



Assessing land cover changes in the French Pyrenees since the 1940s A semi-automatic GEOBIA approach using aerial photographs

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Assessing land cover changes in the French Pyrenees since the 1940s

A semi-automatic GEOBIA approach using aerial photographs



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Introduction



As in many mountain areas in Europe, **agro-pastoral landscapes** of the Pyrenees are **subject to fast spontaneous reforestation**. Encroachment is mainly related to the abandonment of farmland in combination with rural depopulation and agriculture modernization.

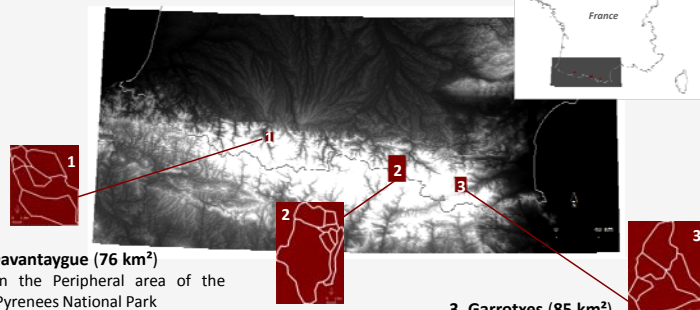


Observed changes of land abandonment or land-use extensification can be similar at the regional scale but the **dynamics at the local scale do not occur homogeneously**, as it is determined by specific conditions (environmental, climatic, socio-economic, anthropogenic).

The **objective** of this work (part of the MODE-RESPYR project) is to **assess the spatial patterns of land cover changes** during the last 70 years in three study sites of the Pyrenees, and to **compare the local dynamics** in order to observe and to explain similarities and disparities.

Study sites

Three Human-Environment Observatories



1. Davantaygue (76 km²)

- In the Peripheral area of the Pyrenees National Park
- 6 municipalities

2. Haut-Vicdessos (244 km²)

- In the Regional Natural Park of Ariège
- 7 municipalities

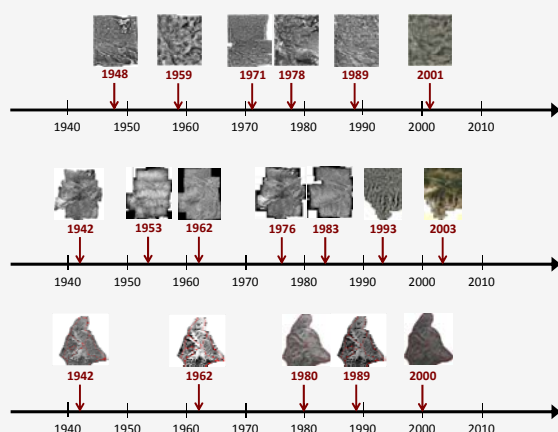
3. Garrotxes (85 km²)

- In the Regional Natural Park of the Catalan Pyrenees
- 5 municipalities

Material and Method

Data

Historical panchromatic aerial photographs with recent true color digital images



1. Davantaygue

- Number of photographs: 67
- 6 dates: from 1948 to 2001
- Scale: 1:15000-1:30000
- Spatial resolution: 0.5m
- TIFF (8 or 24 bits)

2. Haut-Vicdessos

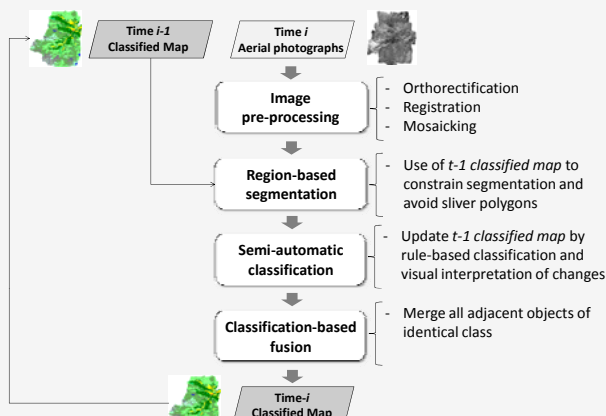
- Number of photographs: 286
- 7 dates: from 1942 to 2003
- Scale: 1:25000-1:30000
- Spatial resolution: 0.5m
- TIFF (8 or 24 bits)

3. Garrotxes

- Number of photographs: 104
- 5 dates: from 1942 to 2000
- Scale: 1:25000-1:30000
- Spatial resolution: 0.5m
- TIFF (8 or 24 bits)

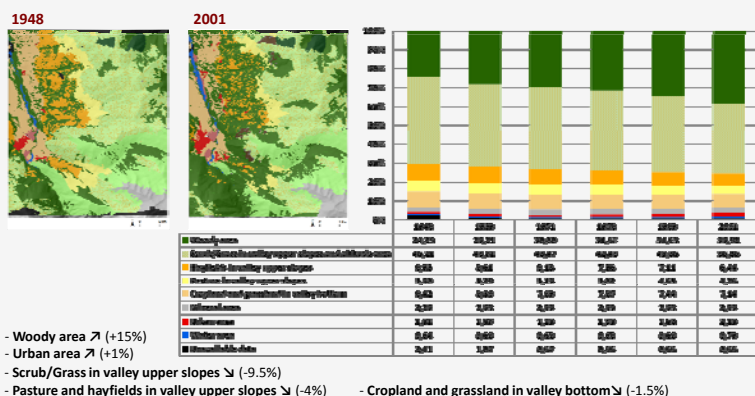
Methodological approach

Dependently-generated land cover maps from a GEOgraphic Object-Based Image Analysis



Results

1. Davantaygue



- Woody area \nearrow (+15%)

- Urban area \nearrow (+1%)

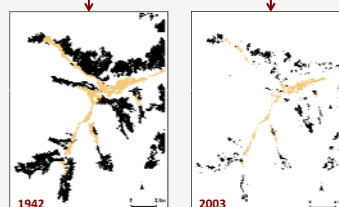
- Scrub/Grass in valley upper slopes \searrow (-9.5%)

- Pasture and hayfields in valley upper slopes \searrow (-4%)

- Cropland and grassland in valley bottom \searrow (-1.5%)

2. Haut-Vicdessos

	1942	2003
Crop	157.9	1.1
Pasture / Hayfield	0.7	0.4
Scrub/Grass	11807.1	0.0
Urban	27.9	12.9
Forest	390.0	1494.9
Water	0.0	61.0
Mineral	0.1	1.4
Total (in ha)	578.3	1786.6



Woody area \nearrow (+16%)
Urban area \nearrow (+0.25%)
Scrub/Grass in valley upper slopes \searrow (-7.6%)
Pasture and hayfields in valley upper slopes \searrow (-6.3%)
Cropland and grassland in valley bottom \searrow (-1.7%)

■ Pasture and hayfield
■ Crop

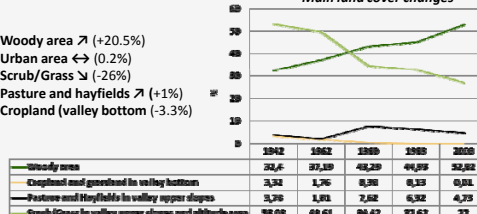
Conclusions

- A **similar spatial pattern** of land cover changes for the 3 study sites (encroachment at low and medium altitudes) but with **different rates and extents**, and occurring at different periods.
- A spatial pattern highly related to pattern of **farmland abandonment** and depopulation.
- A **generic method** usable for various mountain areas
- Perspectives: developing an automatic classification procedure using very high resolution remotely sensed images for monitoring annual land use and cover changes.

3. Garrotxes

- Woody area \nearrow (+20.5%)
- Urban area \leftrightarrow (0.2%)
- Scrub/Grass \searrow (-26%)
- Pasture and hayfields \nearrow (+1%)
- Cropland (valley bottom) \searrow (-3.3%)

Main land cover changes



Forest expansion

