Microsite amelioration by post-fire deadwood in a *Pinus nigra* planted forest in central Italy

Flavio Taccaliti[1], Davide Marangon[1], Alessandro Vitali[2], Carlo Urbinati[2], Raffaella Marzano[3], Emanuele Lingua[1]

[1]Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro Forestali, Legnaro (PD) 35020, Italy   **contact**: flavio.taccaliti@unipd.it
[2]Università Politecnica delle Marche, Dipartimento di Scienze Agrarie, Alimentari ed Ambientali, Via Brecce Bianche 10, Ancona 60131, Italy
[3]Università degli Studi di Torino, Dipartimento di Scienze Agrarie Forestali e Alimentari, Largo Braccini 2, Grugliasco (TO) 10095, Italy

Interreg Alpine Space

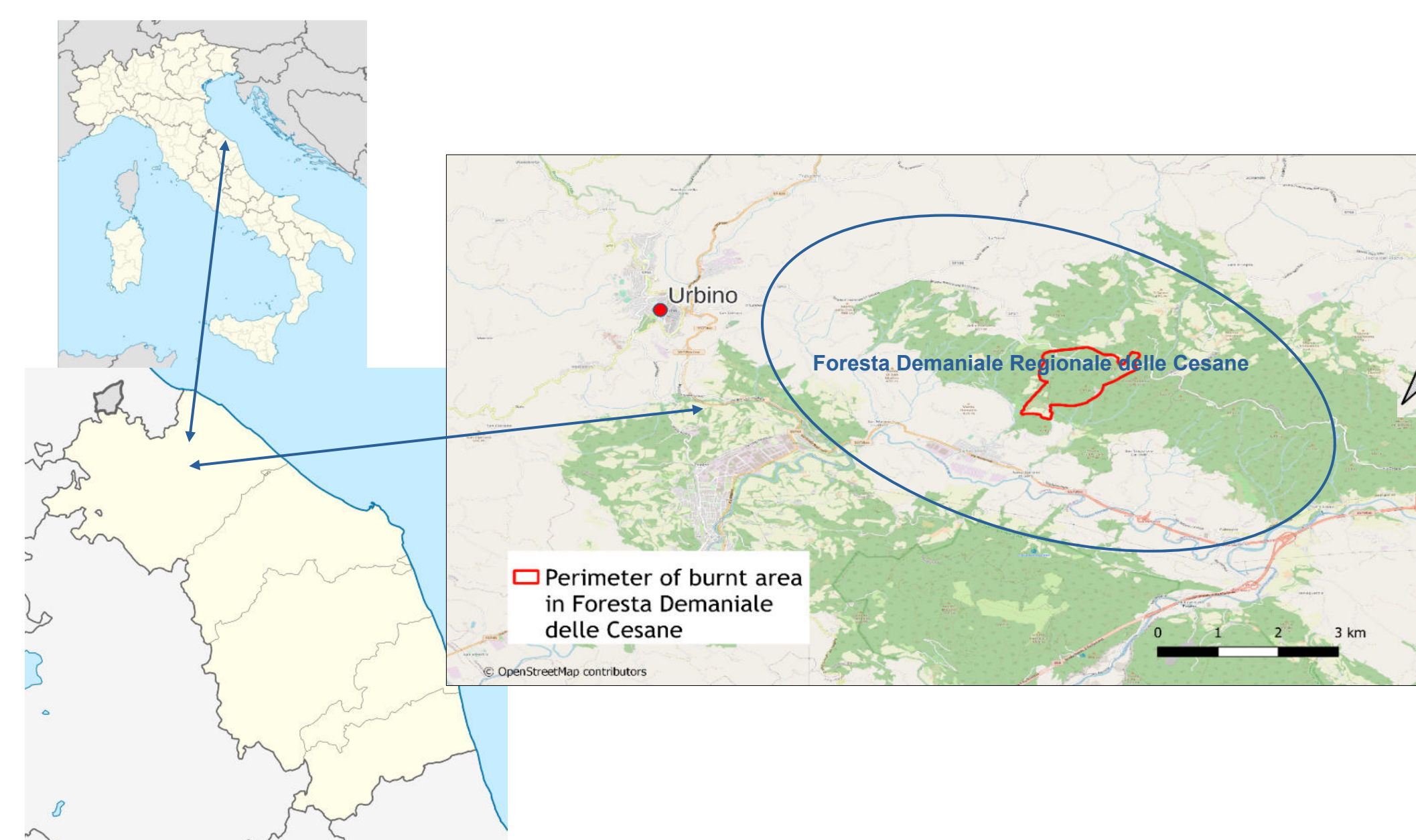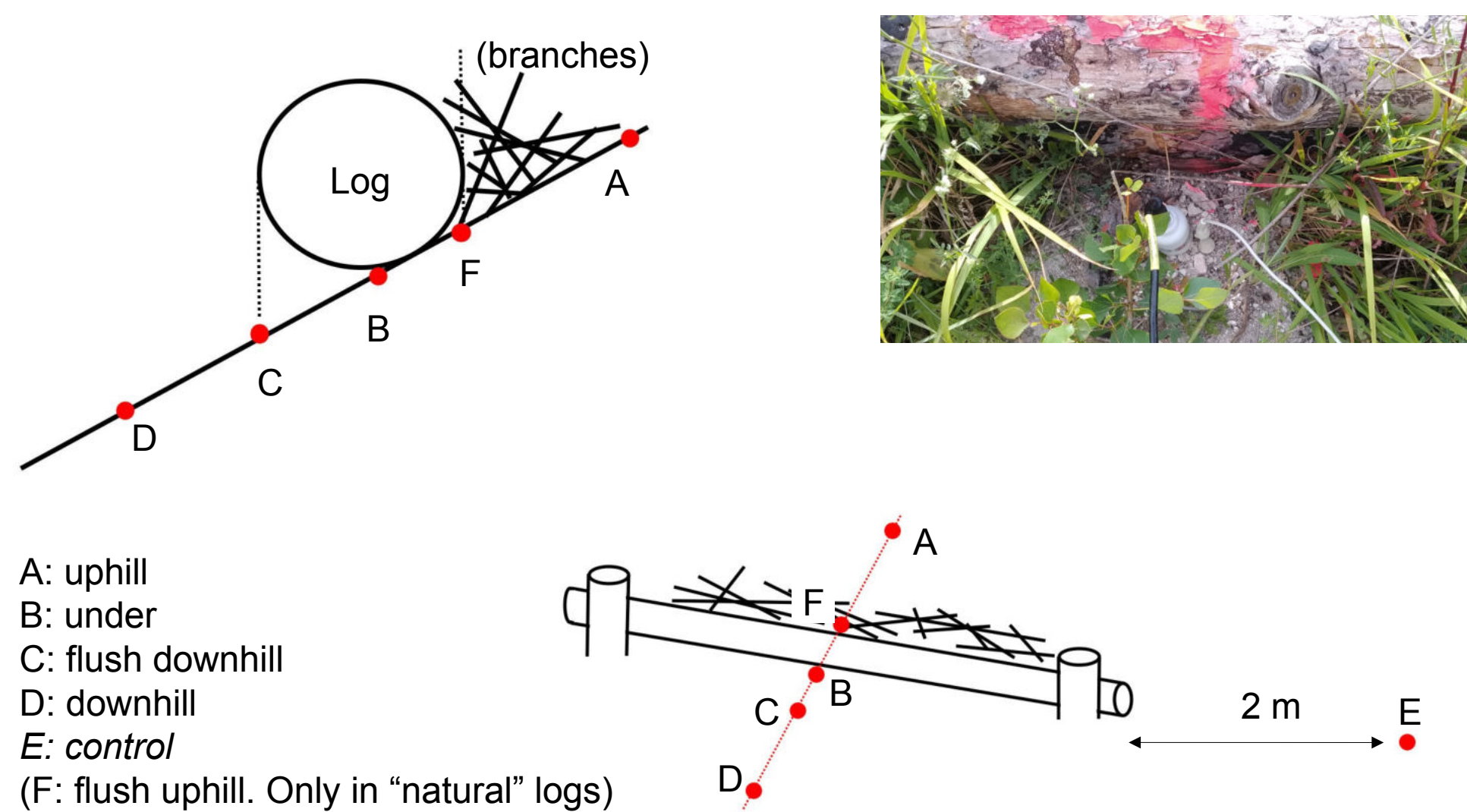Co-funded by the European Union

MOSAIC

AIM

Evaluate if laying deadwood ameliorates microsite conditions for natural regeneration in high-severity burnt pine forests.

OBJECTIVES

- Examine the effect of distance from laying deadwood on near-surface soil temperature and moisture.
- Compare the effect of naturally fallen, and artificially placed logs.

A: uphill
B: under
C: flush downhill
D: downhill
E: control
(F: flush uphill. Only in "natural" logs)

DATA COLLECTION

- Near surface (topmost ~5 cm) soil moisture and temperature (Delta-T HH2 moisture meter + SM150T probe; Testo 108 thermocouple).
- 5+1 (control) positions around "natural" logs, 4+1 around artificial barriers (-1 position: branches uphill).
- 14 "natural" logs, 19 artificial barriers.
- 9 timesteps (28 June → 4 October 2022, ca. every 10 days).

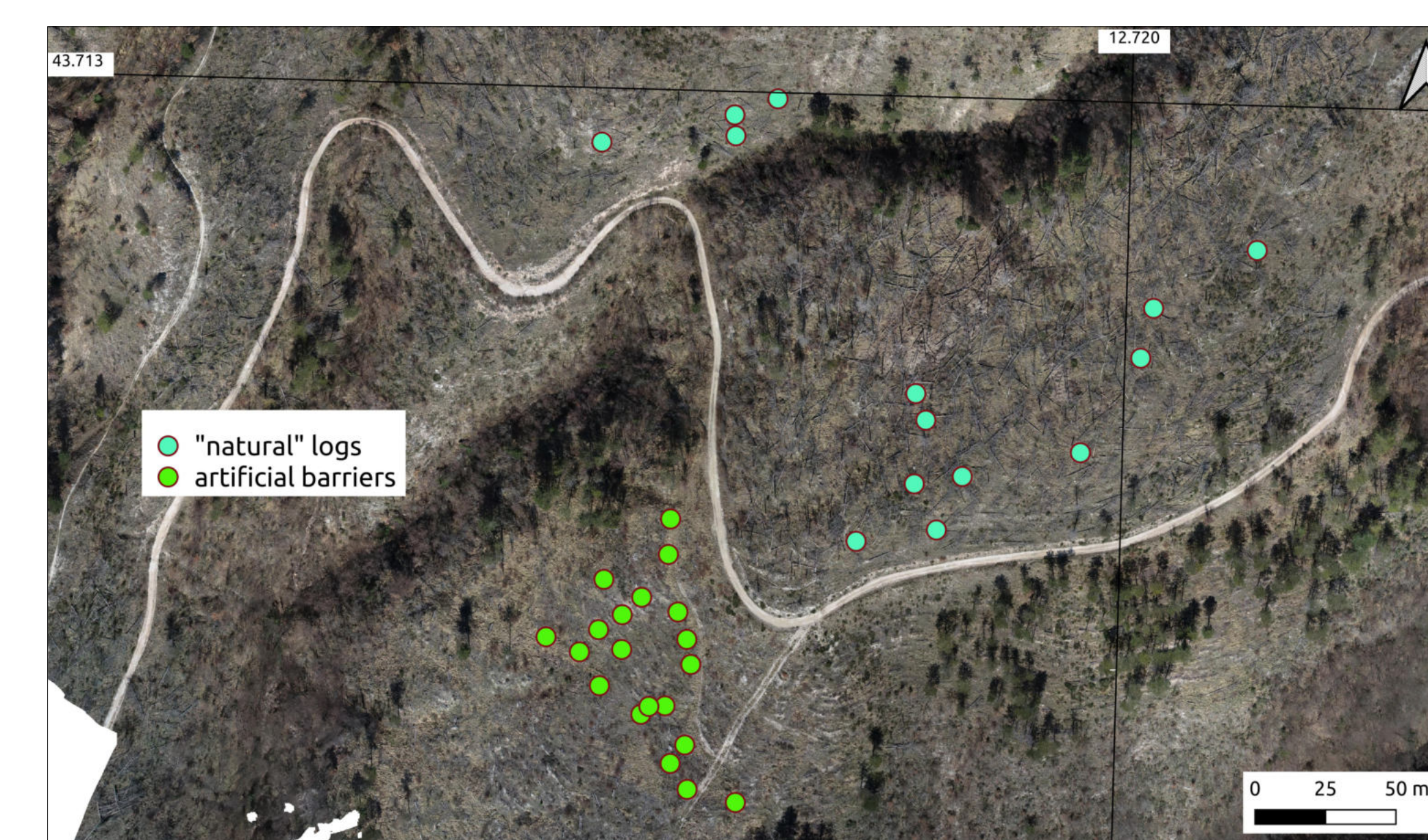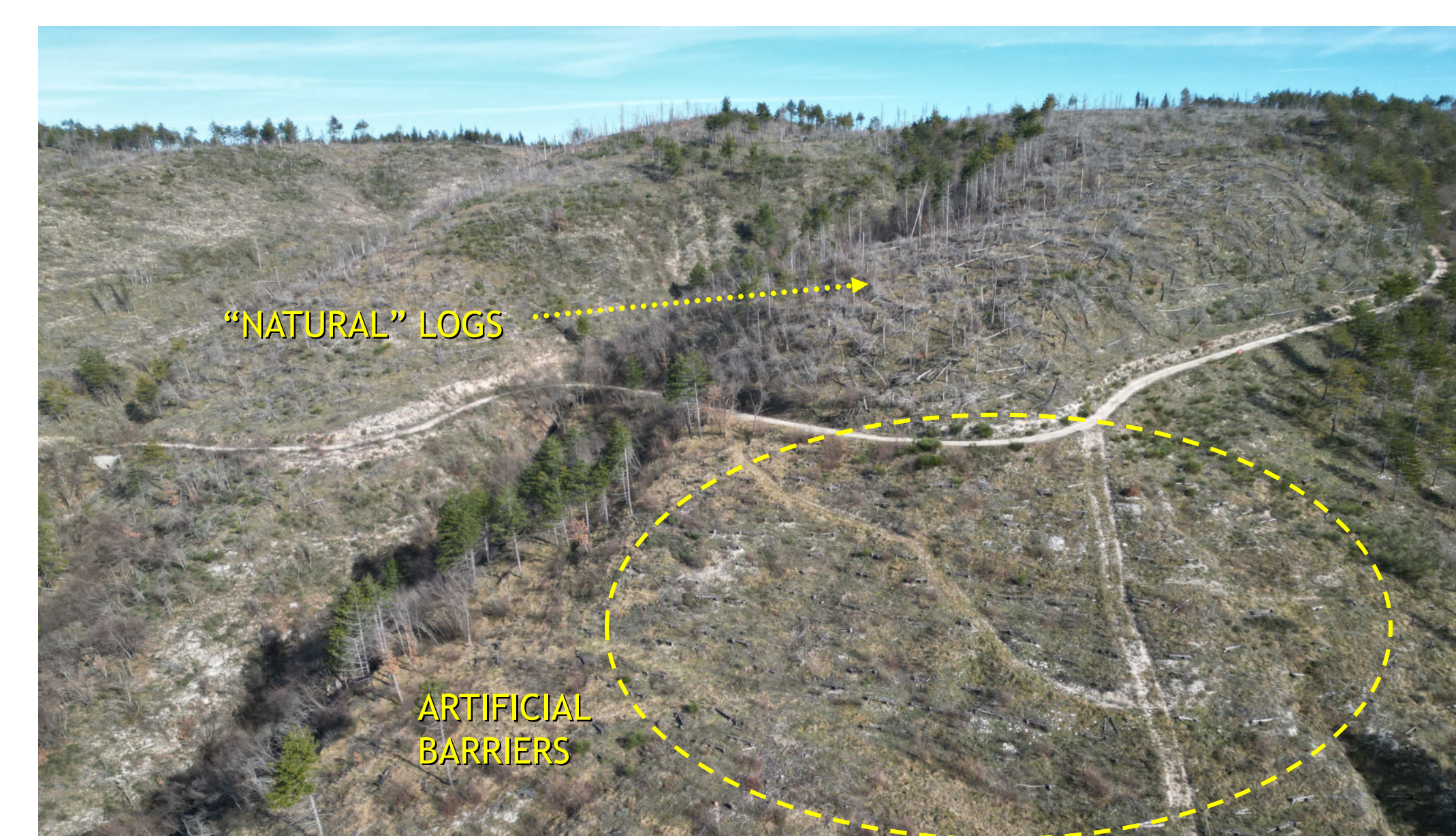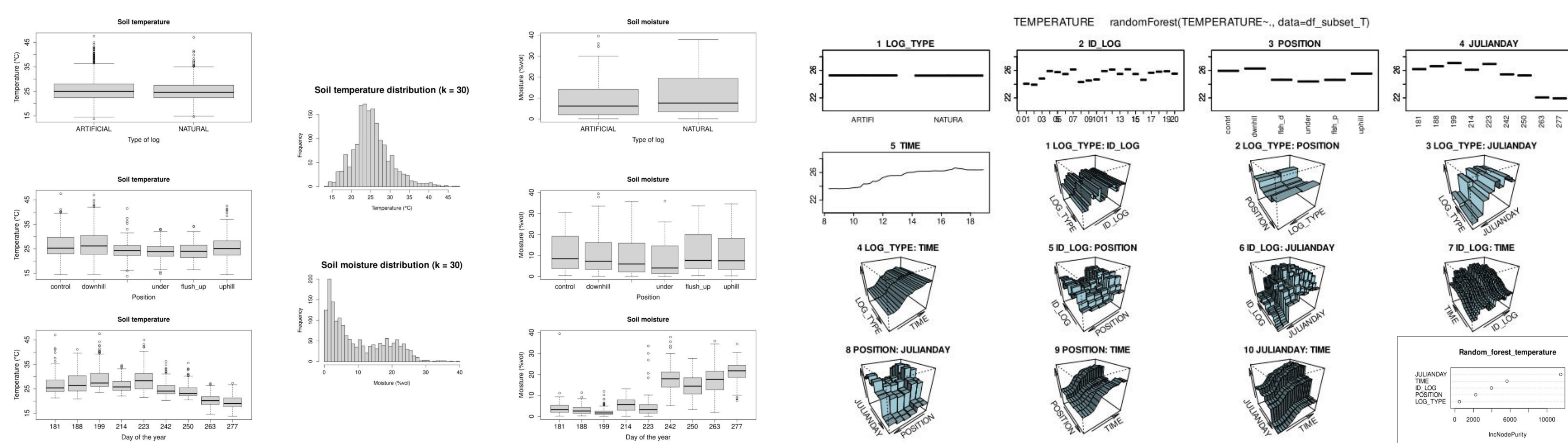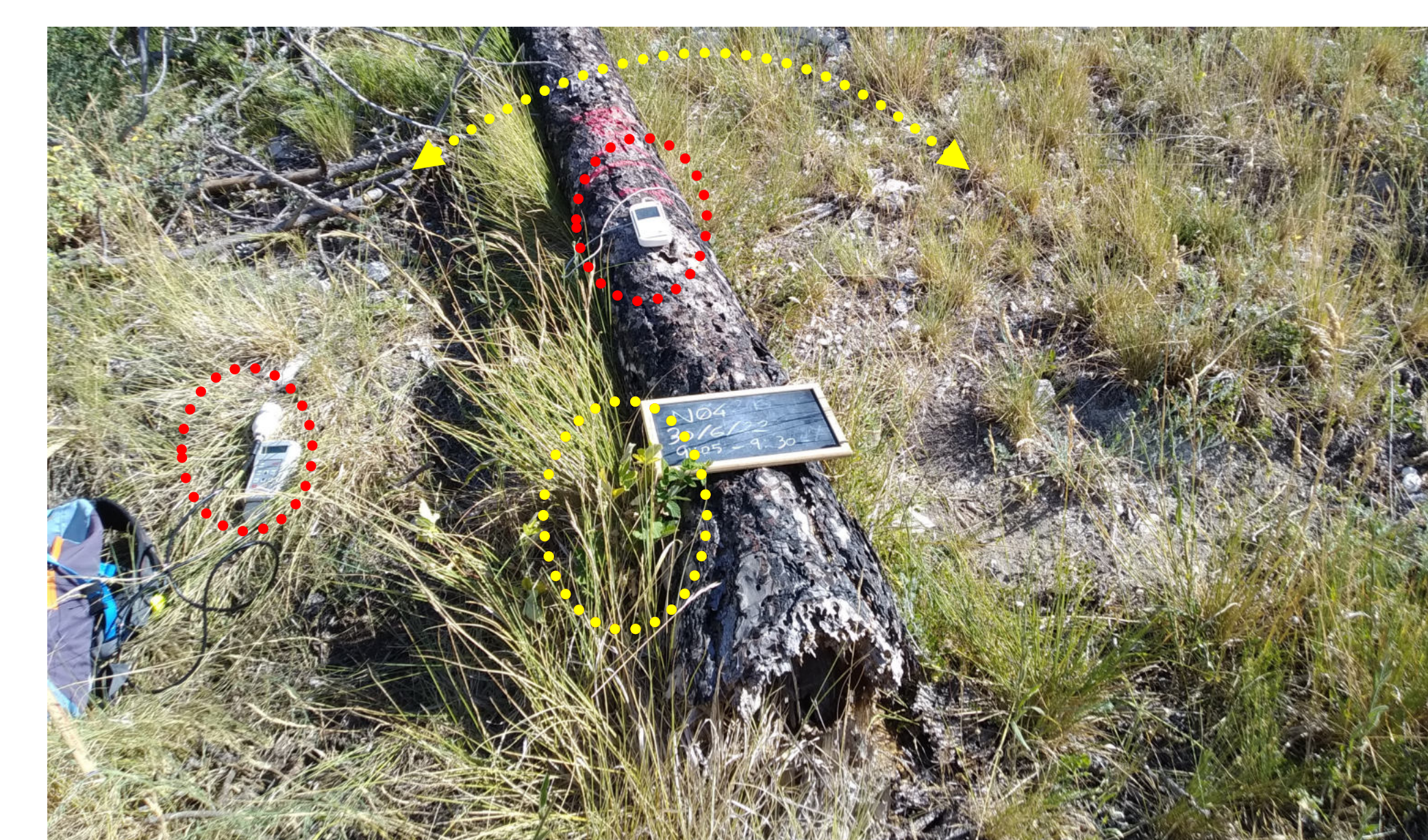"NATURAL" LOGS

ARTIFICIAL BARRIERS

INTRODUCTION

Most intense forest fires in Italy, and in Southern Europe, take place in pine forests.

This study examines the effects of a forest fire occurred near Urbino (Marche, Italy) in July 2017 classified with high severity for ~50 ha.

Burnt stands were 50 y. old plantations dominated by *Pinus nigra* J.F. Arnold, mixed with a minor share of broadleaf species (*Fraxinus ornus* L., *Ostrya carpinifolia* Scop., *Quercus pubescens* Willd.), coherent with the natural composition of nearby forests.

Perimeter of burnt area in Foresta Demaniale delle Cesane

DATA ANALYSIS

- Analyses design:
- Y_i → soil temperature; soil moisture (separately)
- X_i → position around log; artificial/natural log
- Confunding factors → time of day; ID log

Descriptive statistics → non-normal distribution!

Explorative analysis: random forest

PRELIMINARY RESULTS

Mainly date and time affect soil temperature and moisture variability, but also the position with respect to logs has a clear relevance.

FIRST CONCLUSIONS

Soil seems to be cooler and moister right by the logs → if confirmed, these results may suggest preferential microsites for natural or artificial post-fire regeneration in *Pinus nigra* forests.

FUTURE CHALLENGES

- Evaluate the logs facilitation effect on artificial regeneration by planting and sowing trees (*started*).
- Evaluate the effect of ecological facilitators, including shrubs and microtopography, directly on natural regeneration (*ongoing*).
- Repeat the analyses on other study areas (*Alpine Space*).
- Examine if other drivers may be present (unexpected regeneration).
- Apply advanced statistical methods (multivariate regression)

Karst plateau, Italy/Slovenia, 2023