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► To cite this version:

Fabien Stark, Julie Ryschawy, Myriam Grillot, Romane Mettauer, Guillaume Martin, et al.. Combining biotechnical and organisational levers to engage agroecological transition of farming systems: A case-study of sheep integration into organic cropping systems in South-western France. *Landscape* 2021, Sep 2021, Berlin, Germany. hal-03641231

HAL Id: hal-03641231

<https://hal.inrae.fr/hal-03641231>

Submitted on 14 Apr 2022

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Combining biotechnical and organisational levers to engage agroecological transition of farming systems:

A case-study of sheep integration into organic cropping systems in South-western France

F. Stark, J. Ryschawy, M. Grillot, R. Mettauer, G. Martin, A. Cassagnes, Y. Bertin, M. Moraine



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Context and problematic

► Context

- Negative impacts of specialization and concentration of agricultural systems
- Specialization of both farms and regions
- Integrated crop-livestock systems (ICLS) as a relevant lever for agroecological transition

Objective

Explore different forms of ICLS in a given region to evaluate their possible benefits and perspectives



Material

- ▶ Minervois region
(South Western France)
 - ▶ Mediterranean climate
 - ▶ A plain zone / a Causse zone
- ▶ Two forms of existing ICLS



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Grazing-ICLS :
involve shepherds,
vineyards &
cereals growers

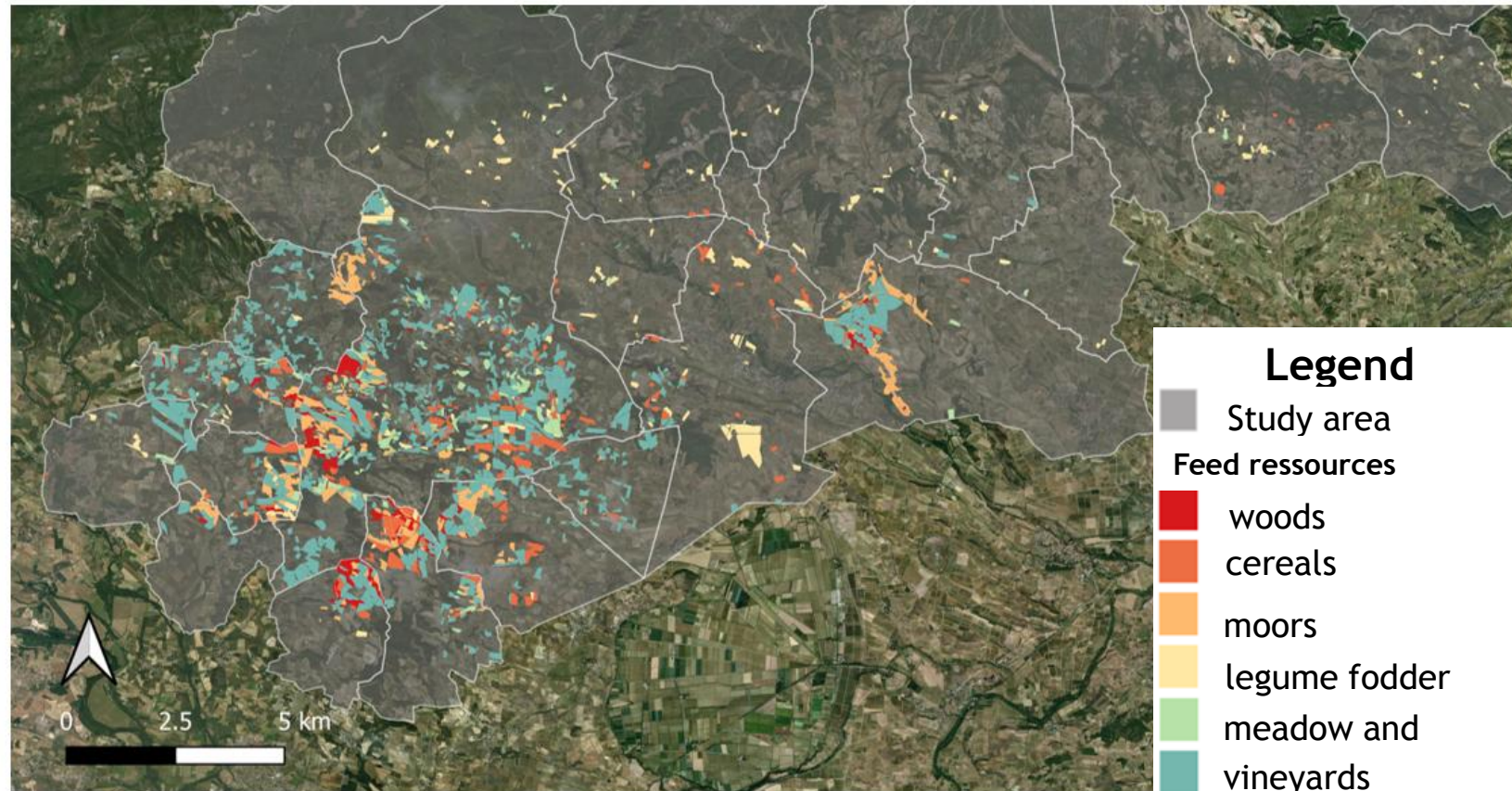
Mowing-ICLS :
involve breeders
& cereal growers



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Methodology: modelling

- ▶ Spatialized and temporalized regional supply-demand model
- ▶ Spatial distribution of surfaces = 3,000 ha (20 % of the territory's agricultural surface)
- ▶ Feed resources estimation (legume fodder, moors, inter-row vineyard, ...)
- ▶ Farming systems and CLI practices calibration: semi-structured interviews (n=22)



Methodology: simulation

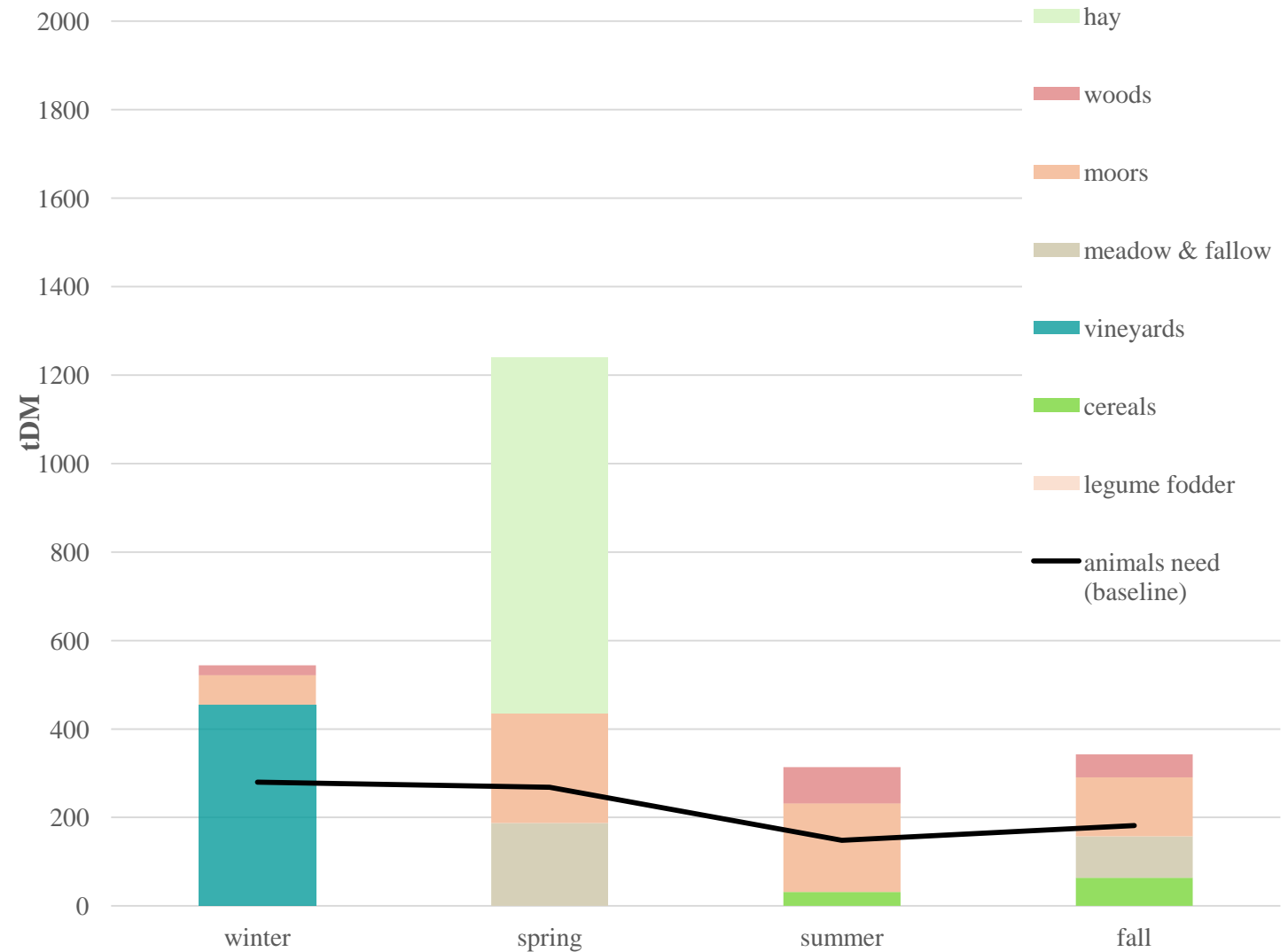
	Scenarios	CC impacts	ICLS « optimisation »	Spatial « extrapolation »	Temporal « optimisation »	Temporal & spatial « optimisation »
Setting						
Crops		Change in yields (min-max)	Change in forage allocation (mowing-ICLS)	Change in land use (increase ICLS)	-	-
Livestock		-	-	-	Change in management (transhumance)	Change in management (batching)

- ▶ simulation plan consistent with local actors
- ▶ settings consistent with farming system structures and functioning

Results: Baseline scenario

- ▶ Herd of 1,000 ewes feed on the territory (shepherd)
- ▶ Diversity of feed resources
- ▶ Feed resources vary with seasons
- ▶ Quantity of available resources (and consequently number of animals fed) depend also of seasons

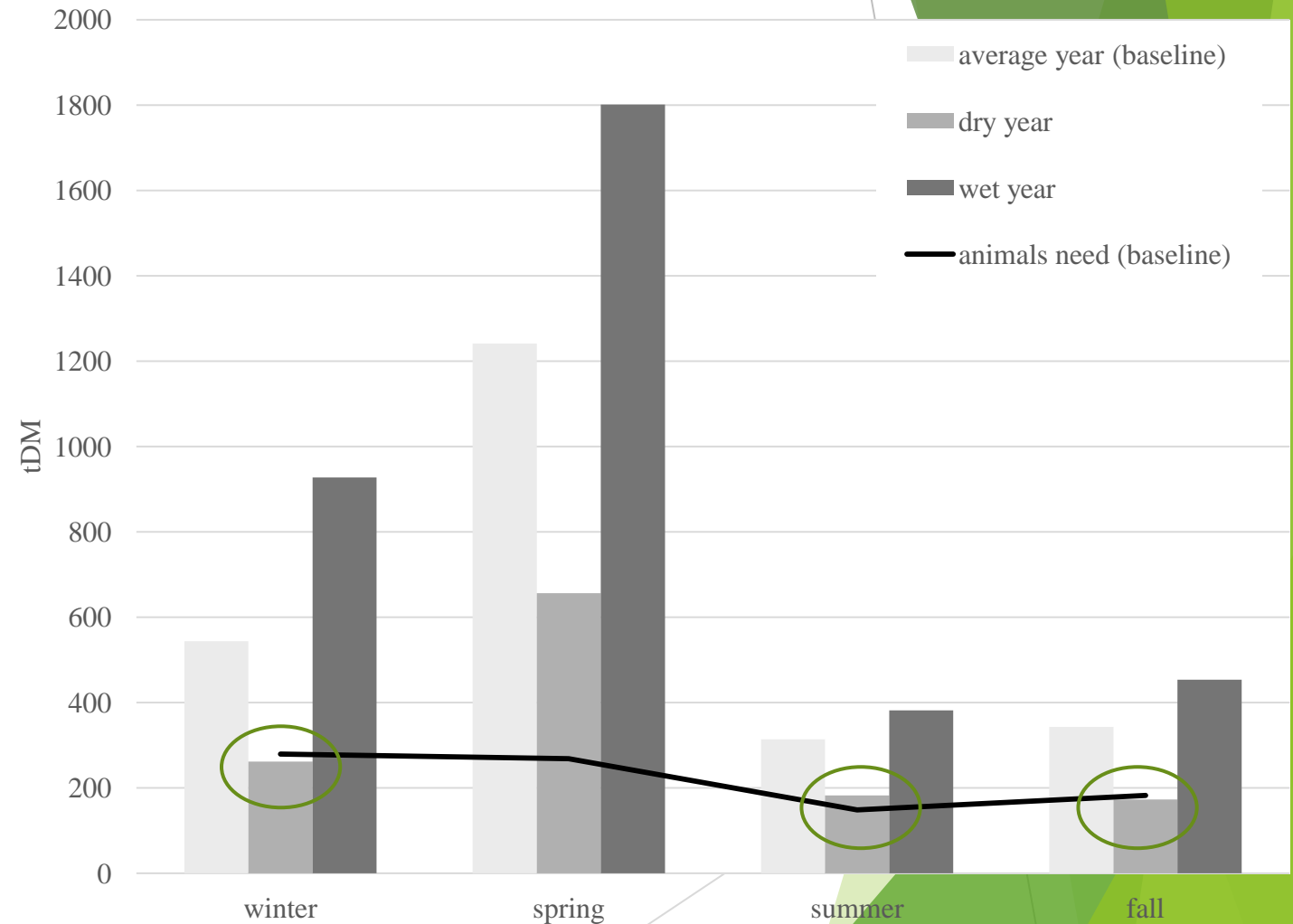
LANDSCAPE 2021



Results: Climatic change impact

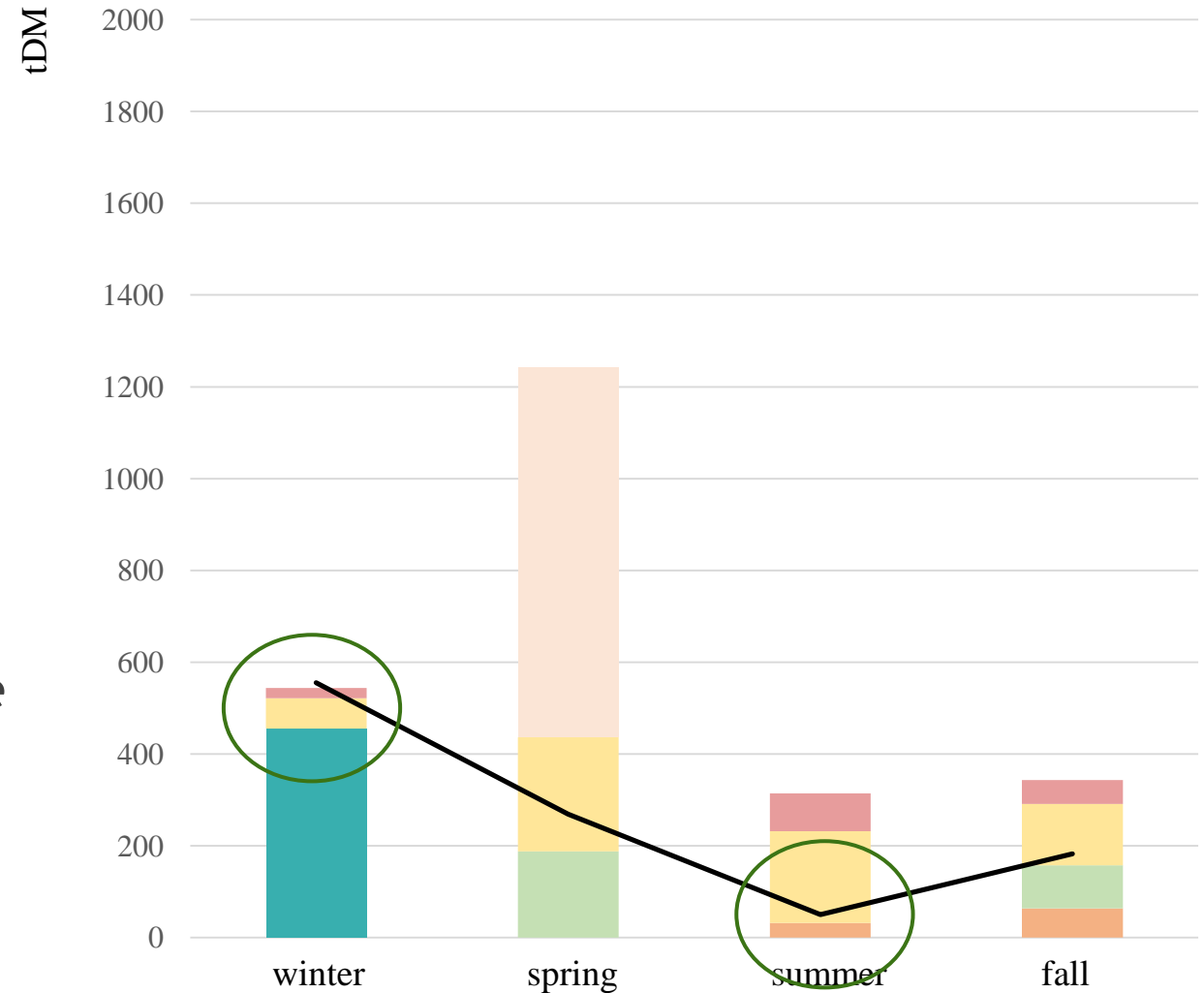


- ▶ Setting: Change in yields
- ▶ Fall and winter become also limiting in dry years (what happened this year)
- ▶ Not enough resources to feed the actual herd

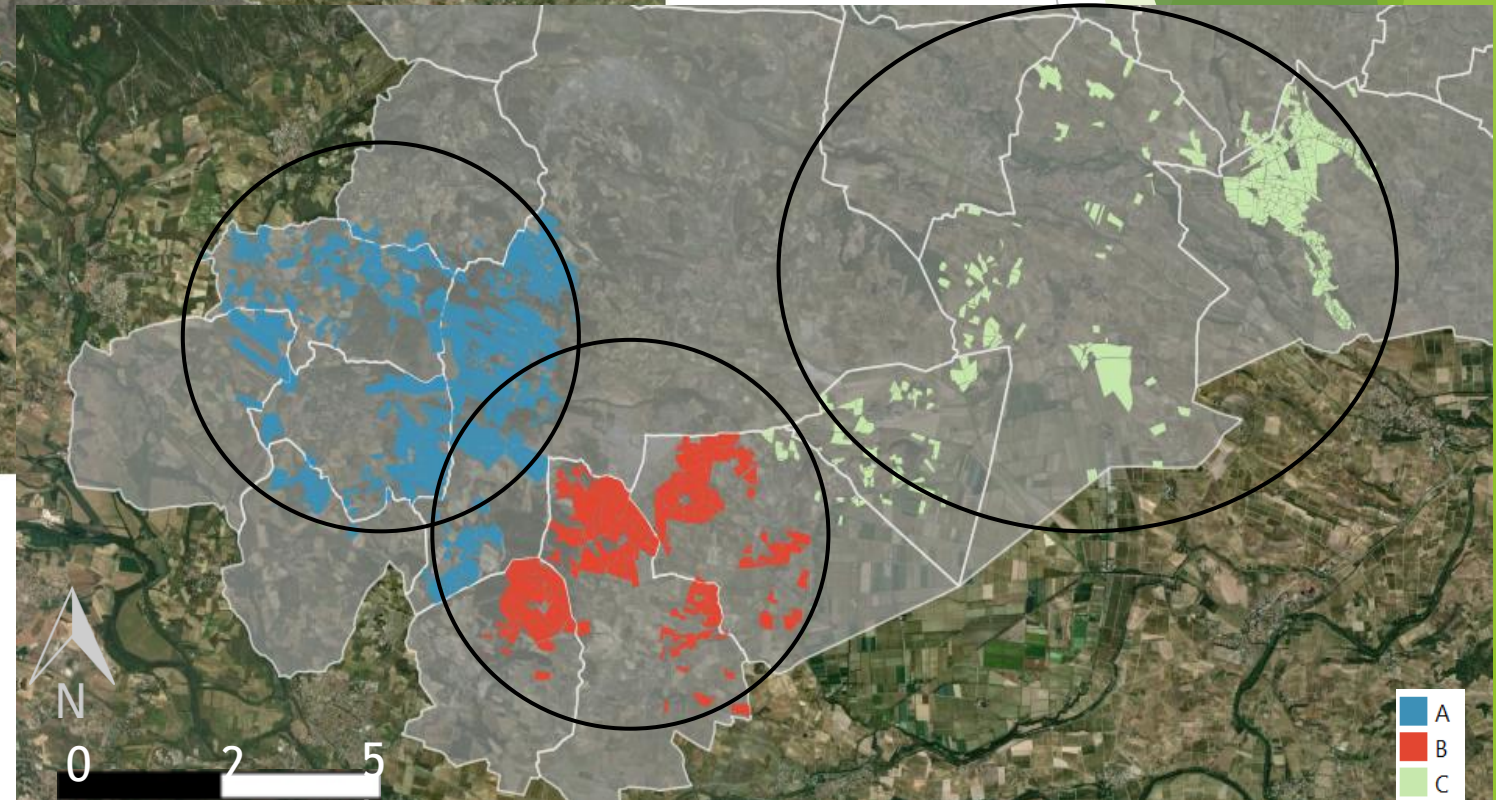
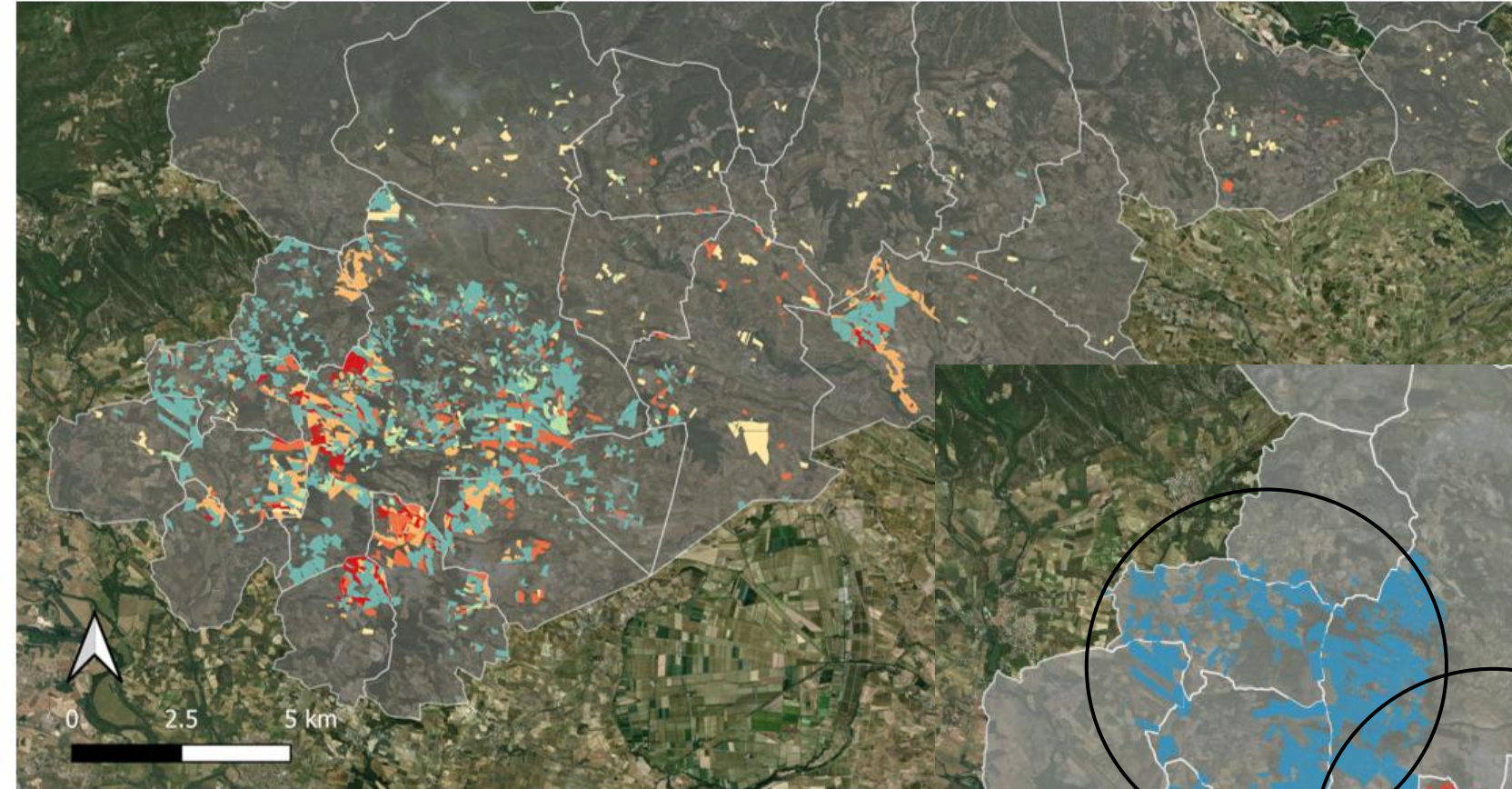


Results: temporal adaptation

- ▶ Setting: Change in grazing periods
- ▶ Summer transhumance (estive) to reduce pressure on resources
- ▶ Inverse transhumance (winter) to optimize the use of available resources

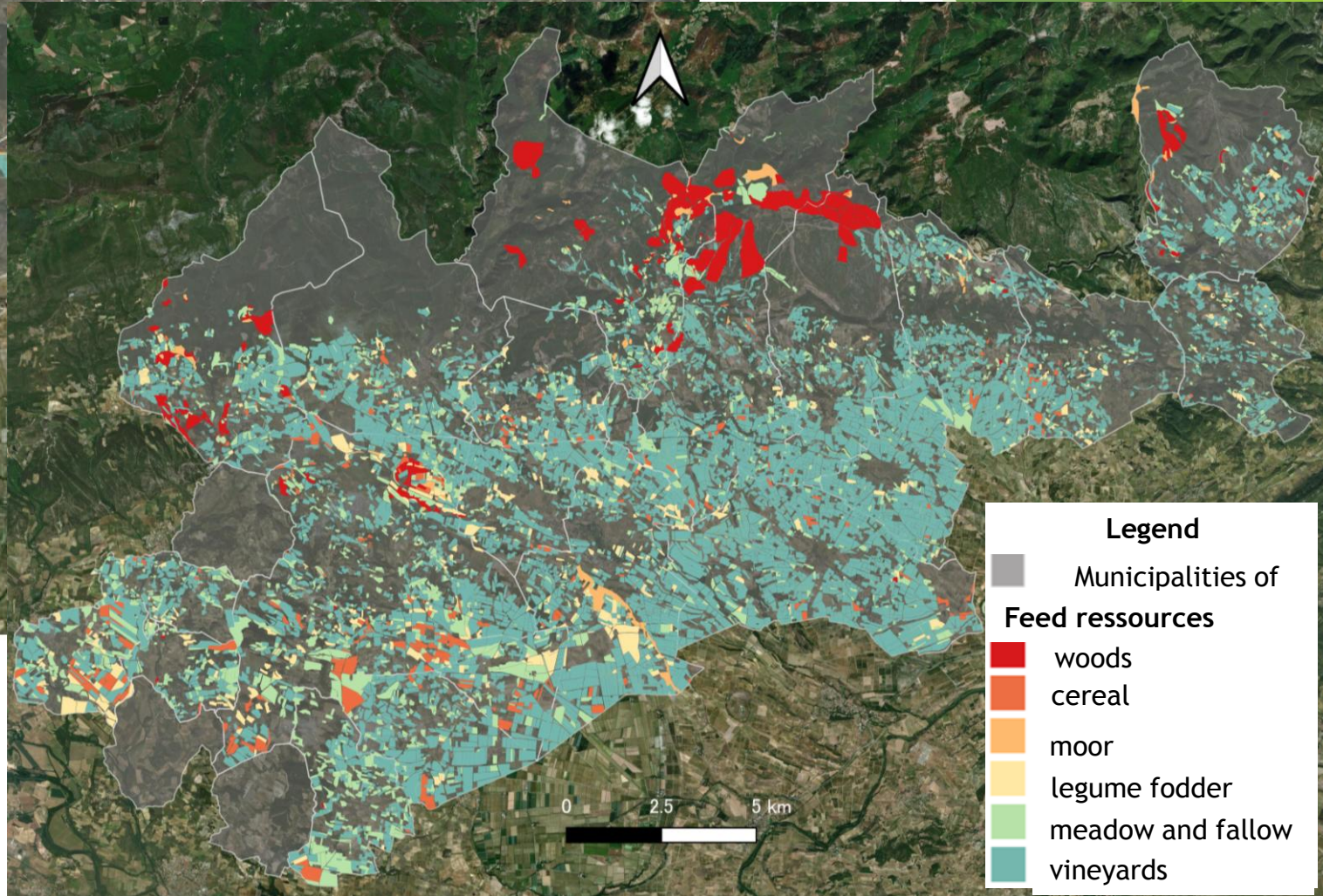
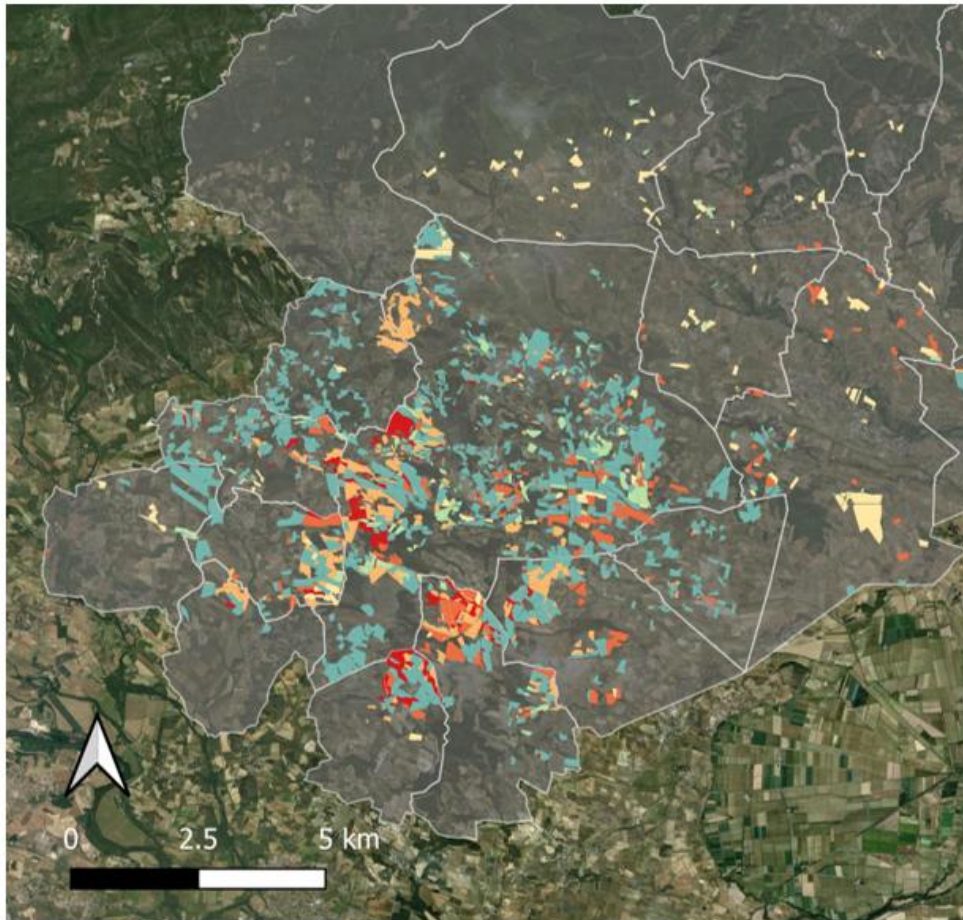


Results: Batching adaptation



- ▶ separate the herd into 3 batches
- ▶ decrease animal density
- ▶ facilitate management

Results: spatial adaptation



- ▶ Consider ICLS all over the territory
- ▶ Increase number of ewes (> 8,000)

Discussion & Perspectives

- ▶ Interest in combining dynamic analysis (seasonality) and spatial analysis (heterogeneity of land use) to design future landscapes
- ▶ Issues of reintroducing livestock farming in specialised territories :
 - ▶ Services provided to crops: weeding, fertilization, outlet
 - ▶ Services provided to landscape: Shrub encroachment, fire, ... biodiversity
- ▶ Multicriteria assesment of benefits associated to these ICLS (realised but not presented)
 - ▶ Agro-environmental dimension: soil fertility, energy consumption & emission
 - ▶ Socioeconomical dimension: Gross Margin, subsidies ...



Discussion & Perspectives

- ▶ Need to take into account organizational issues and relationships between actors
 - ▶ Consultation meetings with farmers, stakeholders, inhabitants, associations...
 - ▶ Importance of local « leaders »
- ▶ Ongoing project (funding achieve for the next 3 years !)
- ▶ Not yet published (ASD special issue ;-)
- ▶ Thanks to Romane's master thesis



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Besoins concernant le projet Ecopâturage





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