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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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### CONTEXT AND OBJECTIVES

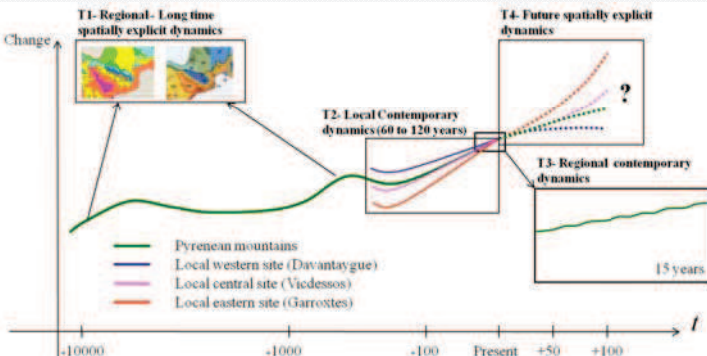
#### Context

- 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

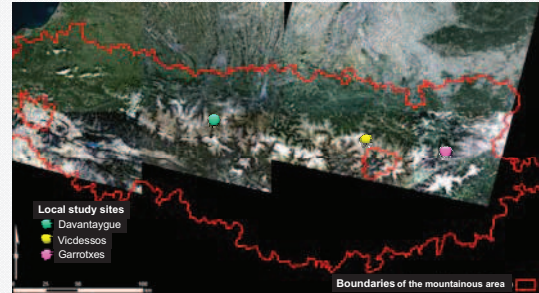
**Task 3:** Regional LUCC over last 15-20 years using high resolution satellite imageries



**Task 4:** Modelling past / future LUCC based on scenarios and dynamic/spatially explicit models

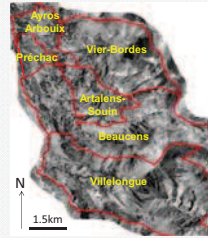
### STUDY SITES

#### The Pyrenees



#### Davantaygue

Long Term Ecological Research site  
76 km<sup>2</sup> - 6 municipalities



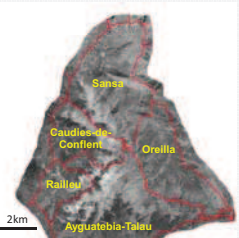
#### Vicdessos

Human-Environment Observatory  
244 km<sup>2</sup> - 7 municipalities



#### Garrotxes

25 years of observations / studies  
85km<sup>2</sup> - 5 municipalities



### PRELIMINARY RESULTS

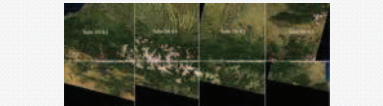
#### LUCC databases

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

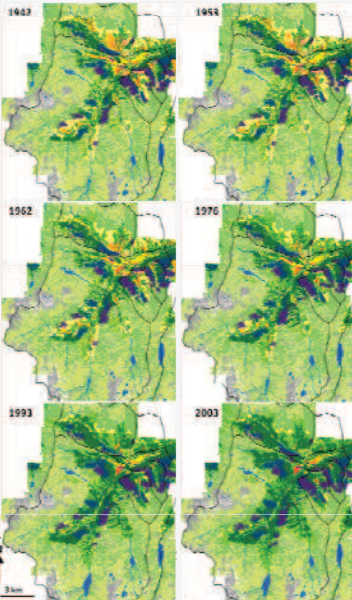
- Palaeo database (PALEOPYR and in situ cores)



- 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)

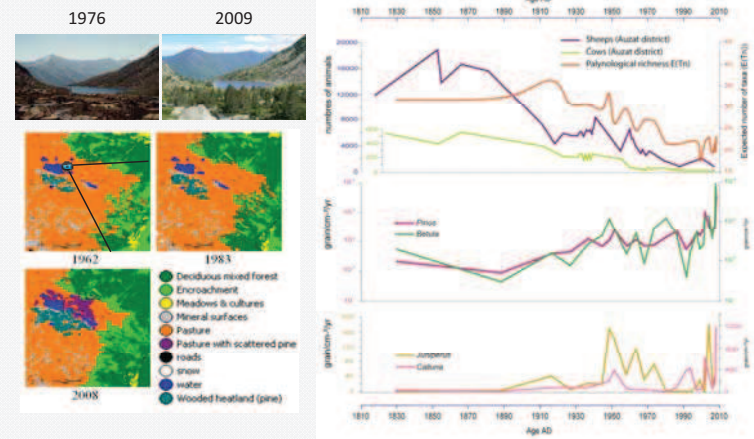


#### Local LUCC over the last Century

→ 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)



### CONCLUSION

MODE RESPYR (2011-2015) is a 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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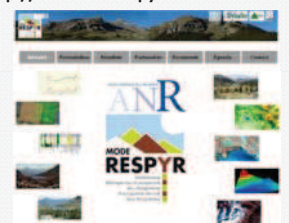
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### WEBSITE

<http://w3.mode-respyr.univ-tlse2.fr>



Project founded by ANR Jeune Chercheur / Jeune Chercheuse  
MODE RESPYR (2010 JCIC 1804 01 – 01)

