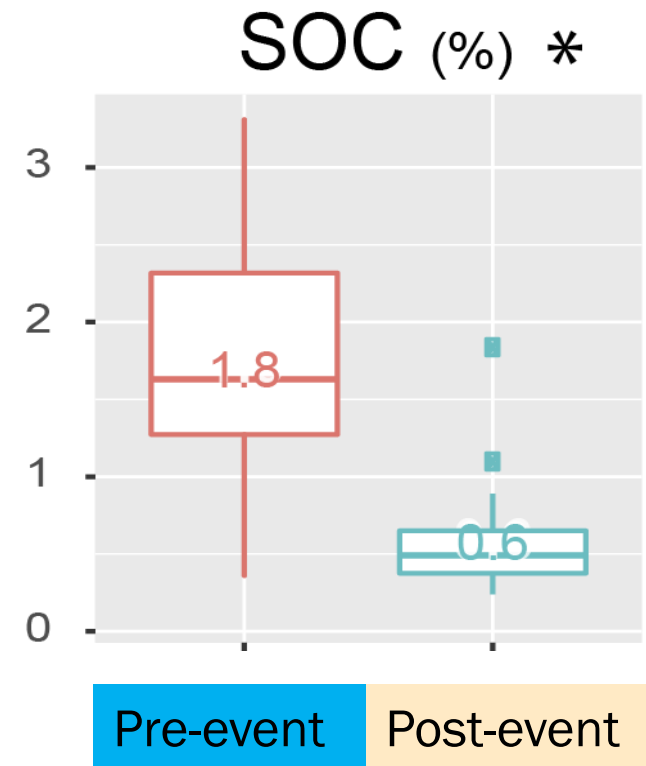Agricultural

Rangeland

Subsoil

Channel bank

SOC variation

A.1
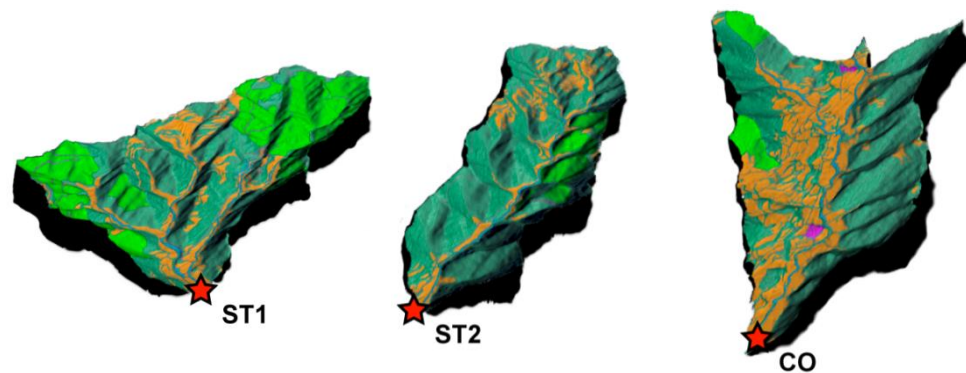Pre-event channel-bed samples under regular floods

B
Post-event channel-bed samples under exceptional floods

SOC (%) *
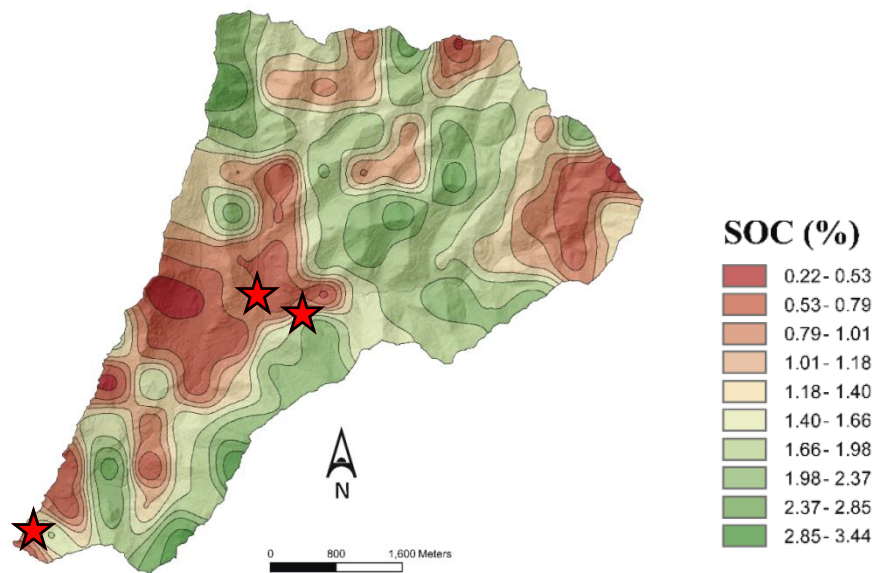
1.8

0.6

Pre-event   Post-event
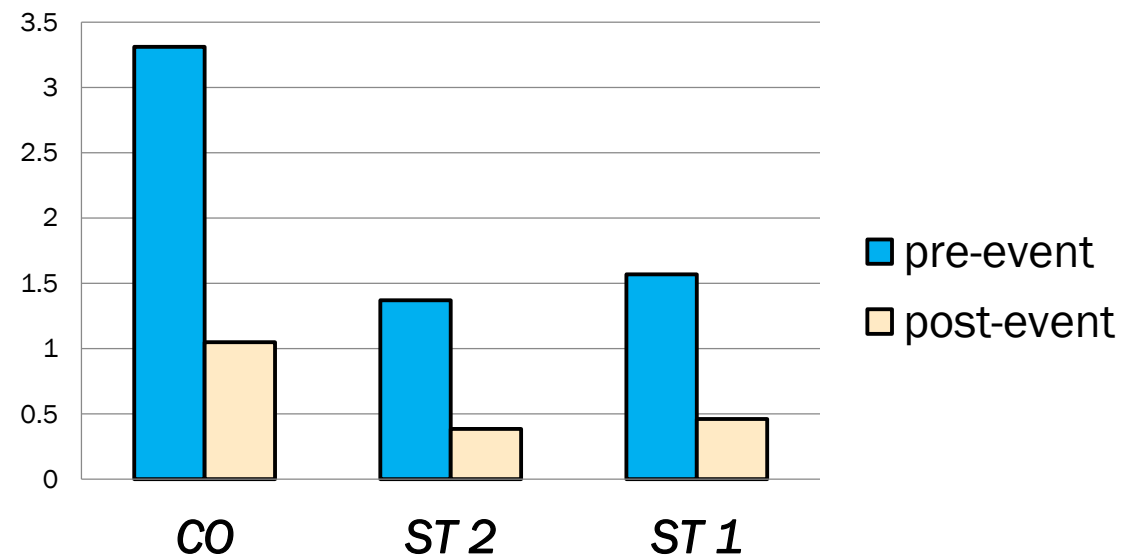
SOC export vs cropland cover

- ◉ SOC contents are higher in rangeland soils at the headwaters,
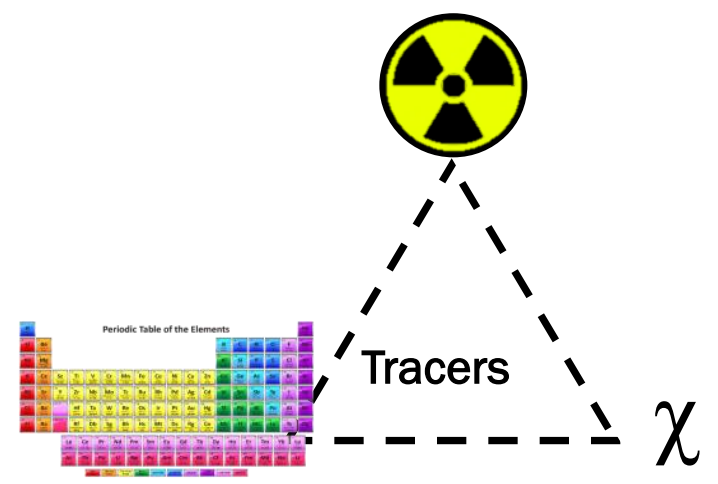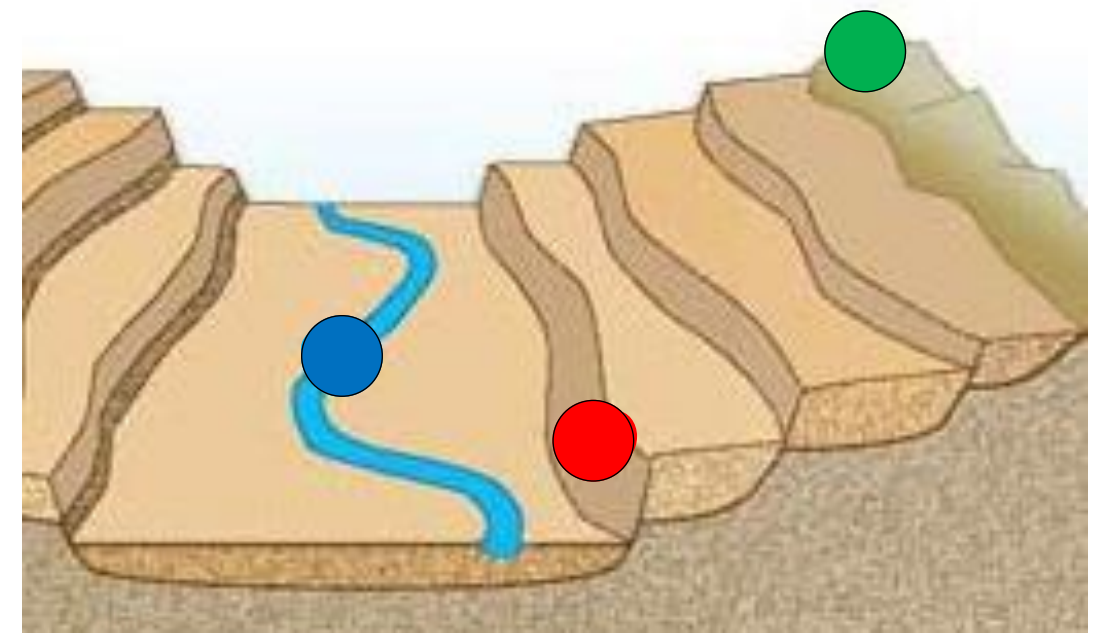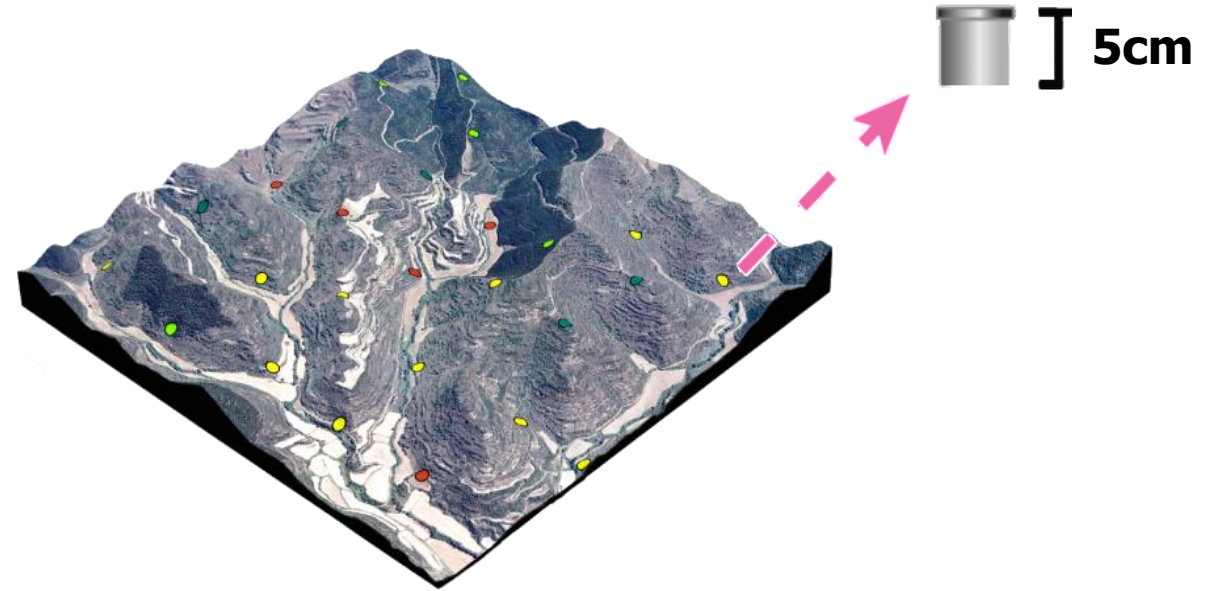- ◉ but highest SOC content is found in channel bed samples at the catchment outlet.

	AG	RG	SS	CB
SOC (%)	2.6	3.4	0.3	0.5
Soil Erosion $Mg\ ha^{-1}\ yr^{-1}$	-31	-6	-	-

SOC (%)
- 0.22- 0.53
- 0.53- 0.79
- 0.79- 1.01
- 1.01- 1.18
- 1.18- 1.40
- 1.40- 1.66
- 1.66- 1.98
- 1.98- 2.37
- 2.37- 2.85
- 2.85- 3.44

SOC (%) variation

- pre-event
- post-event

Fingerprinting sampling and analysis

5cm

Tracers χ

Sources   5 cm | < 0.63

Channel Bank   5 cm | < 0.63

Active channel 5 cm | < 0.63

Unmixing procedure
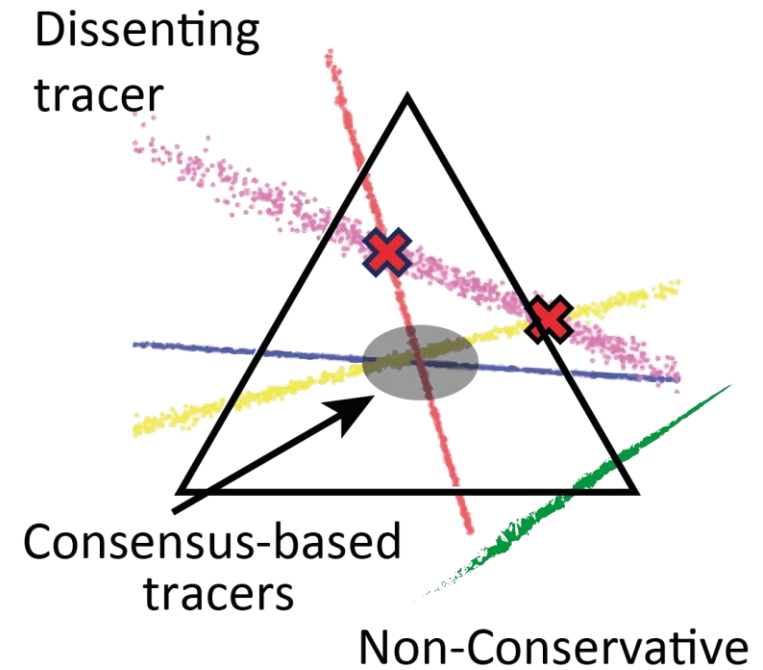
Tracer selection
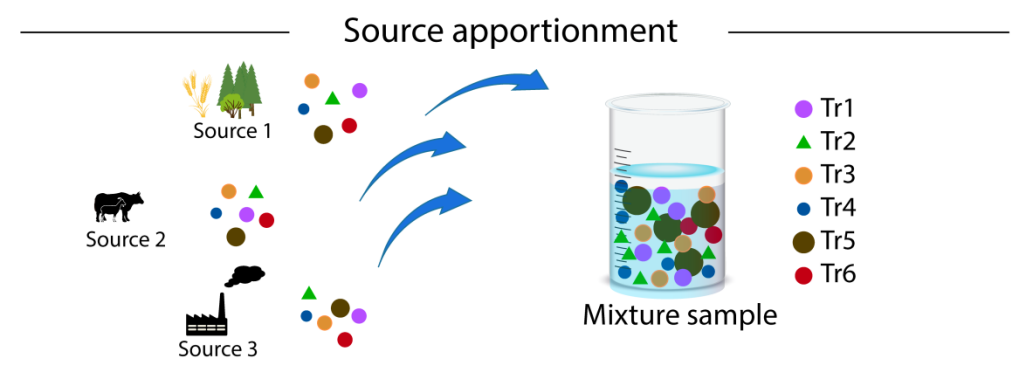
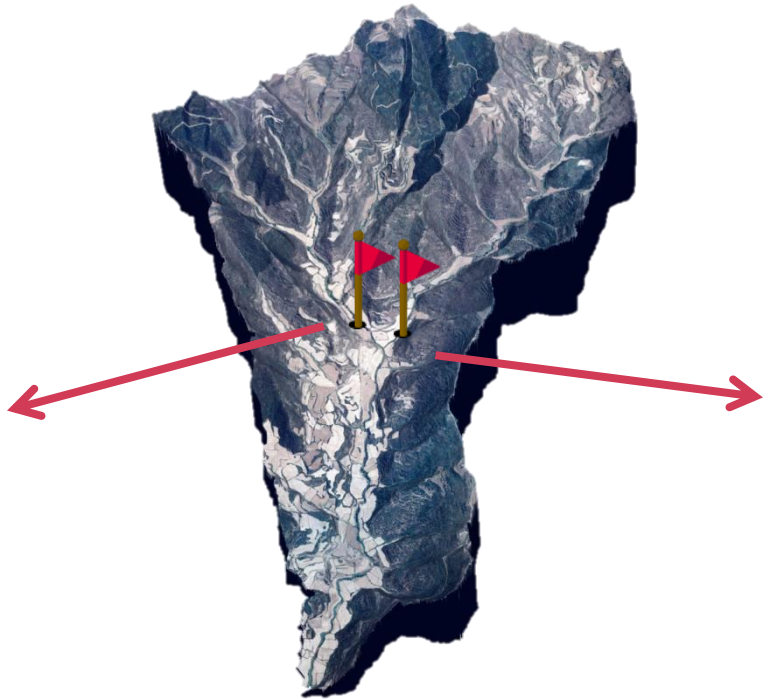# *Consensus method*
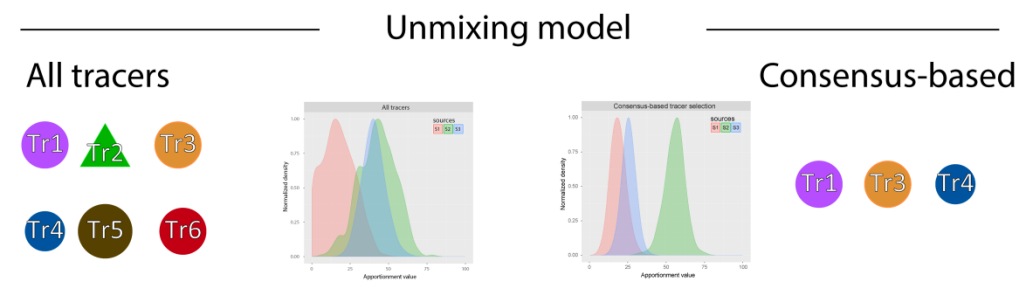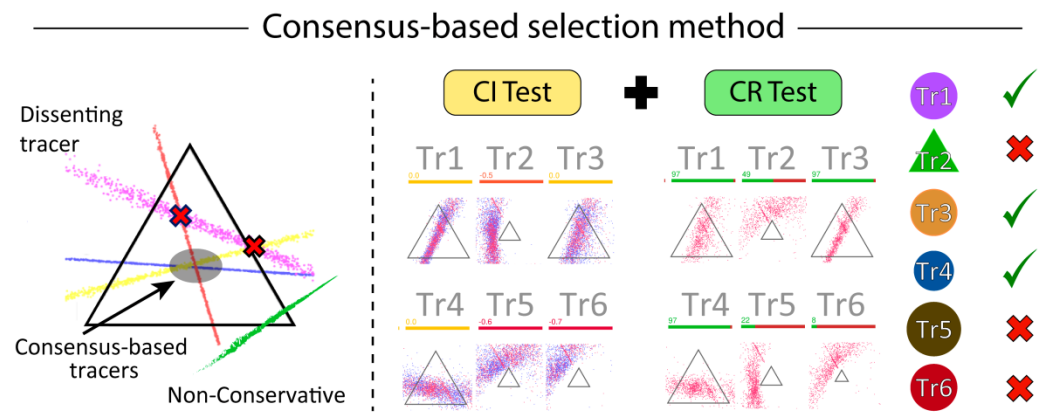
FingerPro model
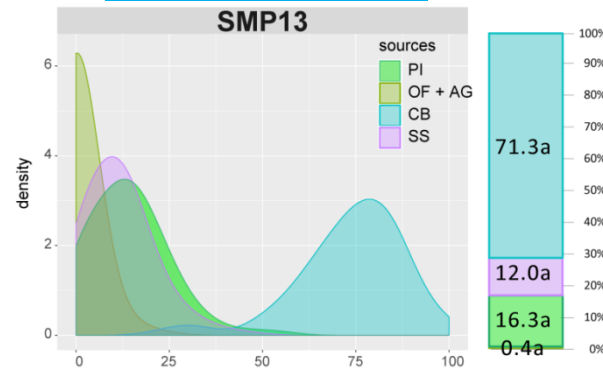

Lizaga.I, Latorre. B, Gaspar.L and Navas.A (2018). fingerPro: Sediment Source Fingerprinting.
R package version 1.1. https://github.com/eead-csic-eesa
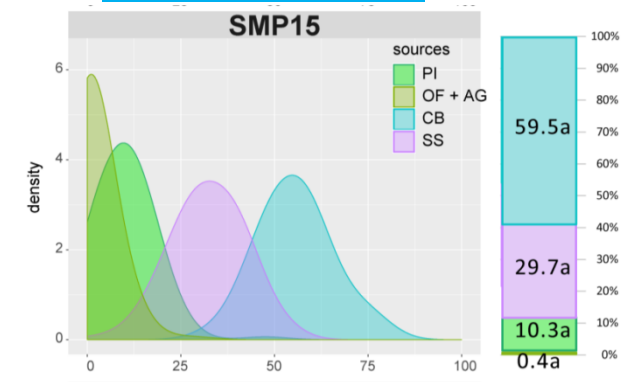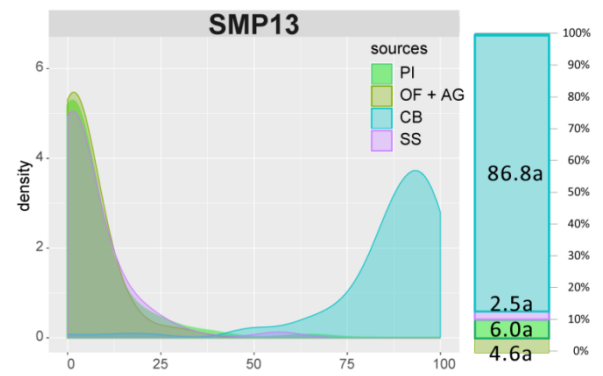
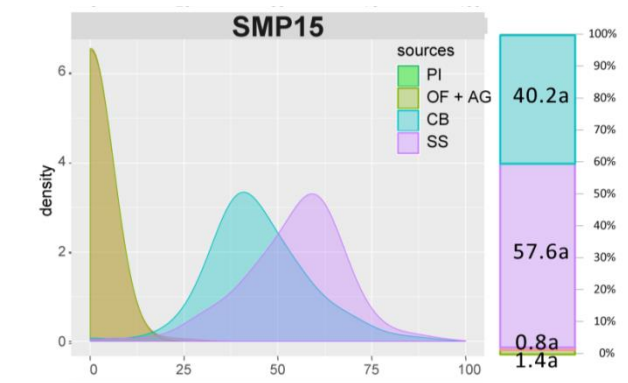# *Spatial assessment*
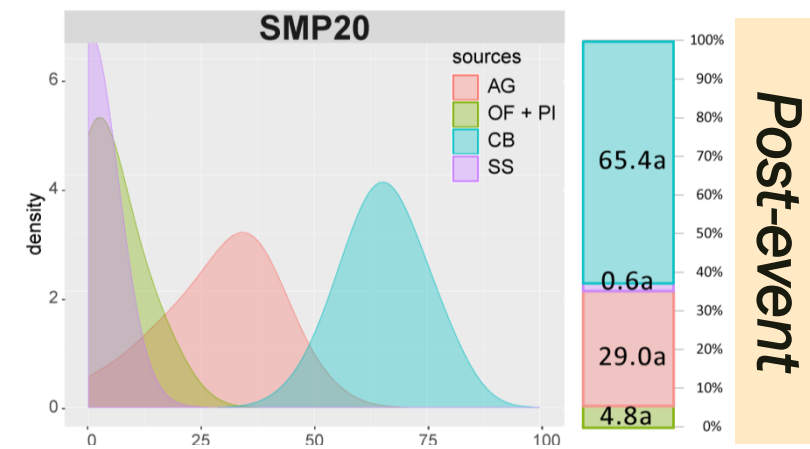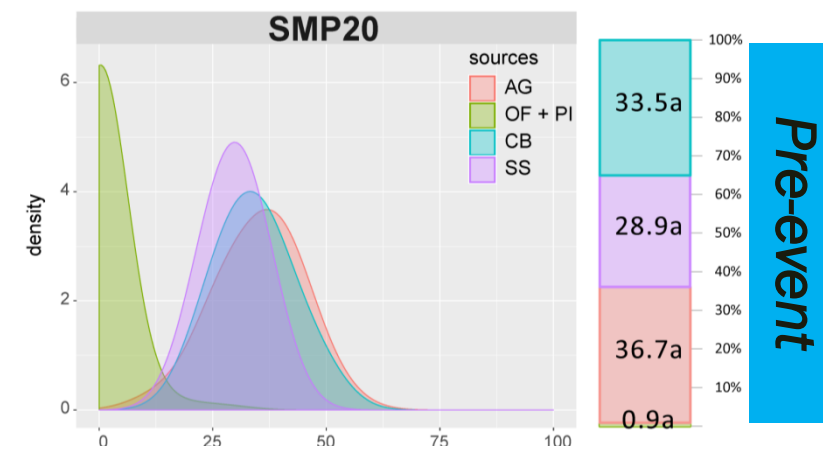

Pre-event

Post-event

Pre-event

Post-event

Spatial assessment

Conclusions

- The direct connectivity of croplands along with the lack of riparian vegetation at the lower part of the catchment produce high agricultural sediment exports during severe storm events.

- Despite higher SOC values in rangeland soils at headwaters, the predominant more eroded croplands in the lower part of the catchment substantially increase SOC supply to the stream.

- Under exceptional storm events the bare surfaces in croplands deliver important amounts of SOC.

- Implementation of FingerPro model with the novel consensus method allow tracing the variations of sediment provenance during the pre and post- extreme storm event to track SOC export patterns.