

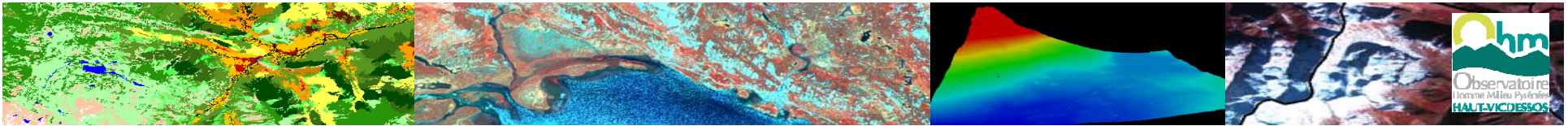
EFFECTS OF PROJECTED LAND COVER & CLIMATE CHANGES ON SNOW COVER IN THE VICDESOS OBSERVATORY — APPLICATION ON THE BASSIÈS VALLEY (PYRENEES, FRANCE)

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Jean-François DEJOUX¹, Christelle VIGNEAU², Pascal FANISE¹

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² GEODE – Lab. of Environmental Geography

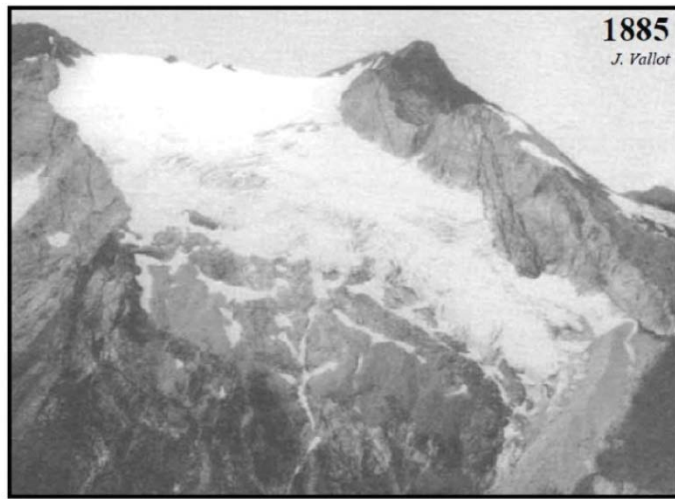




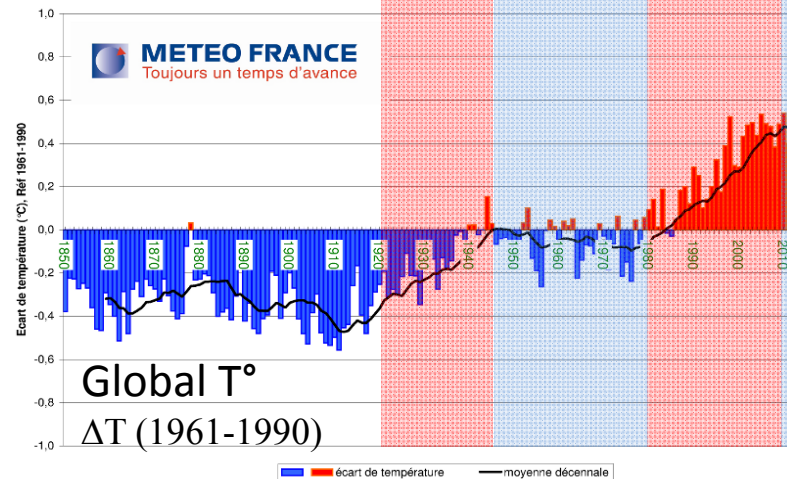
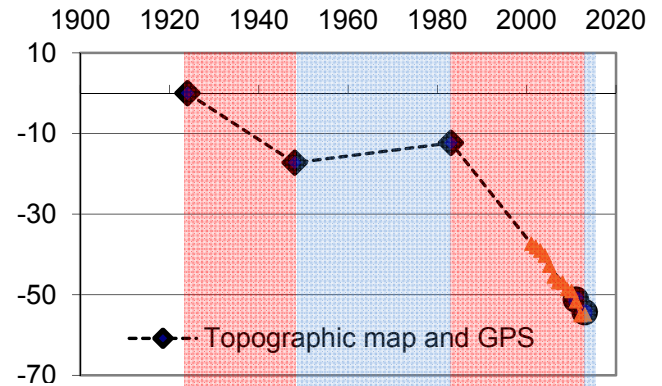
Introduction

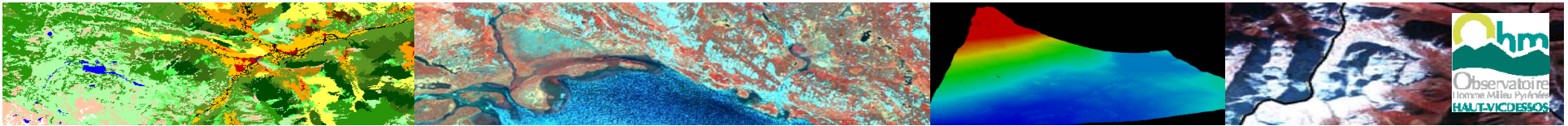
The Pyrenees are highly sensitive to climate change

« Hot spot of climate change » (IPCC AR5, 2014)



Ossoue glacier
(Central Pyrenees)
total mass balance
(in $m^3 \cdot m^{-2}$)

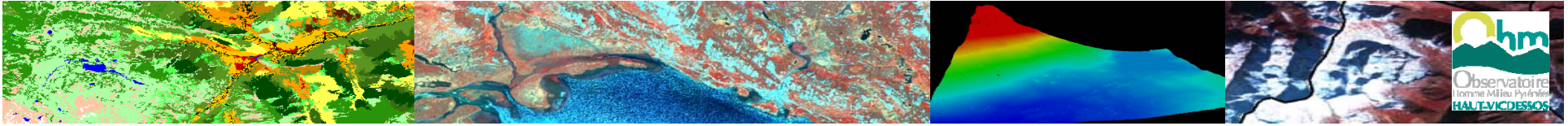




Introduction

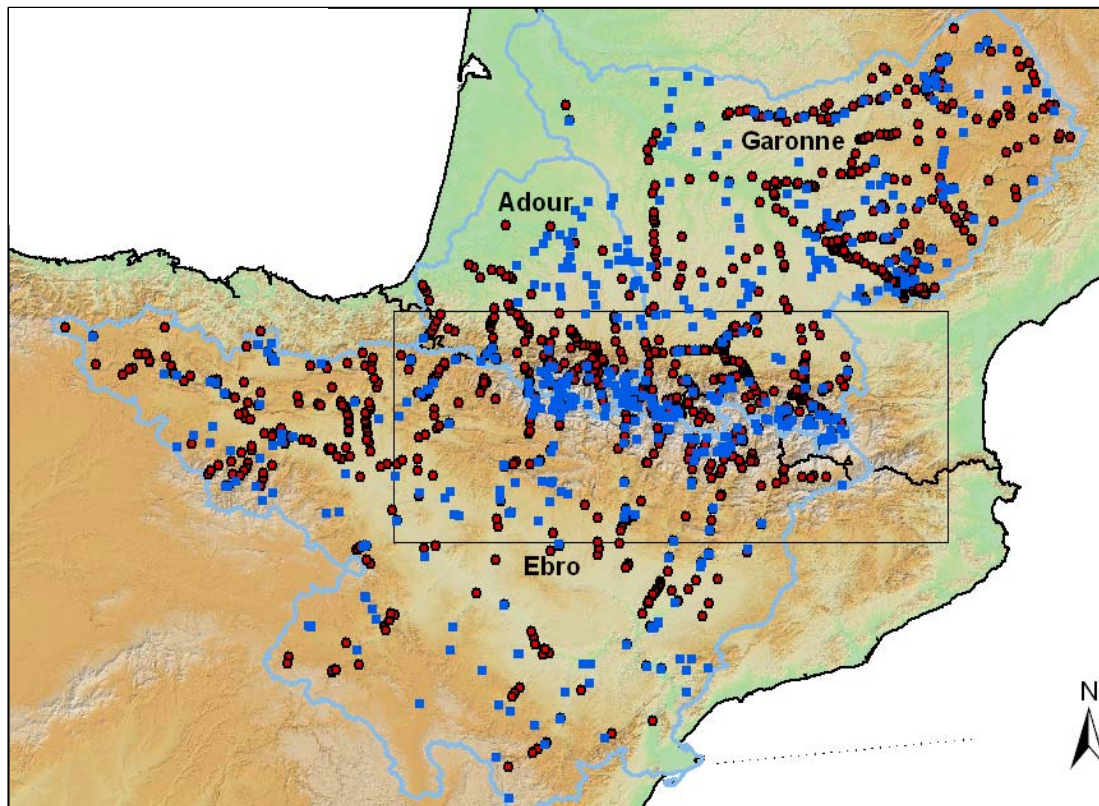
The Pyrenees are highly sensitive to climate change
The Pyrenees have exhibited strong LUCC over the past century



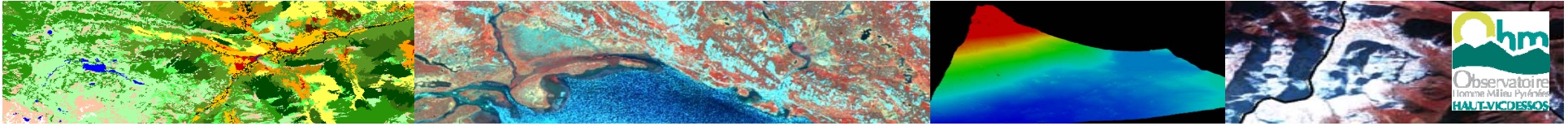


Introduction

The Pyrenees are highly sensitive to climate change
The Pyrenees have / are exhibiting strong LUCC over the past century
The Pyrenees is the main water reservoir of the SW France

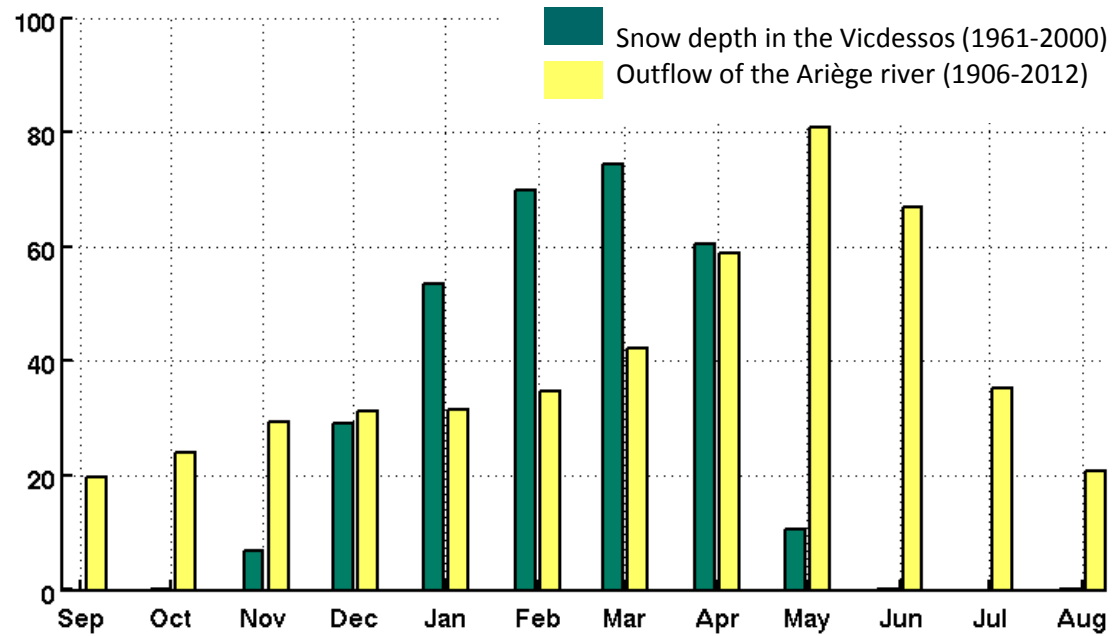


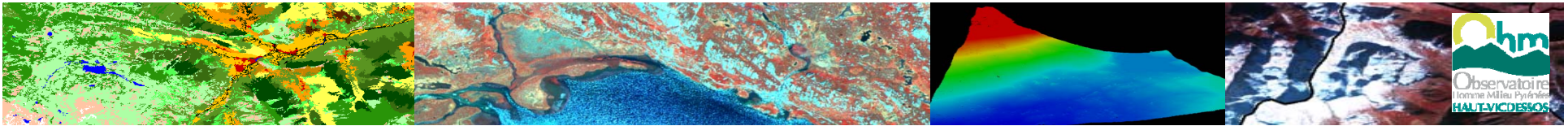
- Dams
- Hydroelectricity plants



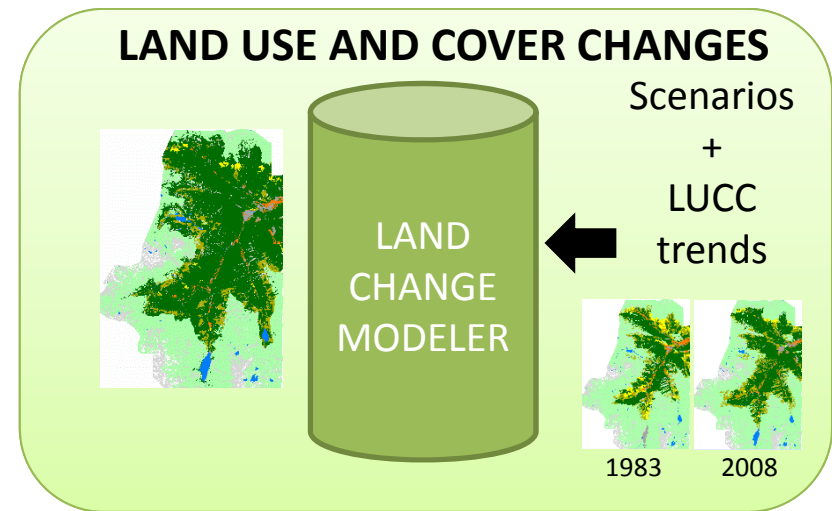
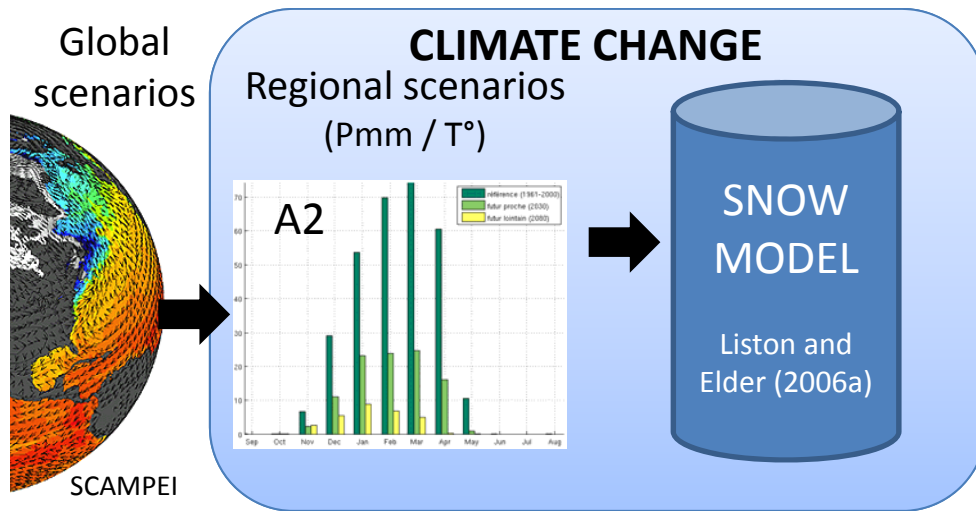
Aim

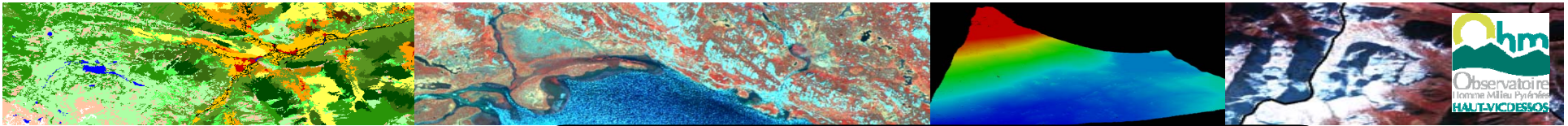
What would be the future of snow in the Pyrenees?
(... and of hydrological resources)



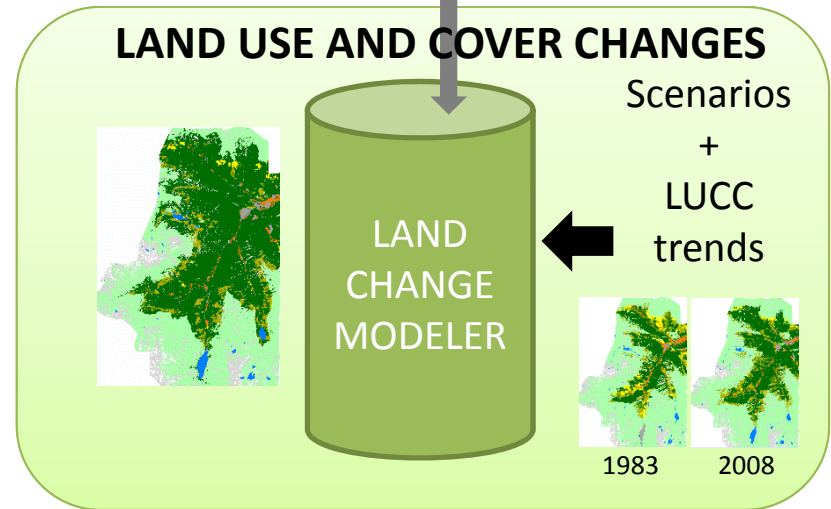
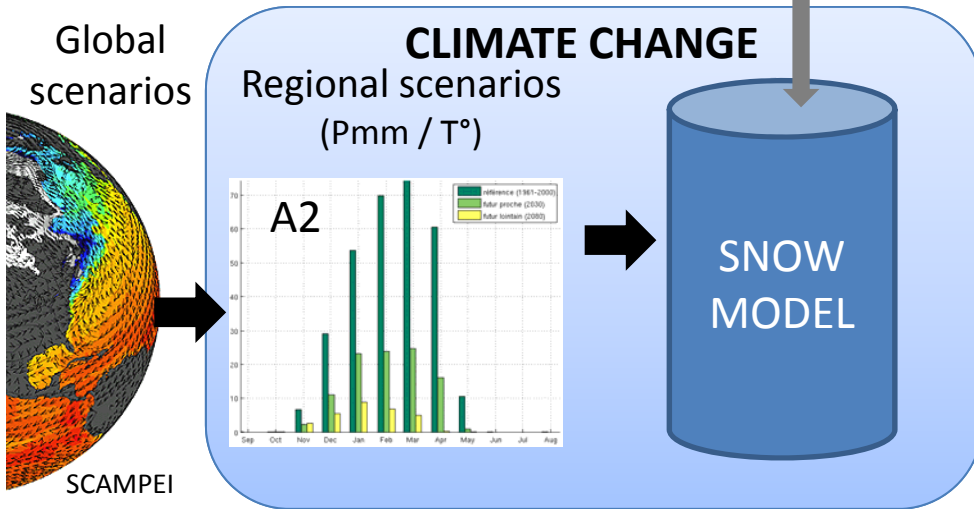
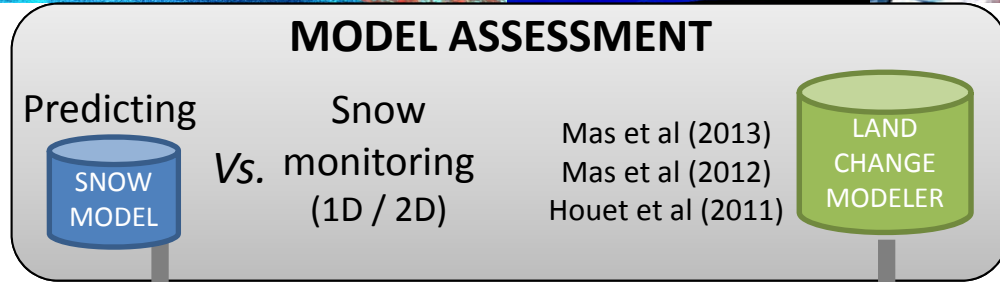


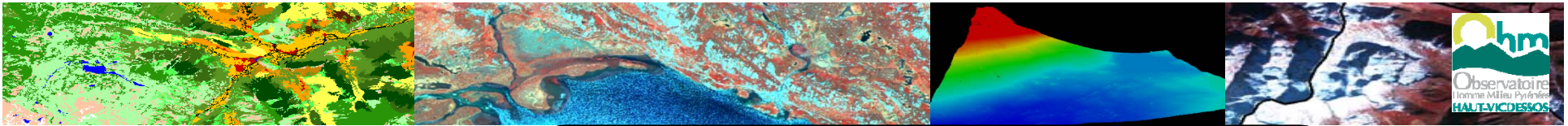
Method



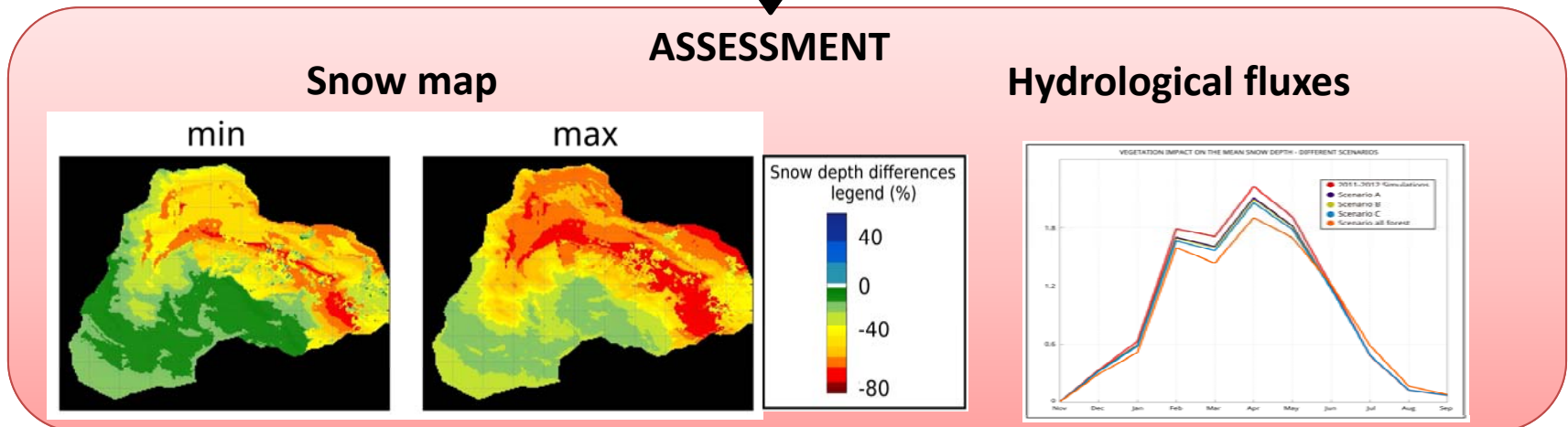
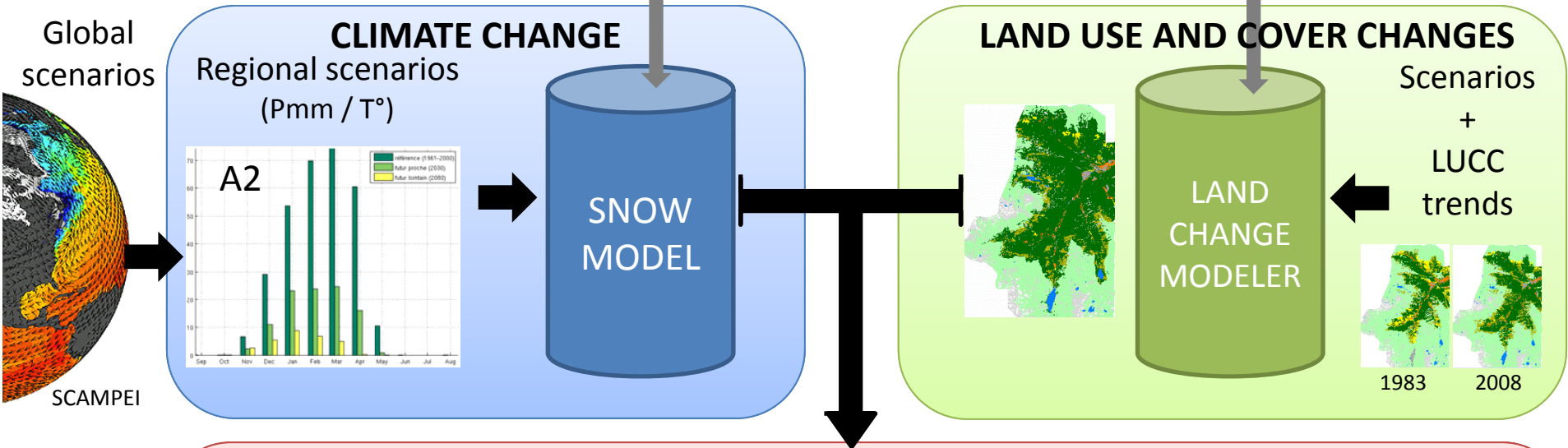
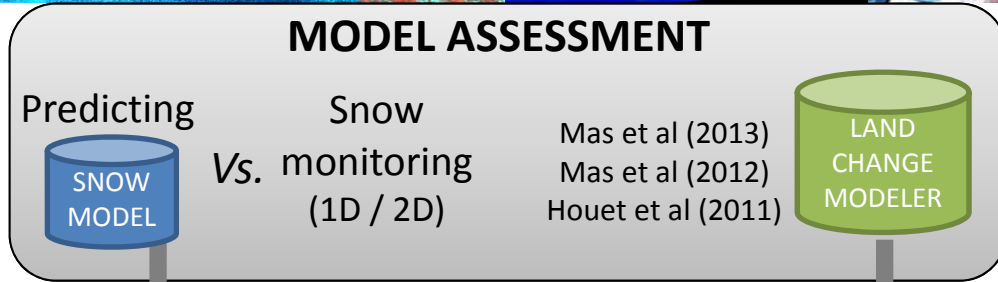


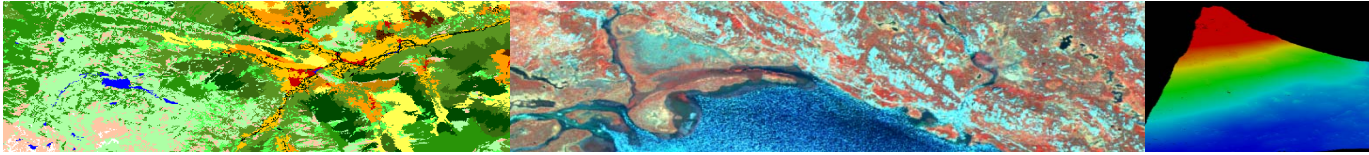
Method





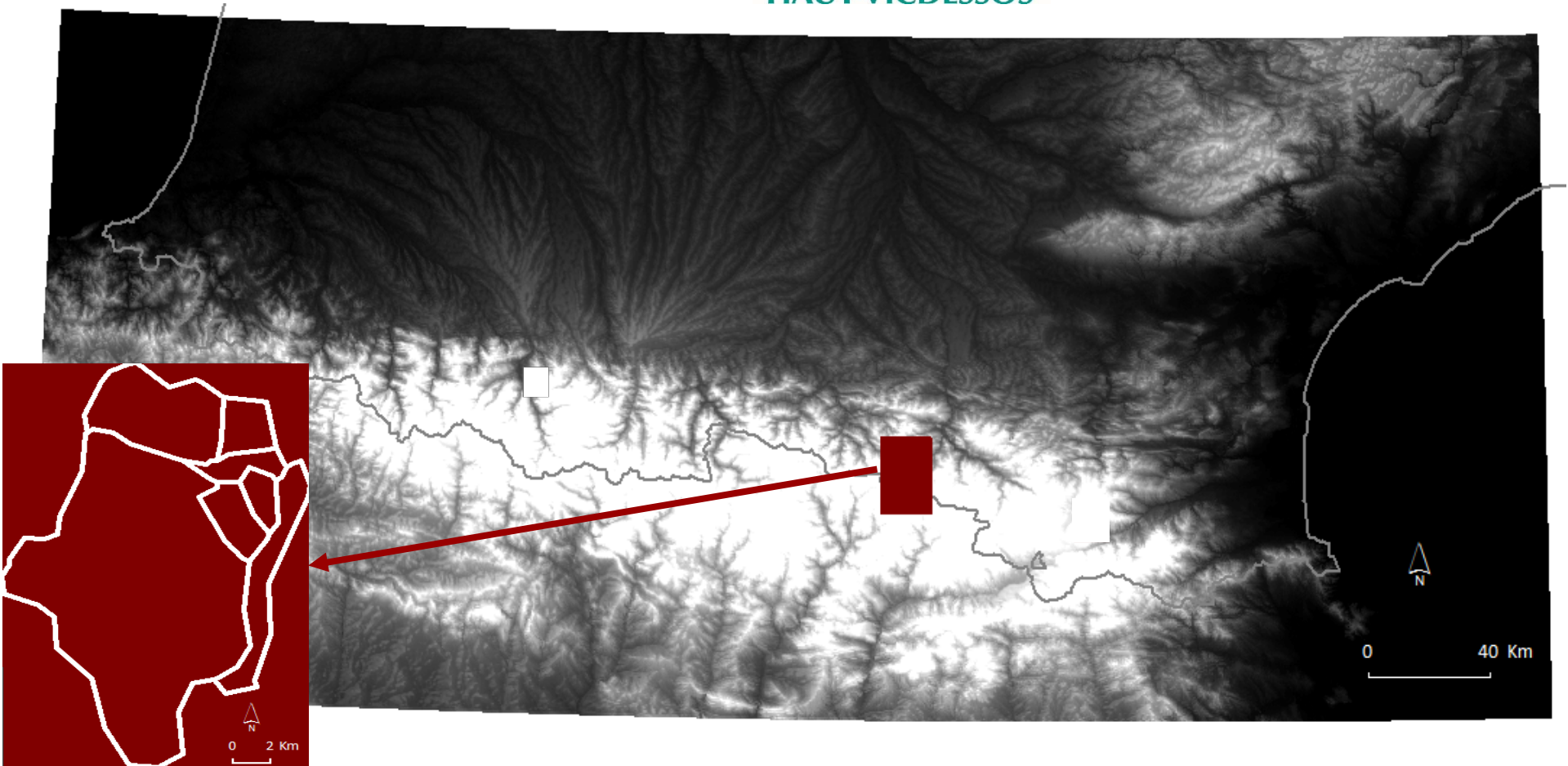
Method

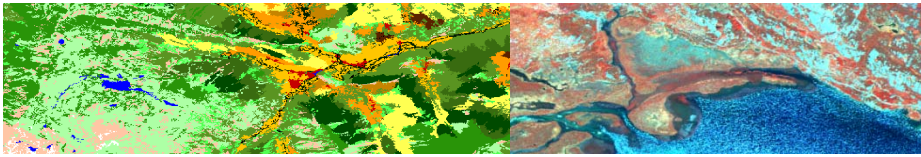




Case study

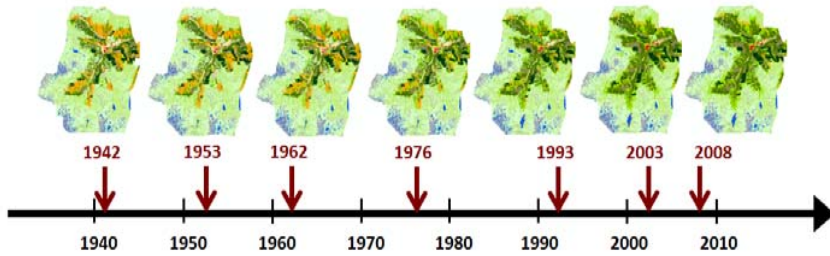
Haut-Vicdessos Mountain observatory





Data sets

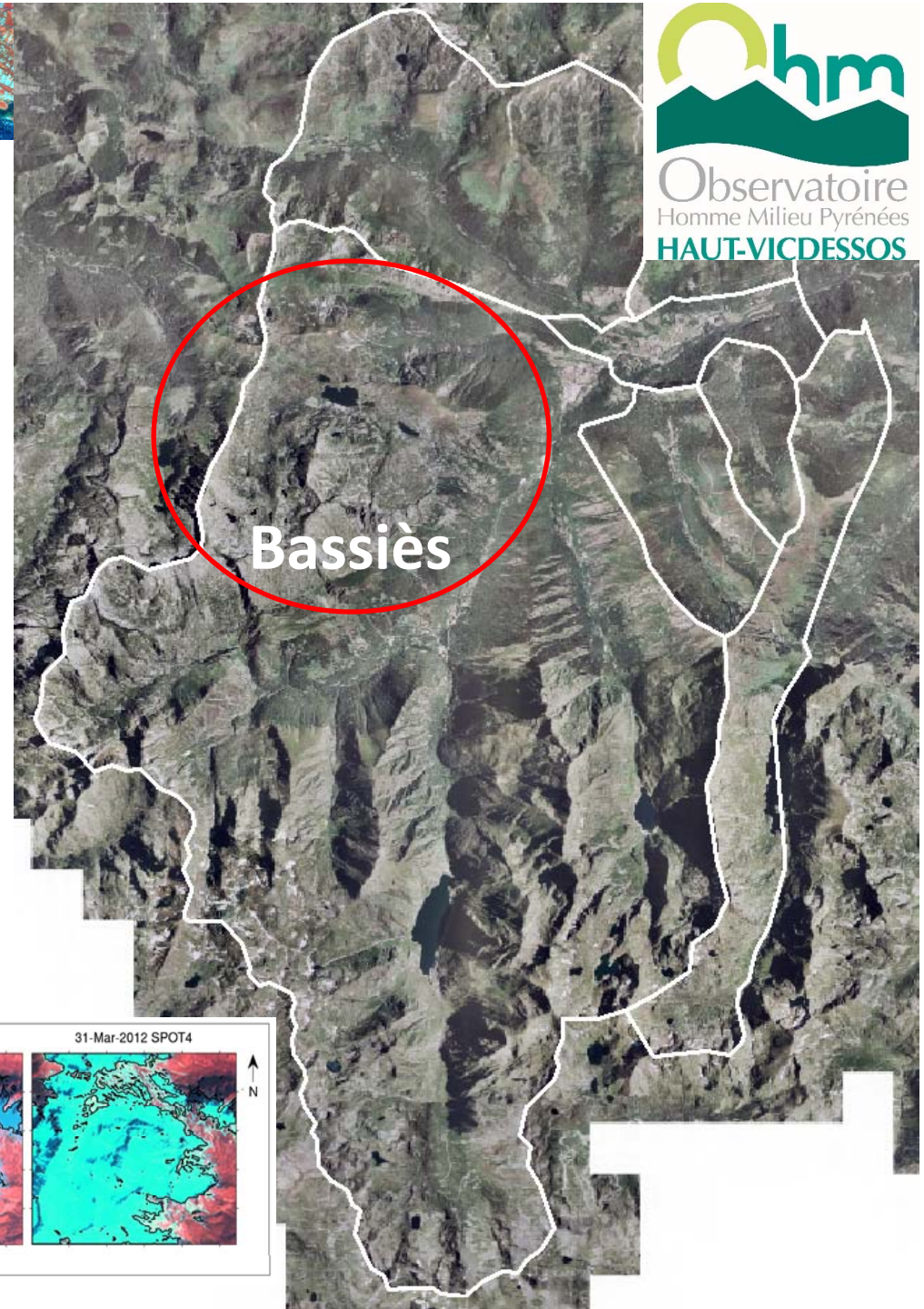
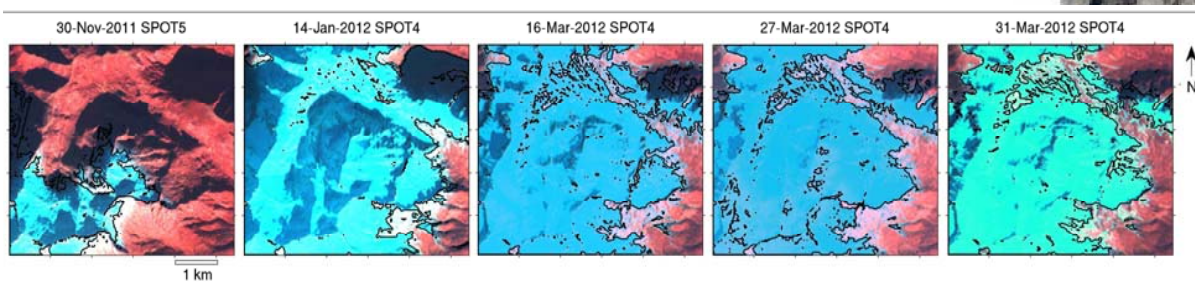
Land cover changes (cf. tomorrow 2pm)

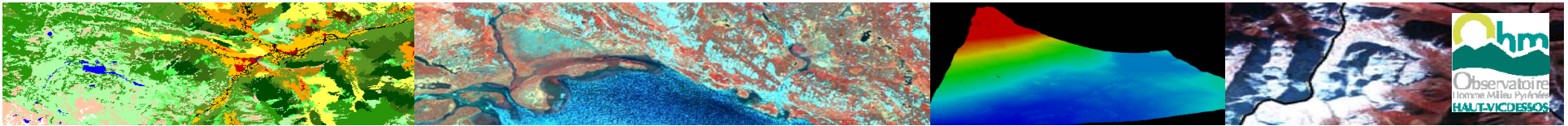


In situ sensors



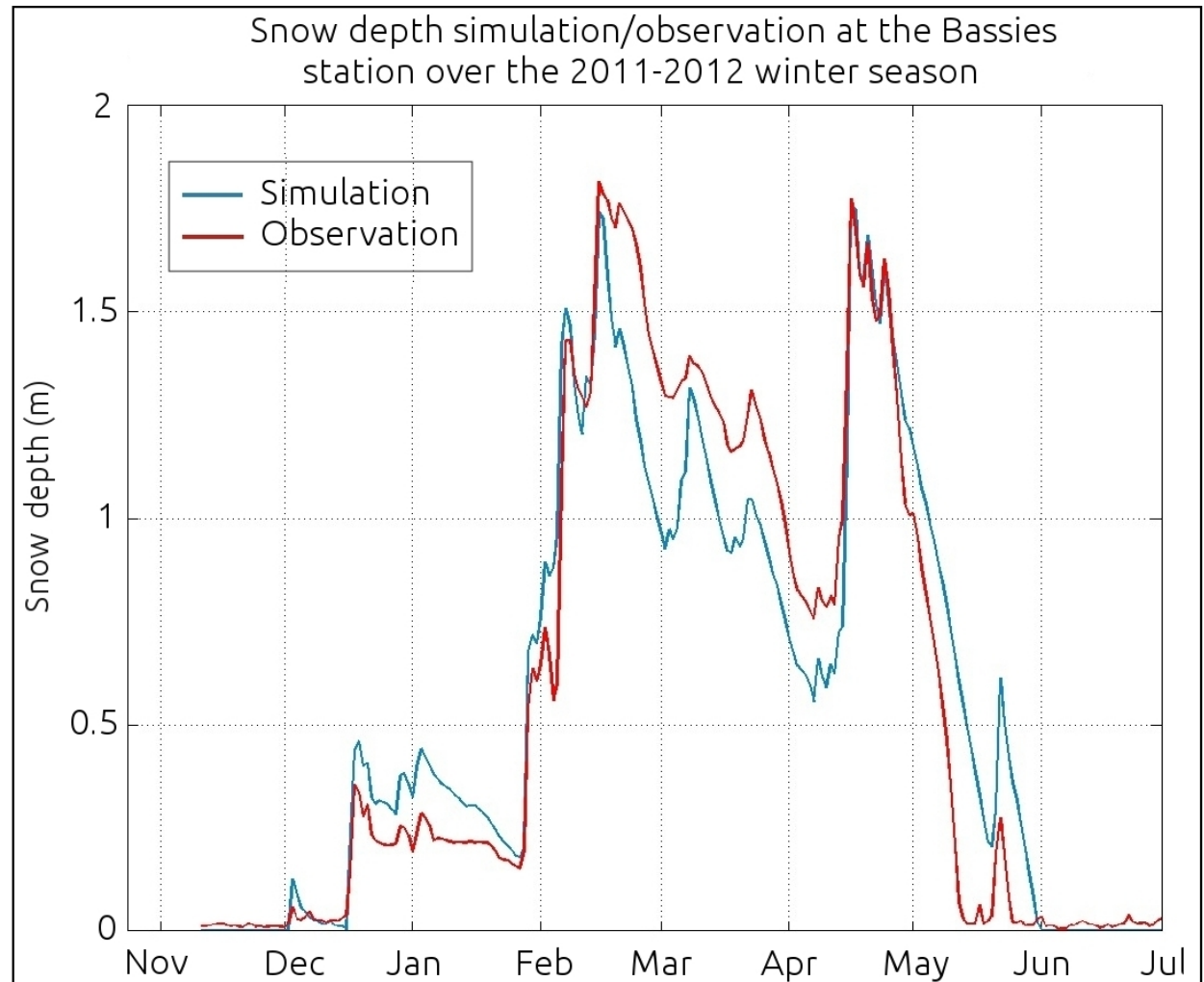
SPOT satellite imagery time series

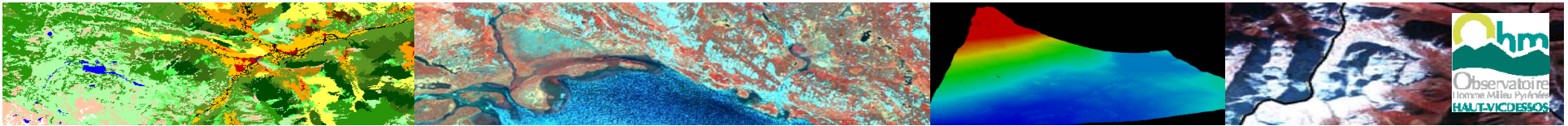




Results

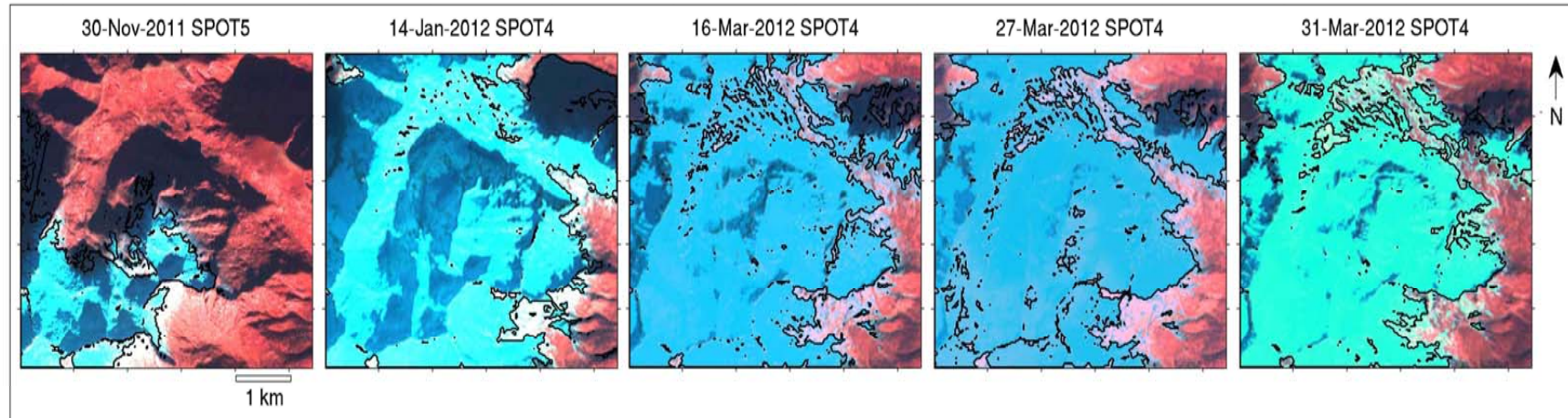
Validation 1-D of SNOW model



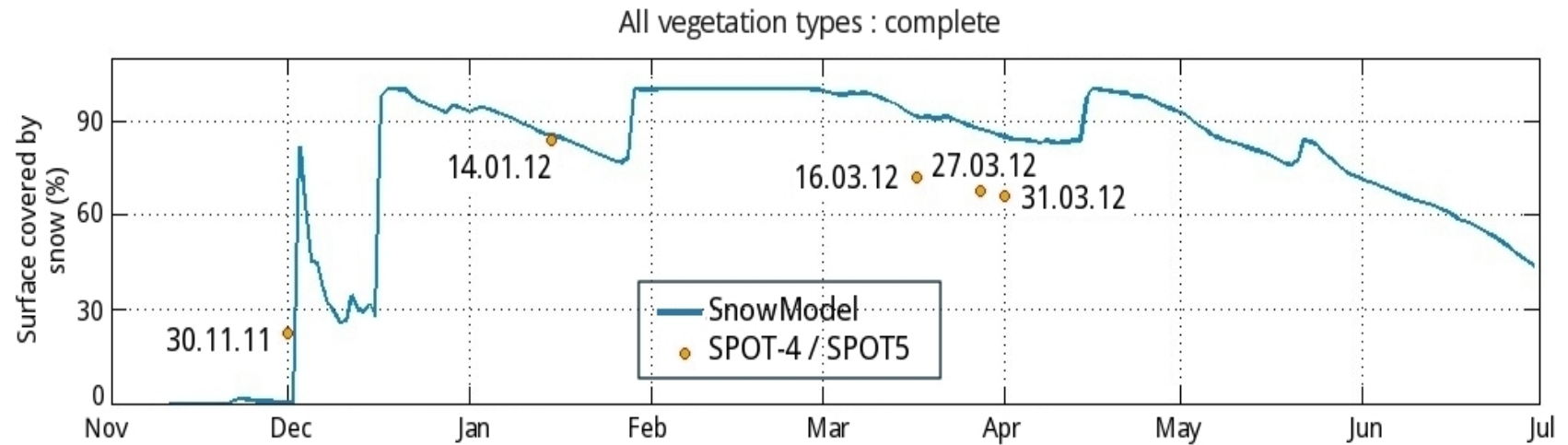


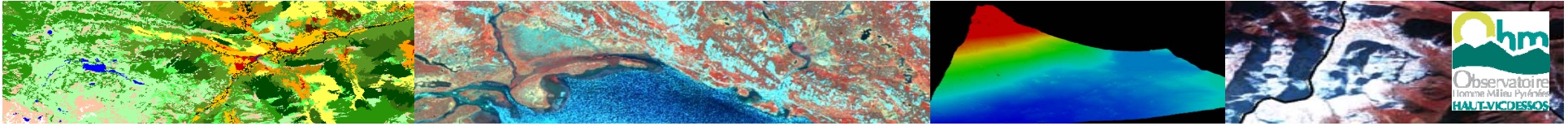
Results

Validation 2-D of SNOW model



Snow covered surface, simulated by SnowModel and observed by SPOT-4 or SPOT-5



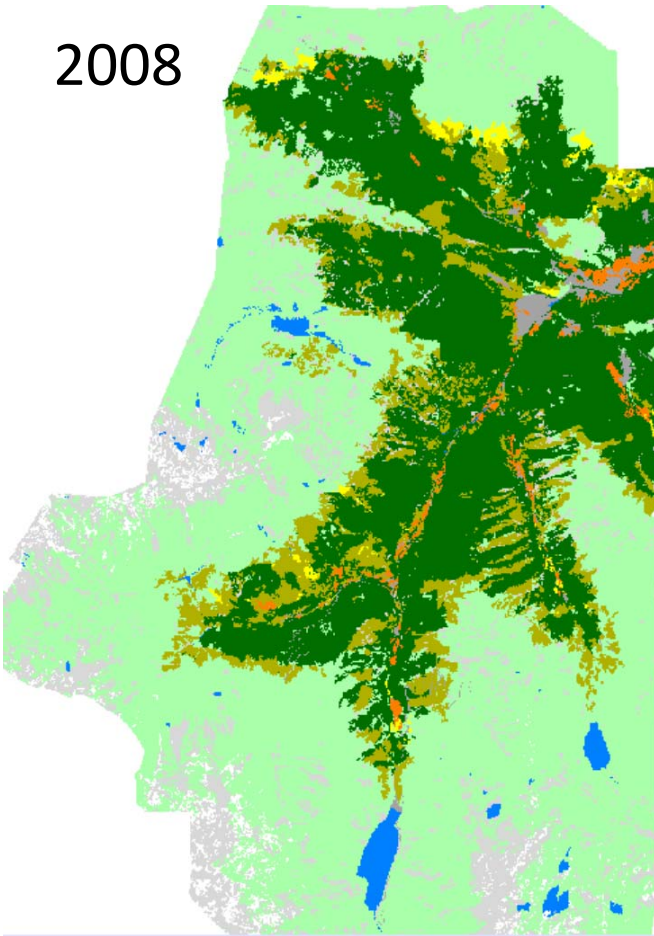


Results

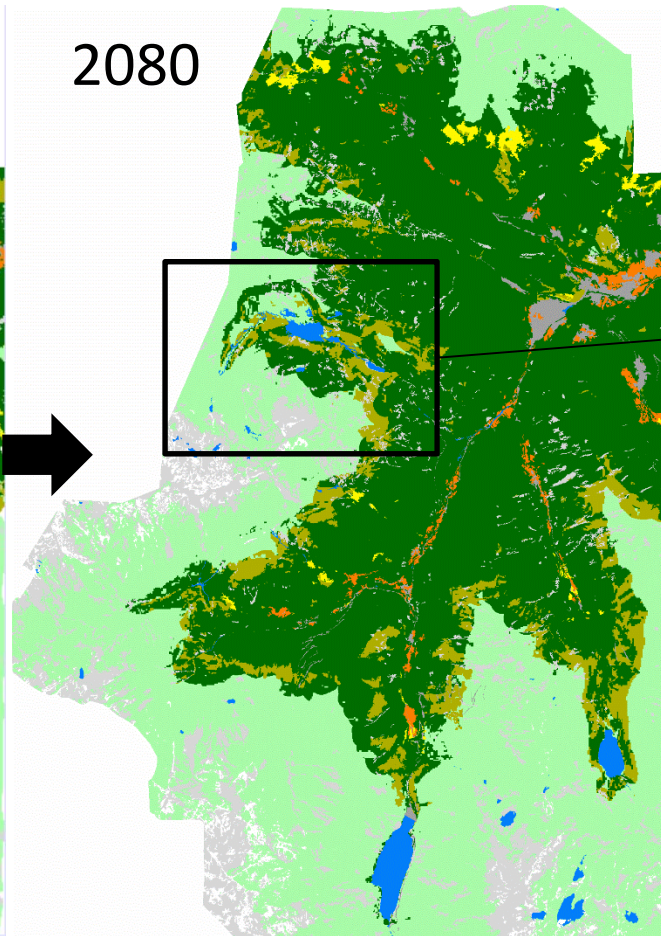
Projected land cover

- Forest
- Water
- Moors
- Rocks

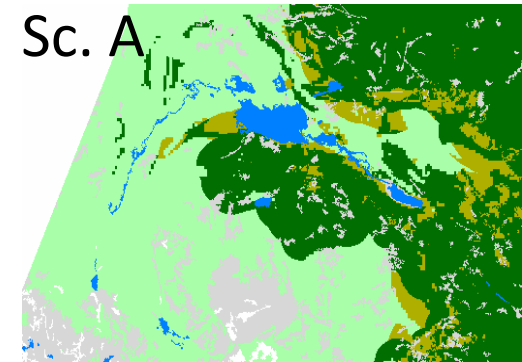
2008



2080

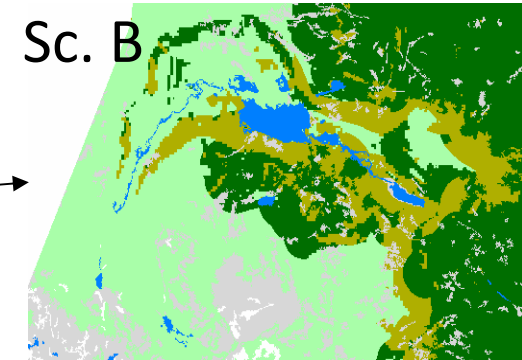


Sc. A



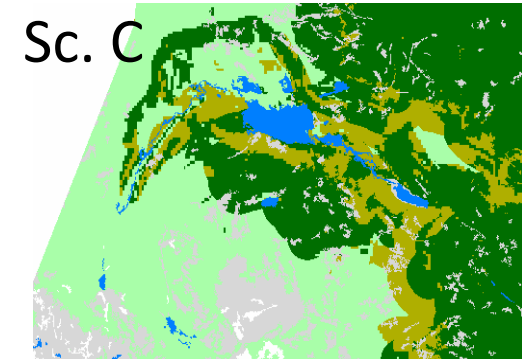
Maintaining pastoral pressure

Sc. B

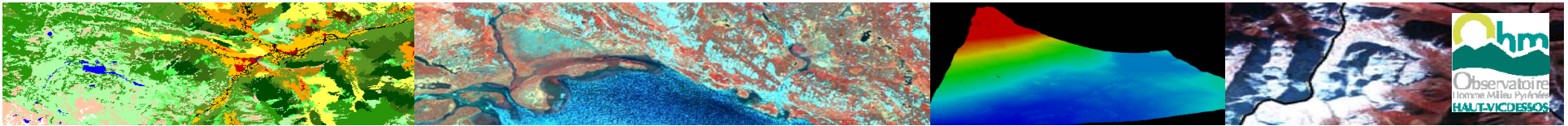


Decreasing pastoral pressure (trend)

Sc. C

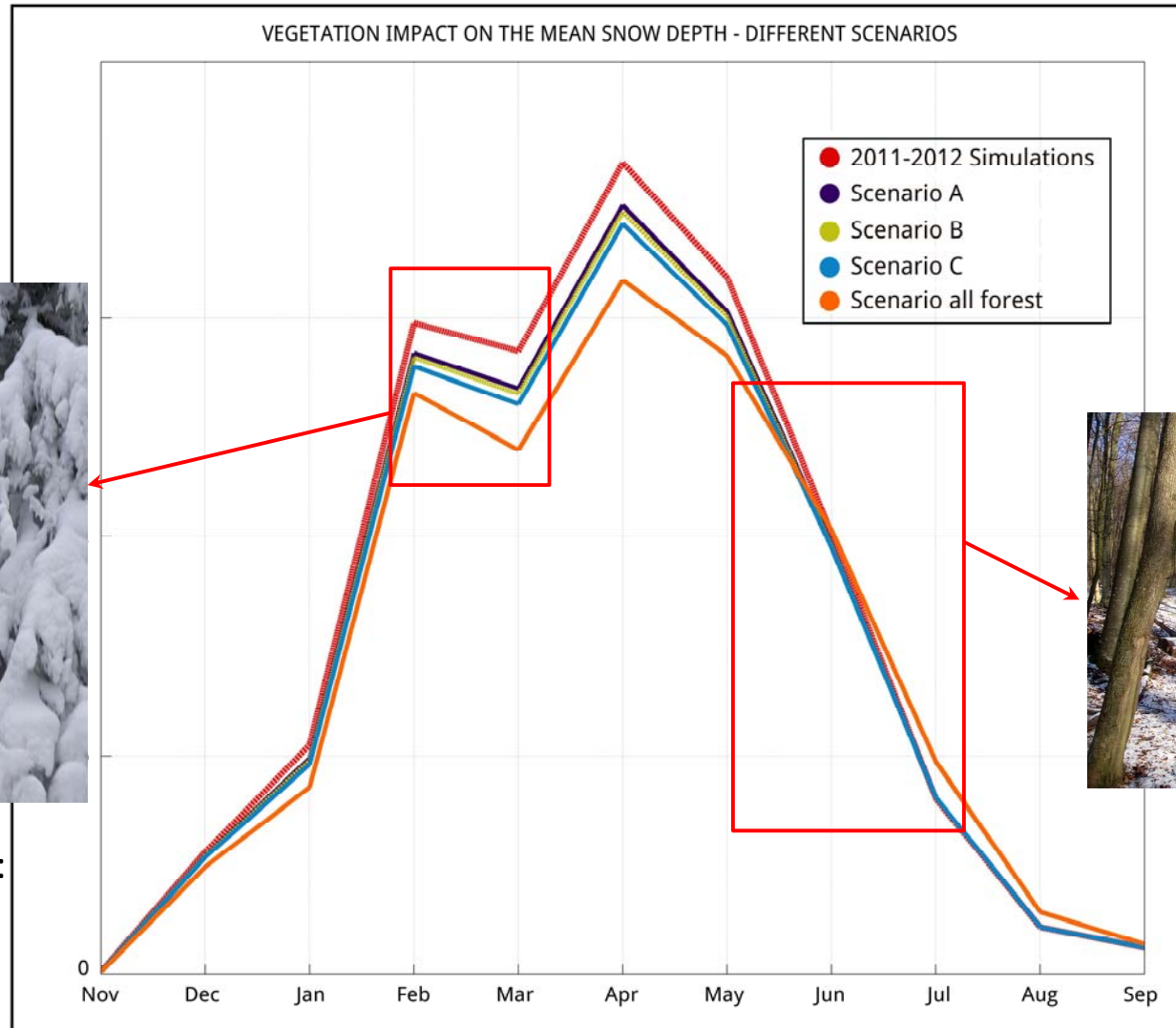


Pastoral abandonment



Results

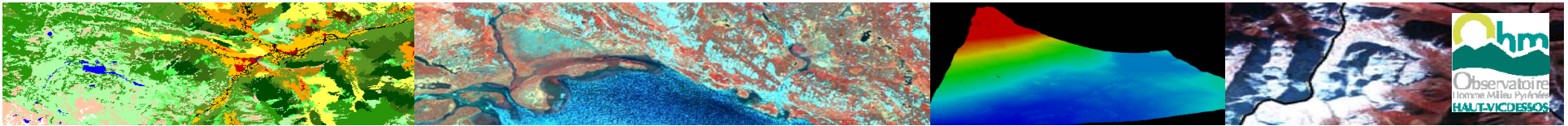
Impact on snow



Lower accumulation:
interception by new
vegetated areas



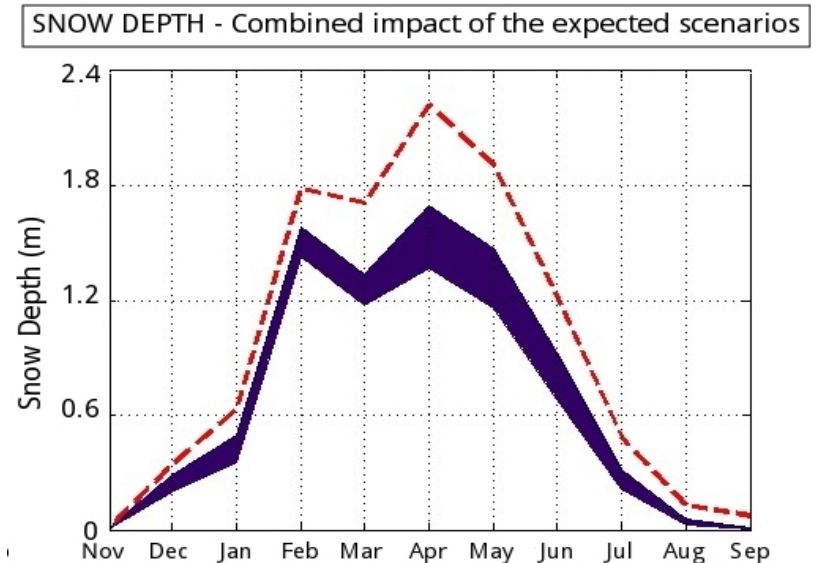
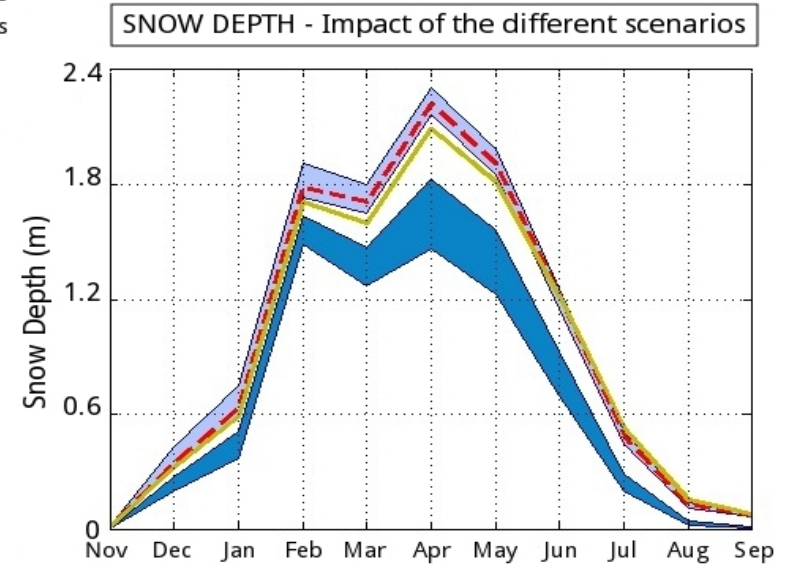
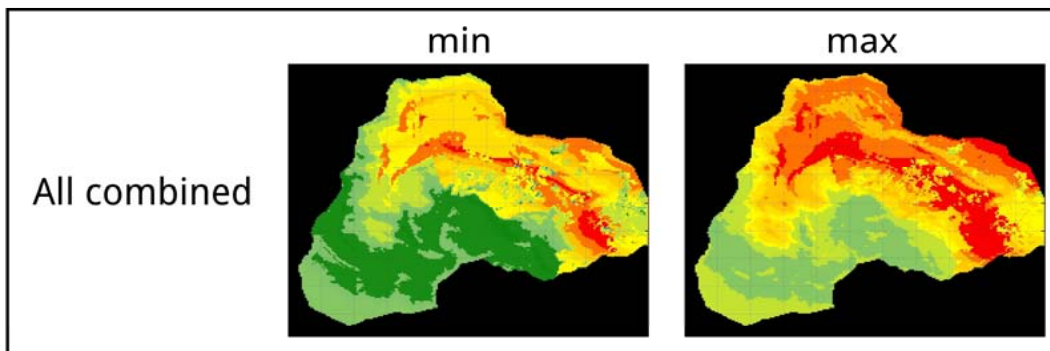
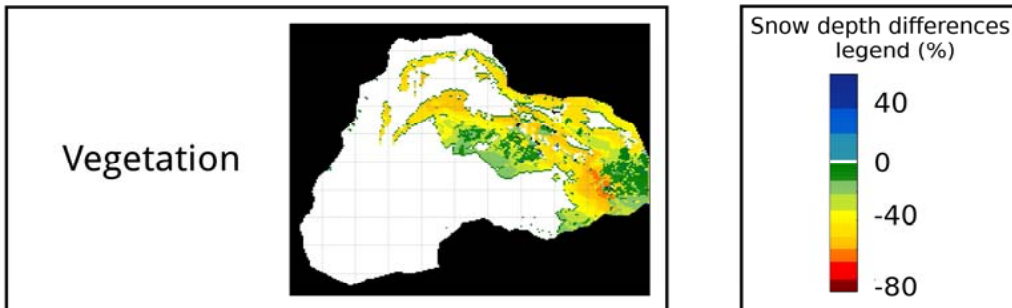
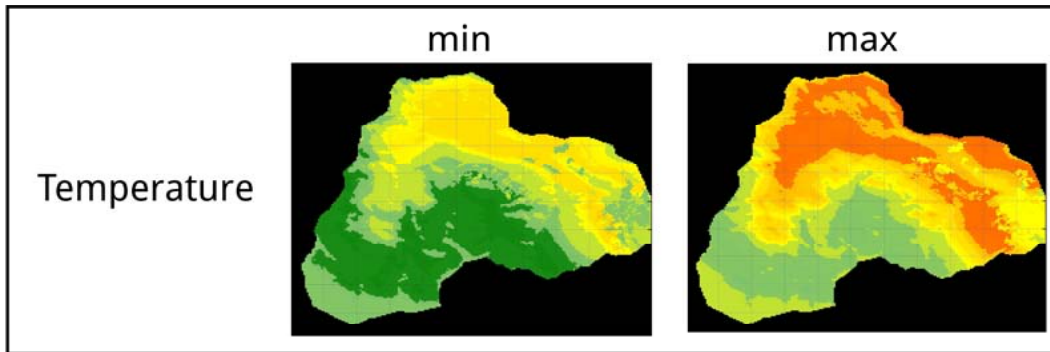
Slower ablation

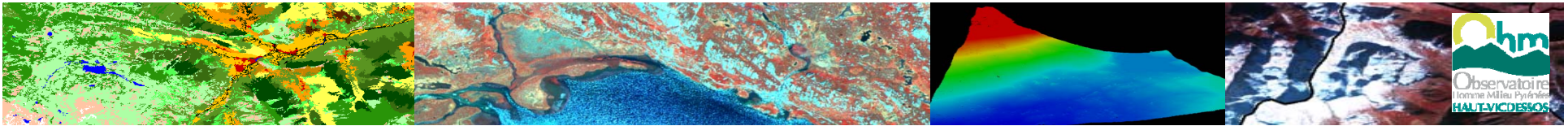


Results

Impact on snow

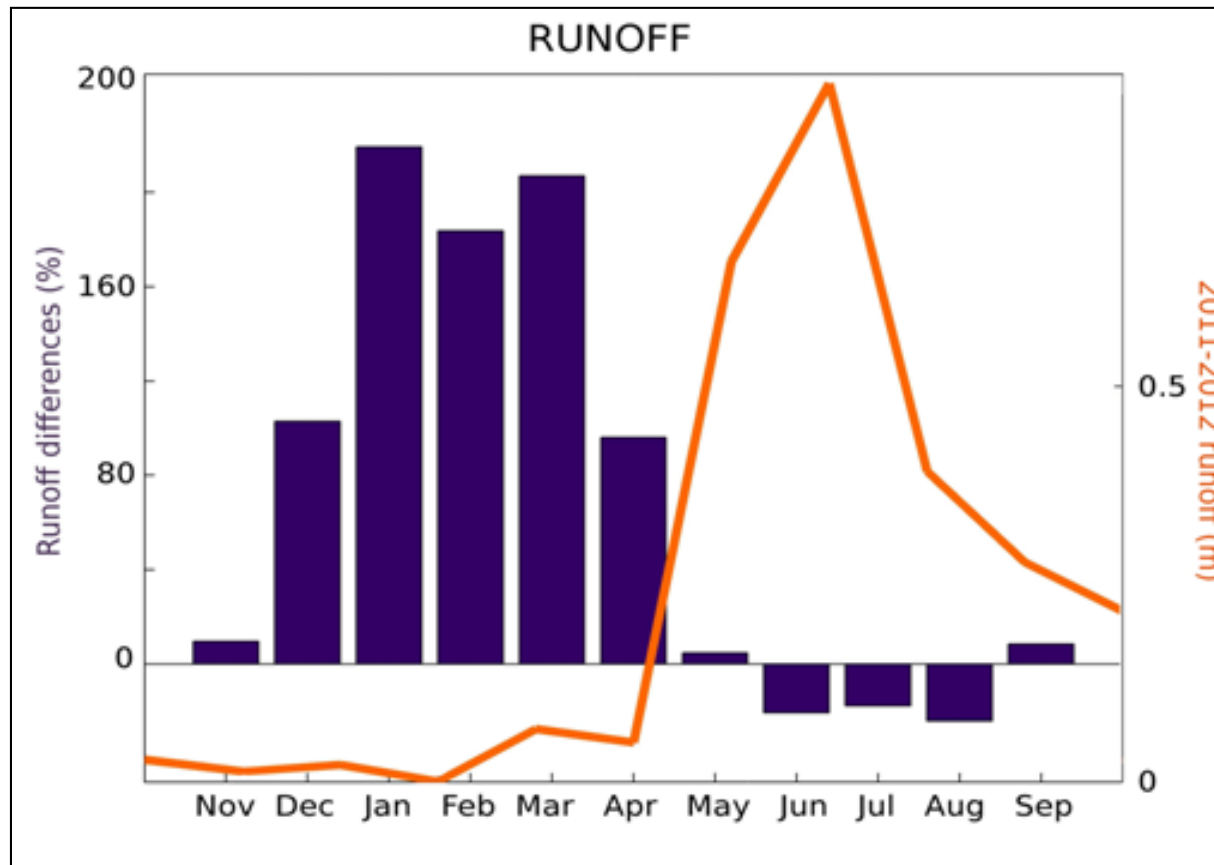
- Precipitation scenarios
- Temperature scenarios
- - - Reference 2011-2012
- Vegetation scenario
- All combined





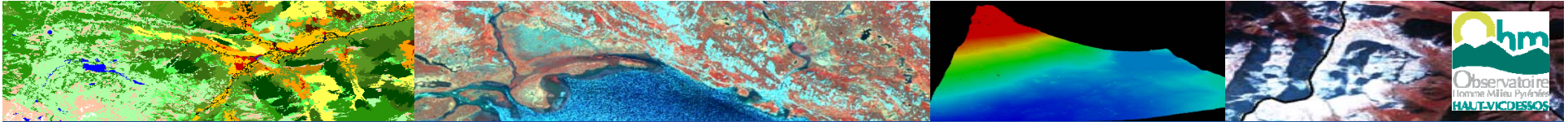
Results

Impact on hydrology



Subtle changes over spring → major impacts on runoff

Changes of snow amount → changes of dams' management (winter)



Thanks for your attention

Szczypta C., Gascoin S., Houet T., Vigneau C., Fanise P. (2015), Impact of climate and land-use changes on snow cover in a small headwater catchment in the Pyrenees, France, *Journal of Hydrology*, 521, 84-99

