Mountain grasslands in central Greece

14th Eurasian Grassland Conference, 2017

Riga, Latvia

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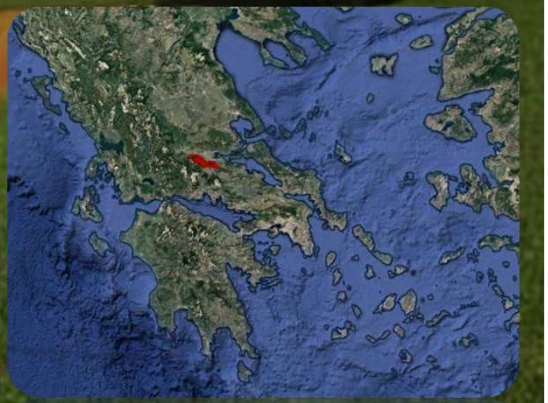
FOROPENFORESTS

LIFE11 NAT/GR/1014

Conservation of forests and forest openings at the mountains Oiti and Kallidromo (central Greece)



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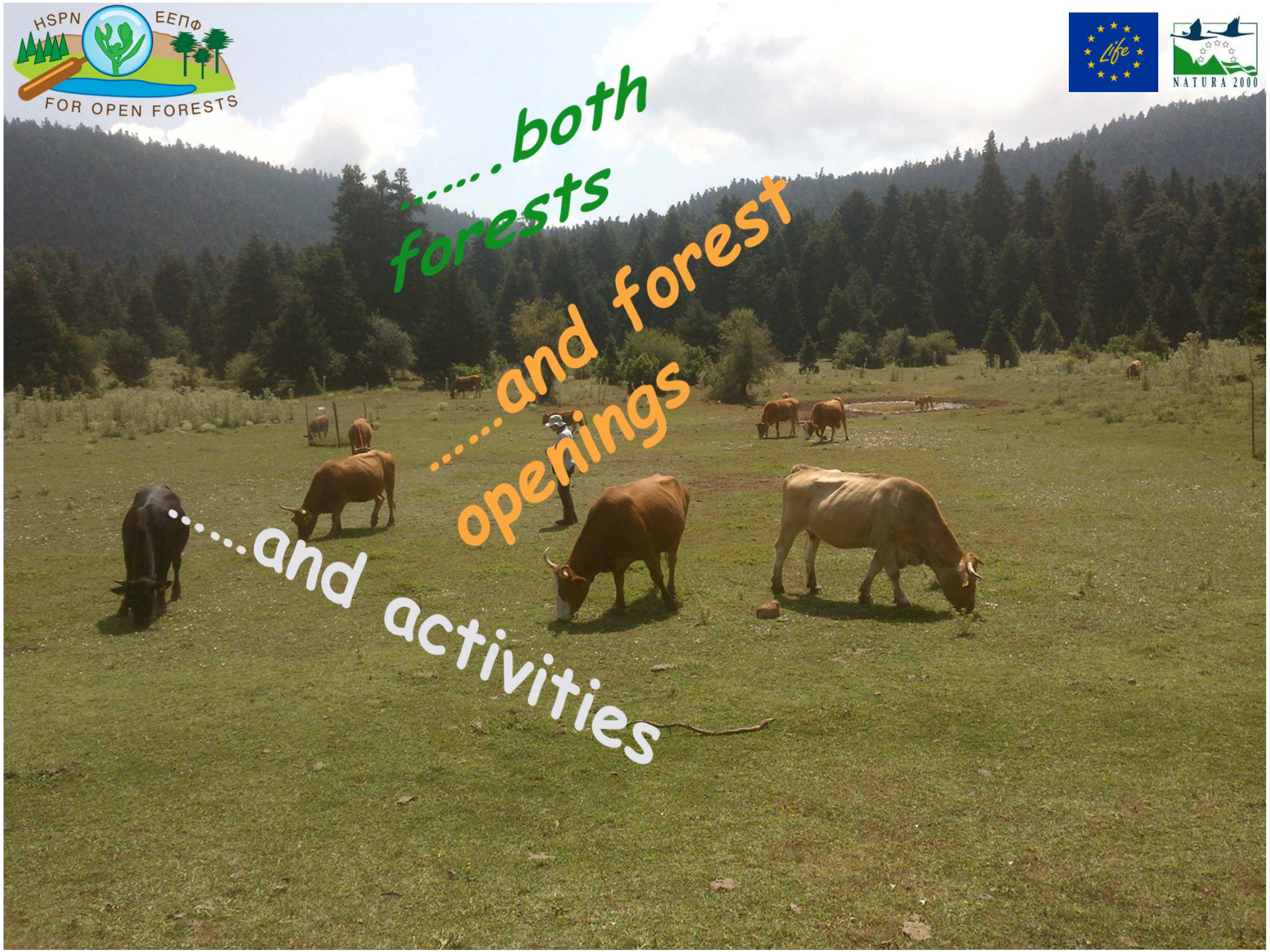
LIFE11 NAT/GR/1014

✓6 target species:brown bear, woodpeckers, patridge, owl, endemic temporary pond plant

✓5 target habitats: juniper forest, black pine forest, mountain grasslands, temporary ponds

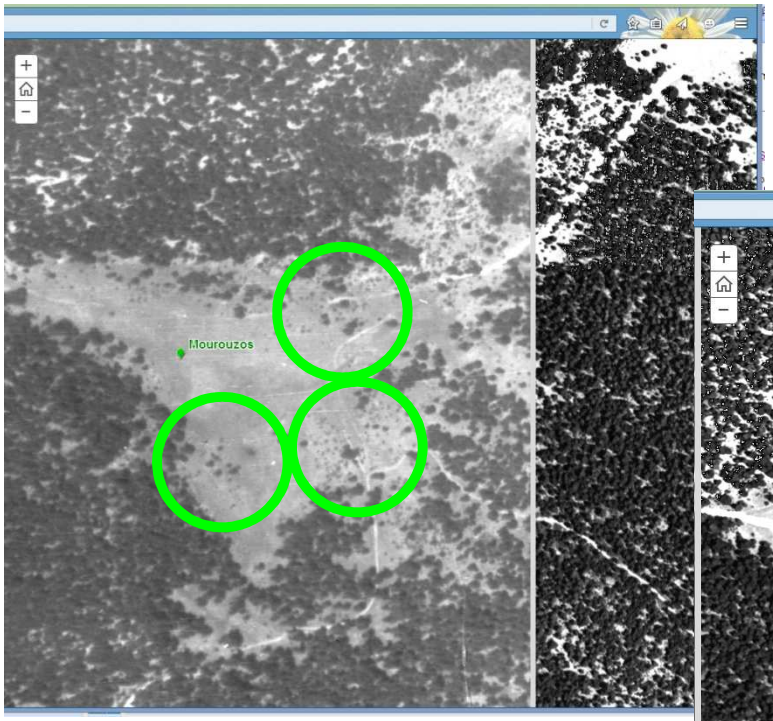
✓6 partners


HSPN
ΕΕΠΦ
FOR OPEN FORESTS
Life
NATURA 2000
.....both forests
.....and forest openings
For Open Forests...


HSPN
ΕΕΠΦ
FOR OPEN FORESTS
Life
NATURA 2000
.....both forests
.....and forest openings
.....and activities

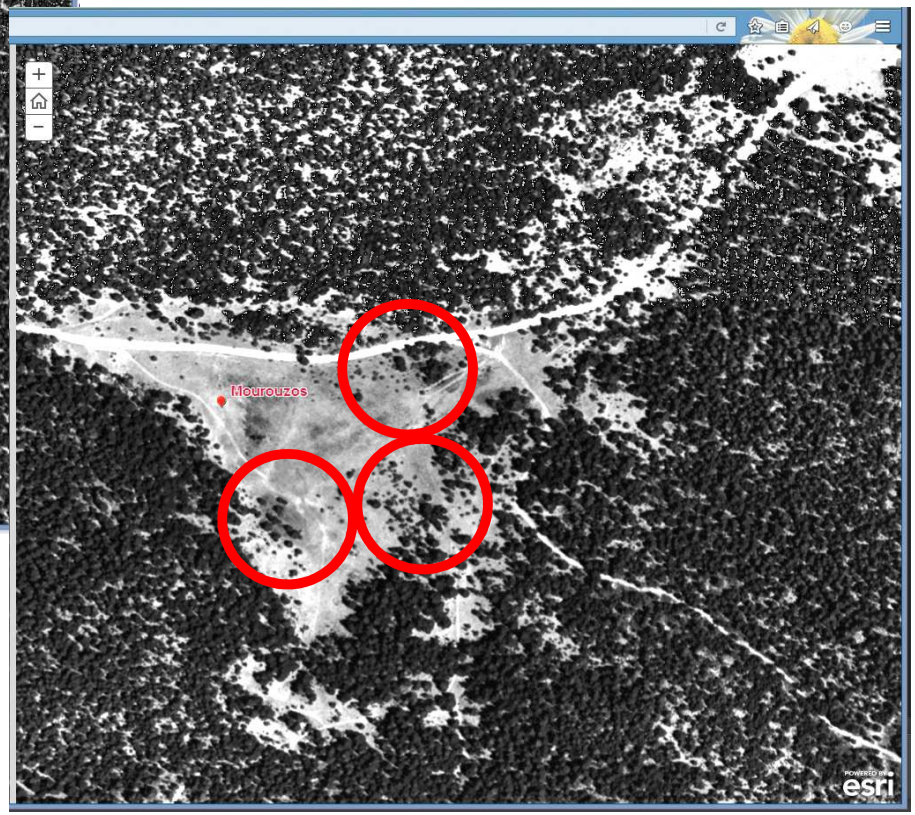
Mountain grassland story

Abandonment of traditional management → Scrub encroachment / Forest expansion → Loss of grasslands



1970

1996



!Undergrazed mountains

!overgrazed sites

Mountain grassland study in FOROPENFORESTS

1. Determination of vegetation composition and structure coupled by soil properties study in the mountain grasslands (habitat types 6210*, 62A0, 6230*, 6420)

2. Study of forest expansion and of use by livestock

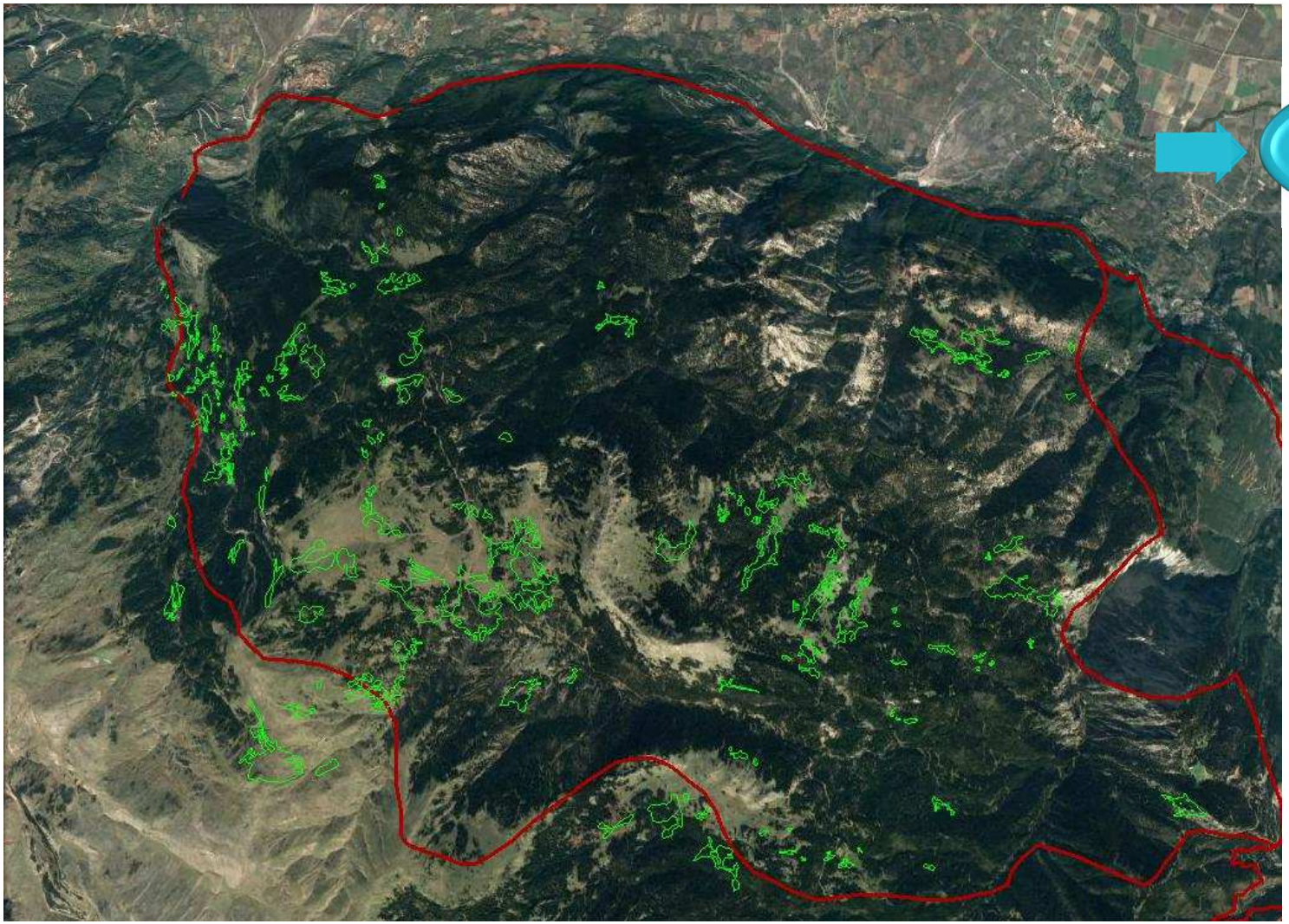
- ✓ Remote sencing image timeseries: 1970/1986/1996/2013
- ✓ Mapping of forest expansion
  - ✓ Range condition and grazing capacity of mountain grasslands
    by Vasilis Papanastasis, Kostas Mantzanas, Christakis, Evangelou

→ Specifications for management
→ Implementation of management

Project sites: National Park of Mt. Oiti

1150 plant taxa

>15 habitat types



400 ha of grasslands
0.02 – 100 ha

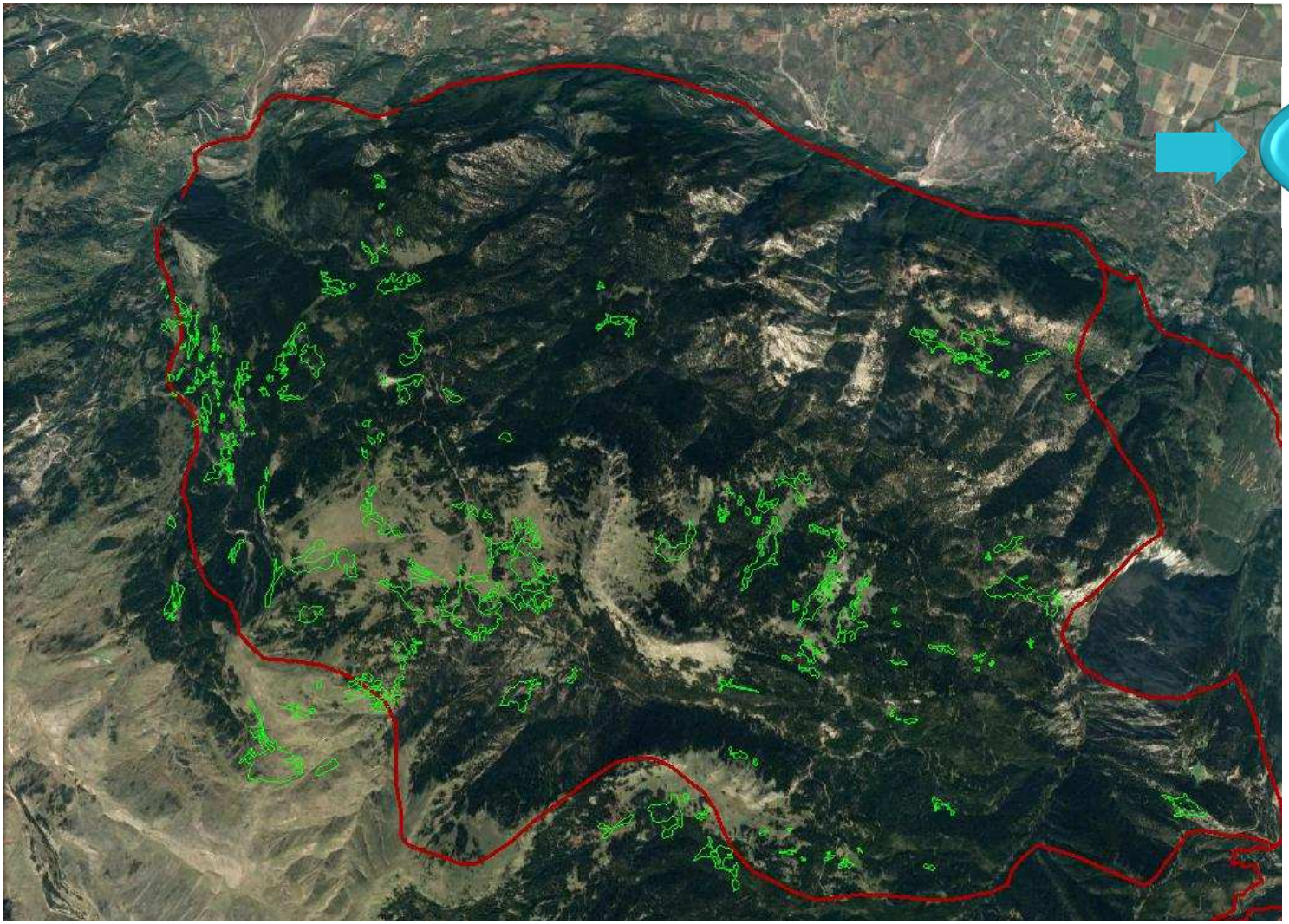
1400 – 1900 m meso- to oro – Mediterranean bioclimate

Mostly flysch with dolomite intercalations, soil a sandy loam, pH 5 – 6.5

Project sites: Mt. Kallidromo

1000 plant taxa

>15 habitat types



230 ha of grasslands
0.01 – 30 ha

800 – 1300 m thermo- to mountain – Mediterranean bioclimate

flysch hard limestone, deposits, soil a sandy clay loam, pH 5 – 7.6

Project sites: National Park of Mt. Oiti

→ expansion of mat forming *Juniperus nana*

→ expansion of fir

→ No or little grazing in the National Park since the 1950s

Project sites: Mt Kallidromo

→ expansion of mountain scrub

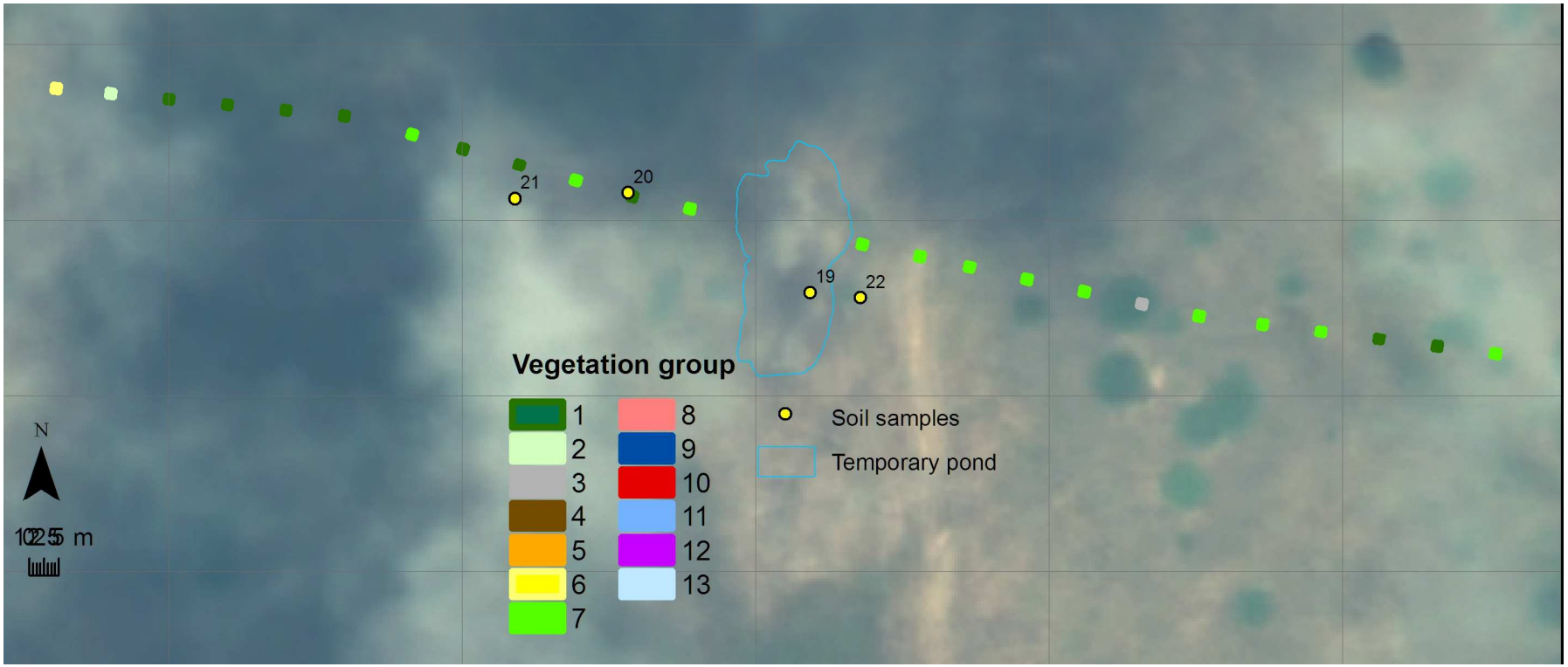
→ expansion of fir

→ Uncontrolled grazing
→ Grazing reduced since the 1960s

Vegetation composition and structure – field work

- ✓ 27 transects (50 – 250 m) Placed so as to cover
- ✓ grassland variety
- ✓ transition to (intrusion of) scrub
- ✓ transition to wet grassland, ponds

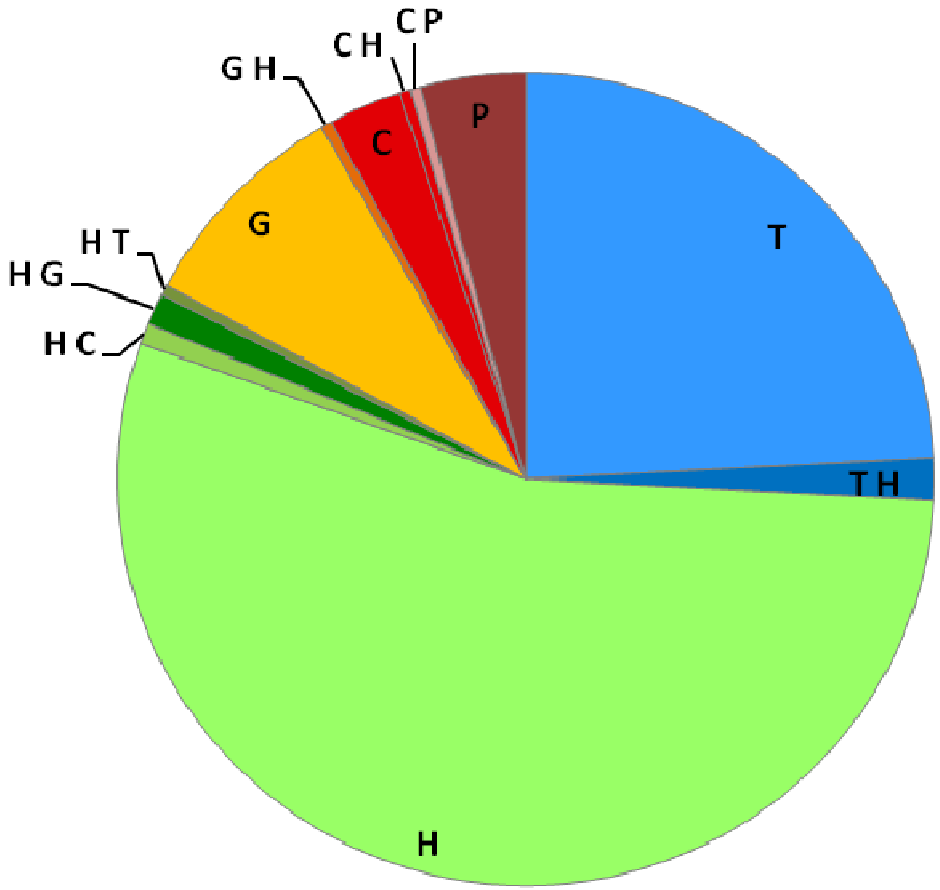
- ✓ 290 plots (1x1m)
- ✓ Placed systematically along the transects every 10 m
- ✓ Cover abundance recording of all species



! Object: spatial distribution of plants, monitoring

Flora composition

Life form spectrum

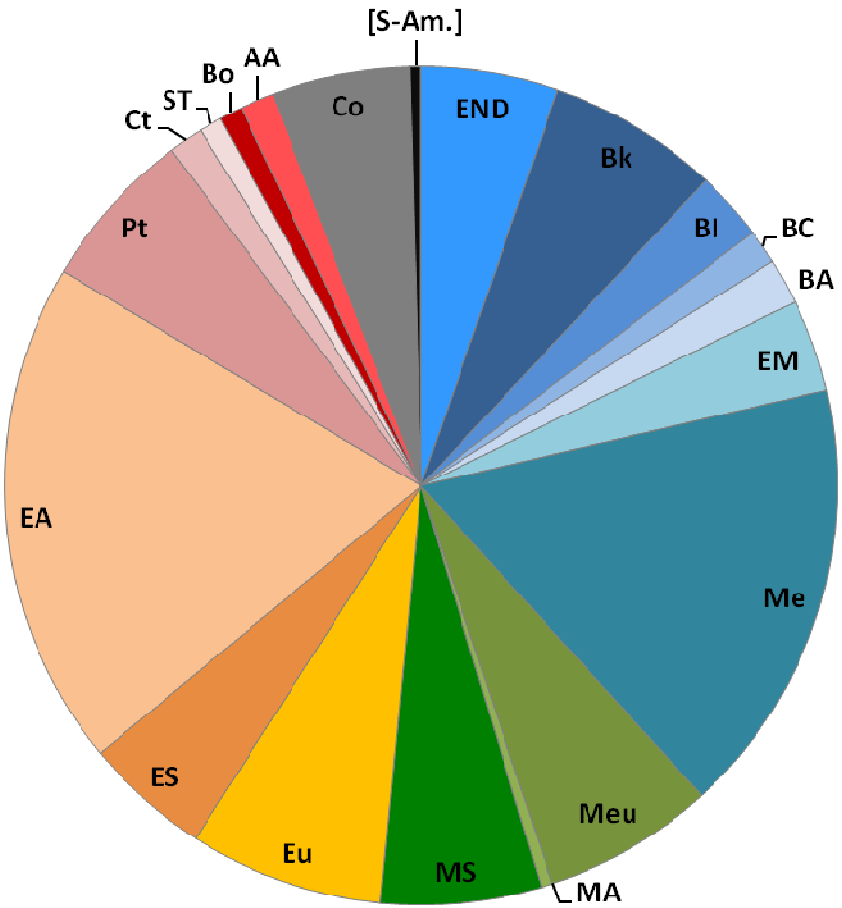


- ✓ 254 plant species Oiti
- ✓ 179 plant species Kallidromo

- 61% Perennial herbs
- 24 % annual herbs (dry grassland, synanthropic
- few woody species

Flora composition

Chorological spectrum



↓ greek, Balkan and Mediterranean endemics

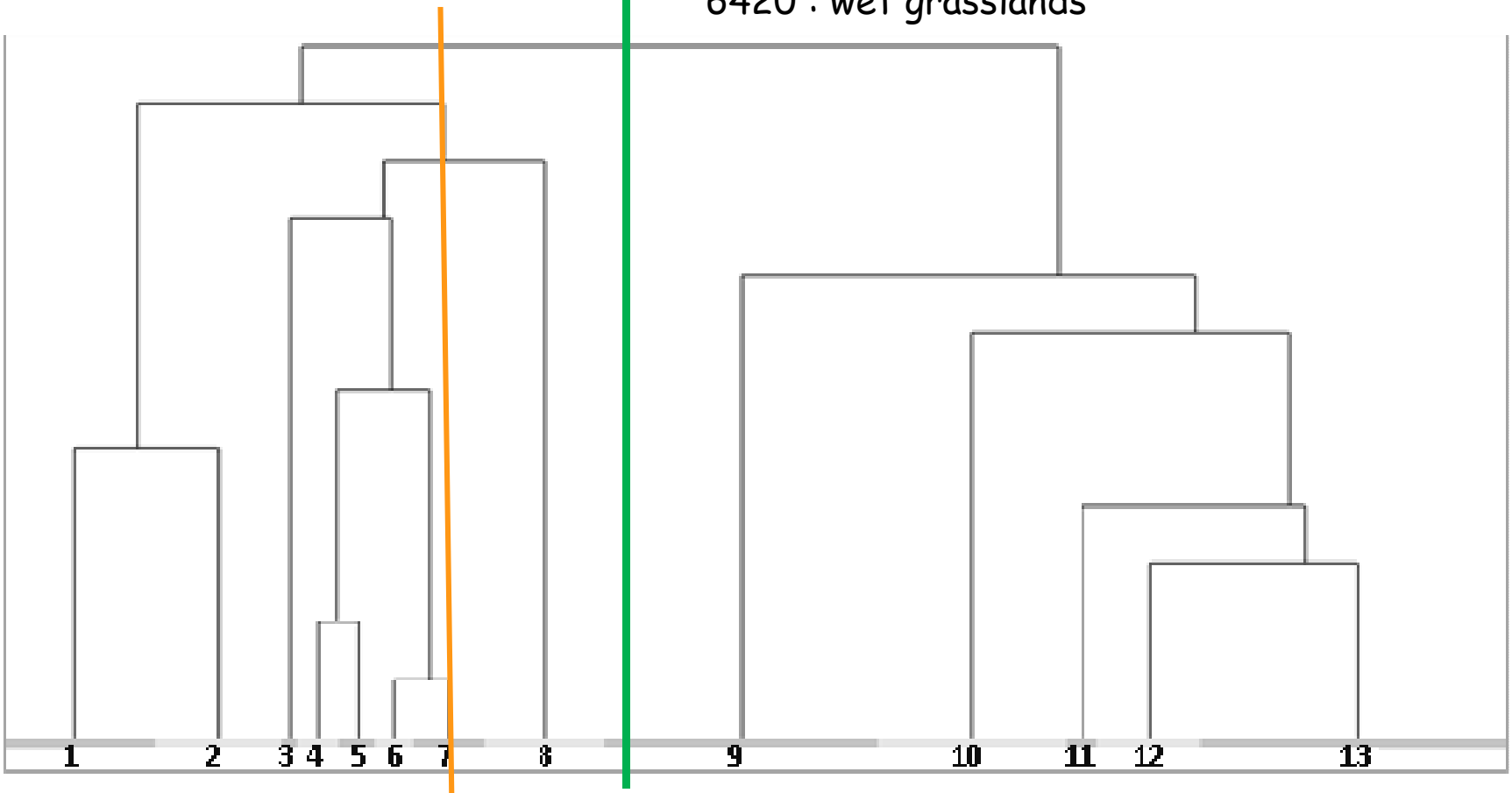
↑ European – Eurasiatic species

! 5 Boreal species (Oiti)

Vegetation groups

→ 9 -13 Kallidromo
62A0: *Scorzoneretalia villosae* (and transitions-
6420 : wet grasslands

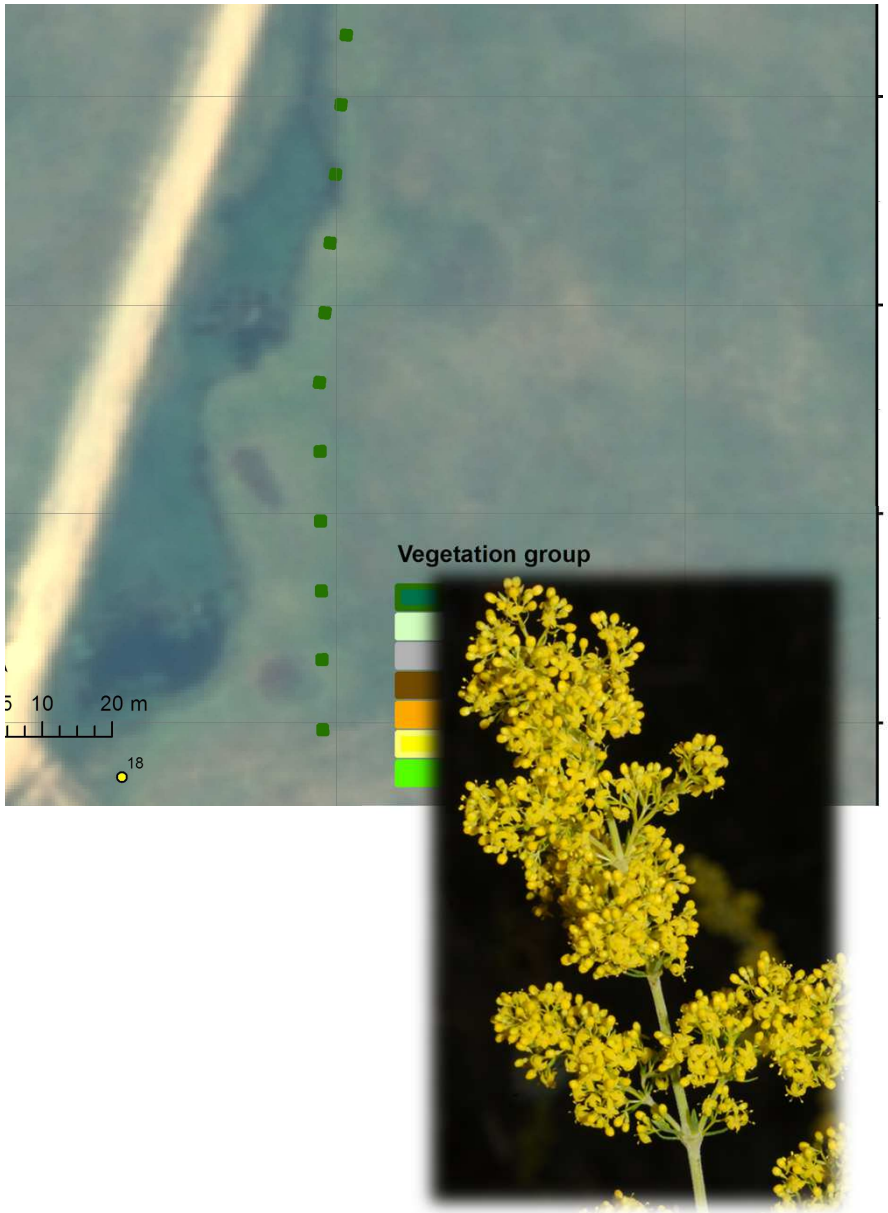
altitude



→ 8 6210: FESTUCOBROMETEA (and transitions-Kallidromo

← 1 - 7 6230: *JUNCETEA TRIFIDI* (and transitions) Oiti

Vegetation group 1 JUNCETEA TRIFIDI



6230 - *Nardus stricta-Centaurea nervosa* subsp. *promota*

Diagnostic species: *Centaurea nervosa* subsp. *promota, Nardus stricta, Trifolium hybridum*

Constant species: *Centaurea nervosa* subsp. *promota, Galium verum*

Dominant species: *Centaurea nervosa* subsp. *promota, Deschampsia cespitosa, Nardus stricta*

>1700 m, flysch, waterlogged, acidic soils

Galium verum ?diagnostic of mesophytic *Festuco-Brometea* grasslands

But a range of mountain grassland communities in Greece and in Europe e.g*Mollinio-Arrhenatherea* in Italy *Koelerio-Corynephoretea* and *Daphno-Festucetea* in the Greek Prespes National Part, acidophilous *Brachypodietalia pinnati* communities in Aar Germany

Vegetation group 1 JUNCETEA TRIFIDI

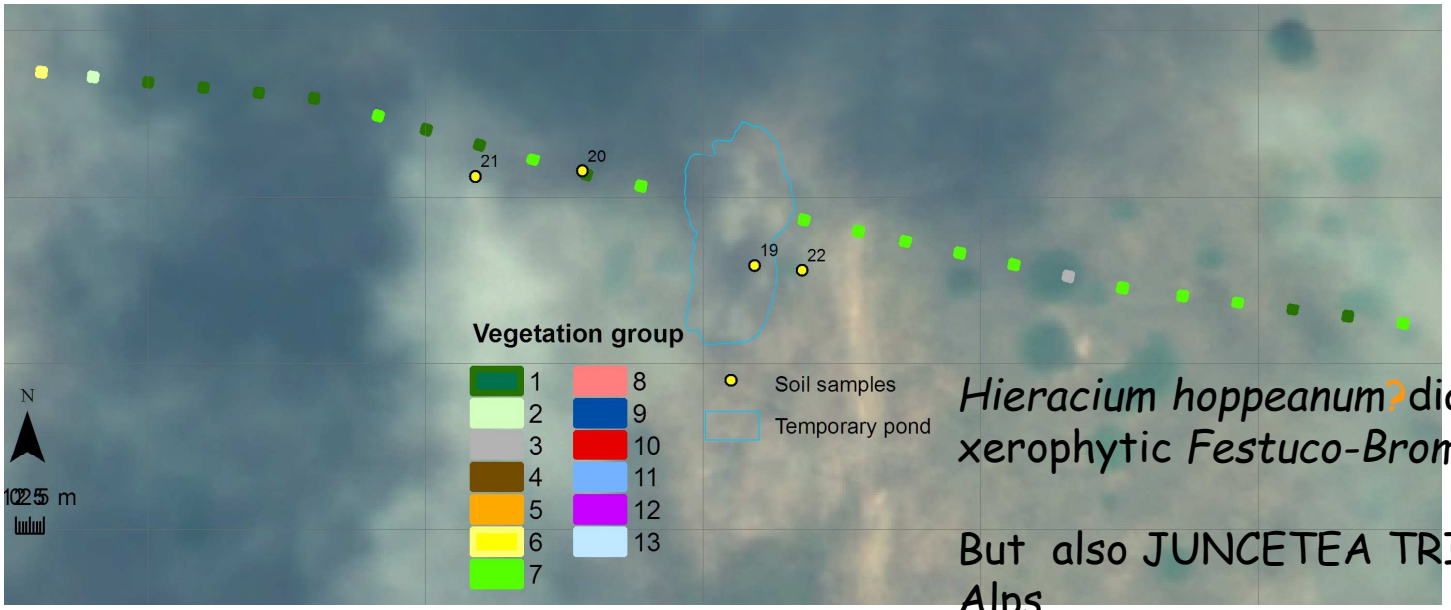
Vegetation group 7 JUNCETEA TRIFIDI

>1700 m

6230 and 6230 transition to 4090 (oroMediterranean scrub) - *Hieracium hoppeanum-Plantago holosteum*

Diagnostic species: *Anthemis cretica ssp. columnae, Hieracium hoppeanum s.l., Minuartia recurva*

Constant species: *Hieracium hoppeanum s.l., Plantago holosteum, Poa bulbosa*



Hieracium hoppeanum? diagnostic of mes-xerophytic *Festuco-Brometea* grasslands

But also JUNCETEA TRIFIDI (Romania, Alps

Vegetation group 7 JUNCETEA TRIFIDI

Vegetation group 2 transition

a series of *FESTUCO-BROMETEA* species, sporadic presence of *JUNCETEA TRIFIDI*

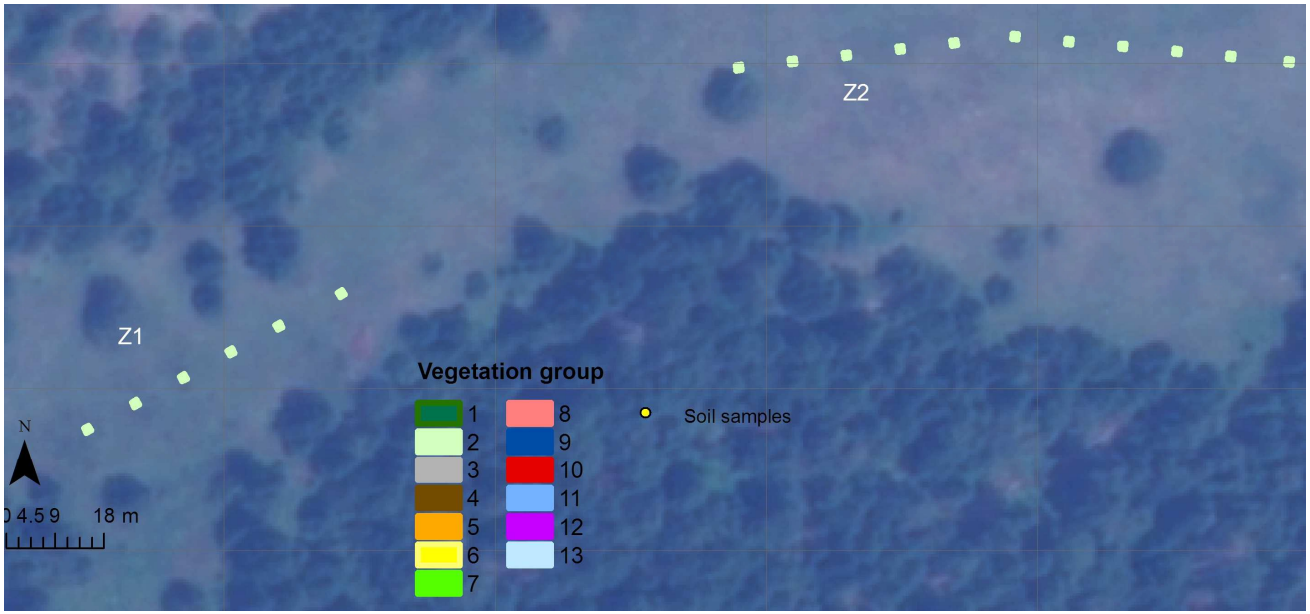
>1400 m, flysch

Vegetation group 2: 6230 and 6230 transition DAPHNOFESTUCETEA oroMediterranean scrub) – *or* FESTUCOBROMETEA

Diagnostic species: *Achillea setacea, Poa timoleontis, Potentilla recta*

Constant species: *Galium verum*

Dominant species: *Achillea setacea, Galium verum, Helictotrichon pubescens, Hieracium hoppeanum s.l., Juniperus foetidissima, Poa timoleontis*

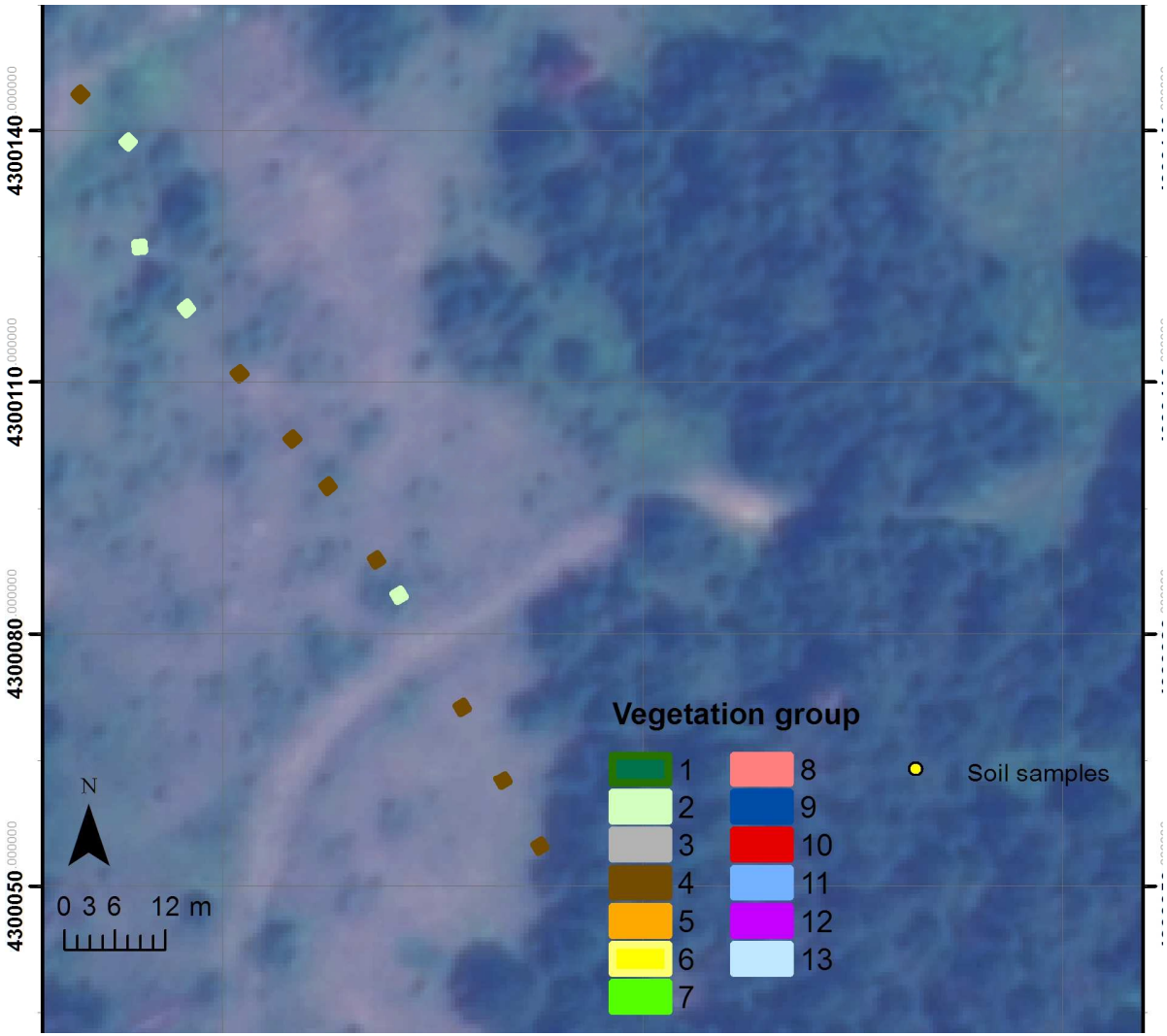


Poa timoleontis, ?diagnostic of the class *Daphno-Festucetea* in Greece

But also JUNCETEA TRIFIDI

Vegetation group 4

>flysch with limestone intercalarions



6210 (or 6230 transition to *Festuco-Brometea*) - *Plantago holosteum-Hieracium piloselloides*

<u>Diagnostic species</u>:
Euphrasia liburnica, Hieracium piloselloides, Plantago holosteum

<u>Constant species</u>:
Plantago holosteum

Plantago holosteum, ?
dry *FESTUCO-BROMETEA* communities (*Brometalia erecti*: *Xerobromion*, *Halacsyetalia sendtneri*, *Scorzoneretalia villosae*)
? *THERO-BRACHYPOETEA*
But also dry aspect of *JUNCETEA TRIFIDI*

Vegetation group 4

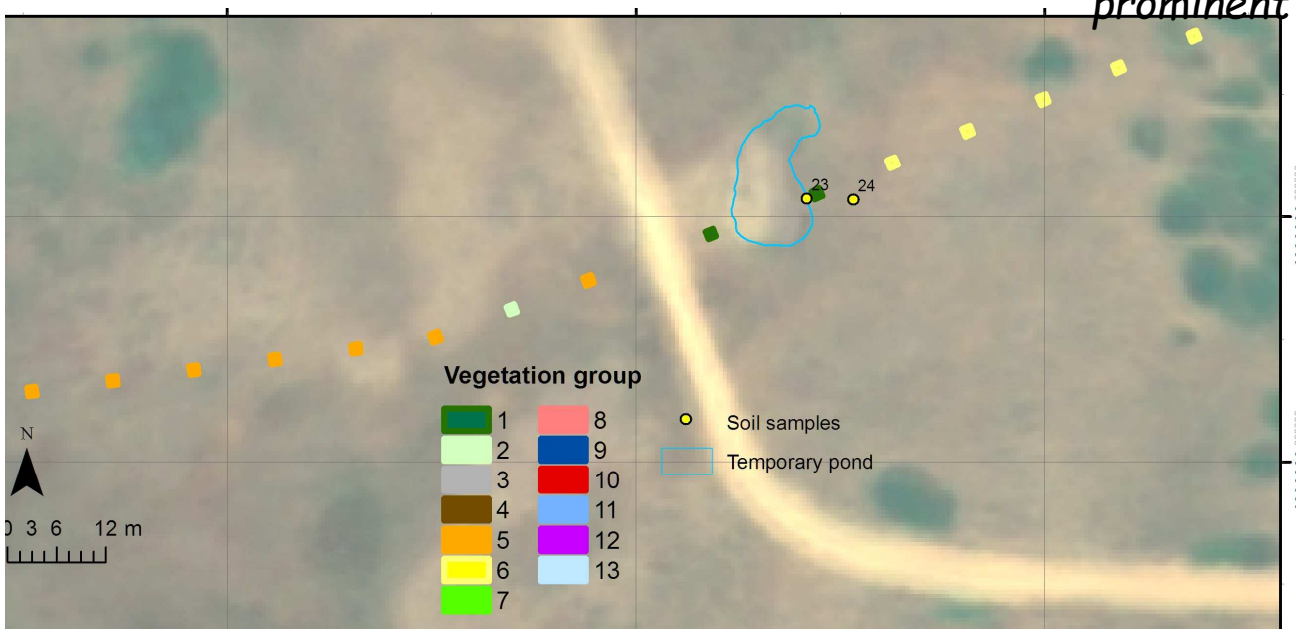
Vegetation group 5

6230 transition to *Festuco-Brometea* - *Festuca dalmatica-Plantago argentea*

Diagnostic species: *Achillea species, Centaurea triumfettii, Festuca dalmatica, Poa bulbosa, Trifolium phleoides*

Constant species: *Festuca dalmatica, Plantago argentea, Poa bulbosa, Trisetum flavescens*

constant participation of *Juncetea trifidi* species (*Dianthus tymphresteus*, *Rumex acetosella*, *Anthemis tinctoria* subsp. *parnassica*) is high constancy of species such as the *Plantago argentea*, *Trisetum flavescens*, *Trifolium alpestre*, and *Armeria canescens* which present an affiliation to the *Juncetea trifidi* presence of *Festuco-Brometea* prominent



Plantago argentea, ? *FESTUCO-BROMETEA* ? *JUNCETEA TRIFIDI*

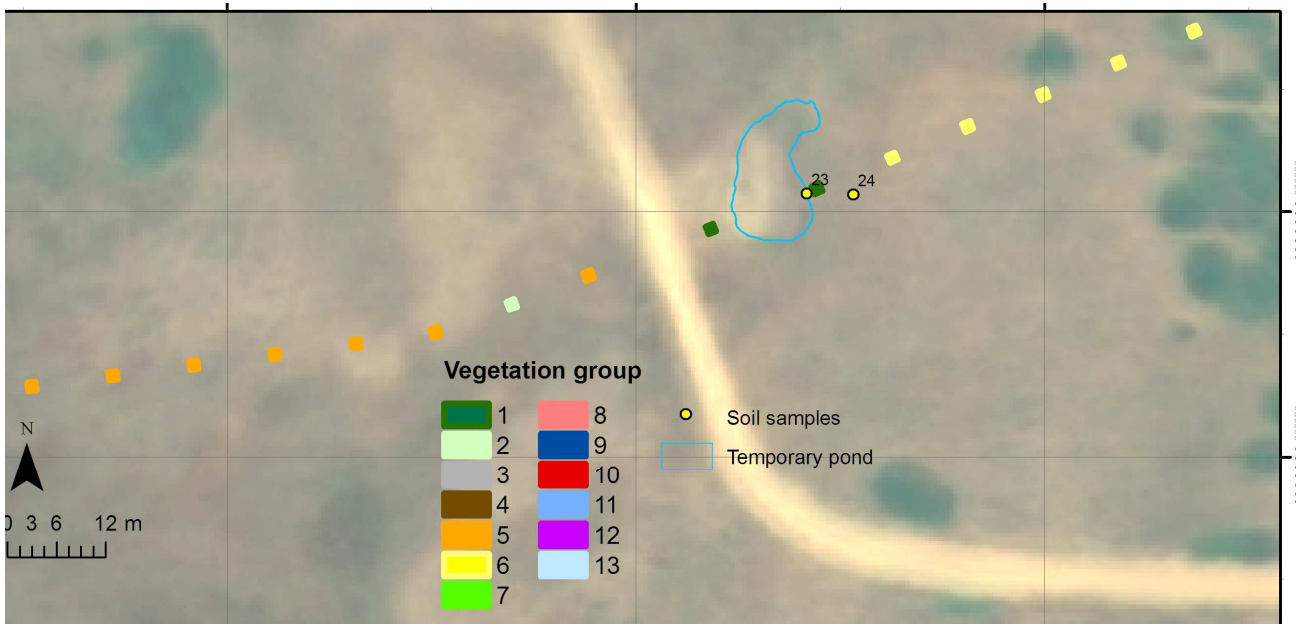
> 1800 m, flysch with limestone intercalarions

Vegetation group 5

> 1800 m, flysch with limestone intercalarions

Vegetation group 6

6230 transition to Oro-Mediterranean scrub - *Koeleria lobata-Poa variegata*
Diagnostic species: *Astragalus sempervirens, Koeleria lobata, Poa variegata* (valid name = *Bellardiochloa variegata*)
Constant species: *Koeleria lobata, Poa variegata*
Dominant species: *Secale montanum* (valid name = *Secale strictum* subsp. *strictum*)

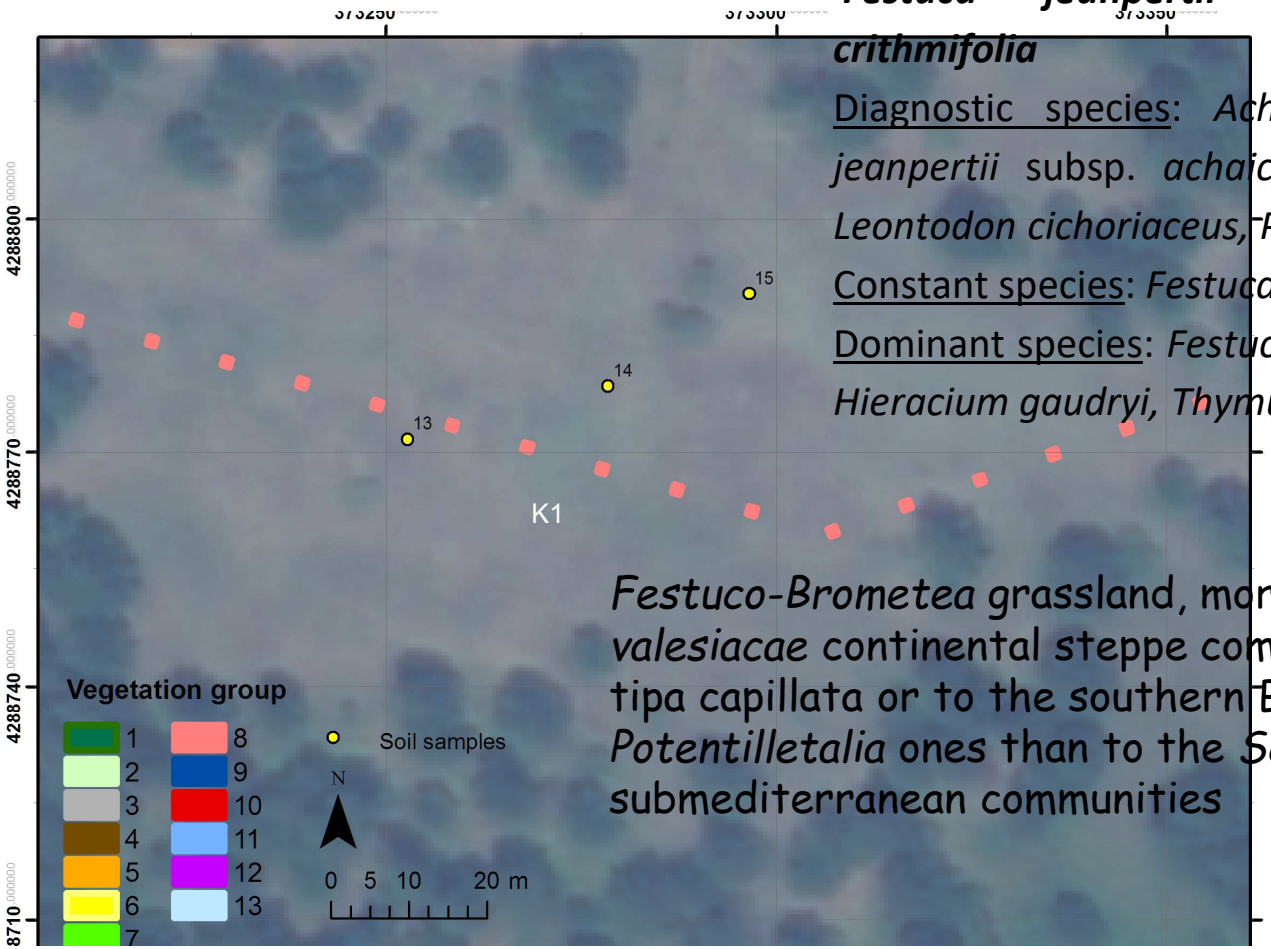


> 1800 m, flysch with dolomite intercalarions

Vegetation group 6

> 1800 m, flysch with limestone intercalarions

Vegetation group 8



Festuca jeanpertii* subsp. *achaica-Achillea crithmifolia

<u>Diagnostic species</u>: *Achillea crithmifolia, Festuca jeanpertii* subsp. *achaica, Hieracium hoppeanum, Leontodon cichoriaceus, Potentilla laciniosa*

<u>Constant species</u>: *Festuca jeanpertii* subsp. *achaica*

<u>Dominant species</u>: *Festuca jeanpertii* subsp. *achaica, Hieracium gaudryi, Thymus longicaulis*

Festuco-Brometea grassland, more affiliated to *Festucetalia valesiacae* continental steppe communities (also Nepeta nuda, tipa capillata or to the southern Balkan *Astragalo-Potentilletalia* ones than to the *Scorzoneretalia villosae* submediterranean communities

> 1400 m, hard limestone, I plot on dolomite

Vegetation group 8

> 1

Vegetation groups 10, 12, 13

10	Festuca ???valesiaca-Eryngium campestre	6210/62A0+synanthropic
12	Hordeum bulbosum-Agrostis gigantea (Ononis spinosa)	62A0, 62A0 transition to 6420
13	Plantago lanceolata-Lotus corniculatus (Ononis spinosa)	62A0, 62A0 transition to 6420

> 1400 m, hard limestonw, I plot on dolomite

Vegetation groups 10, 12, 13

Vegetation group 10: 6210/62A0+synanthropic - *Festuca valesiaca-Eryngium campestre*

Diagnostic species: *Centaurea solstitialis, Eryngium campestre, Festuca valesiaca, Hypochaeris cretensis*

Dominant species: *Aegilops lorentii* (valid name = *Aegilops biuncialis*), *Bromus hordeaceus, Festuca polita, Lotus corniculatus*

Vegetation group 12: 62A0, 62A0 transition to 6420 - *Hordeum bulbosum-Agrostis gigantea (Ononis spinosa)*

Diagnostic species: *Agrostis gigantea, Avena barbata, Carex flacca, Convolvulus betonicifolius, Dactylis glomerata, Hordeum bulbosum, Mentha spicata* subsp. *condensata, Ononis spinosa, Xeranthemum cylindraceum*

Constant species: *Agrostis gigantea, Hordeum bulbosum*

Dominant species: *Hordeum bulbosum, Ononis spinosa*

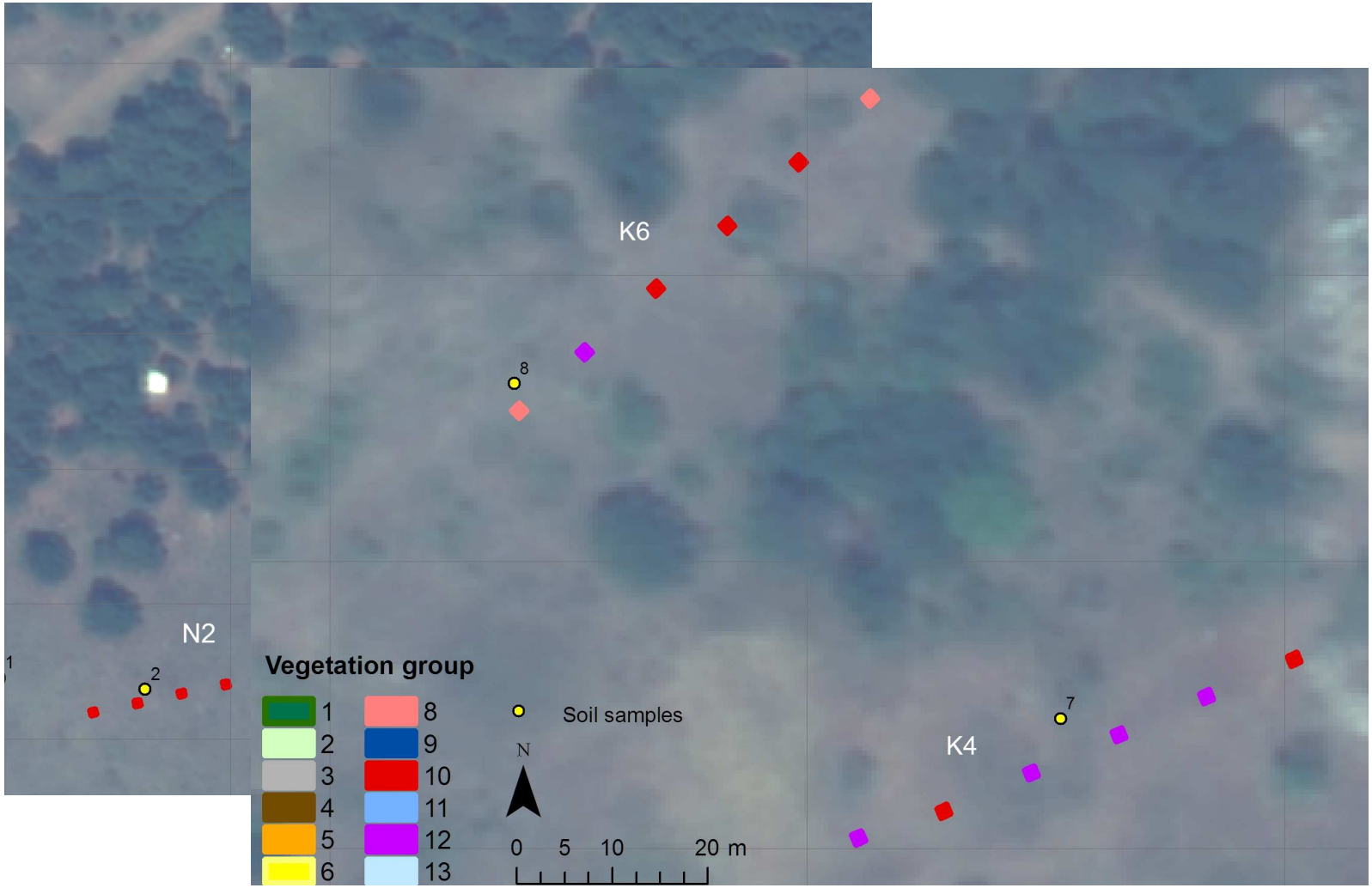
Vegetation group 13: 62A0, 62A0 transition to 6420 - *Plantago lanceolata-Lotus corniculatus (Ononis spinosa)*

Diagnostic species: *Lotus corniculatus*

Constant species: *Plantago lanceolata*

Dominant species: *Agrostis gigantea, Carex distans, Elymus repens, Lolium rigidum, Ononis spinosa, Plantago lanceolata, Prunella laciniata*

Vegetation groups 10, 12, 13

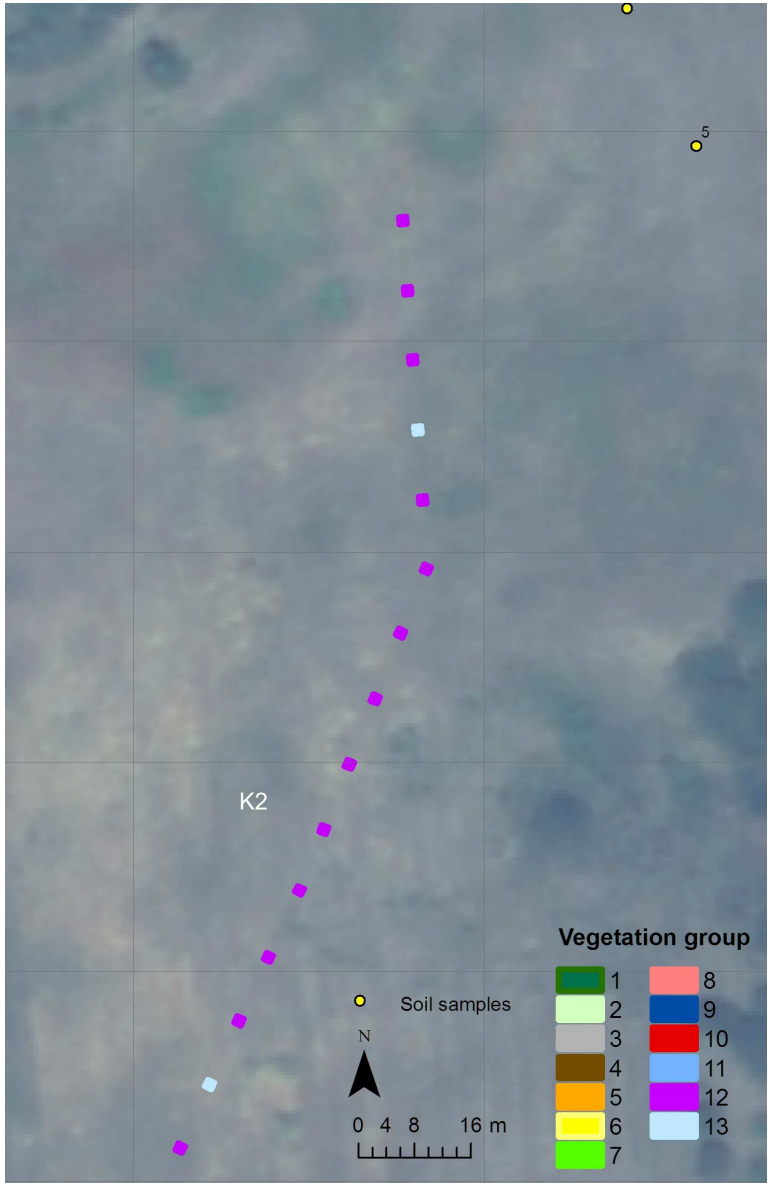


900m, hard limestone,

Vegetation groups 10, 12, 13

900m, hard limestone,

Vegetation groups 10, 12, 13



900m, hard limestone,

Vegetation groups 9, 11

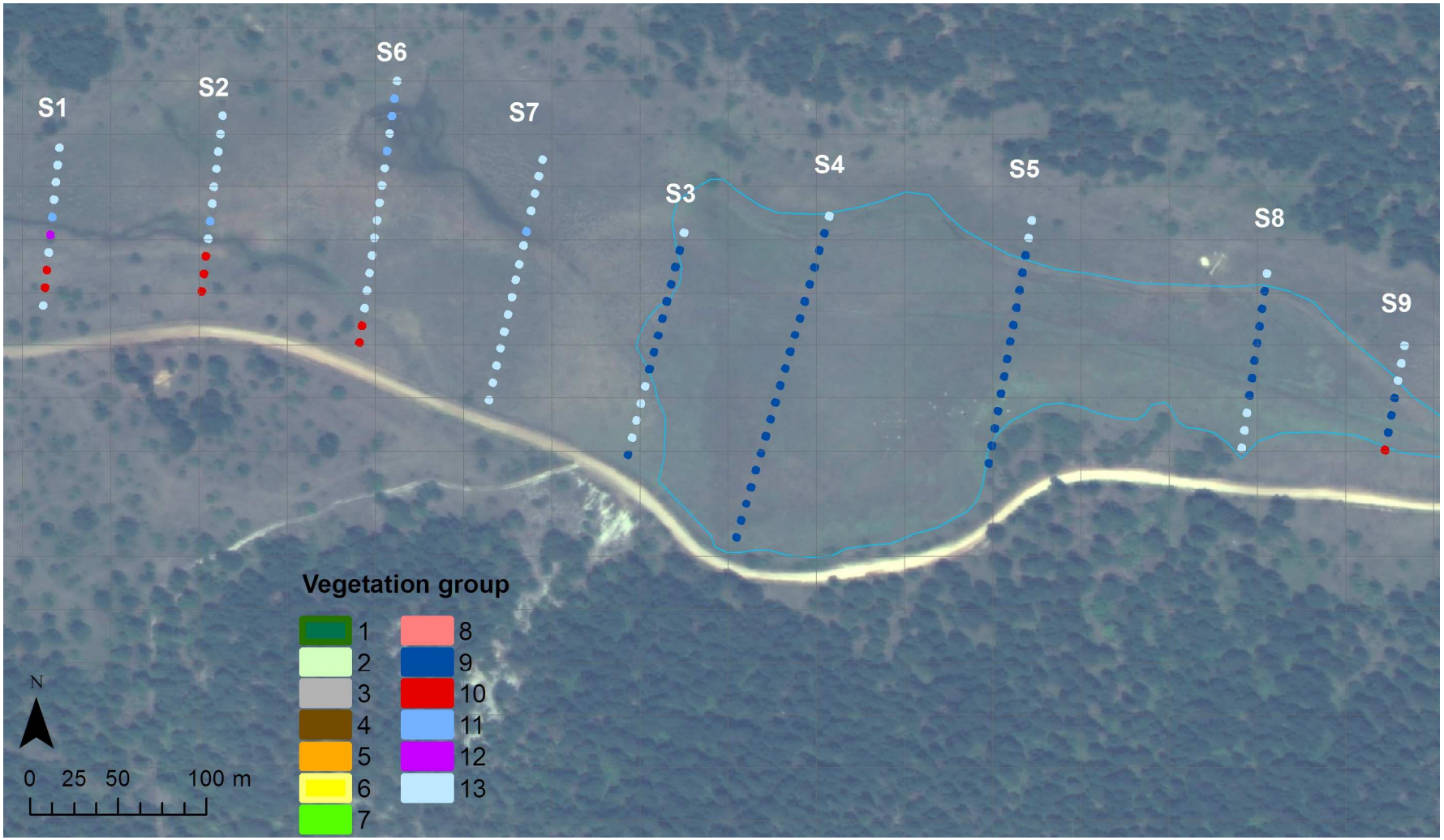
Vegetation group 9: 6420: *Plantaginetalia majoris* transition to *Phragmito-Magnocaricetea* - *Mentha pulegium-Potentilla reptans*

Diagnostic species: *Eleocharis palustris, Mentha pulegium*
Constant species: *Mentha pulegium*
Dominant species: *Convolvulus arvensis, Cynodon dactylon, Eleocharis palustris, Mentha pulegium, Plantago lanceolata, Potentilla reptans*

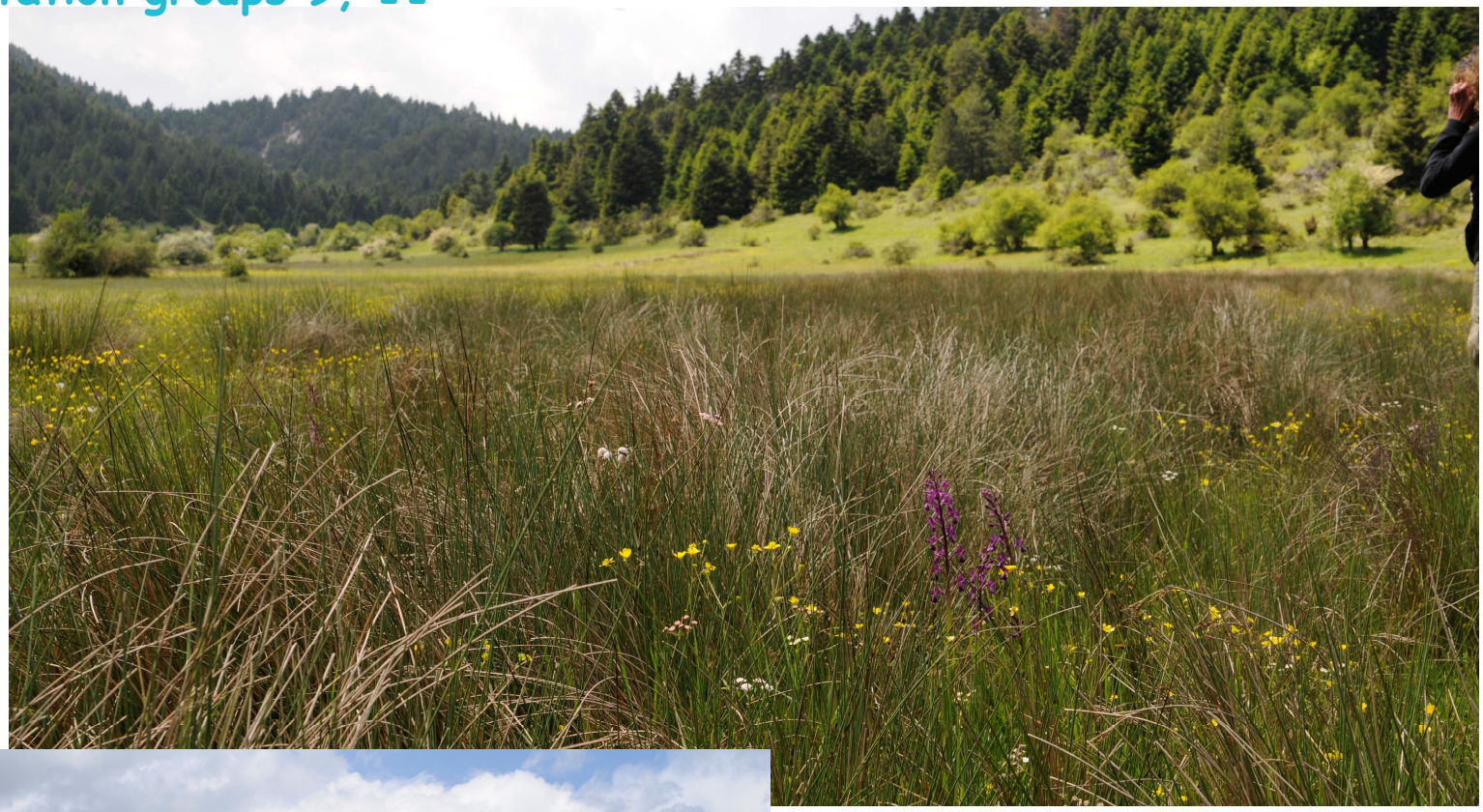
Vegetation group 11: 6420: *Plantaginetalia majoris - Juncus inflexus*

Diagnostic species: *Juncus articulatus, Juncus inflexus*
Constant species: *Juncus inflexus*
Dominant species: *Juncus inflexus*

Vegetation groups 9, 11

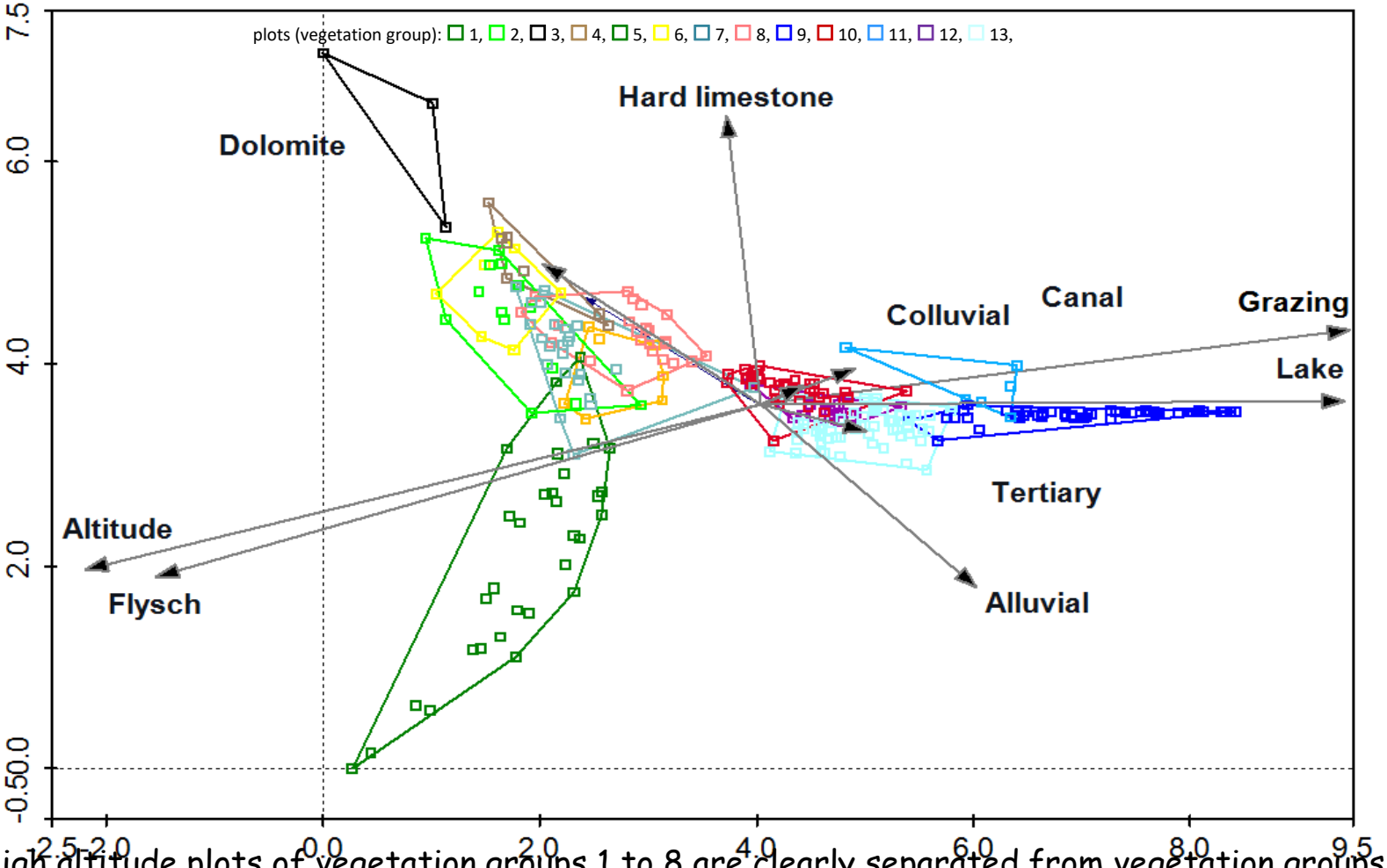


Vegetation groups 9, 11



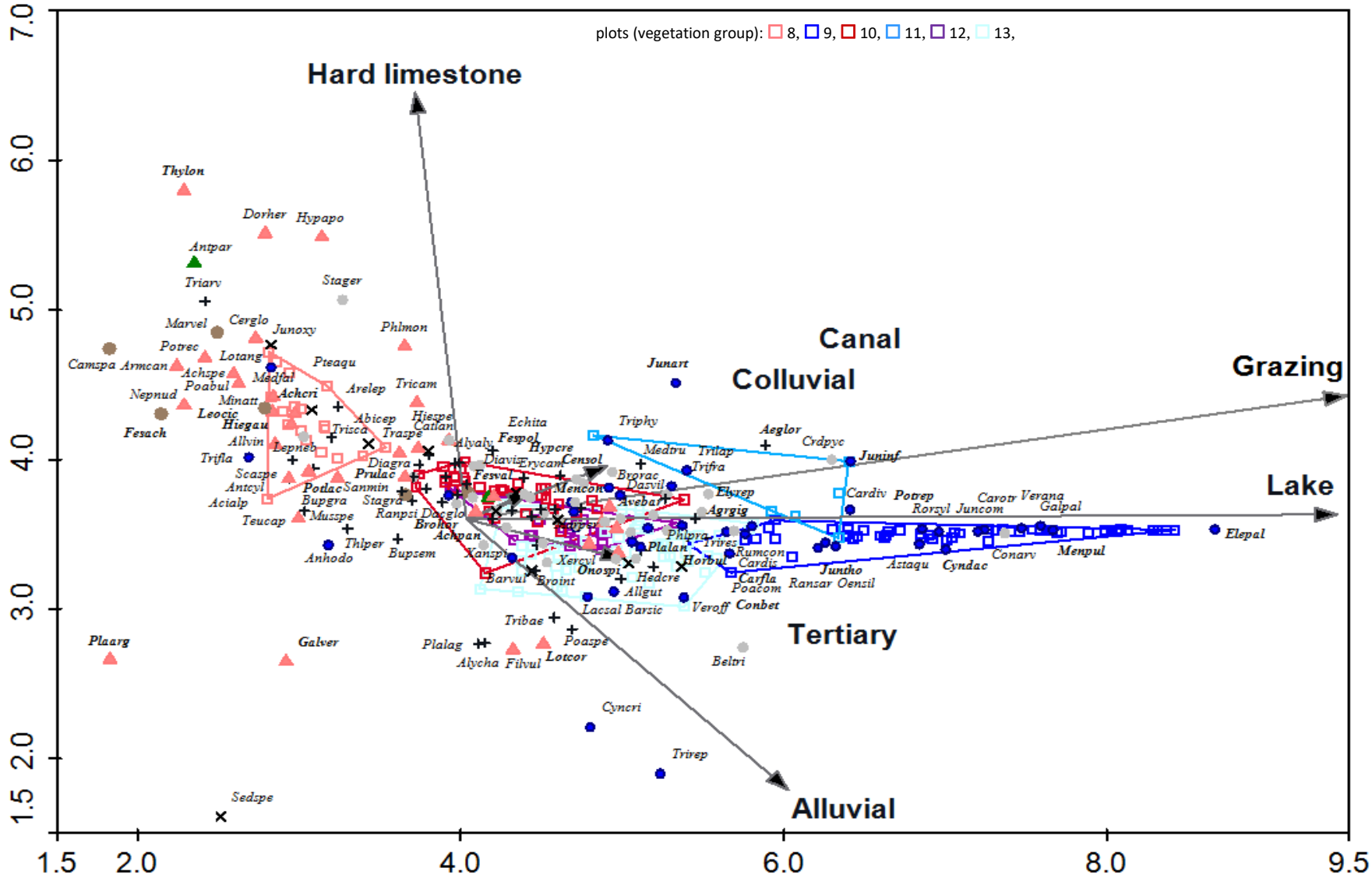
Vegetation group 8

Ecological factors, DCA, plot data, focus on Kallidromo

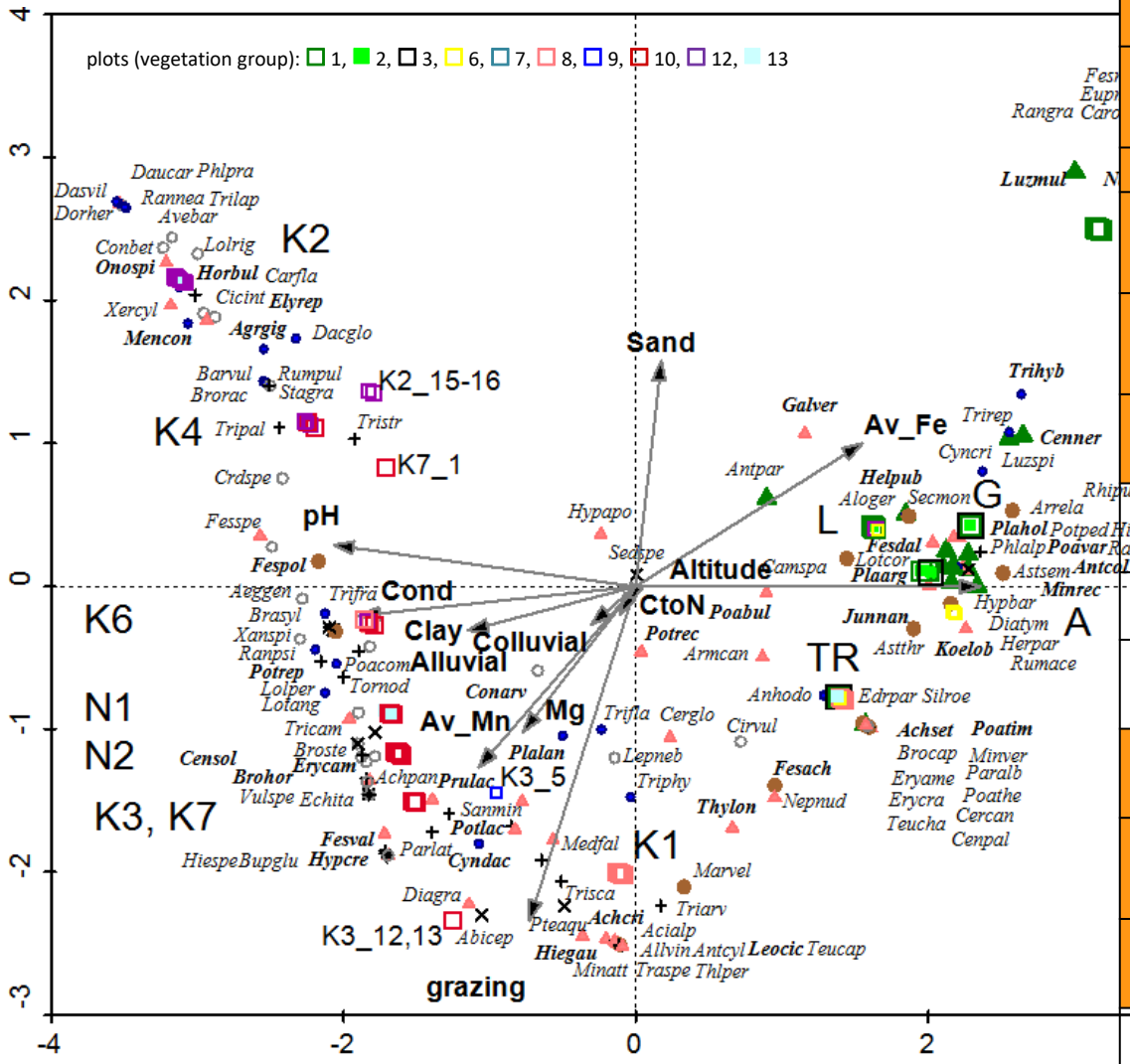


The high altitude plots of vegetation groups 1 to 8 are clearly separated from vegetation groups 9 to 13 along the 1st ordination axis indicating different ecological niches related to altitude and the flysch substrate on the one hand and grazing and water-related substrates on the other (Figure 31). Vegetation groups 1 (6230) and 4 (4060) are separated from vegetation groups 2, 3, 5, 6, 7 and 8 along the 2nd ordination axis apparently depicting differences in substrate (flysch vs. limestone-dolomite) and possibly water content

Ecological factors, DCA, species data



Ecological factors, CCA, (131 plots, 34 %



Variable	Lambda1	Variable	Lambda1
Altitude	0.77	Total N	0.46
Ca	0.71	OrganicC	0.45
pH	0.69	Silt	0.44
Base_sat	0.69	Av_P	0.44
Tertiary	0.63	K	0.44
Flysch	0.62	CtoN	0.4
Av_Zn	0.61	Clay	0.37
Cond	0.6	Mg	0.37
grazing	0.59	Av_Cu	0.36
Av_Mn	0.58	Alluvial	0.33
Hardlim	0.57	Colluvia	0.33
Av_Fe	0.57	Sand	0.33
CEC	0.51	Dolomite	0.32
Na	0.49		

Λιβάδια

τα λευκά

Λιβάδια

Galium verum

τα κίτρινα

Potentilla recta

Λιβάδια

τα κίτρινα

Λιβάδια


Malva moschata

τα ροζ


Dianthus


Dianthus tymphresteus

Λιβάδια

τα αγκαθωτά

Astragalus sempervirens

Astracantha thracica

Ορεινά Λιβάδια

ΥΠΟΥΡΓΕΙΟ ΑΓΡΟΤΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΤΡΟΦΙΜΩΝ
ΕΛΛΗΝΙΚΟΣ ΓΕΩΡΓΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ "ΔΗΜΗΤΡΑ"

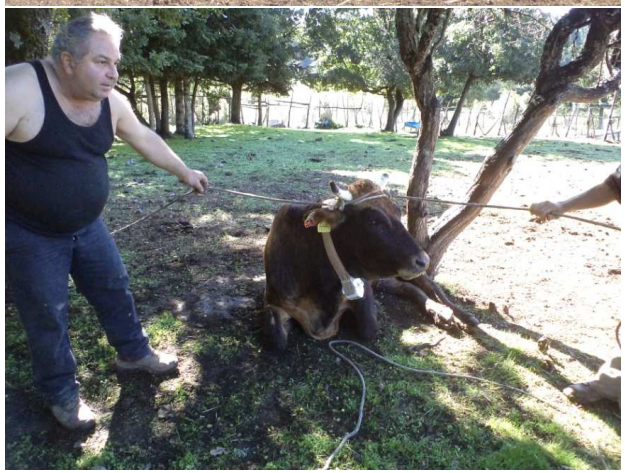
μελέτη διαχείρισης βόσκησης:

✓τοποθέτηση κλωβών

✓σύγκριση βοσκημένων – μη βοσκημένων επιφανειών

Ορεινά Λιβάδια

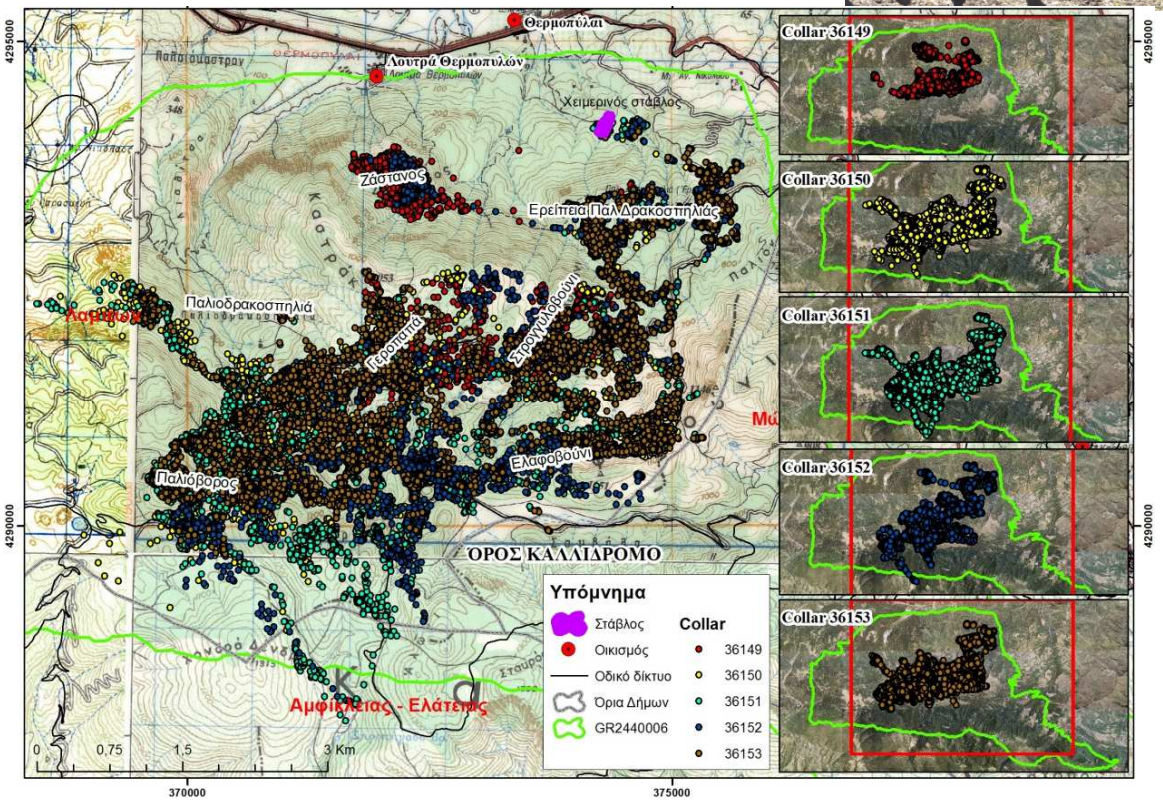
ΥΠΟΥΡΓΕΙΟ ΑΓΡΟΤΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΤΡΟΦΙΜΩΝ
ΕΛΛΗΝΙΚΟΣ ΓΕΩΡΓΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ "ΔΗΜΗΤΡΑ"



μελέτη έντασης θέσεων βόσκησης:

✓τοποθέτηση κολλάρων με GPS σε αγελάδες

✓παρακολούθηση διαδρομών



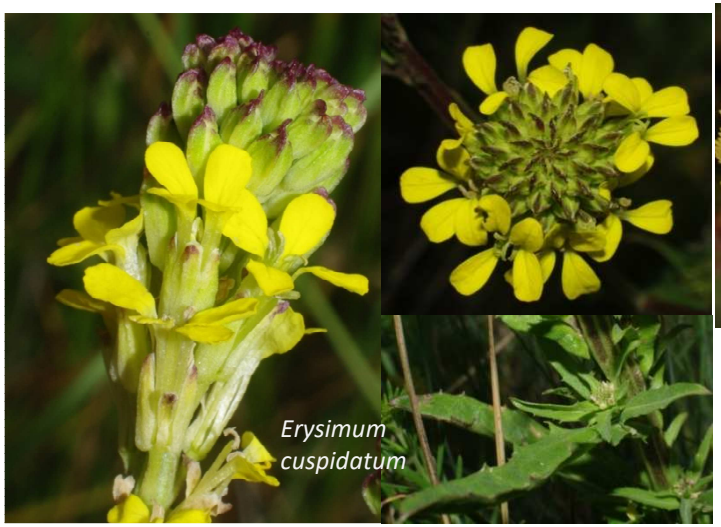
Ορεινά Λιβάδια

Ορεινά Λιβάδια


Galium verum


Orchis pallens

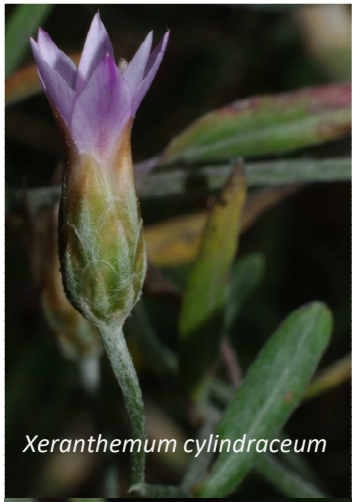

Alyssum chalcidicum


Erysimum cuspidatum


Hieracium hoppeanum s.l.


Potentilla laciniosa

Ορεινά Λιβάδια


Xeranthemum cylindraceum


Nepeta nuda


Salvia ringens


Thymus longicaulis

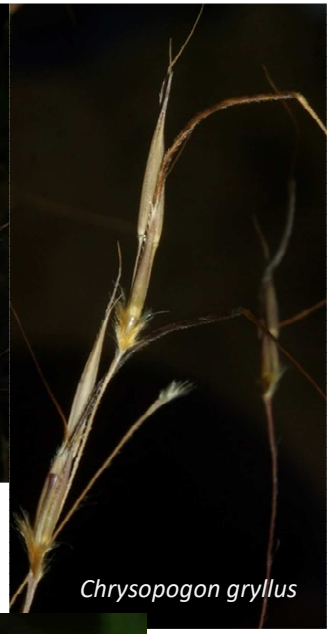

Centaurea triumfettii


Stachys germanica

Ορεινά Λιβάδια

ψυχανθή

Ορεινά Λιβάδια



Chrysopogon gryllus

Poa bulbosa

Stipa capillata

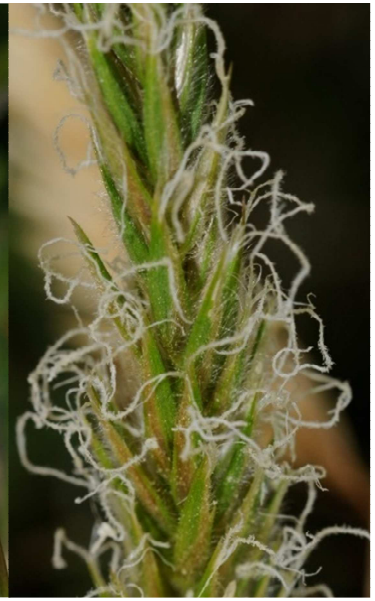
Brachypodium pinnatum

αγρωστώδη

Poa compressa

Phleum pratense

Anthoxanthum odoratum



14tThank you for your attention