Disaggregation of legacy soil maps at regional scale in France. Comparison of DSMART and Random Forest

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MAPPING OF SOILS AND THEIR PROPERTIES USING LEGACY SOIL MAPS

Comparison of DSMART and Random Forest

Joint workshop for Digital Soil Mapping and GlobalSoilMap
12-15 March 2019
Santiago

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Context

Soil polygon maps

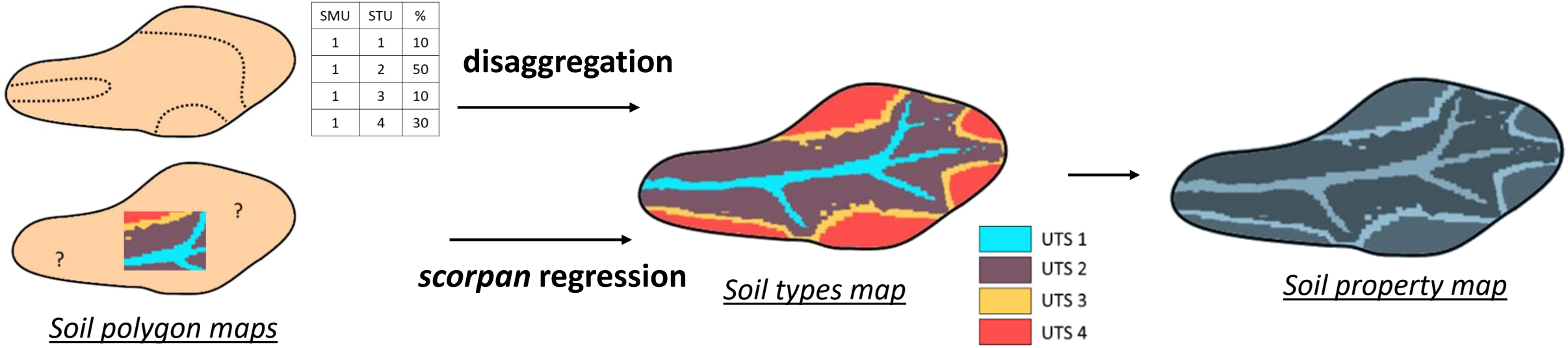
- Cover major part of french territory
- Different scales 1:250 000 ; 1:50 000
- Rich source of information about soil

But ..

- Spatial support and extent is not always adapted to demand

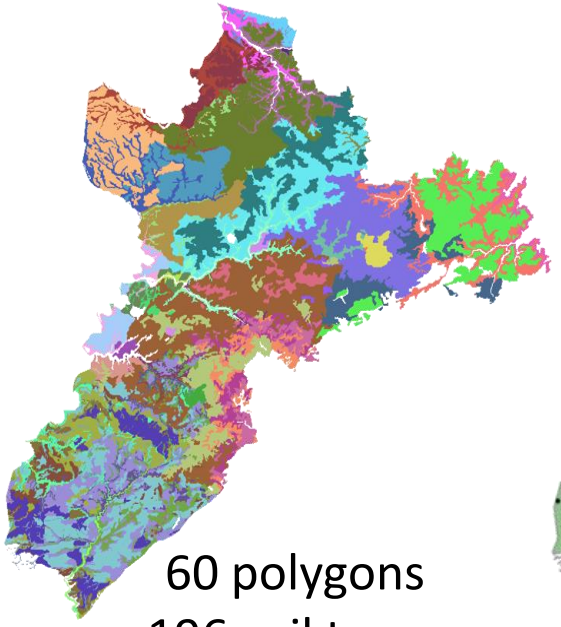
» Objective : **Increase spatial resolution** of soil maps and to **map soil properties**

» How ? We tested and compared two methods :



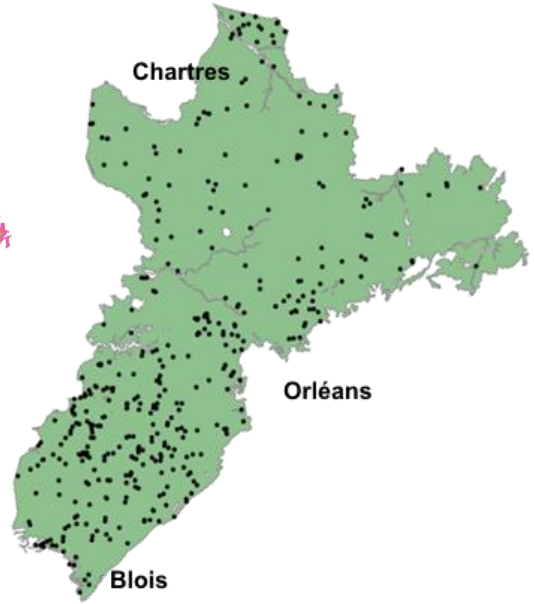
Data available

Legacy soil map

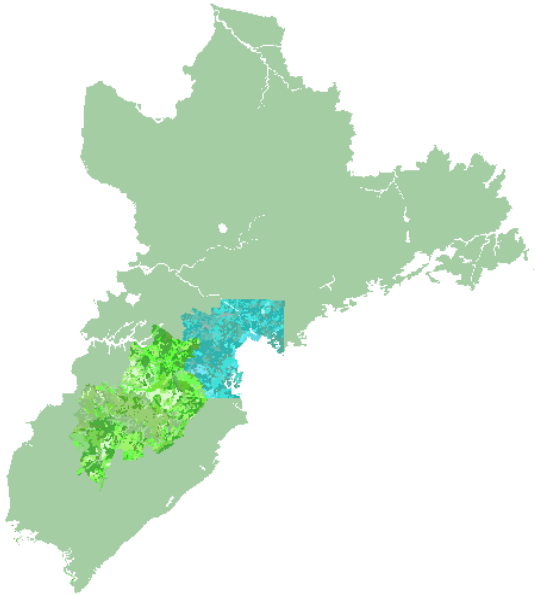


60 polygons
196 soil types

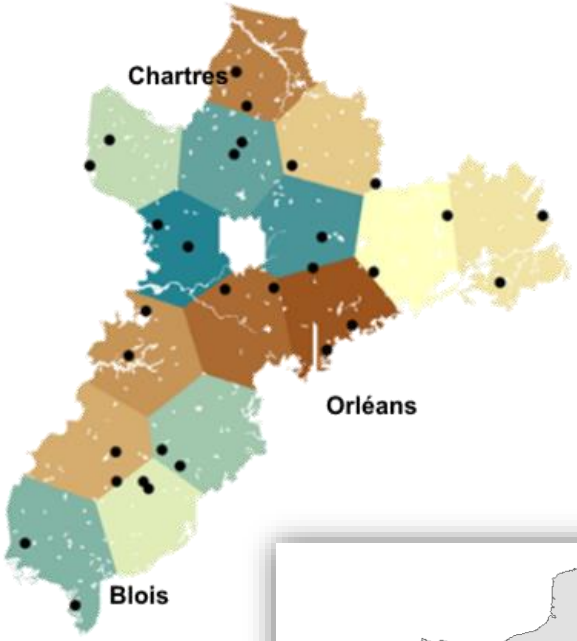
435 soil profiles for calibration



1:50 000 soil maps



30 soil profiles for validation using probability sampling



+ 24 Covariates

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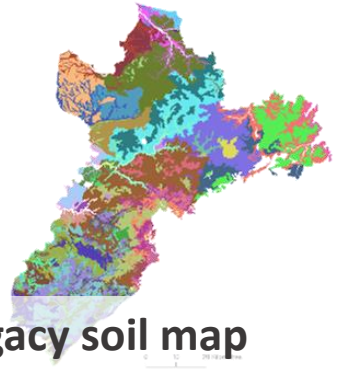
Disaggregation with DSMART

Input

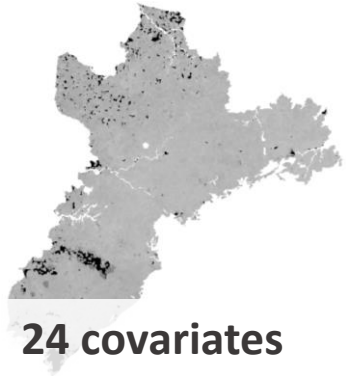


Legacy soil map

SMU	STU	%
1	1	10
1	2	50
1	3	10
1	4	30

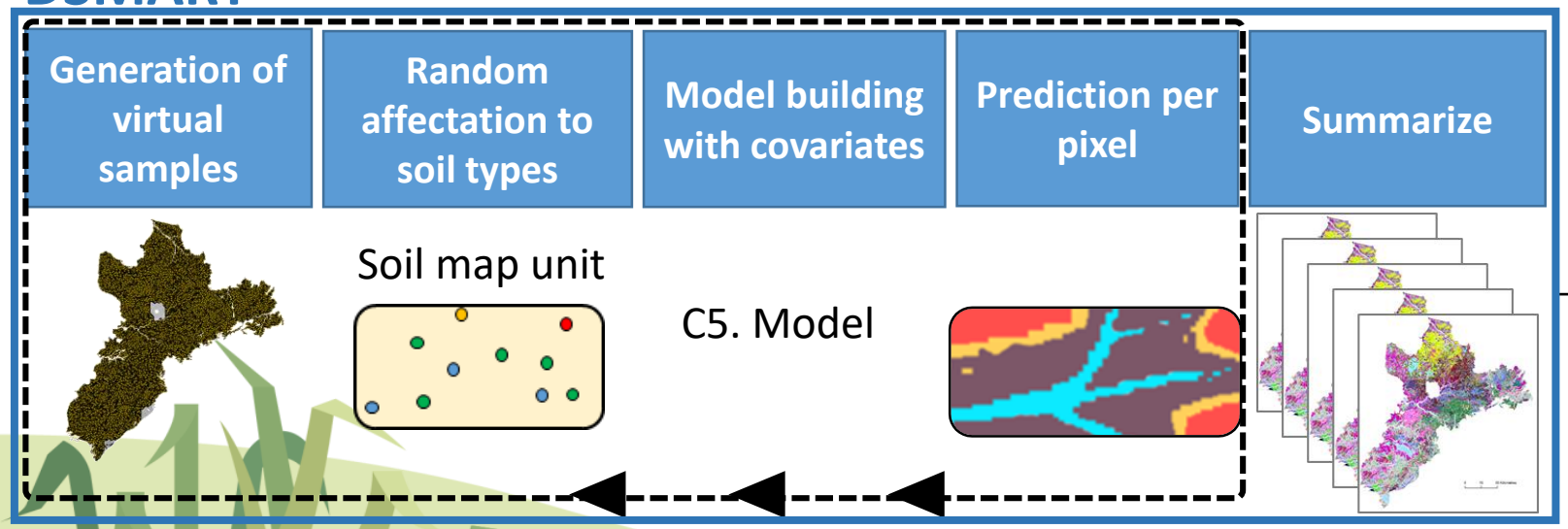
Composition of Soil Map Units

435 point observations

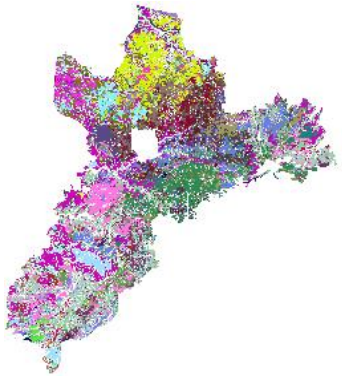


24 covariates

DSMART

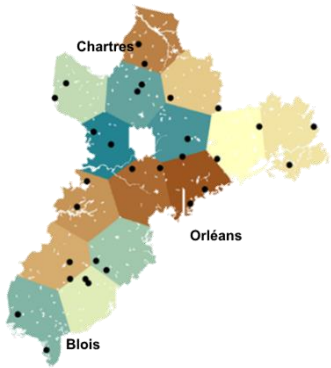


Output



Validation

30 points



Odgers et al., 2014

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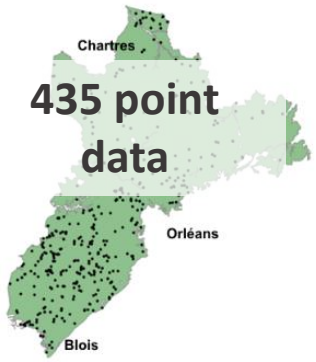
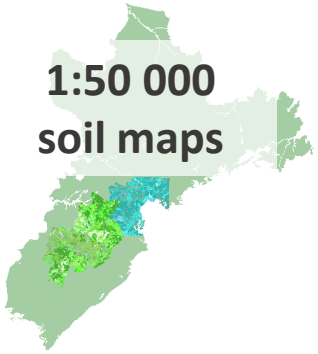
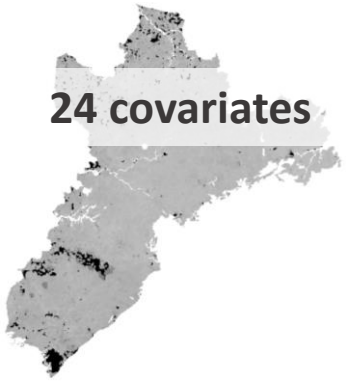
scorpan regression with Random Forest

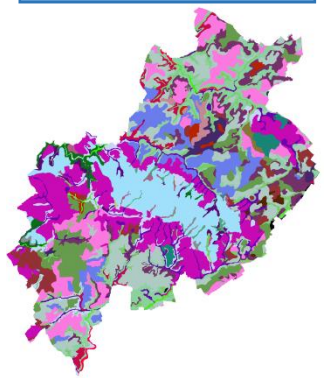
Input



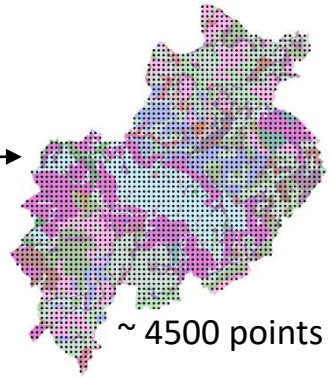




Precise soil map

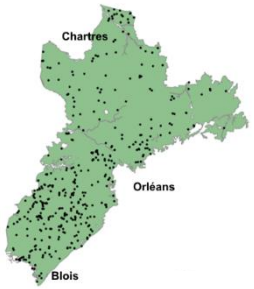


Systematic virtual sampling



~ 4500 points

Add real observations



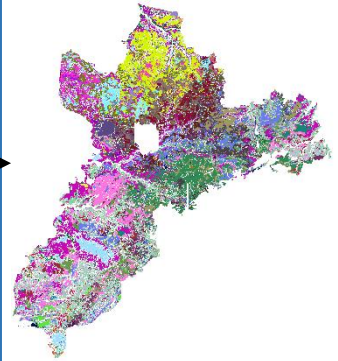
435 points

Model building with covariates

Random Forest

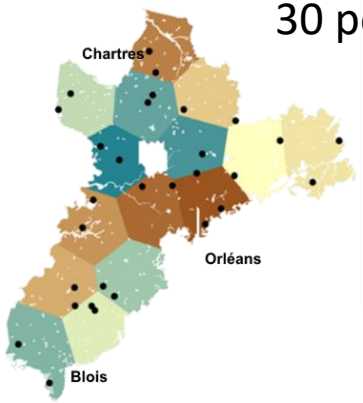
Output

Prediction



Validation

30 points



Collard et al., 2014

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Results

	Map of soil types	
	Purity (%)	**Conf.Int – 90%**
Dominant soil type map	33,33	[19,9 ; 46,8]
DSMART	33,33	[17,8 ; 48,8]
R.F.	26,67	[13,2 ; 40,1]

Validation with 30 points based on probability sampling

Conclusion : Take home message

DSMART	*scorpan* regression
Same performance than the original map	
The covariates did not capture soil spatial variability	
Intense computational load	Efficient computational load
Pedological context is a DSM challenge *new sensors ?*	
Implementation of soil / landscapes rules	New 50 000 map

Thank you for your attention