

**MODELLING PAST AND FUTURE LAND USE AND
COVER CHANGES A MULTI-SCALE APPROACH
APPLIED IN THE PYRENEES – THE MODE
RESPYR PROJECT CONTEXT AND OBJECTIVES**

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MODELLING PAST AND FUTURE LAND USE AND COVER CHANGES

A MULTI-SCALE APPROACH APPLIED IN THE PYRENEES – THE MODE RESPYR PROJECT



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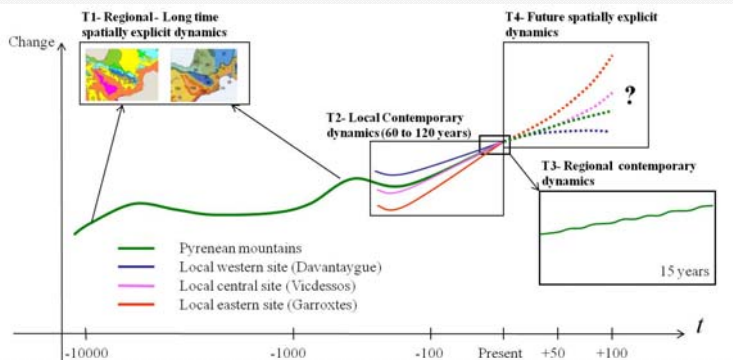
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CONTEXT AND OBJECTIVES

- Context**
- Land cover changes have significant impacts on local and regional climate and on others environmental issues.
 - Understanding past LUCC is essential to reduce uncertainties related to current changes, identify driving forces of LUCC and better anticipate future changes
 - Under climate change assumptions, Pyrenees mountains will face dramatic effects of climate change and show high environmental stakes (water / snow resources, biomass, biodiversity...)
- Scientific & Methodological issues**
- Providing knowledge on past and future land use and cover changes with heterogeneous datasets
 - Simulating local / regional land use and cover changes using spatially explicit models
 - Simulating past / futures land use and cover changes based on scenarios
 - What is the role of spatial approaches in prospective research?
 - What spatial and temporal resolutions are required for short / long term projections?

PROJECT METHODOLOGY



- Task 1:** Regional LUCC over last 12 000 years using palaeo-environmental data and models
- Task 2:** Local LUCC over last 60-120 years using historical maps / aerial photographs
- Task 3:** Regional LUCC over last 15-20 years using high resolution satellite imageries
- Integration of knowledge → Participatory approach → Building scenarios → Use / Development of models
- Task 4:** Modelling past / future LUCC based on scenarios and dynamic/spatially explicit models

STUDY SITES

The Pyrenees

Local study sites
 ● Davantaygue
 ● Vicdessos
 ● Garrotxes

Boundaries of the mountainous area

Davantaygue
 Long Term Ecological Research site
 76 km² - 6 municipalities

Vicdessos
 Human-Environment Observatory
 244 km² - 7 municipalities

Garrotxes
 25 years of observations / studies
 85km² - 5 municipalities

PRELIMINARY RESULTS

LUCC databases

Constitution of LUCC databases based on a reliable land use and cover typology

- Palaeo database (PALEOPYR and in situ cores)
- Satellite imageries pre-treatment and classification (1994, 2002/03, 2009/10) – (Hagolle et al 2008)
- Land use and cover maps from 1940's (Houet et al 2012)

1942 1953 1962 1976 1993 2003

- Forested areas: Podagroses, Conifer forest, Broad-leaf forest, Mixed forest, Broadleaved areas (by forest)
- Anthropogenic areas: Built-up areas, Roads, Others (blair, car park...)
- Water bodies
- Agro-pastoralism areas: Crops and meadows in Valley bottom, Crops and meadows in intermediate areas, Serous fields, Pasture and pastures, Summer grazing areas, Rocks grazing area, Grazing area with trees
- Altitude areas: Snow, Mineral surfaces

Local LUCC over the last Century

→ Comparison of local LUCC (cf. Sheeren et al 2012 - Poster AGILE'2012)

→ Combining palaeo and GIS data for understanding LUCC

Linking grazing activities and land use and cover changes (Galop et al. 2011)

1976 2009

1962 1983 2008

● Deciduous mixed forest
 ● Encroachment
 ● Meadows & cultures
 ● Mineral surfaces
 ● Pasture
 ● Pasture with scattered pine
 ● roads
 ● snow
 ● water
 ● Wooded heathland (pine)

Age AD

numbers of animals

Expected number of taxa (ETN)

grain/cm²/yr

grain/cm²/yr

Age AD

— Sheeps (Auzat district)
 — Cows (Auzat district)
 — Palynological richness (ETN)

— Pinus
 — Betula

— Juniperus
 — Calluna

CONCLUSION

MODE RESPYR (2011-2015) is an ongoing project integrating heterogeneous spatially explicit LUCC data and coupling various disciplines.

→ LUCC databases are nearly finalized and multi-scaled analyses have started as well as model comparison and exploration.

→ Local landscape changes are mostly attributed to human land use changes rather than global warming and have to be compared with regional trends

→ Participatory and scenarios approaches will be performed for modelling future and past local and regional land use and cover changes

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WEBSITE

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