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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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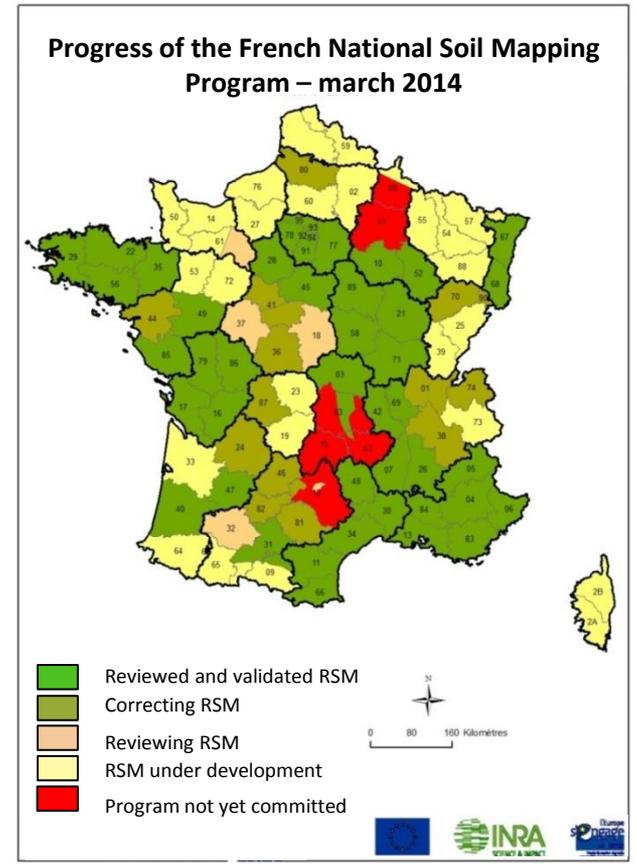


Background

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



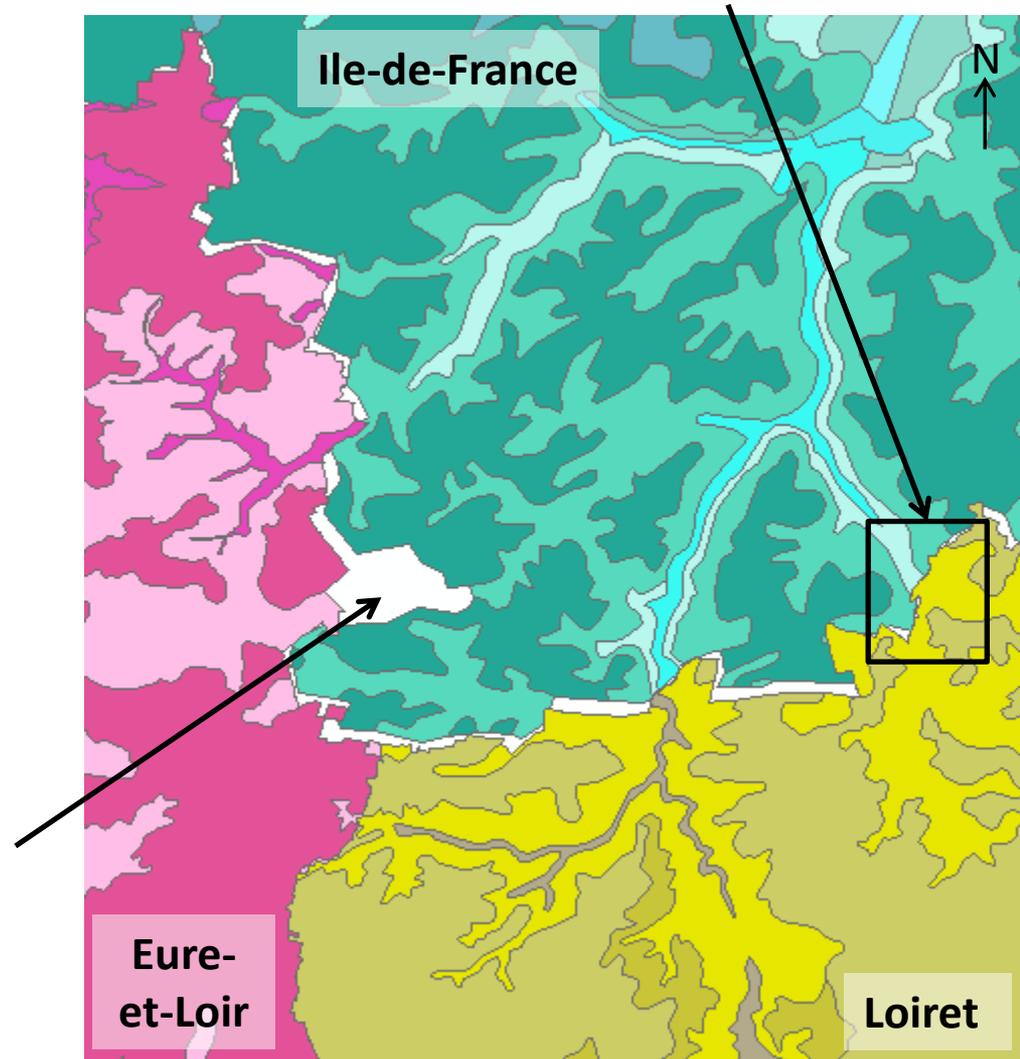


Background

- ❖ 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

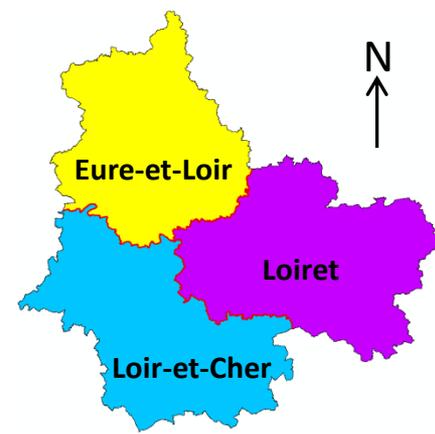
→ Digital Soil Mapping



Test area

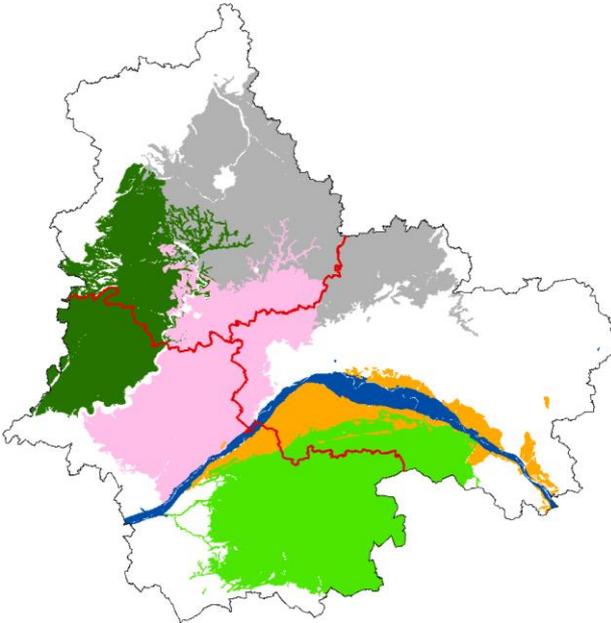
Main rule : minimize the zone which will be modified by the harmonization process.

3 Regional Soil Maps

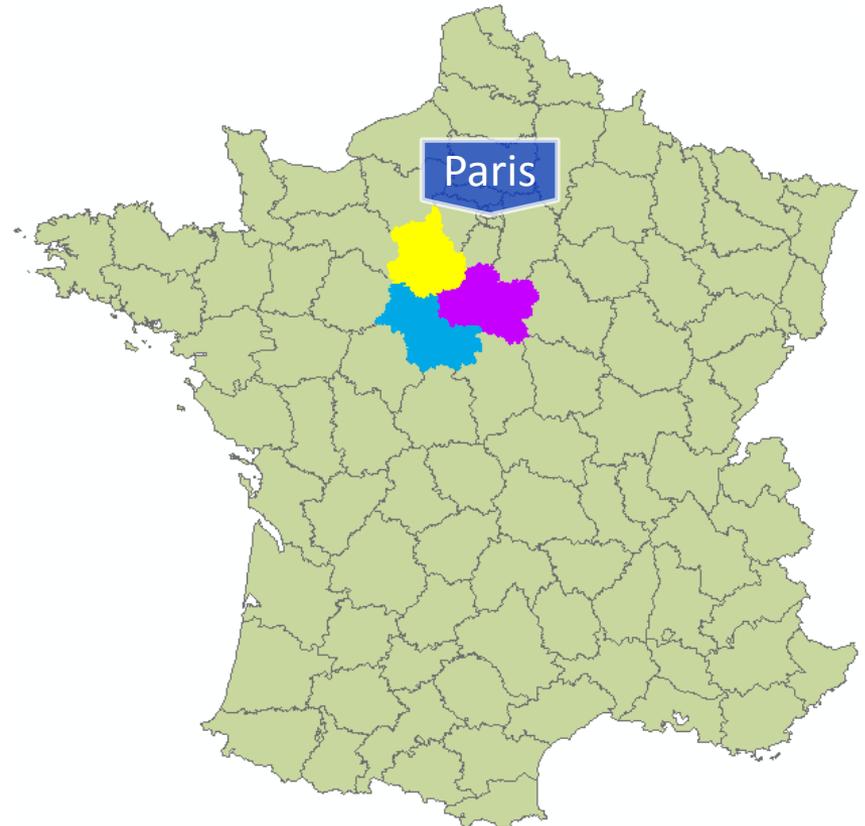


Decompose the RSMs :

- ❖ 6 cross-border Small Natural Regions



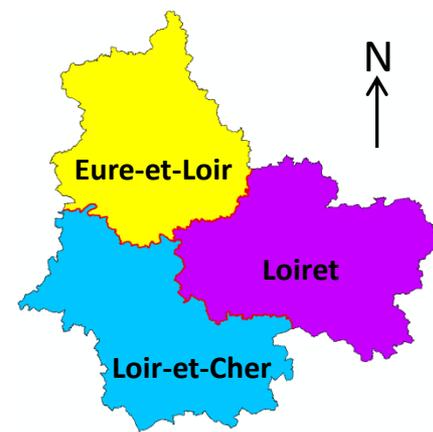
6 Cross-border Small Natural Regions





Test area

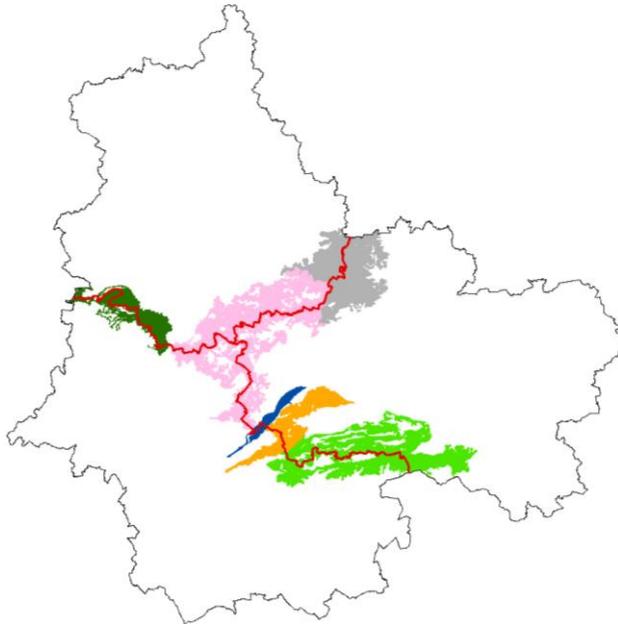
3 Regional Soil Maps



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

Decompose the RSMs :

- ❖ 6 cross-border Small Natural Regions



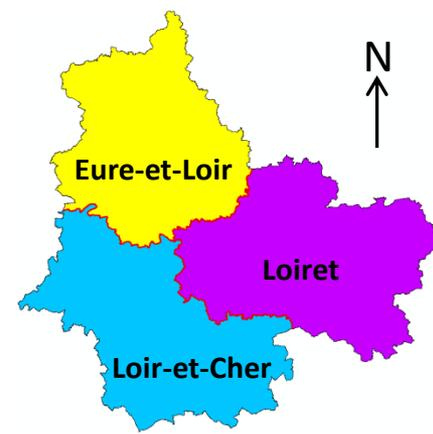
6 working zones

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



Test area

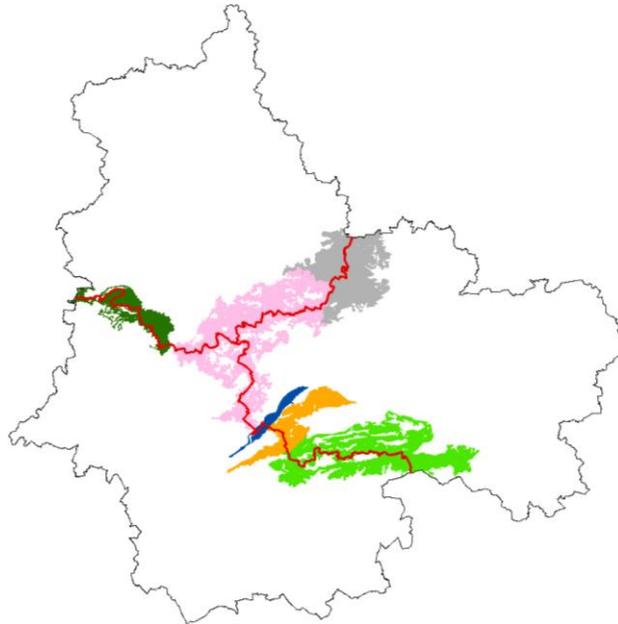
3 Regional Soil Maps



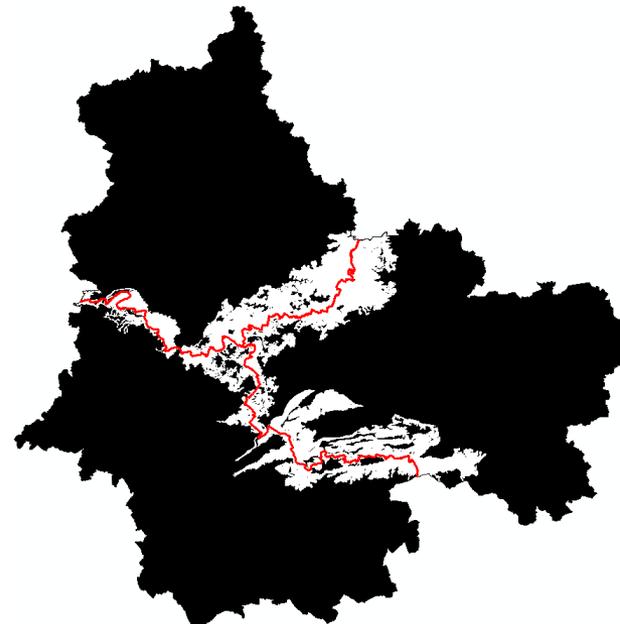
Main rule : minimize the zone which will be modified by the harmonization process.

Decompose the RSMs :

- ❖ 6 cross-border Small Natural Regions



6 working zones



Unmodifiable SMUs

Test area

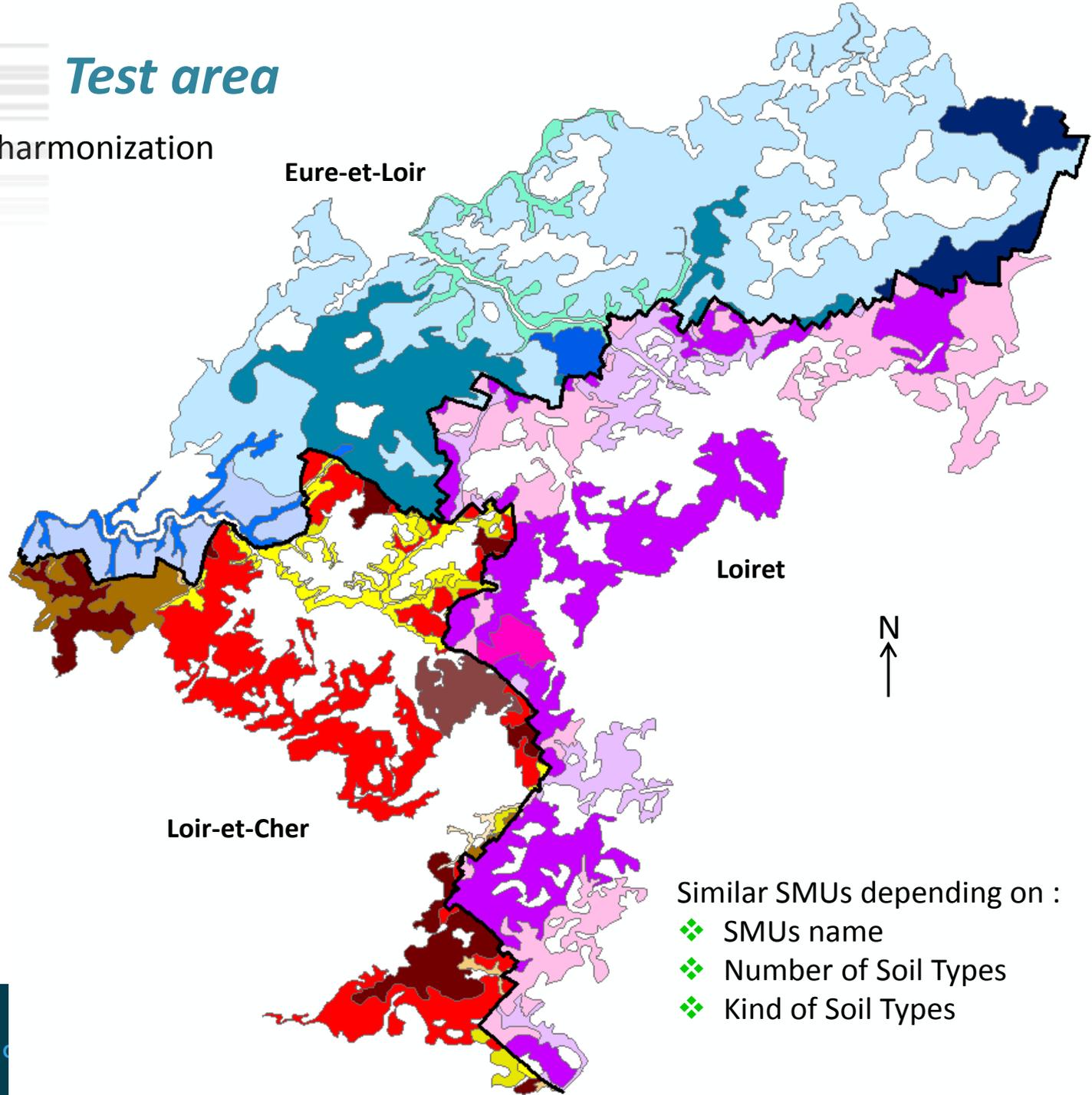
First Stage : Semantic harmonization

21 distinct SMUs

- 46
- 48
- 53
- 55
- 56
- 57
- 59

- 134
- 135
- 136
- 137

- 1602
- 1603
- 1604
- 7100
- 7101
- 7102
- 7103
- 7201
- 7300
- 7301



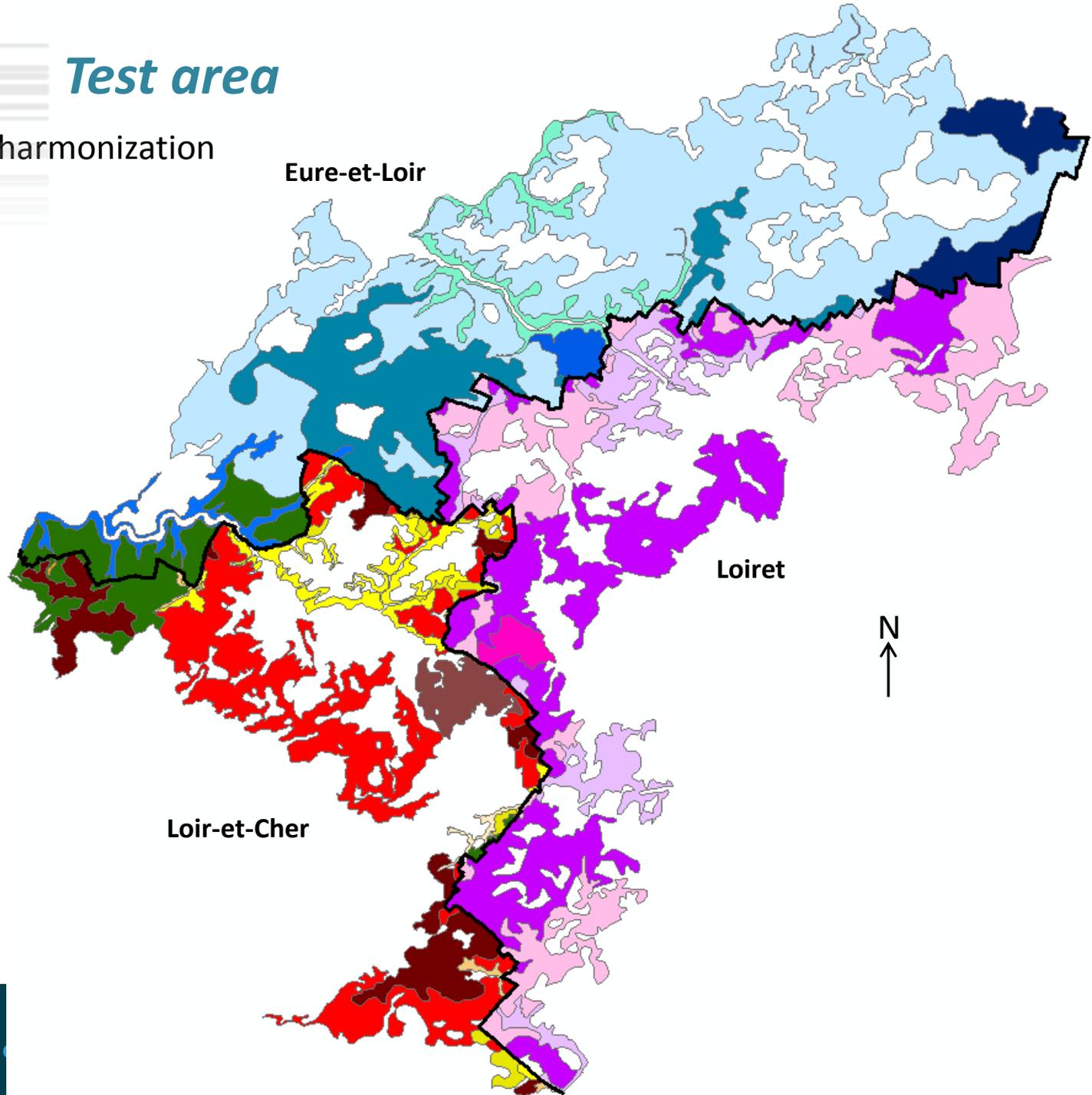
Similar SMUs depending on :

- ❖ 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

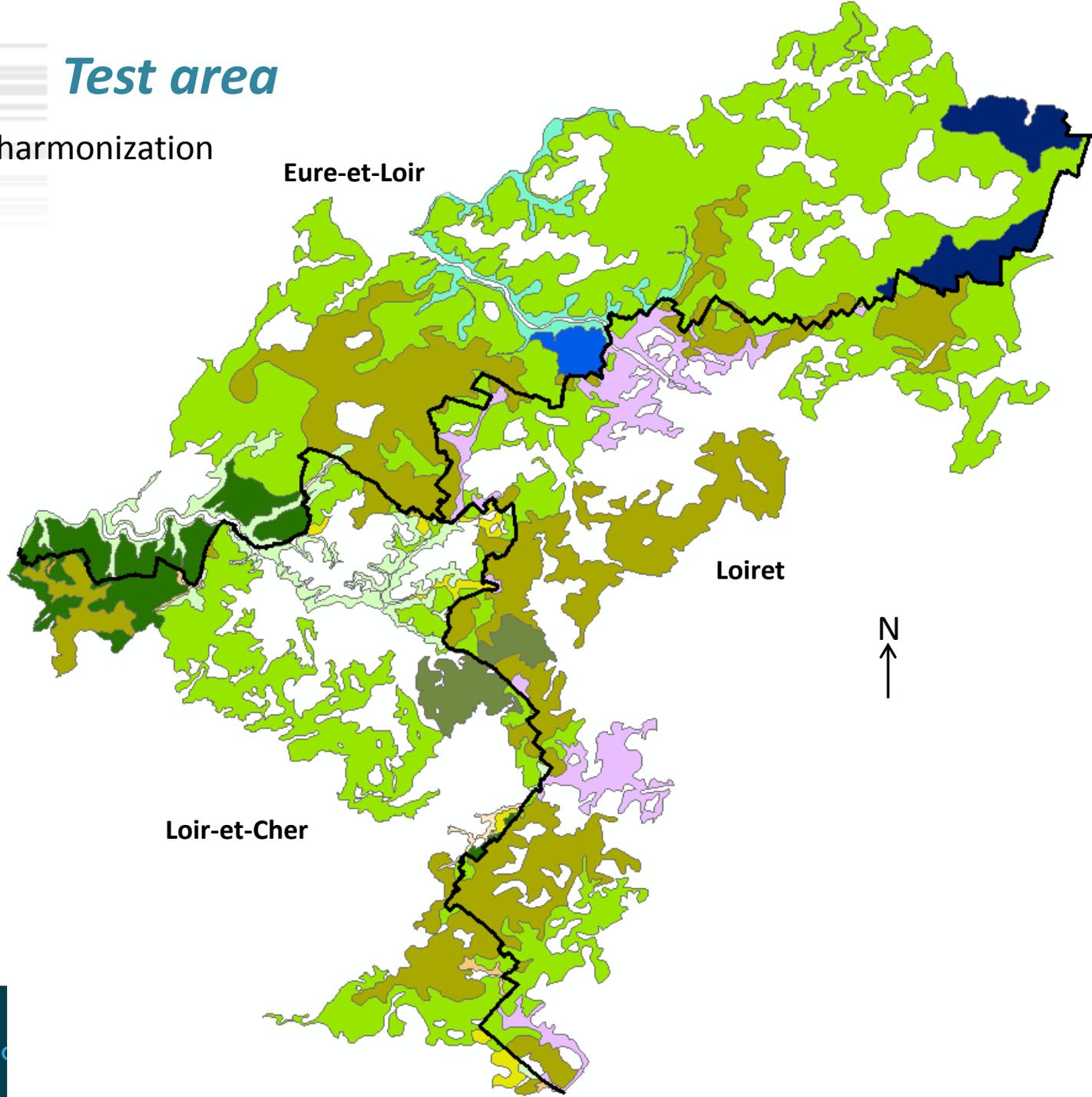
Fisrt Stage : Semantic harmonization

- 46
- 48
- 53
- 55
- 56
- 57
- 59

- 134
- 135
- 136
- 137

- 1602
- 1603
- 1604
- 7100
- 7101
- 7102
- 7103
- 7201
- 7300
- 7301

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5





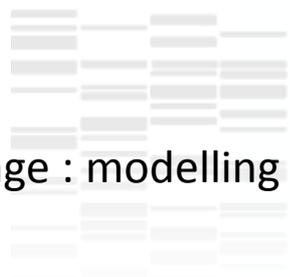
Test area

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

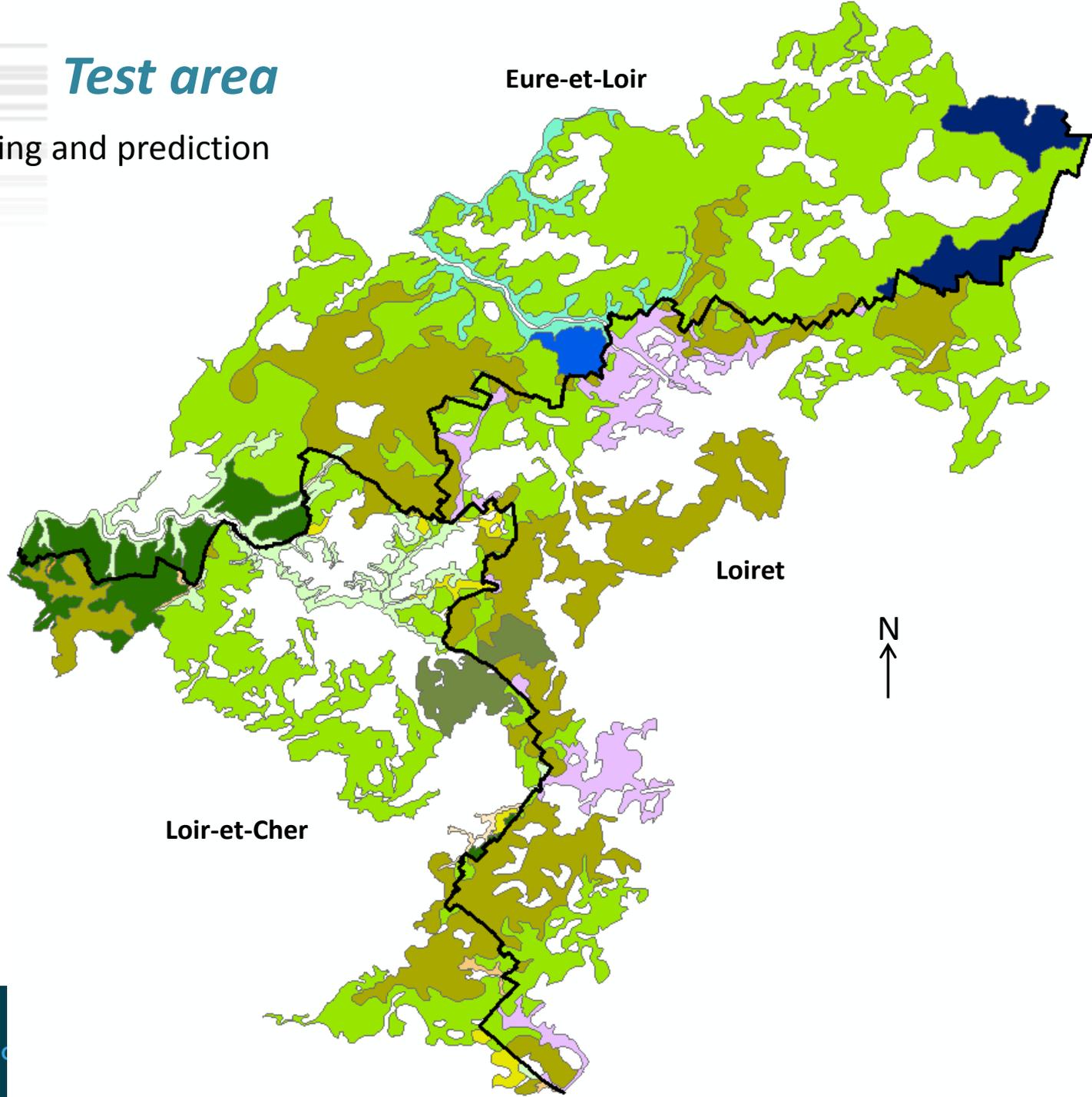
Initial working zone

after the semantic
harmonization
undertaken by the
pedological experts

=

Learning area

(about 300 000
learning points)



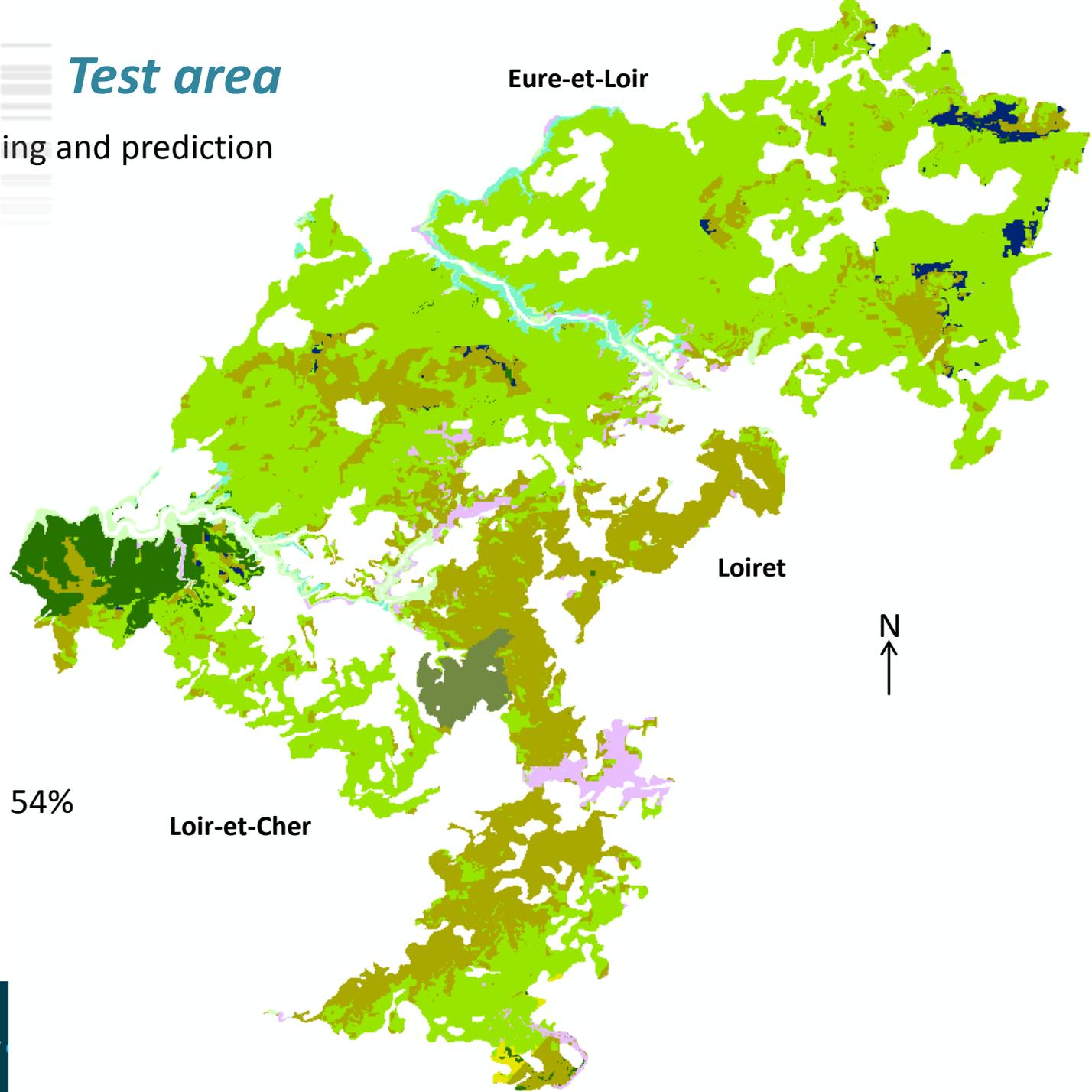


Test area

Second Stage : modelling and prediction

Model prediction

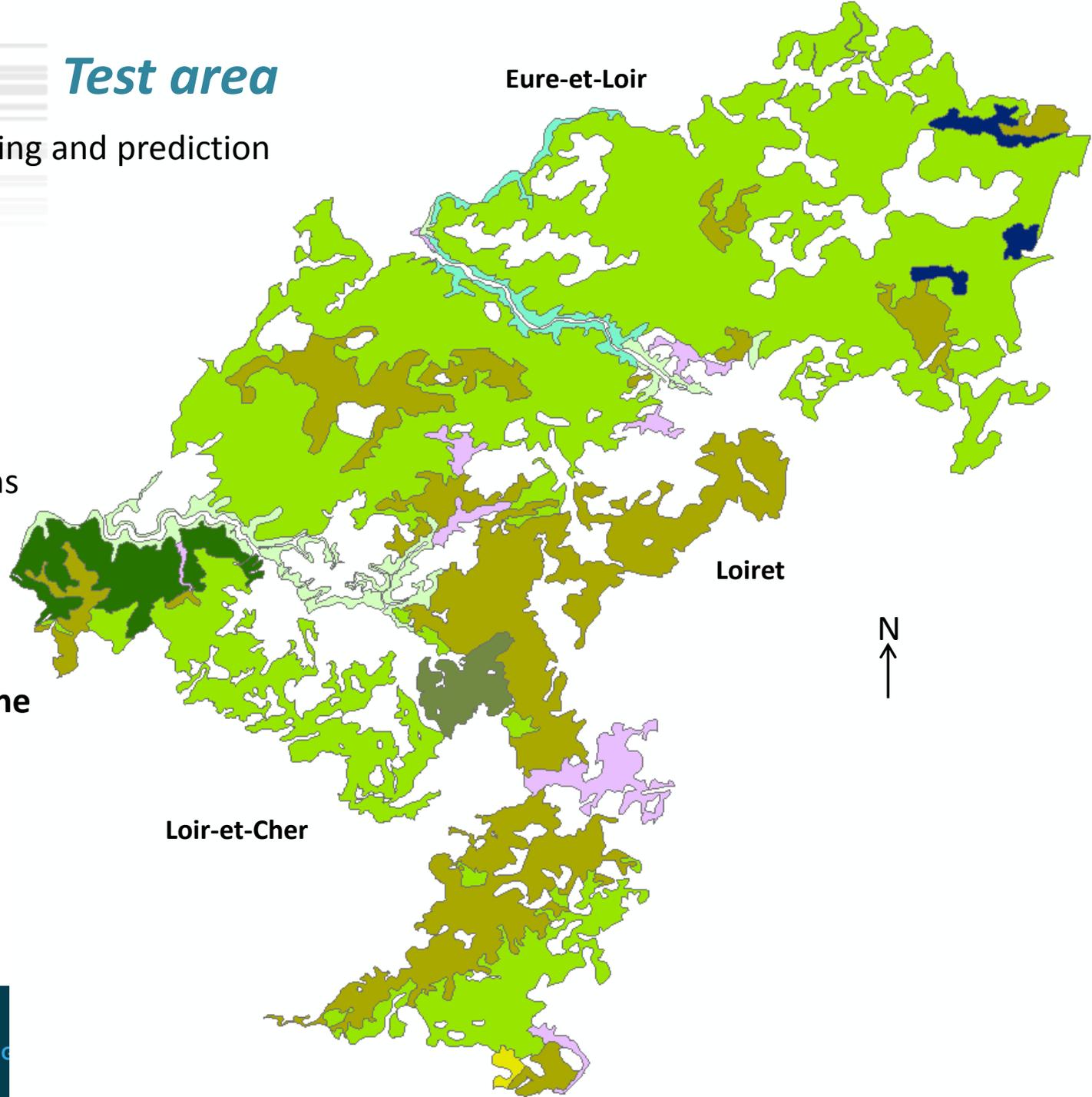
CART :
Cross-validation purity : 54%
Overall purity : 72%





Test area

Second Stage : modelling and prediction



❖ Vectorization

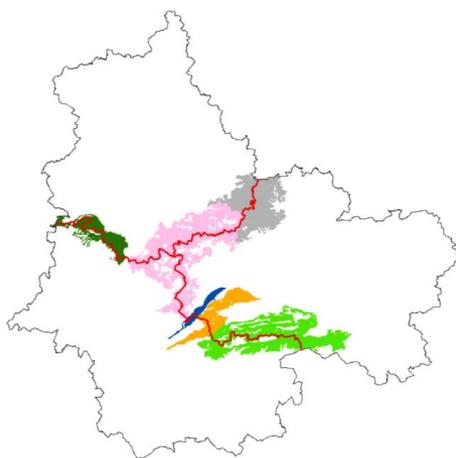
Raster to Shapefile

To respect the mapping specifications

❖ Expert validation of the predictions

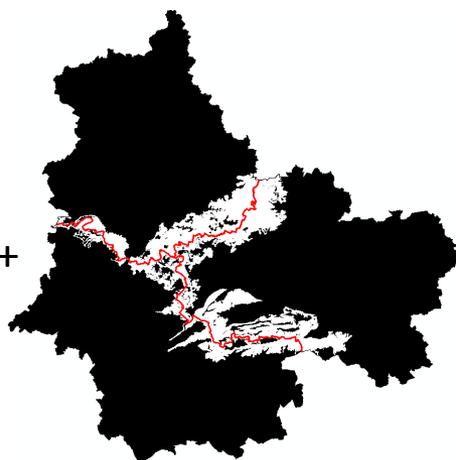
Conclusion :

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



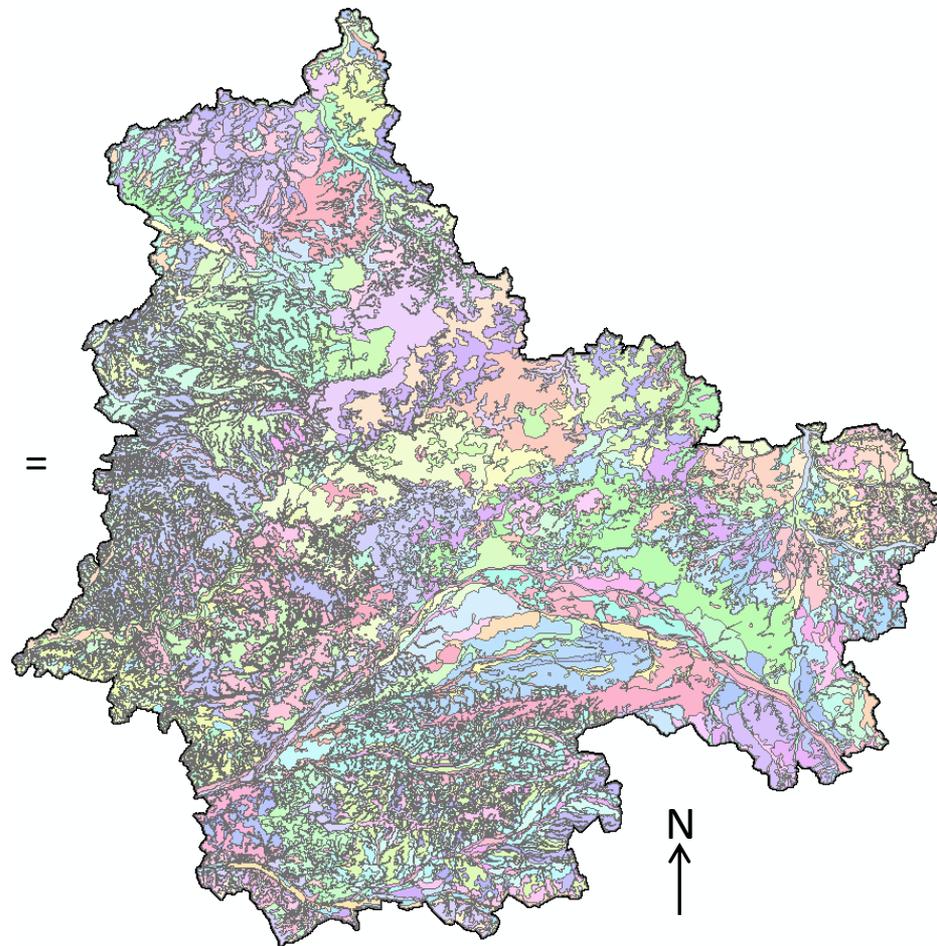
6 harmonized
working zones

+



Unmodified
SMUs

=



3 harmonized Regional Soil Maps



Thank you for your attention