



## Graphic and semantic border harmonization of soil map assisted by DSM

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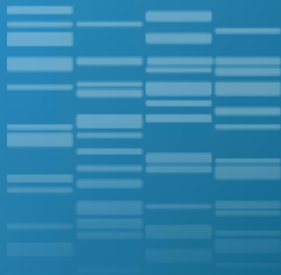
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# Graphic and semantic border harmonization of soil map assisted by DSM

6th Global Workshop on Digital Soil Mapping  
11-14 November 2014, Nanjing, China



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## Background

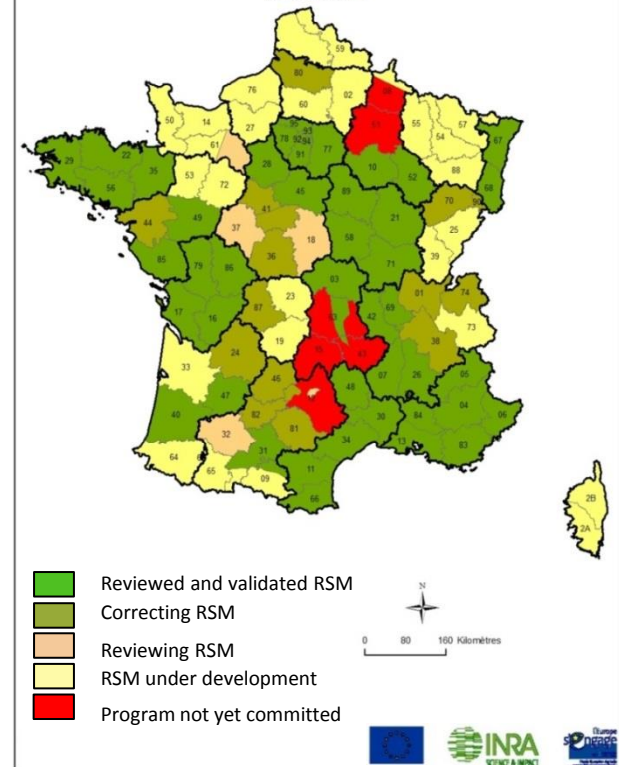
Regional Soil Map (RSM)

National Program of Soil mapping :

- ❖ To provide a national soil map at the scale of 1/250 000
- ❖ Complex Soil Maps Units
- ❖ Put in the hands of several Regional organizations : territory divided into 75 RSM
- ❖ Each map is made by a different soil Surveyor



**Progress of the French National Soil Mapping Program – march 2014**

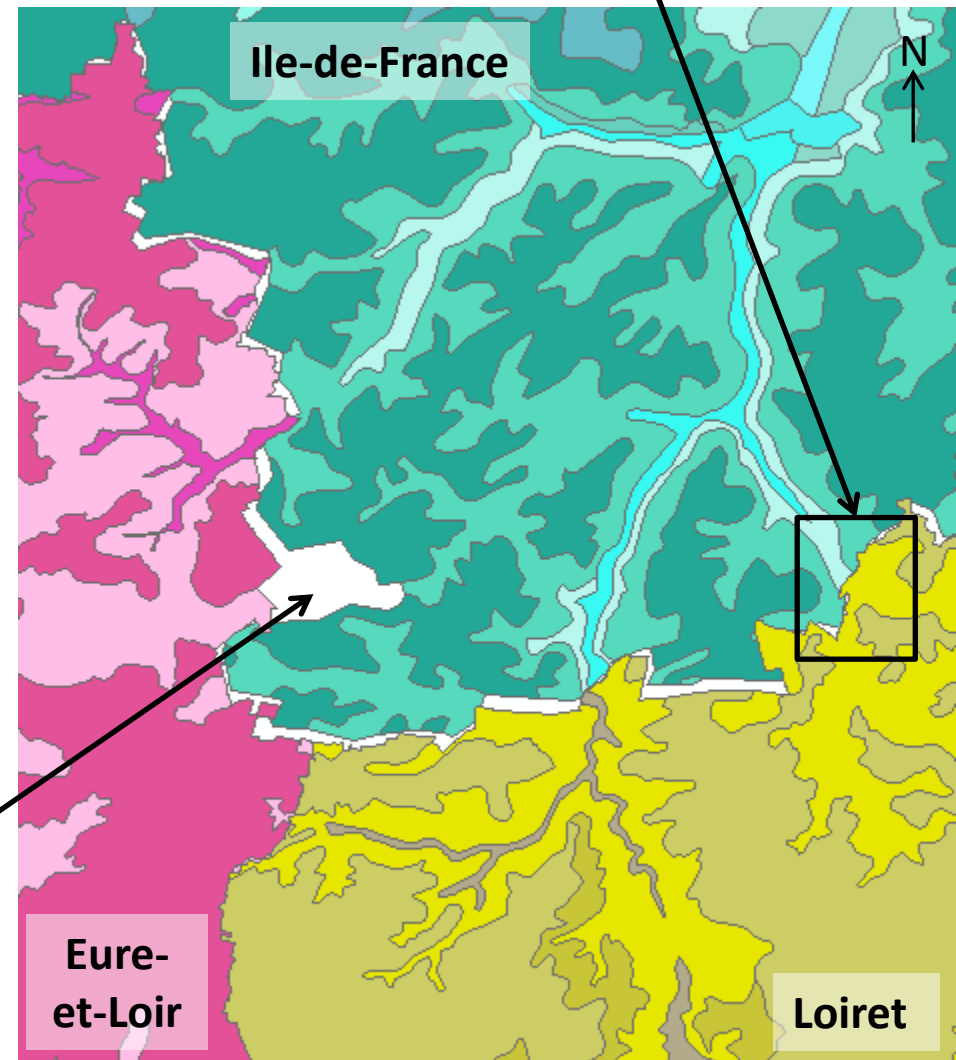


## Background

- ❖ Despite a previous standardization of the RSM mapping, a harmonization stage is needed to obtain a consistent national soil map.
- ❖ Indeed there are several kinds of semantic and graphic incoherences between the adjacent RSMs.

Connection problem between old and recent RSM (difference of spatial projections)

Continuity of the SMU (disagreement between the soil surveyors)





## *Harmonization constraints*

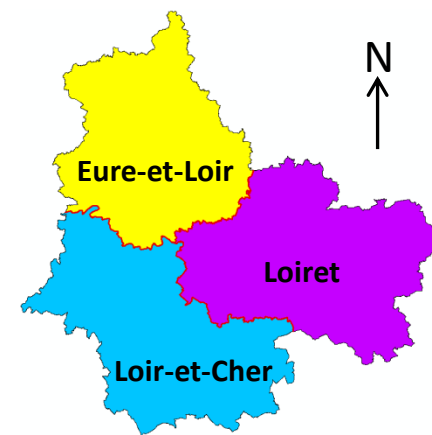
- ❖ To be practical all over the country
- ❖ To be able to correct all the incoherences
- ❖ To minimize the cost of the harmonization
- ❖ To be quick to use

→ Digital Soil Mapping



## Test area

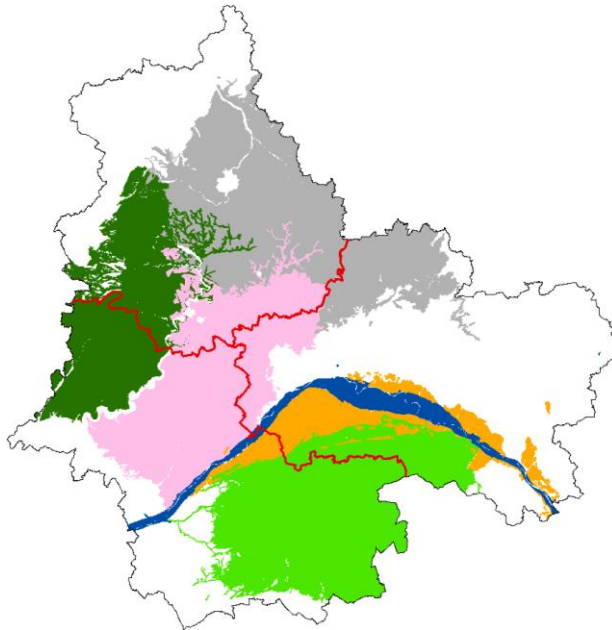
### 3 Regional Soil Maps



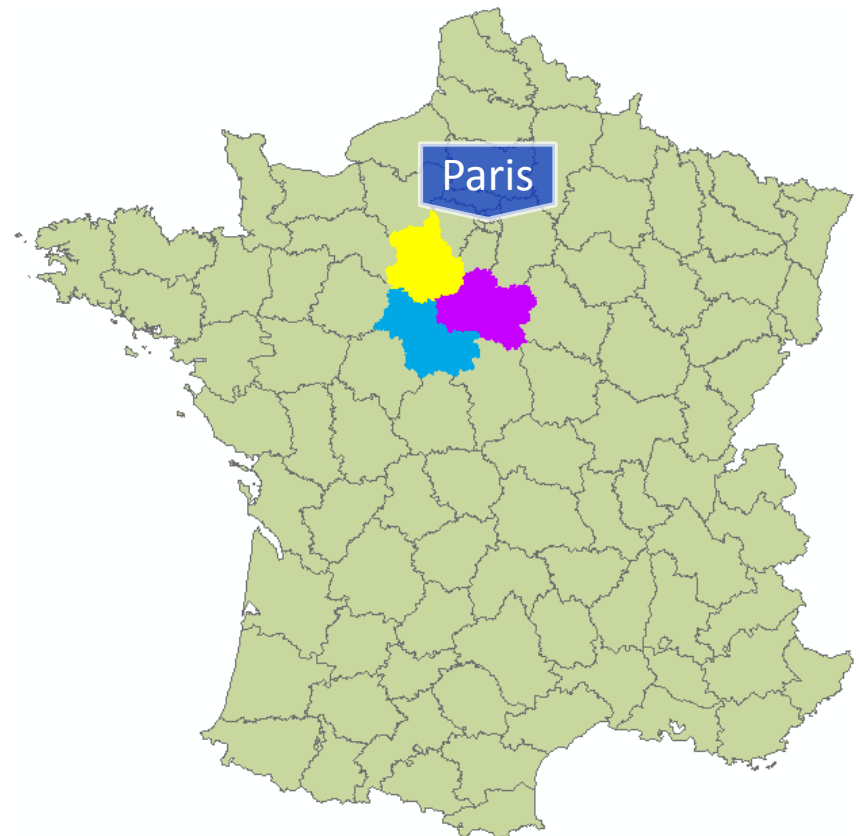
**Main rule : minimize the zone which will be modified by the harmonization process.**

Decompose the RSMs :

- ◆ 6 cross-border Small Natural Regions



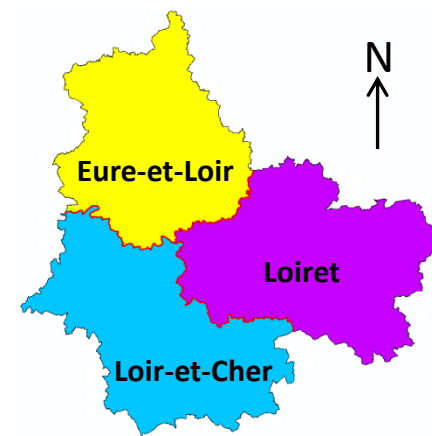
6 Cross-border Small Natural Regions





## Test area

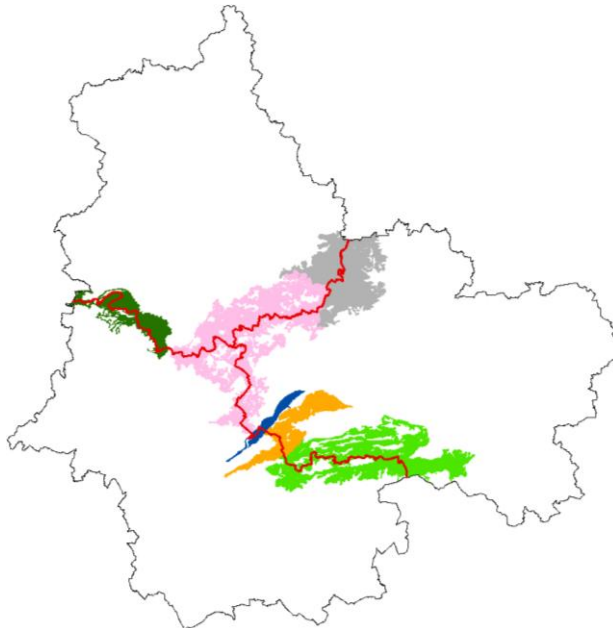
3 Regional Soil Maps



**Main rule : minimize the zone which will be modified by the harmonization process.**

Decompose the RSMs :

- ❖ 6 cross-border Small Natural Regions



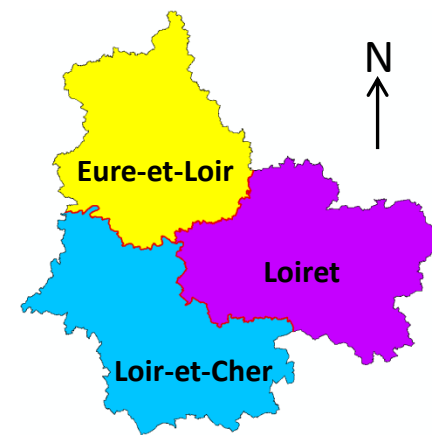
6 working zones

The 6 working zones represent about 10% of the total area



## Test area

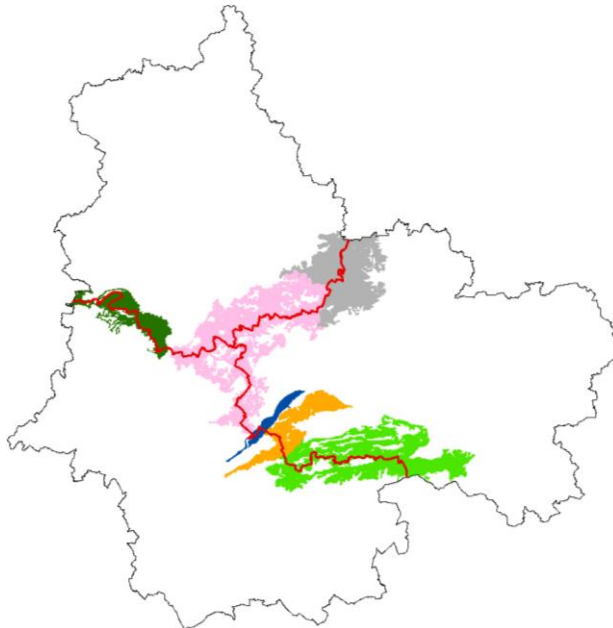
### 3 Regional Soil Maps



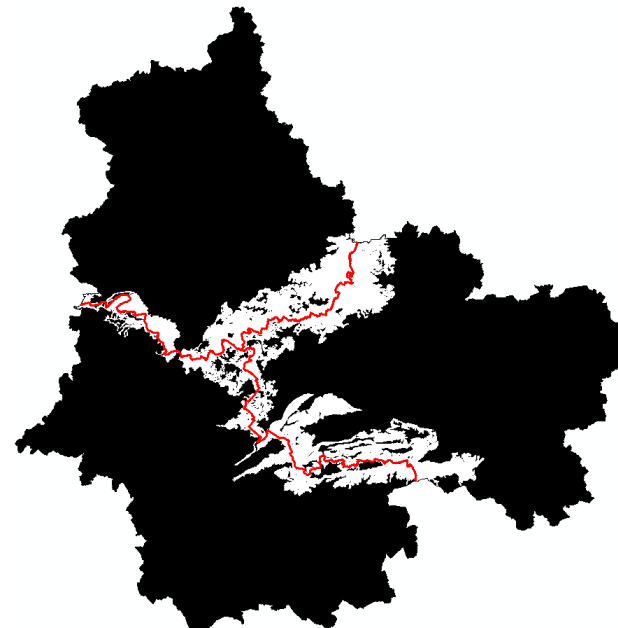
**Main rule : minimize the zone which will be modified by the harmonization process.**

Decompose the RSMs :

- ❖ 6 cross-border Small Natural Regions



6 working zones



Unmodifiable SMUs



## Test area

First Stage : Semantic harmonization

21 distinct SMUs

46  
48  
53  
55  
56  
57  
59

134  
135  
136  
137

1602  
1603  
1604  
7100  
7101  
7102  
7103  
7201  
7300  
7301

Eure-et-Loir

Loiret

Loir-et-Cher



Similar SMUs depending on :

- ❖ SMUs name
- ❖ Number of Soil Types
- ❖ Kind of Soil Types

## Test area

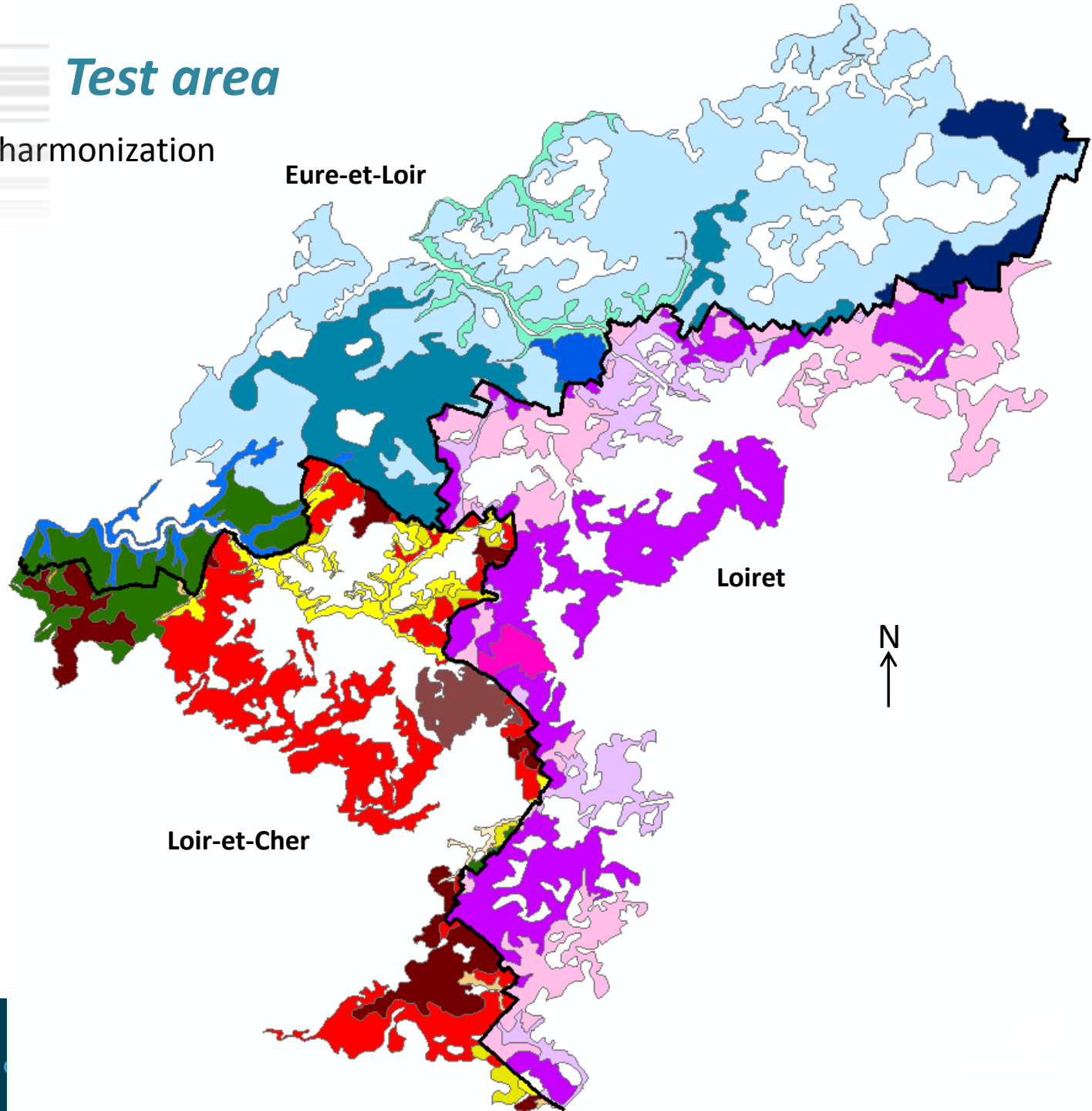
Fisrt Stage : Semantic harmonization

46  
48  
53  
55  
56  
57  
59

→ Group 1

134  
135  
136  
137

1602  
1603  
1604  
7100  
7101  
7102  
7103  
7201  
7300  
7301



## Test area

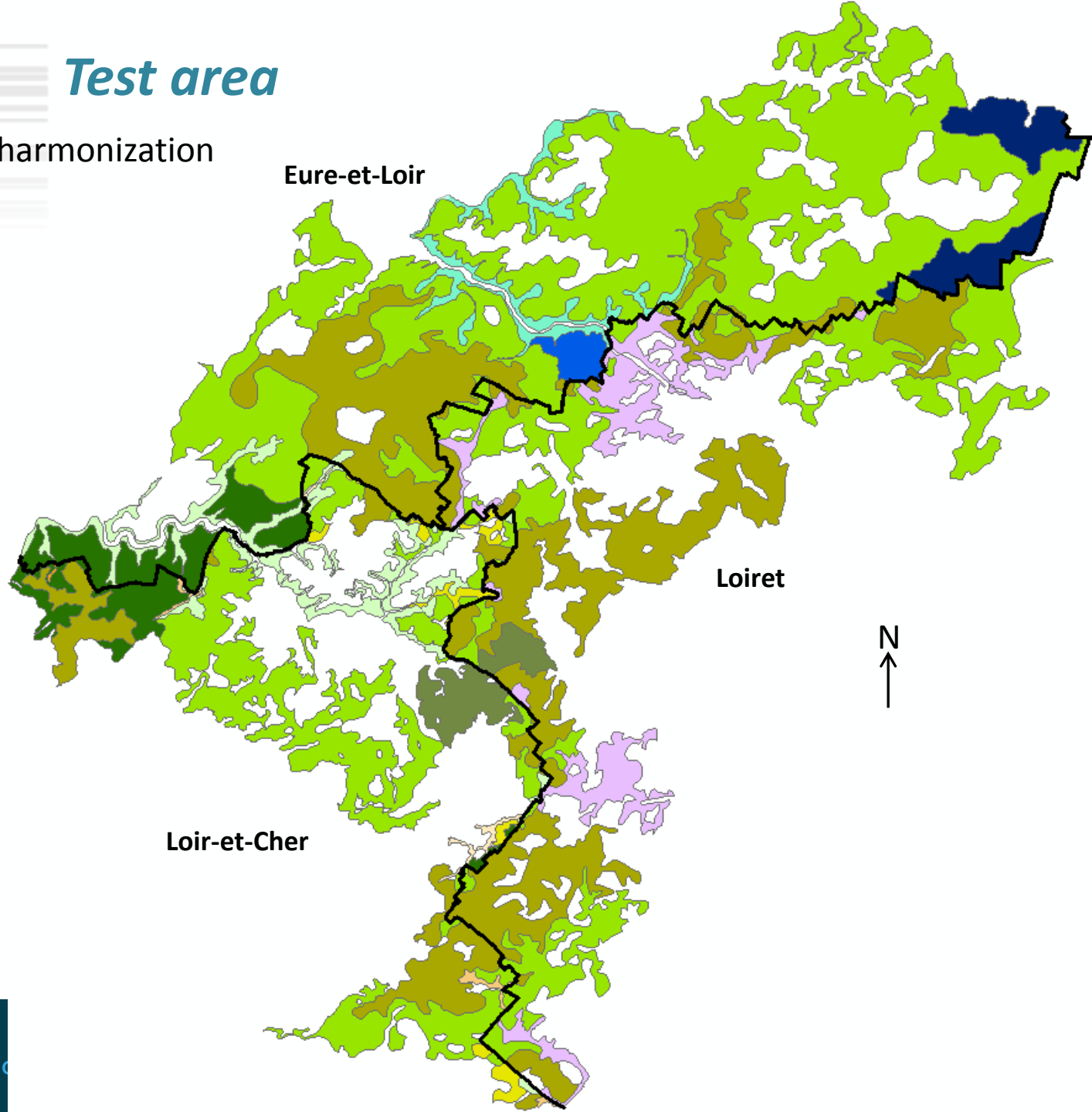
Fisrt Stage : Semantic harmonization

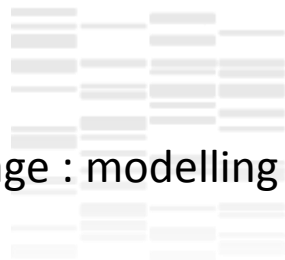
46  
48  
53  
55  
56  
57  
59

Group 1  
Group 2  
Group 3  
Group 4  
Group 5

134  
135  
136  
137

1602  
1603  
1604  
7100  
7101  
7102  
7103  
7201  
7300  
7301





## *Test area*

Second Stage : modelling and prediction

Classification And Regression Tree (CART) model  
Gradient Boosted Model (GBM)

All the available covariates :

- ❖ Climate : not discriminating at this scale
- ❖ Organism : land use map (Corine Land Cover)  
forest cover map
- ❖ Relief : Digital Elevation Model and derivatives
- ❖ Parental materials : parental materials from the 1/1 000 000 French soil map  
1/50 000 geological map  
1/1 000 000 geological map  
gamma Ray remote sensing (Th, Ti, U, K)

## Test area

Second Stage : modelling and prediction

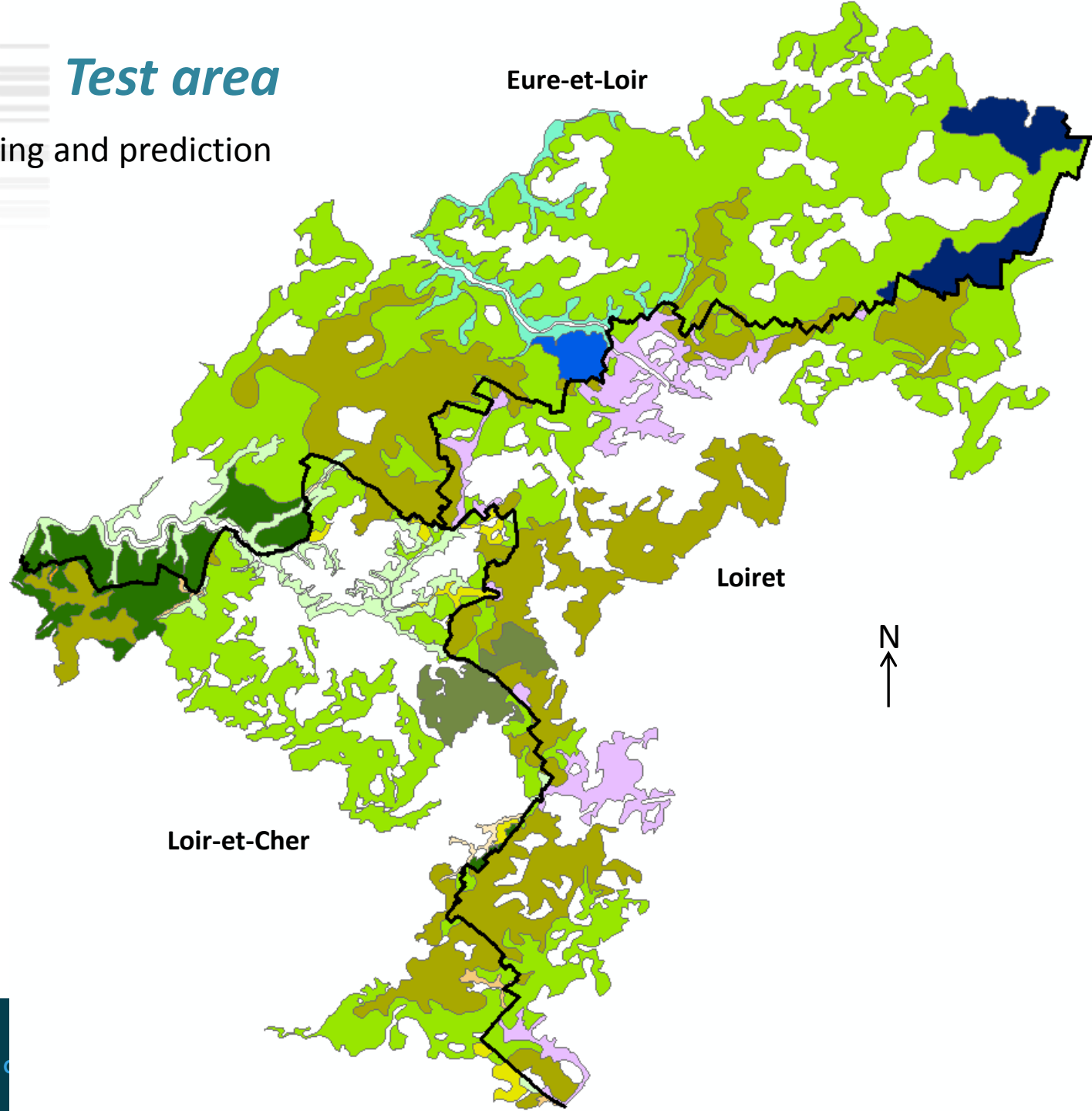
### Initial working zone

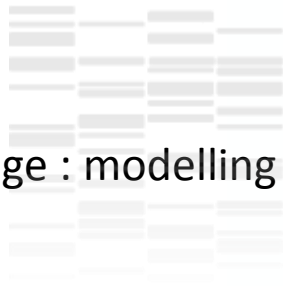
after the semantic  
harmonization  
undertaken by the  
pedological experts

=

Learning area

(about 300 000  
learning points)



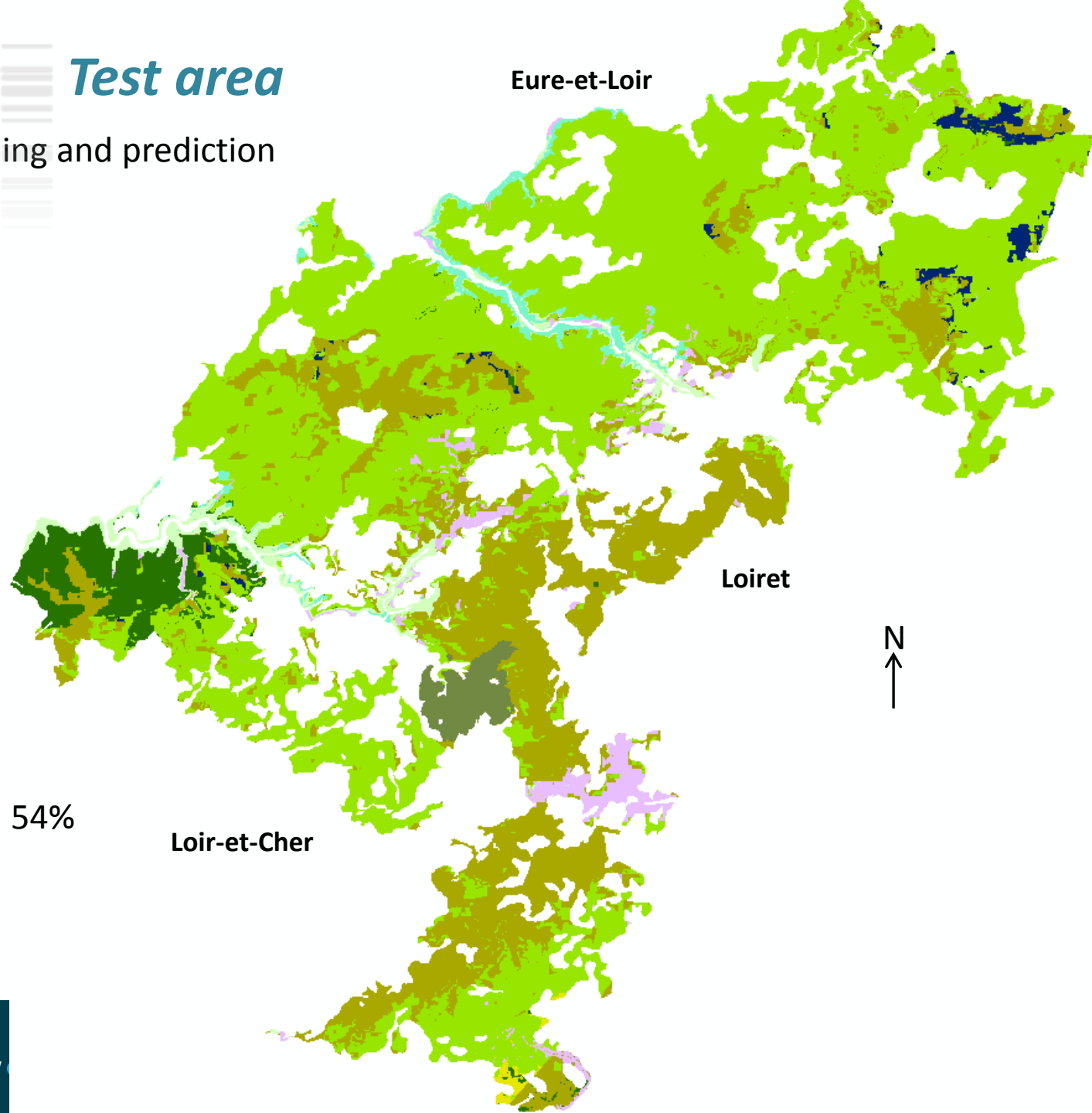


## *Test area*

Second Stage : modelling and prediction

### Model prediction

CART :  
Cross-validation purity : 54%  
Overall purity : 72%



## Test area

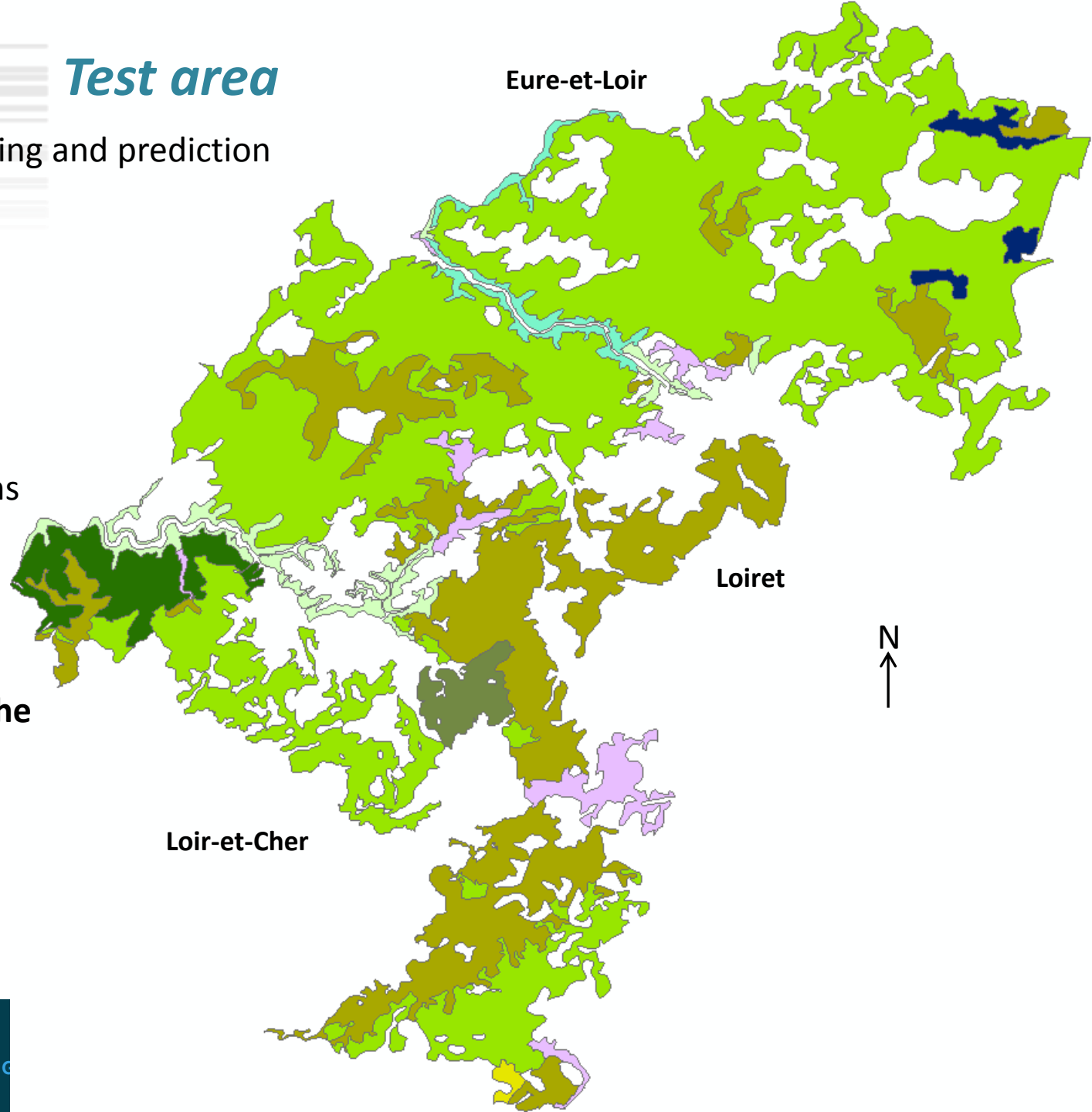
Second Stage : modelling and prediction

### ❖ Vectorization

Raster to Shapefile

To respect the  
mapping specifications

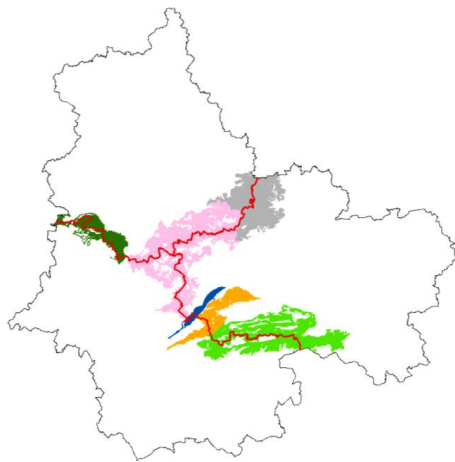
### ❖ Expert validation of the predictions



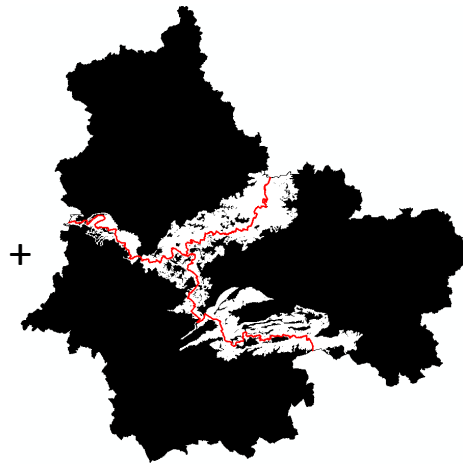


## Conclusion :

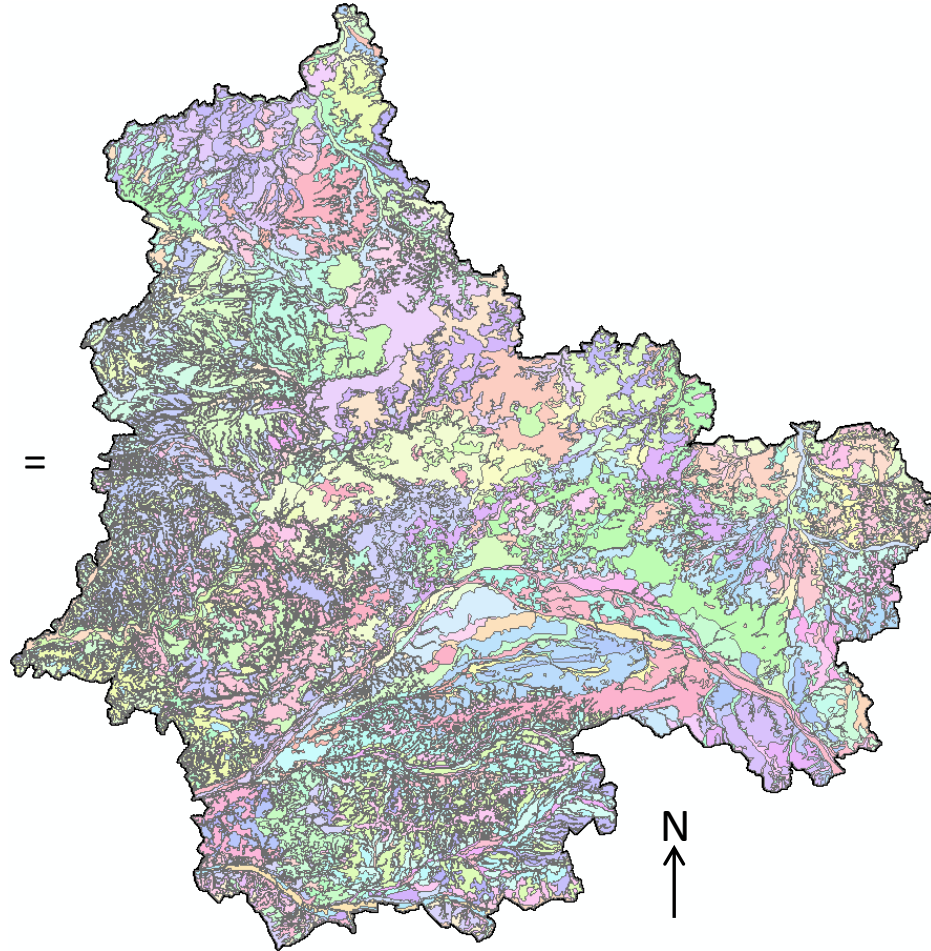
Reunifying the graphically harmonized parts and the unmodified SMUs to build up a coherent map of the 3 initial RSMs



6 harmonized  
working zones

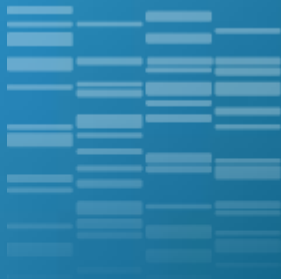


Unmodified  
SMUs



3 harmonized Regional Soil Maps





**Thank you for your attention**