Modelling the dynamics of ecological and socio-ecological systems

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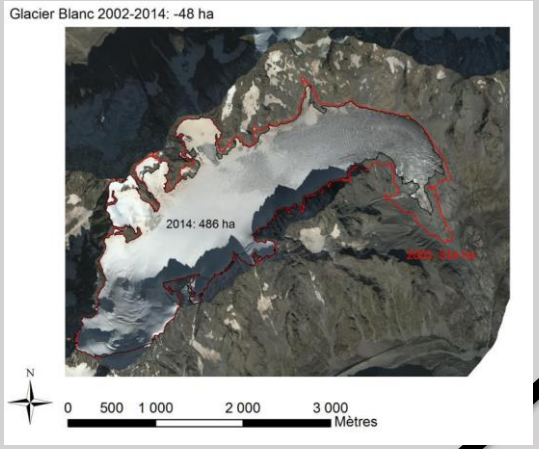
DYNAMIC OF MOUNTAIN ECOSYSTEMS

How to manage
biodiversity conservation
and sustainable development
in a rapidly changing context ?



Dynamics of Mountain ecosystems

Climate

Socio-economical

Dynamic of mountain ecosystems

How to manage
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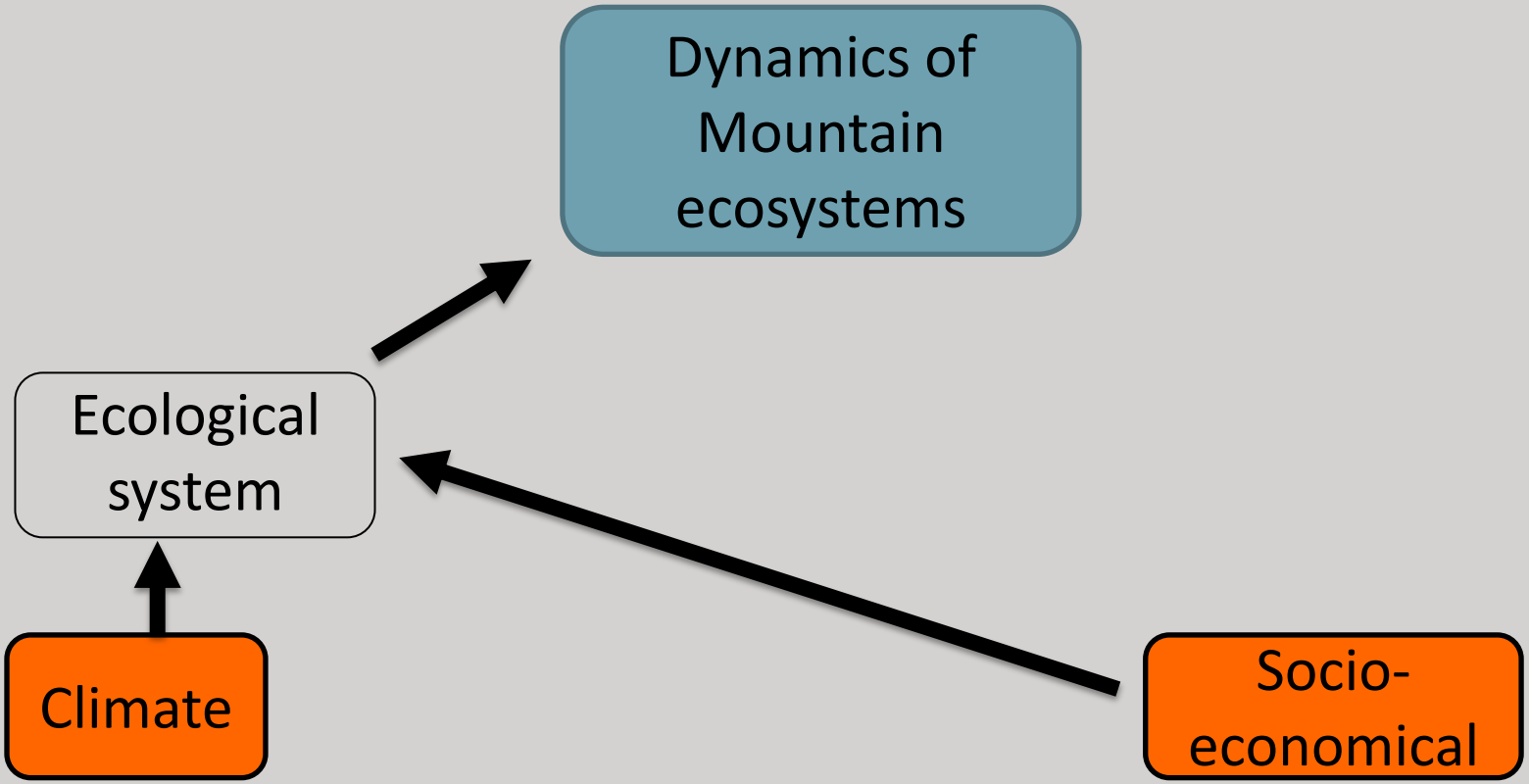
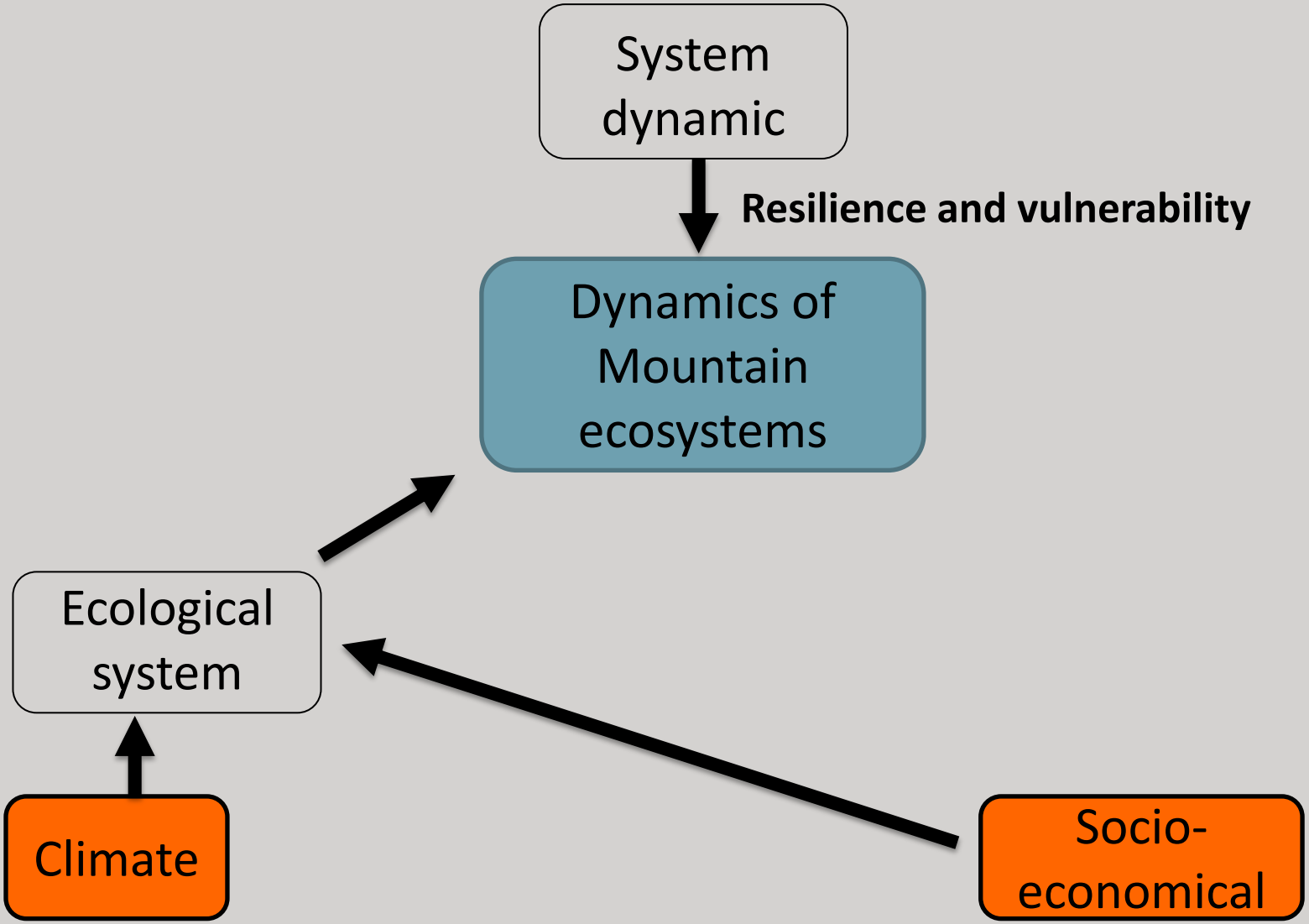
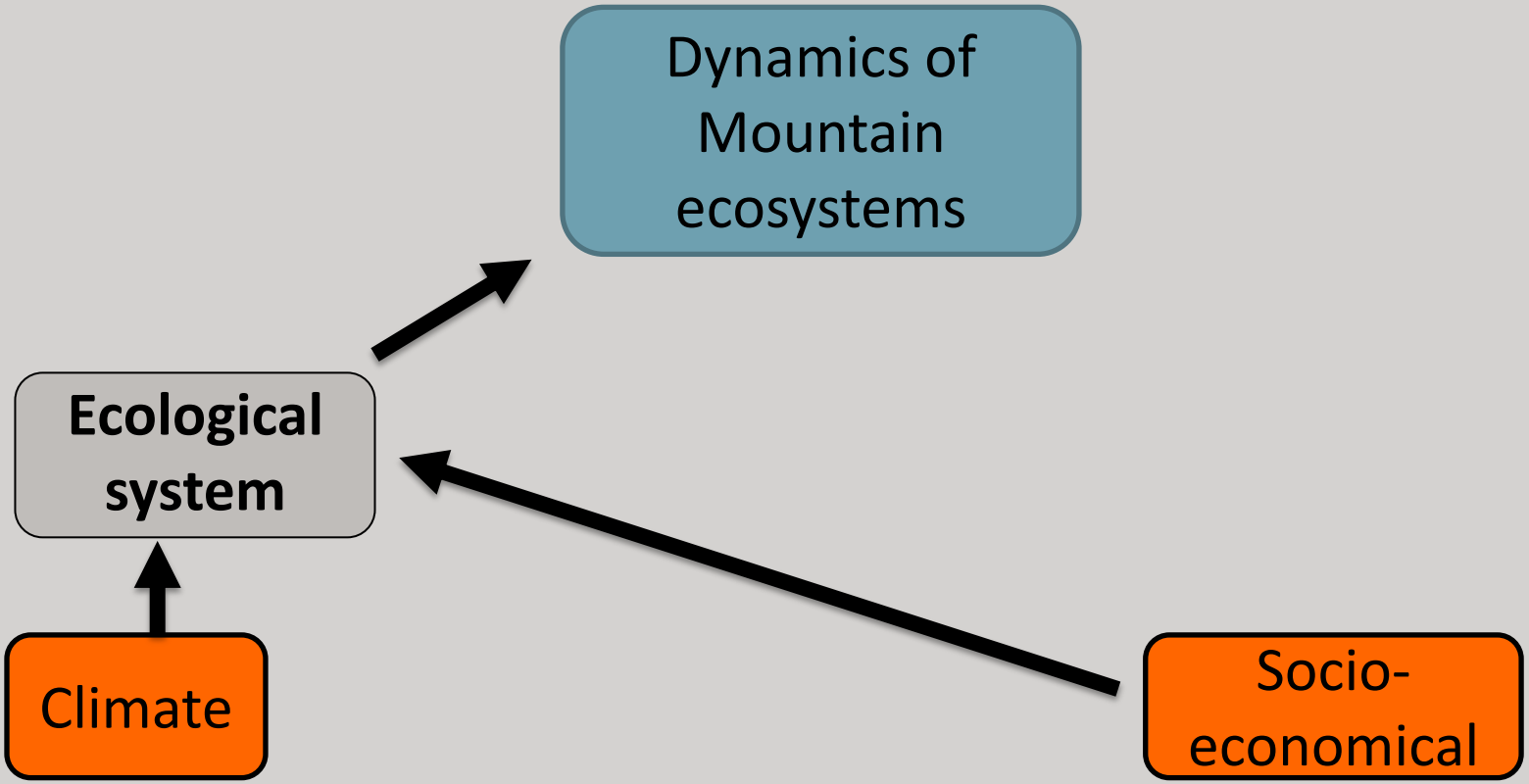


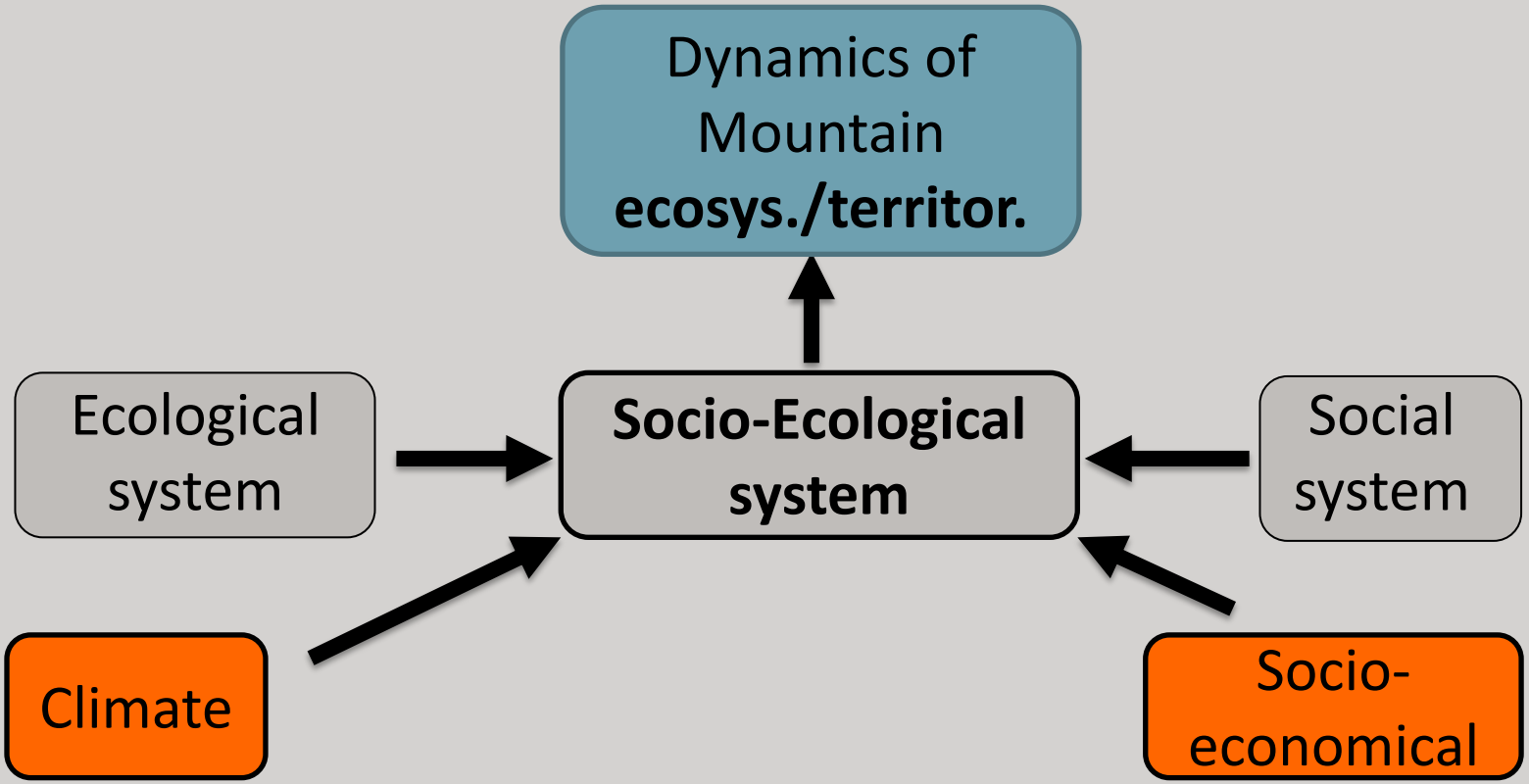
Analysis of system dynamics



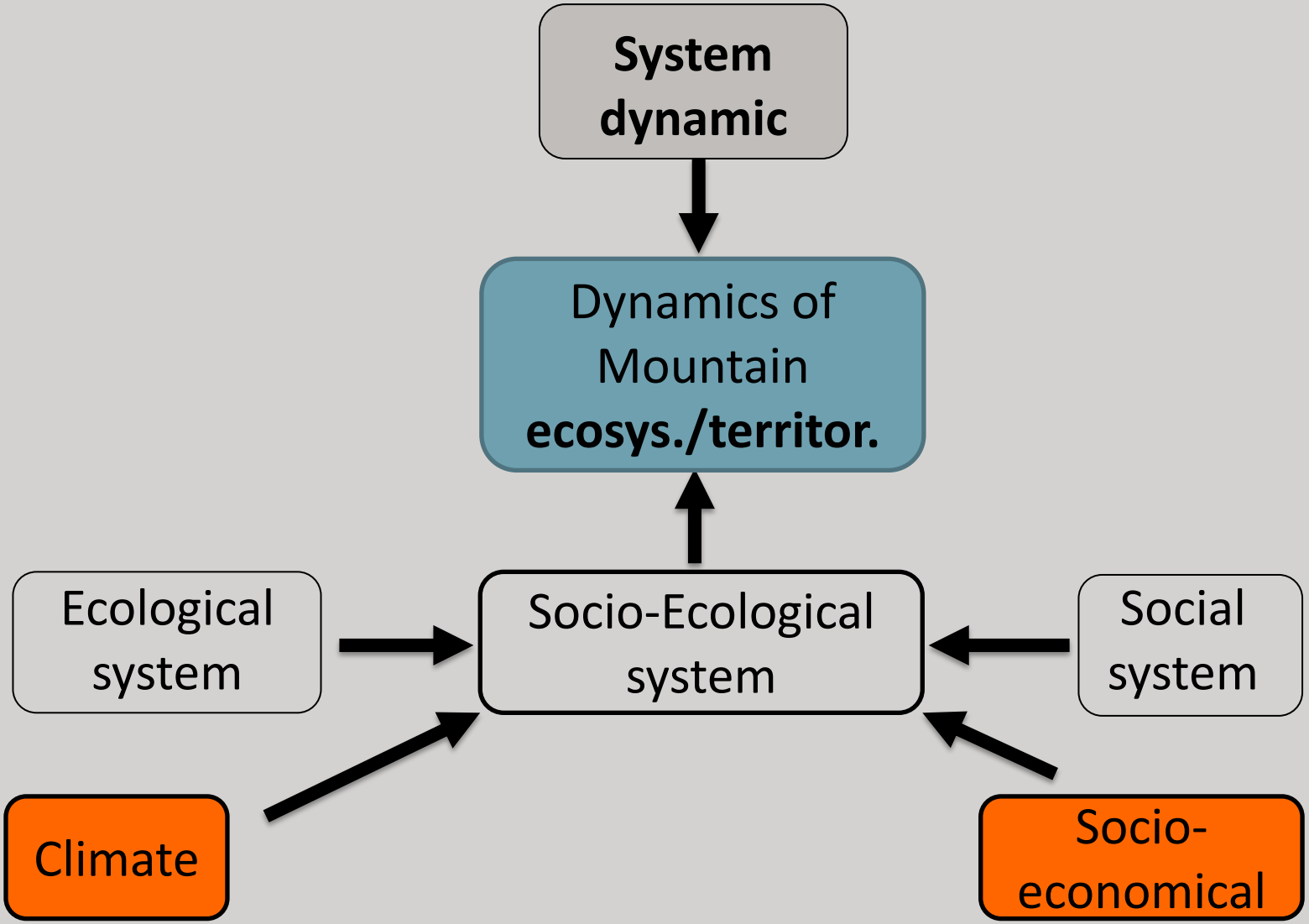
Perspectives for integrated SES models



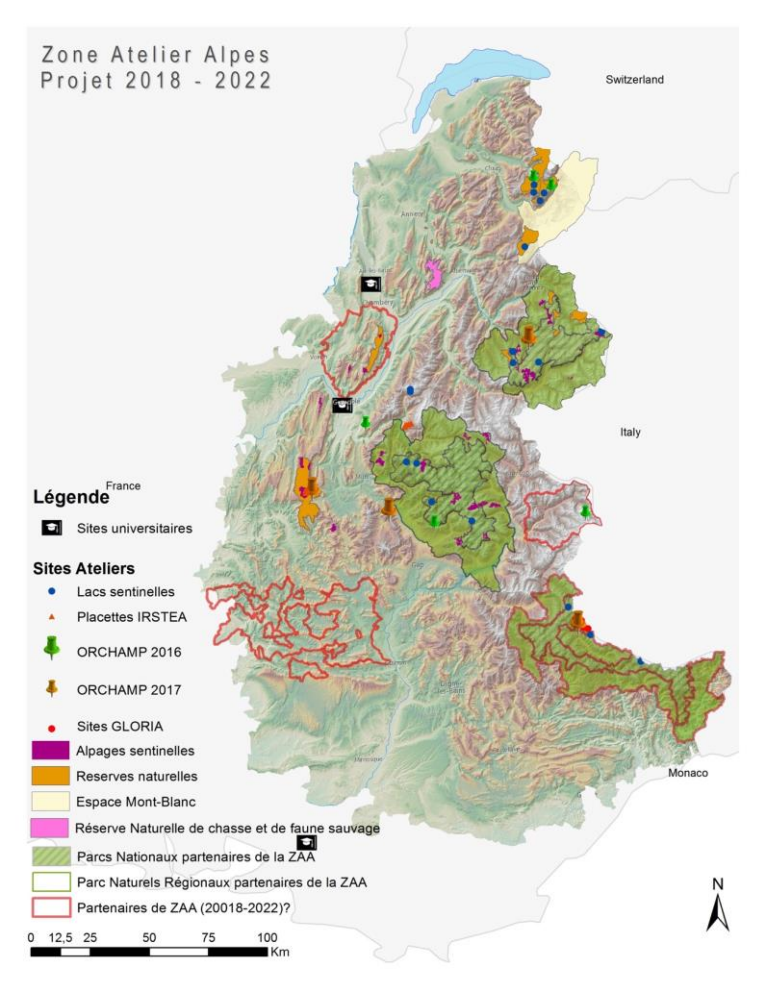
PERSPECTIVES FOR INTEGRATED SES MODELS



PERSPECTIVES FOR INTEGRATED SES MODELS



LTSER research

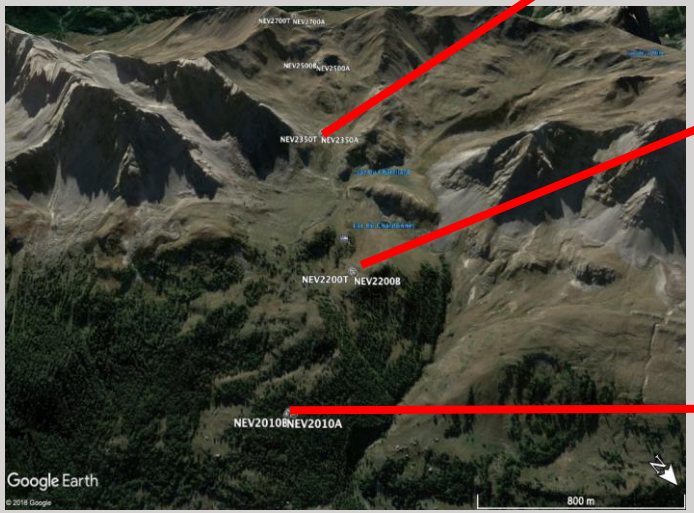


French LTSER Alps

- A network of alpine sites
- A network across regions

Observation of seasons

- Resource availability for cattle
- Snow season and snow events
- Plant phenology (flowering)
- Resource uptake by cattle
- Touristic activity



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Towards functional groups of mountain socio-ecological systems

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OBJECTIVES

1. Build an interdisciplinary database
2. Identify functional attributes of municipalities
3. Develop different perspectives on the French Alps LTSER

VARIABLES' ORGANISATION

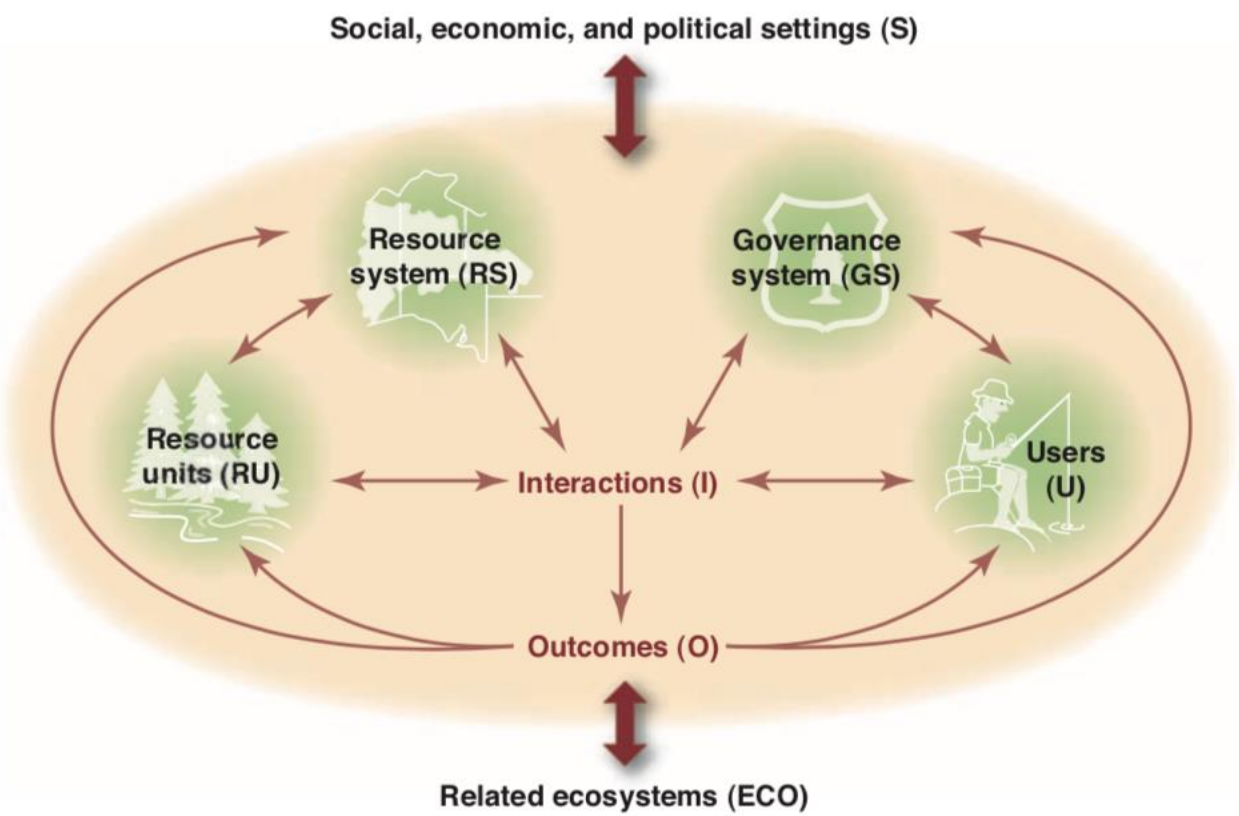
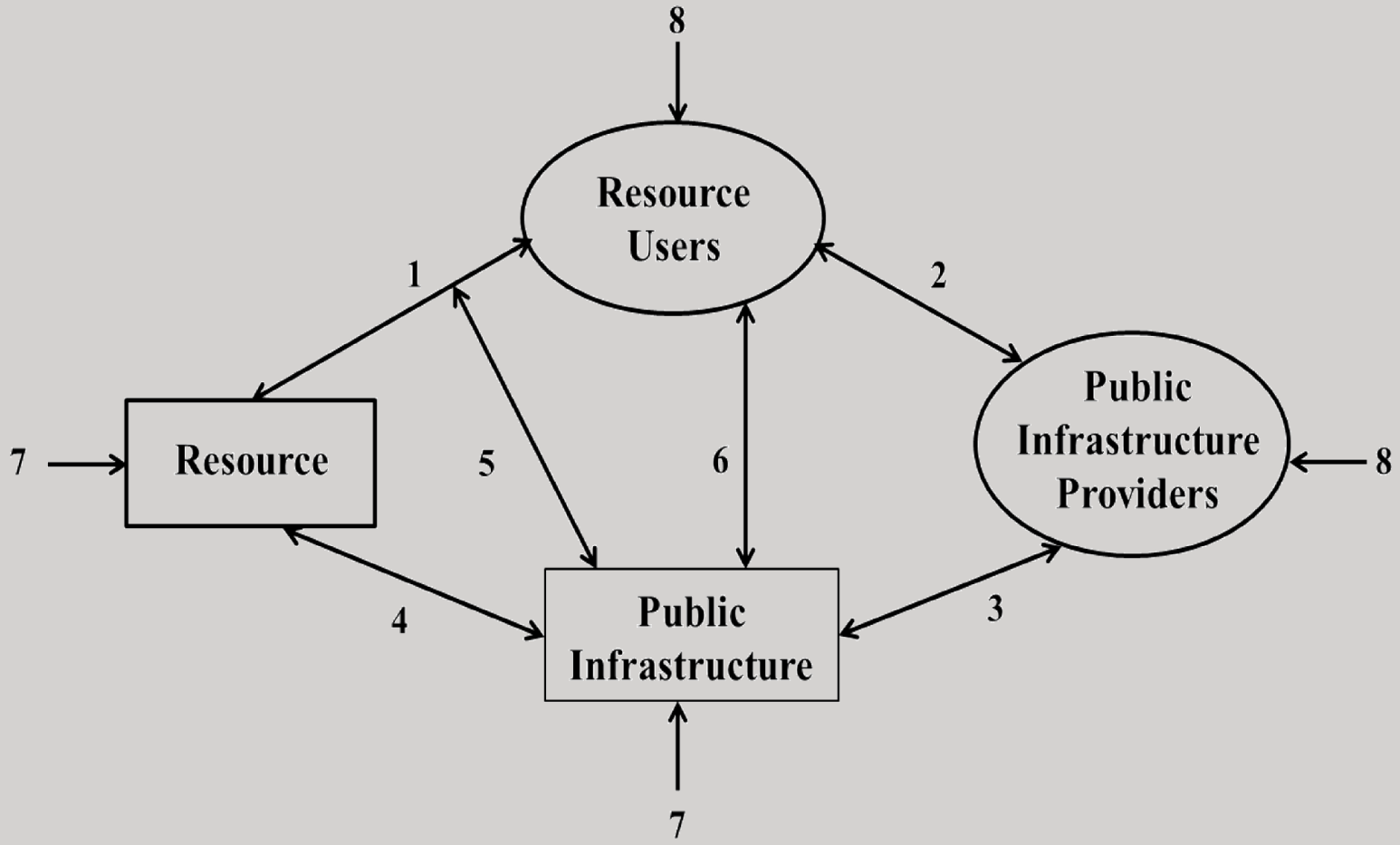


Fig. 1. The core subsystems in a framework for analyzing social-ecological systems.

Ostrom 2009, Sciences ; Vogt et al. 2015 Ecology and Society

VARIABLES' ORGANISATION



Anderies 2004, The robustness framework

VARIABLES' ORGANISATION

Users:
Who? How many? How?

Resources:
Biophysical potential

Activities

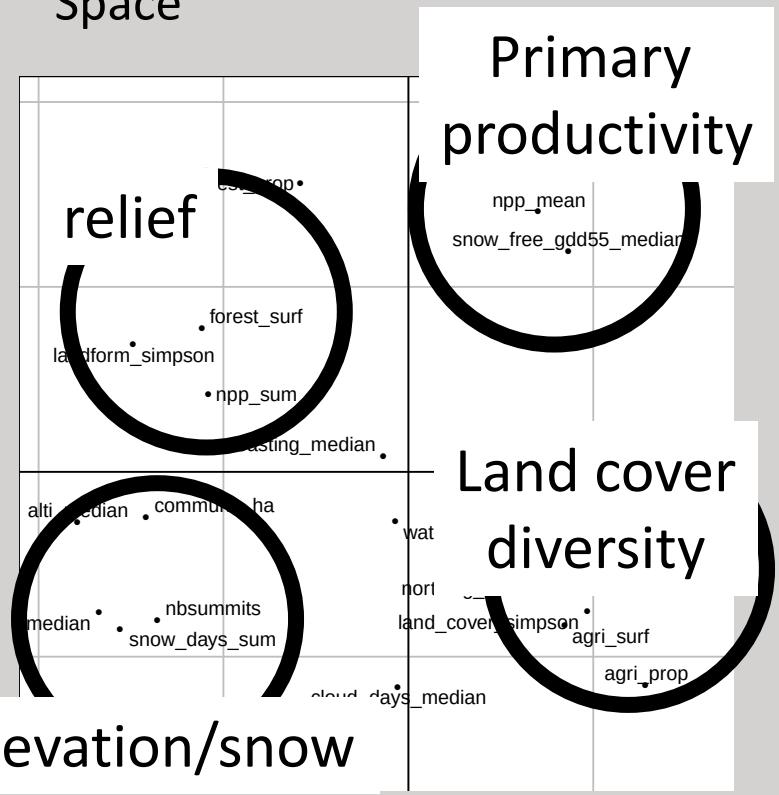
Management/rules

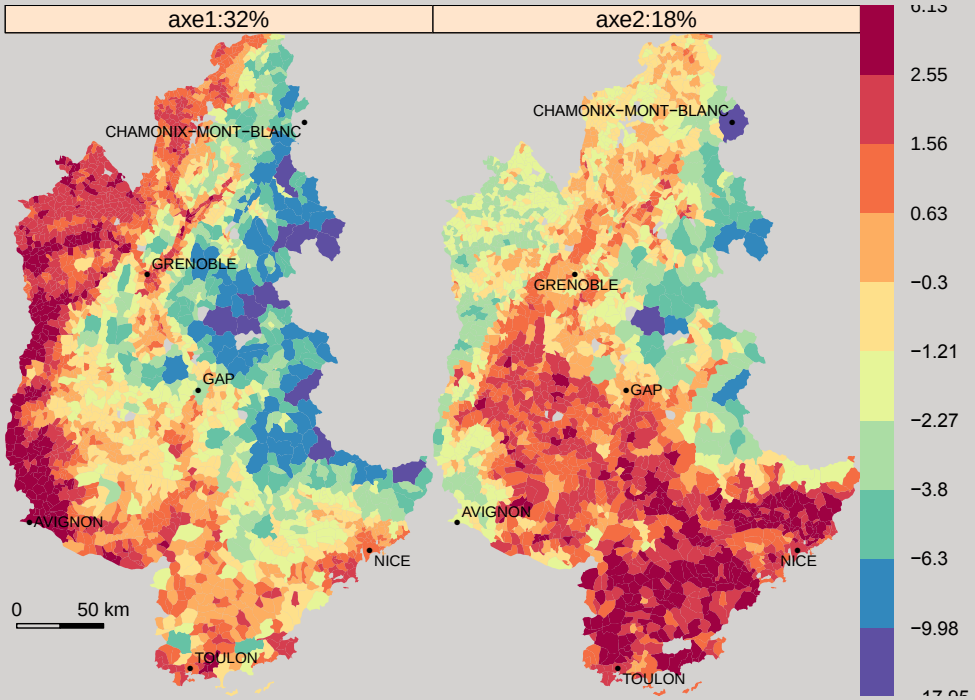
Infrastructures:
Means, support

A Biophysical perspective

Potential for ecosystem services
- Drivers of plant productivity
- Drivers of species diversity
- Elements for touristic activity
- Elements for forestry/agriculture
- Space

Variables
- Primary productivity
- Landform (relief, diversity)
- Land cover (water, forest, fields, diversity)
- Climate (gdd, snow, sun)

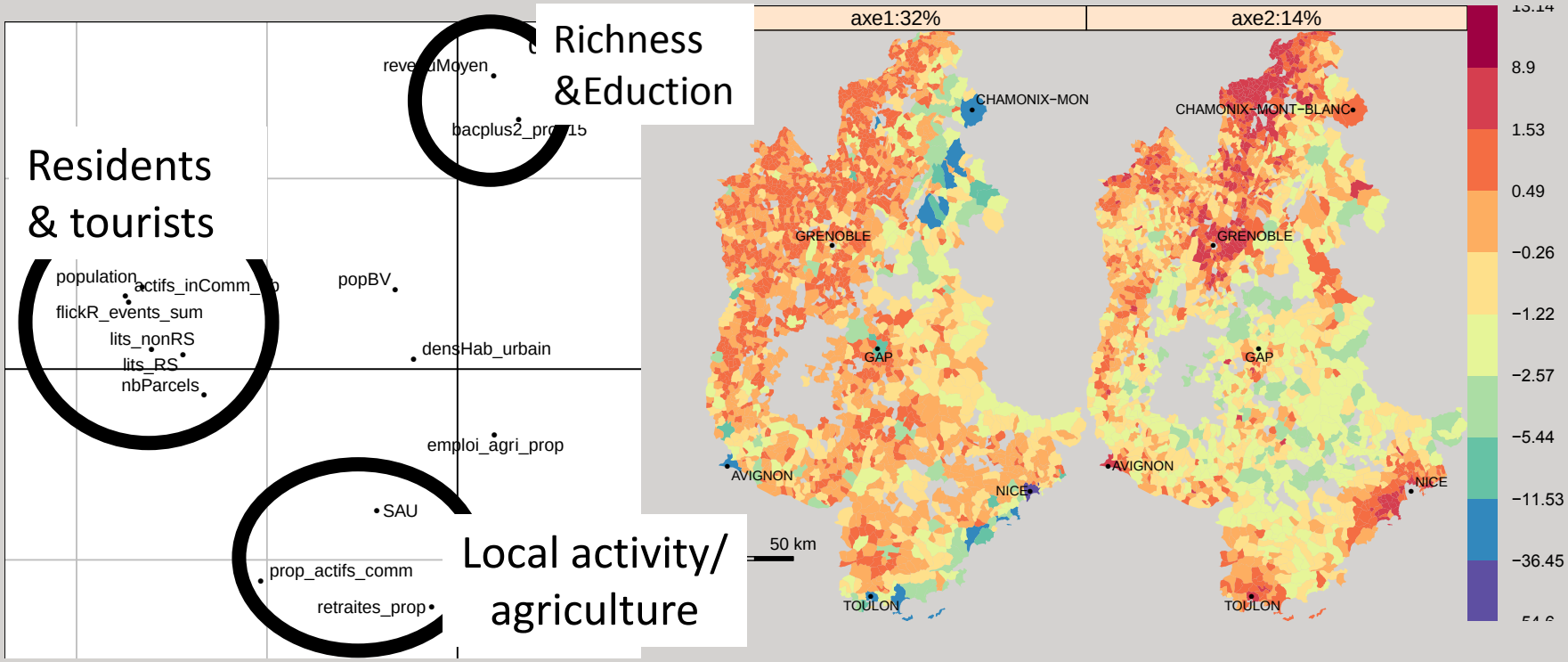




A Users perspective

Characterize users
- Quantity
- Quality
- Type of activities

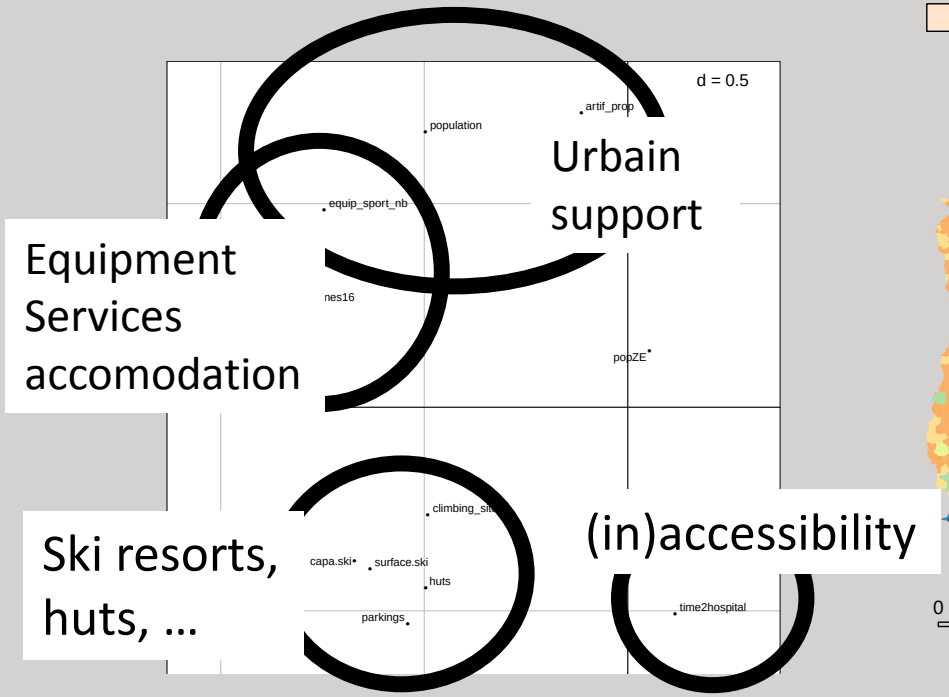
Variables
- Residents and tourists, regional population
- Habitat density, SAU
- Education, richness
- Proportion of employment per category (e.g. in agriculture)

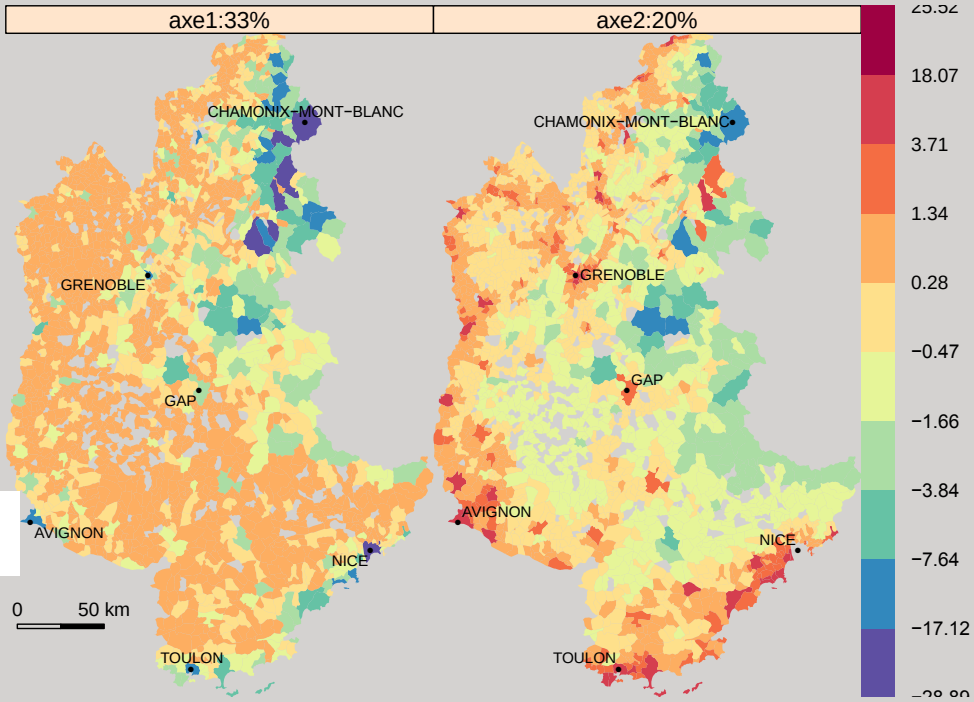


A Infrastructure perspective

Soft and hard infrastructures
- Services
- Hosting
- Equipement
- People
- Geographic accessibility

Variables
- Services
- Population and hosting capacity
- Parkings, roads, isolation
- Ski resorts
- Huts, climbing sites

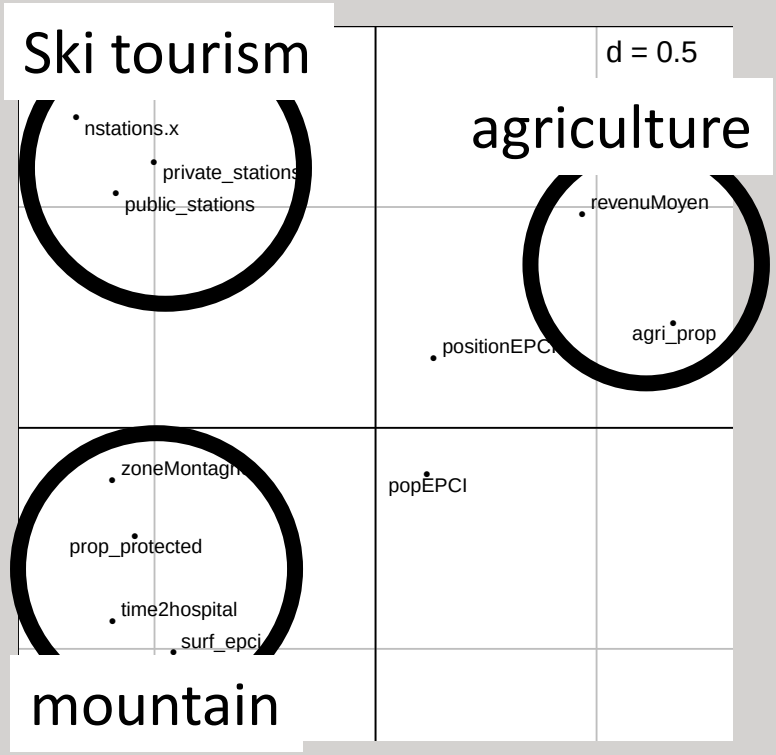


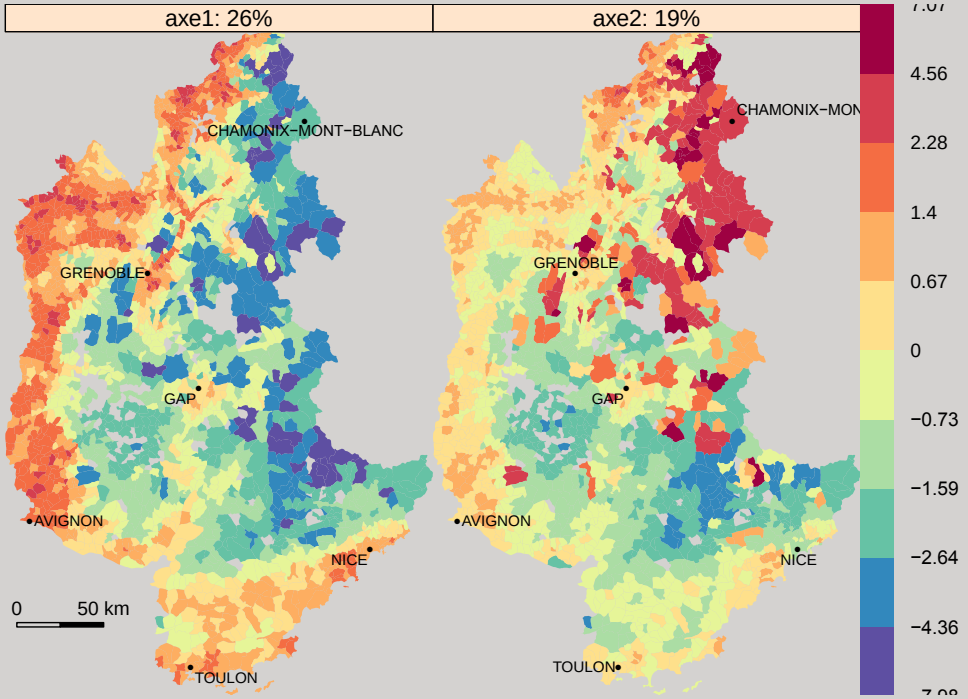


A management perspective

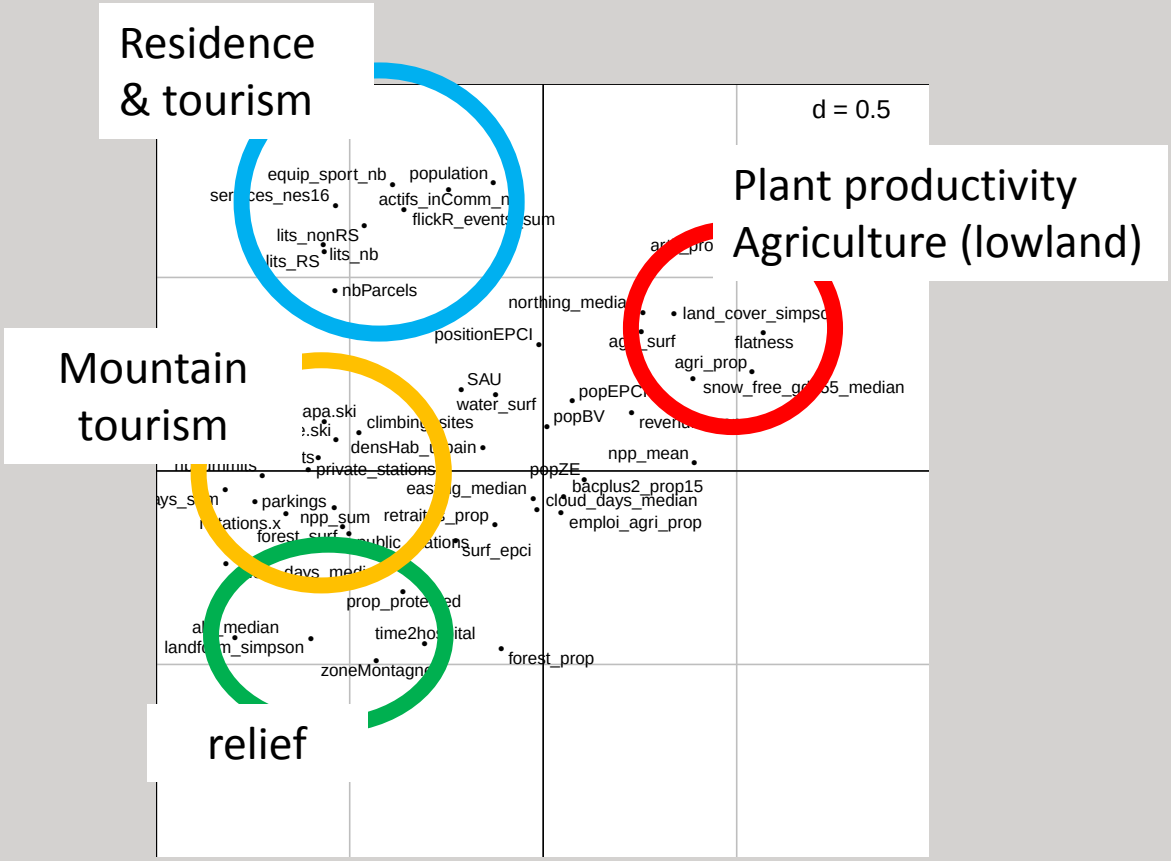
Constraints on management
- Scale of influence, dependence
- Dependence, autonomy
- Private or public management

Variables
- Mountain label for law
- Protected areas
- Isolation
- Local influence, position





SOCIO-ECOSYSTEMS



PERSPECTIVES

- Functional characterization of municipalities
- Functional groups

- Select representative sites
- Contextualise a focal municipality

- Illustrate potential temporal trajectories of municipalities (under climate change or socio-economic scenarios)

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