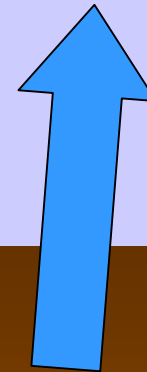
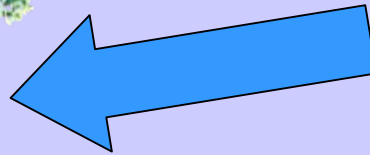
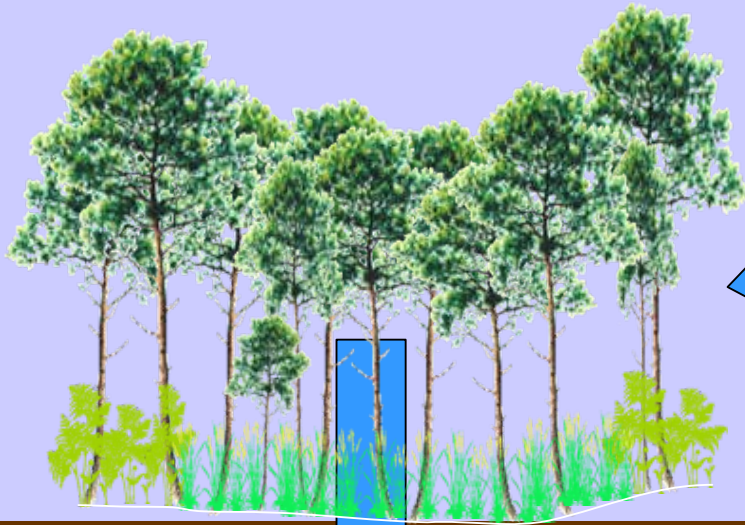


Changes in soil organic matter in relation to land use and agricultural practices

Dominique Arrouays, Guy Richard & Jérôme Balesdent



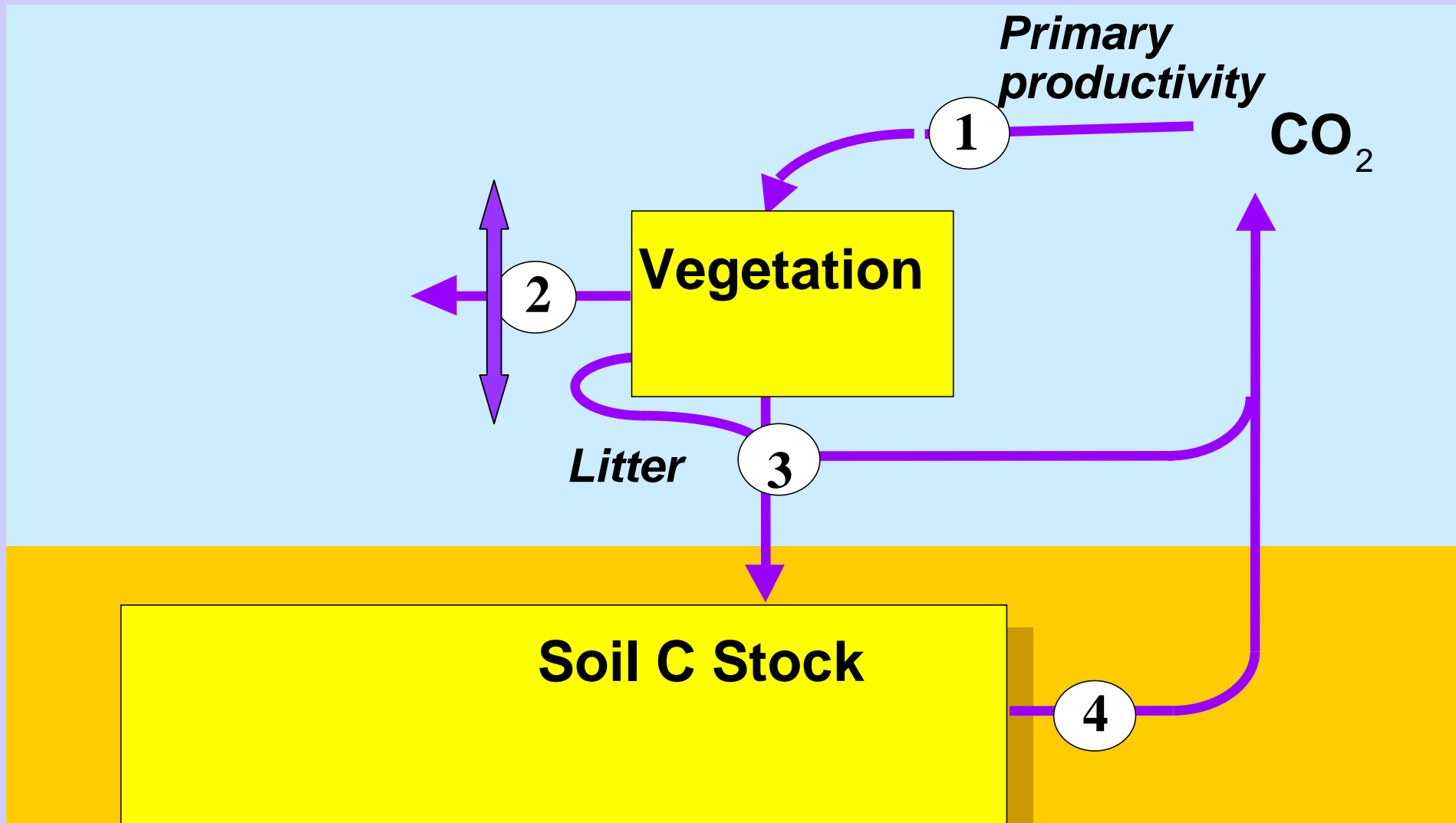
C

Here I am but
how long will
I stay ?





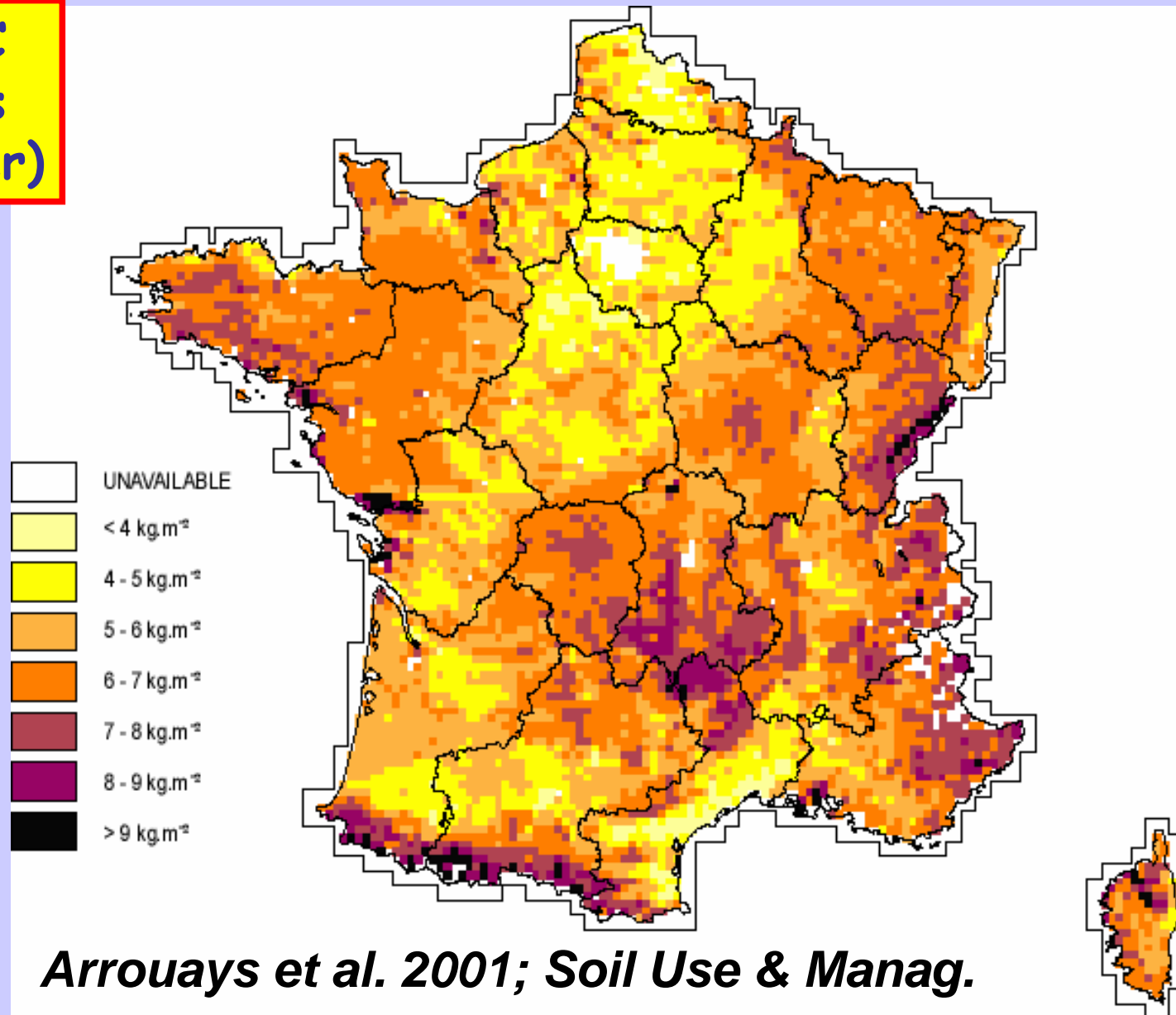
Four ways to manage carbon



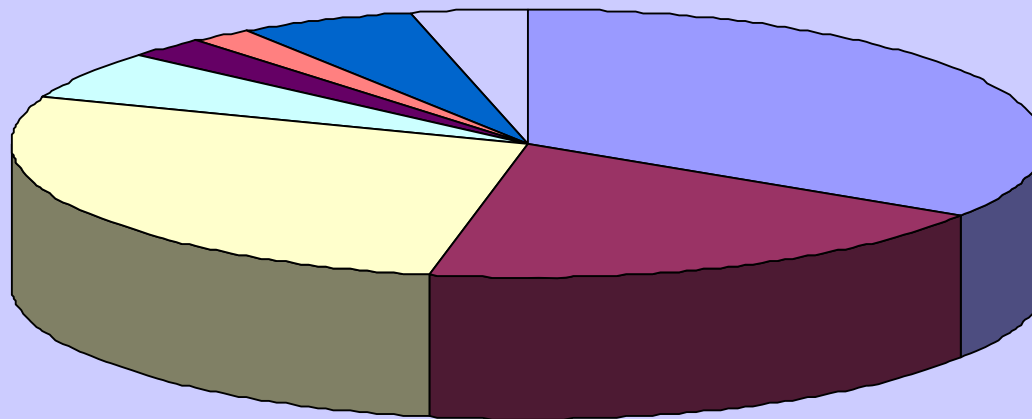
National estimates: how much do you want ?

STOCKS OF C
in French soils
(0-30 cm layer)

3,1 Pg



Metropolitan France: 550 000 km²



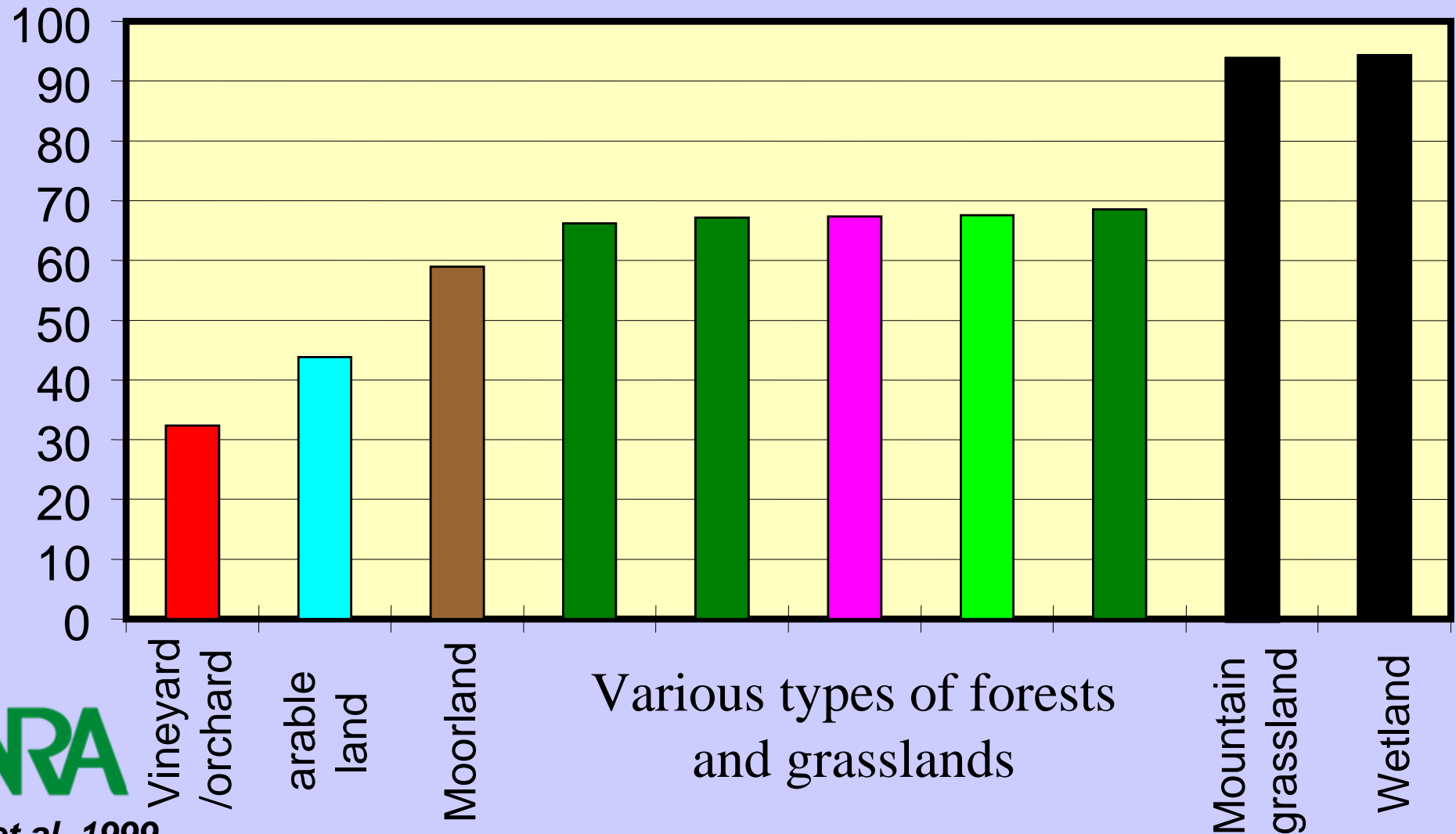
- arable lands
- permanent grasslands
- forests
- rangelands
- mountain grasslands
- vine/fruits
- artificial
- others



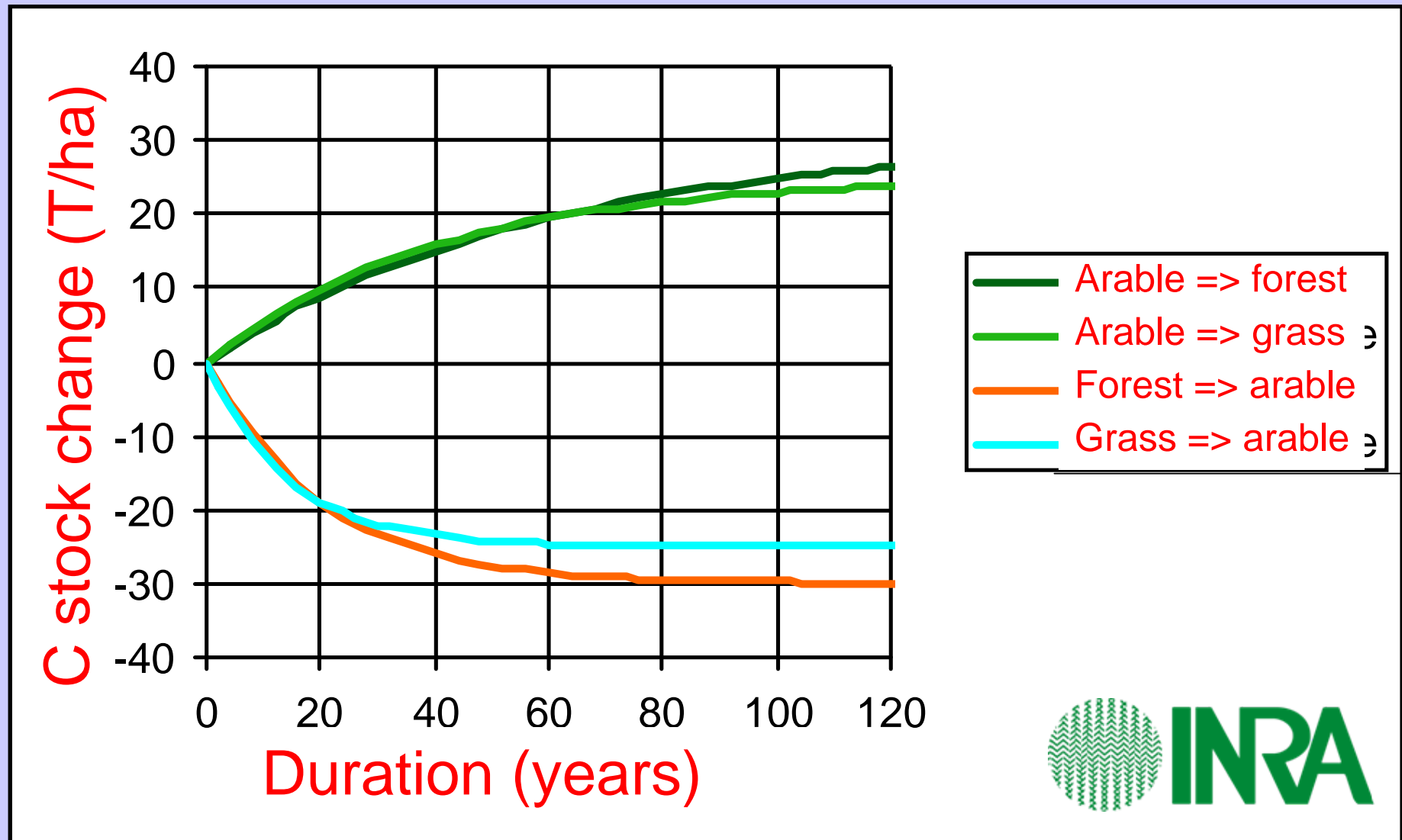
Land cover effect on present topsoil C stocks



10^3 kg/ha (0-30 cm)

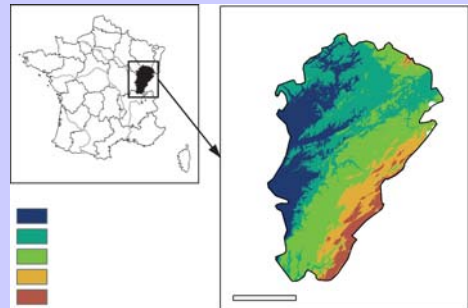


Effects of land cover changes on soil C stocks



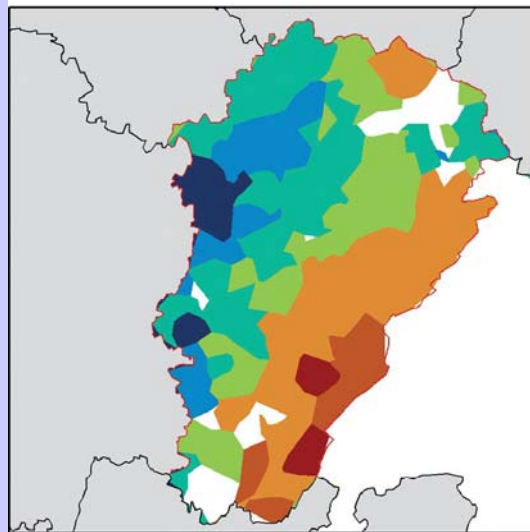


Examples of observed changes

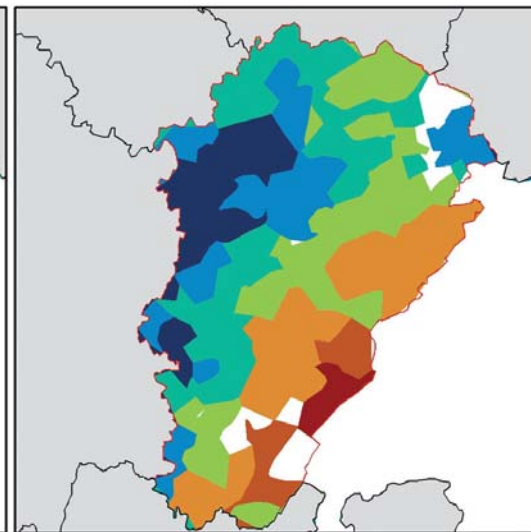


Elevation

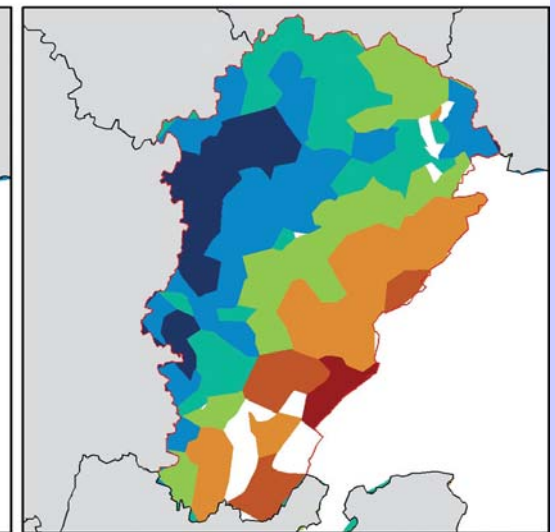
Soil Organic Carbon



1990-94

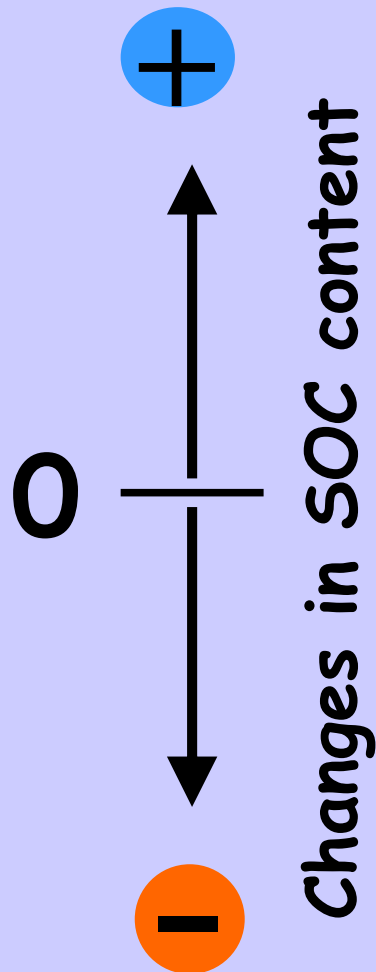


1995-99

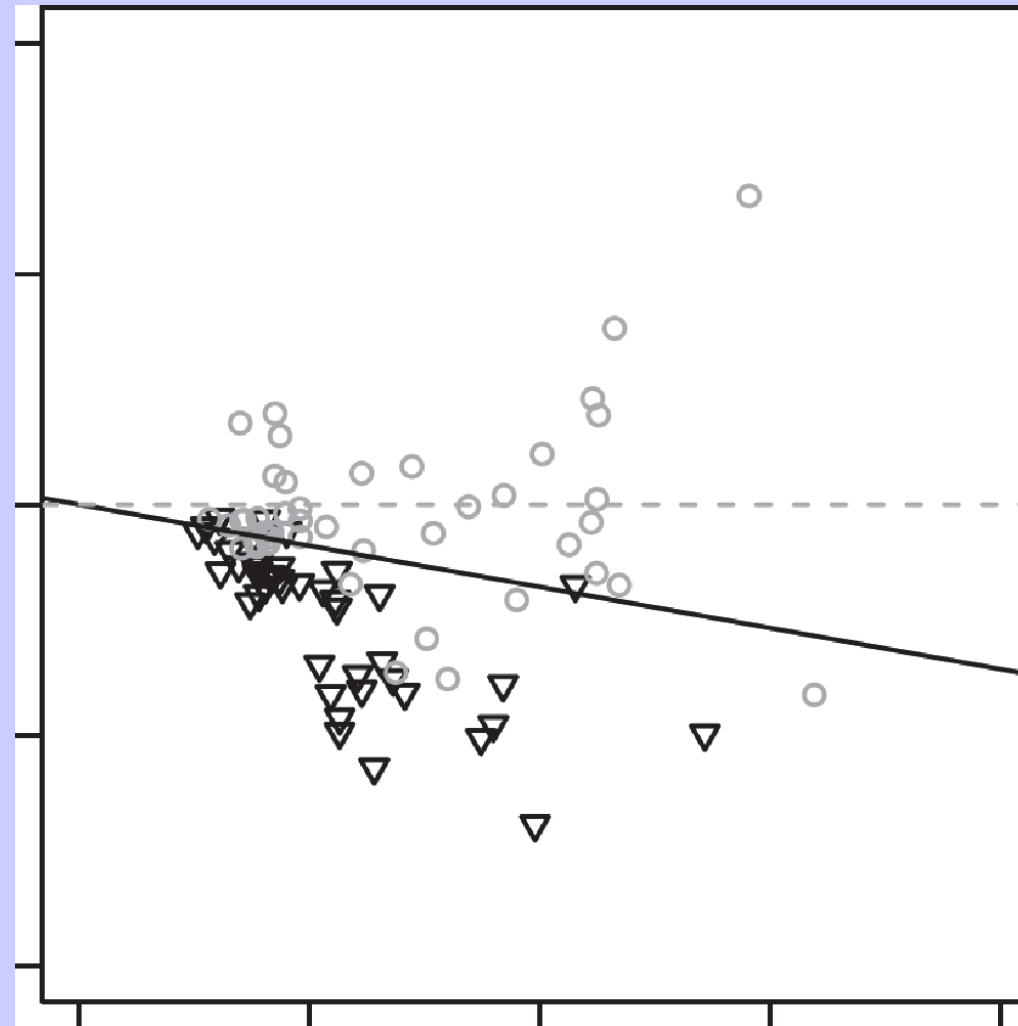


2000-04

Effect of baseline SOC content



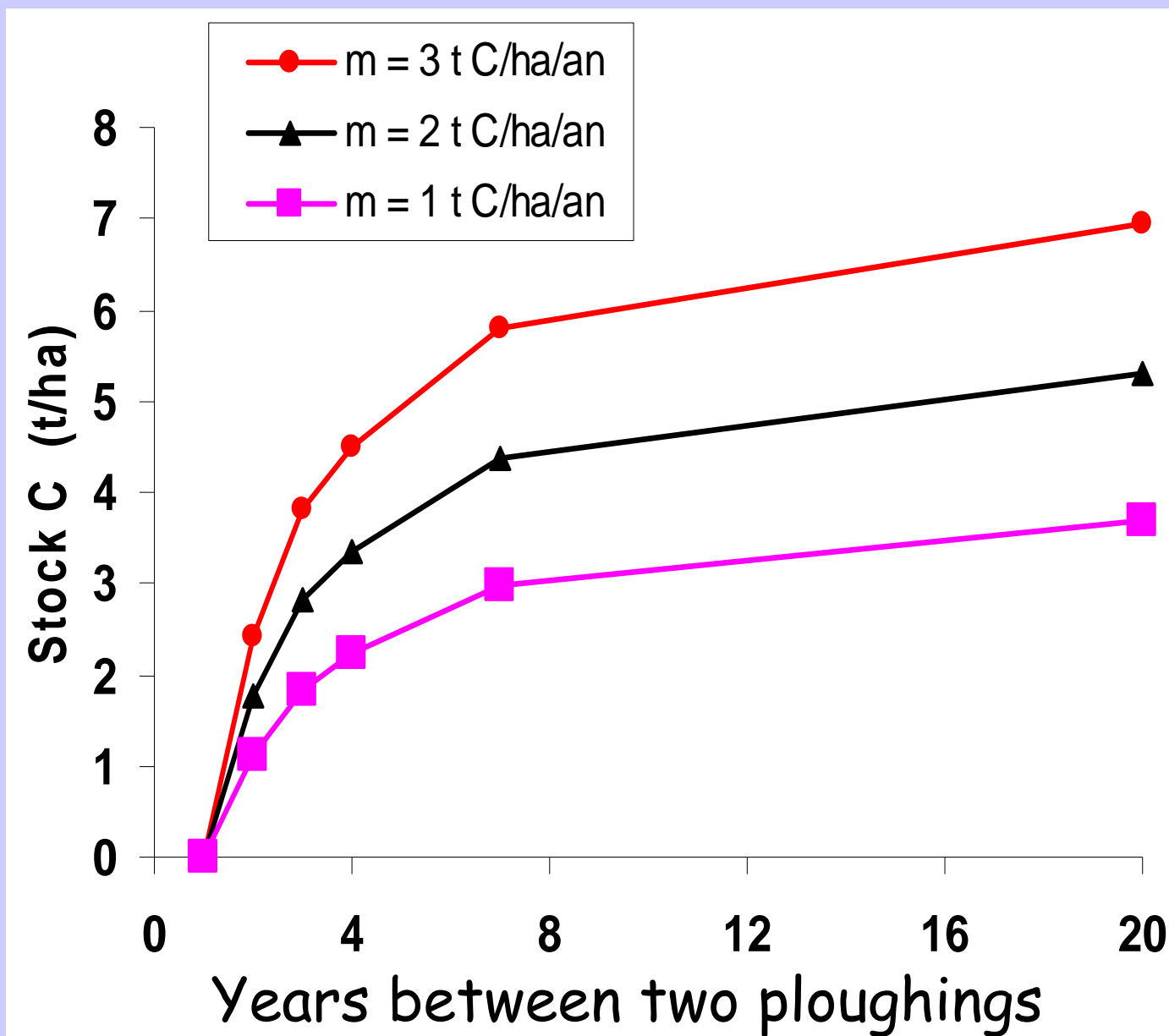
Changes in SOC content



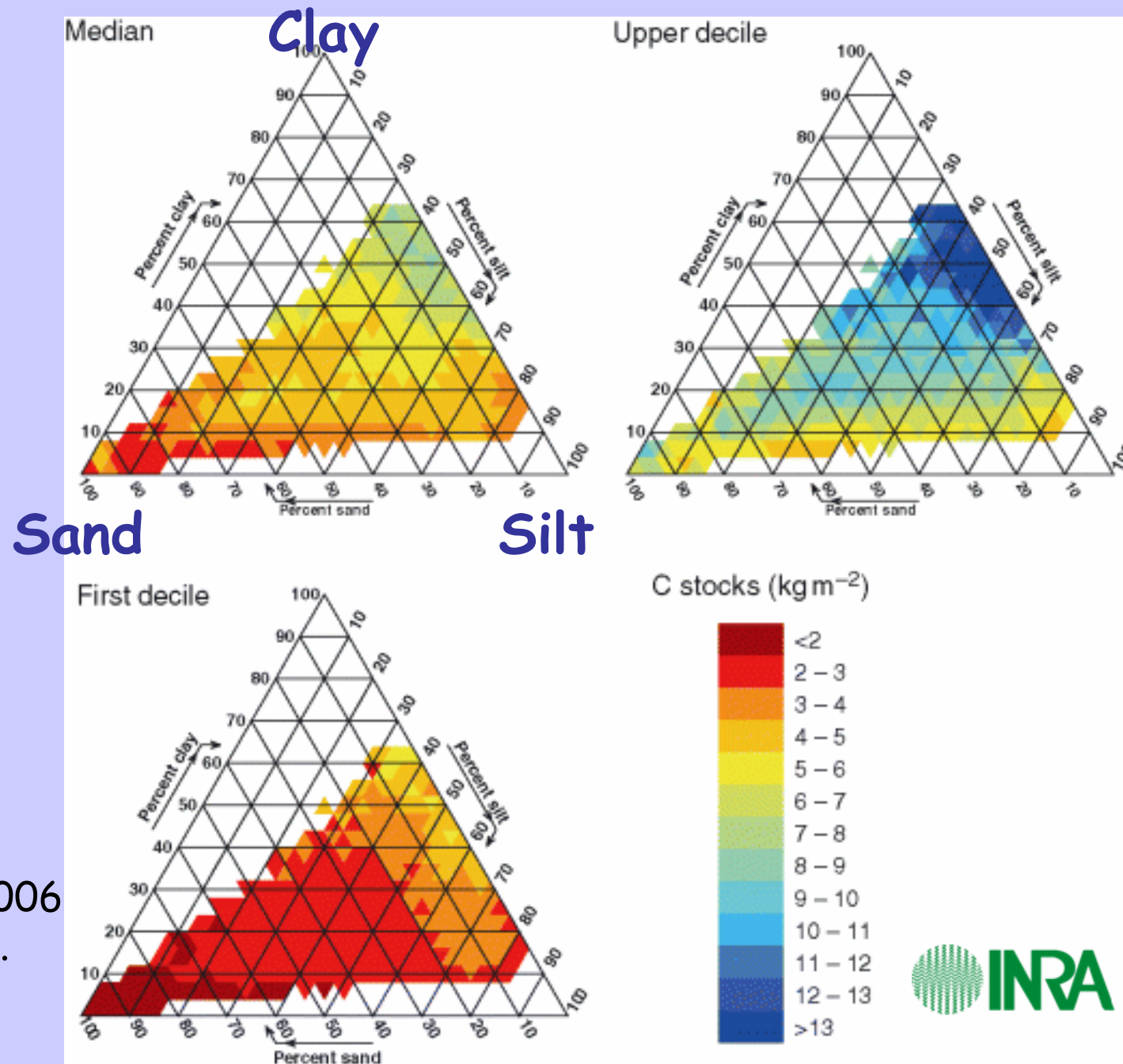
Baseline SOC content



Reducing frequency of ploughing



C sequestration depends on other soil properties



Arrouays et al. 2006
Soil Use & Manag.





Summary

Main factors affecting C storage in soils

Conversion arable lands ↔ forests/grasslands

Reduced tillage or no-till ↔ conventional tillage

Continuous soil cover ↔ bare soils

Temporary grasslands ↔ permanent grasslands

Potential variation in soils and climates



Concluding remarks

Managing C storage is possible

Preserving existing stocks might be more important than trying to create new ones

But

Climate change could affect C storage sustainability

Extension over space or sustainability over time of some practices is limited

The carbon sink is a finite answer to mitigation



Concluding remarks

Is C storage in soil a « win-win » strategy?

Increasing C in soils produces related environmental benefits: reduction of erosion, retention of pollutants, biodiversity...

But might have side effects in some cases: use of pesticides, N₂O emissions...

A verification should be undertaken for each specific case

For the soils and the climates of the next decades... 

***Soil carbon?
Go easy on it !***

Thank you for your attention...



arrouays@orleans.inra.fr

