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# New evaluation criteria for digital soil mapping products from an user's point of view

Philippe Lagacherie & Léa Courteille

*LISAH, INRAE, Montpellier, France*

**INRAE**

**LISAH**



# Usual evaluations of soil mapping products

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- Purity of soil maps (*Beckett and Webster 1971, Marsman and de Gruijter, 1986* )
- Uncertainty measures of DSM products (*Heuvelink, 2014*)



Soil map producer oriented evaluations that imperfectly match the user's requirements

# User-oriented evaluation criteria

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- **Relevance:** the degree to which the map is related to the user's expectations
- **Integrity:** the quality of being honest
- **Intelligibility :** the quality of being possible to understand

# User-oriented evaluations of available mapping products in Languedoc-Roussillon (south of France)

## A conventional Soil map

Etude et Gestion des Sols, pages 67 - 82

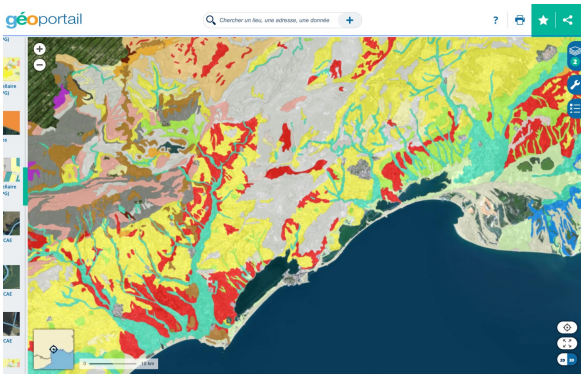
67

### Les banques régionales de données-sols

#### Exemple du Languedoc-Roussillon

M. Bonand\*, J.-P. Legros\*, C. Rouzet\*\*

\* INRA Science du Sol, Place Via a. 34060 Montpellier cedex 1  
\*\* GJT/LAR - Domaine de Lavèze, 34090 Montpellier



## A GlobalSoilMap product

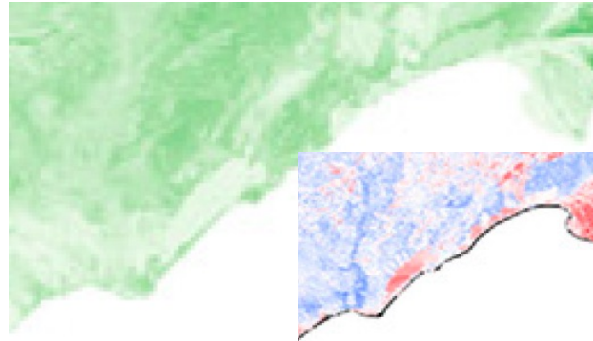


### Using quantile regression forest to estimate uncertainty of digital soil mapping products



Kévin Vaysse<sup>a,b</sup>, Philippe Lagacherie<sup>b,c\*</sup>

<sup>a</sup> SIC L-R, Maison de la FRM/direction, 500 rue Jean-François Breton, 34093 Montpellier Cedex 5, France  
<sup>b</sup> UMRI 1254H - INRA, 2 place Pierre Viala, 34060 Montpellier Cedex 1, France



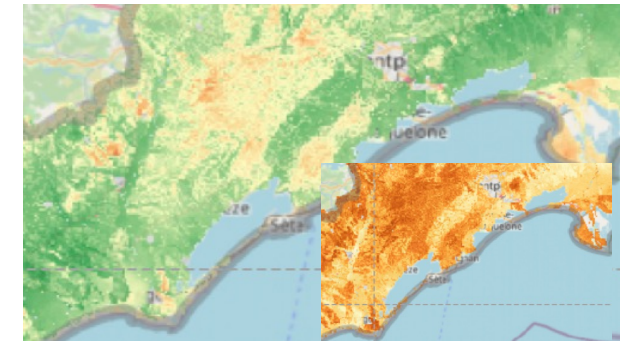
## A digital map of a soil quality index

ORIGINAL ARTICLE

Soil Science WILEY

### A multivariate approach for mapping a soil quality index and its uncertainty in southern France

M. E. Angelini<sup>1,2</sup> | G. B. M. Heuvelink<sup>3,4</sup> | P. Lagacherie<sup>2</sup>



1990

2015

2020

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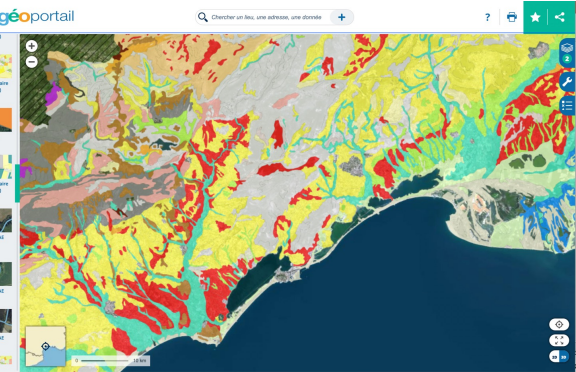
*Etude et Gestion des Sols*, pages 67 - 82

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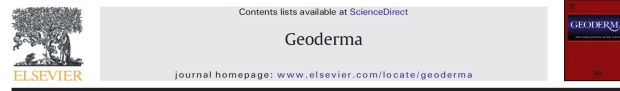
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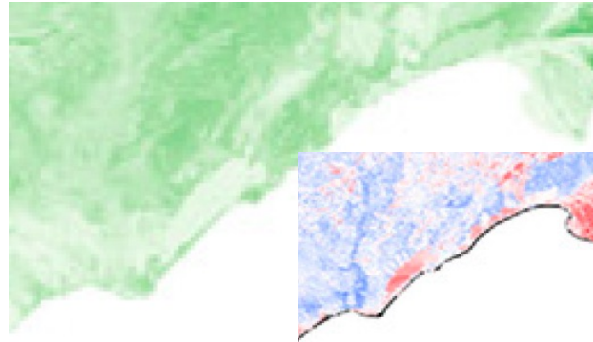
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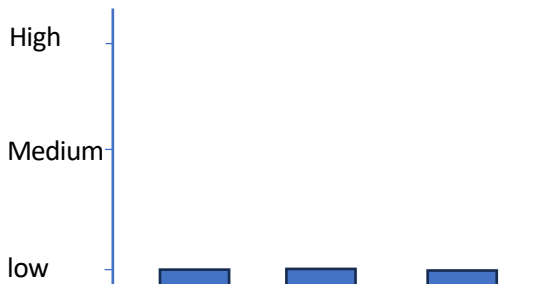
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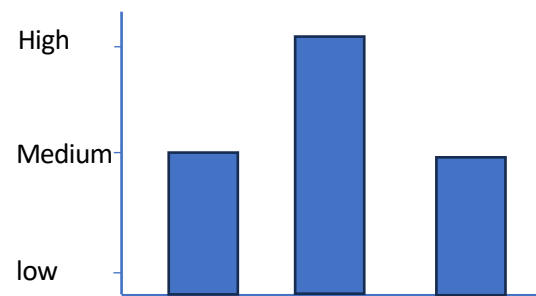


Relevance Integrity Intelligibility



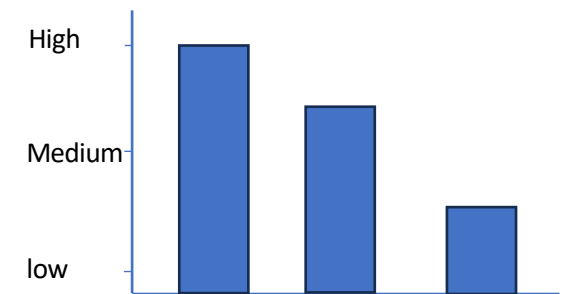
1990

Relevance Integrity Intelligibility



2015

Relevance Integrity Intelligibility



2020

# On the road to implementing user-oriented evaluation criteria

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## ■ Relevance

- Making progresses in Mapping soil functions and soil quality (Challenge 7)
- Extend DSM applications to new properties required by users (deep soil layers, biological properties etc ...)

## ■ Integrity

- Improve the mapping of uncertainties on soil property and soil function mapping

## ■ Intelligibility

- Searching more intuitive visualizations to communicate uncertainty (*next communication*)
- Increase the traceability of the mapping approaches
  - Develop tools for understanding machine learning predictions (challenge 3)
  - Develop dynamic users interfaces to communicate complex mapping contents
- Involve users in the mapping process through participative approaches
  - Soil data collection
  - Soil function assessments

# Conclusions

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- Evaluating DSM products is fine. Evaluating them from an user's point of view is even finer
- Relevance, integrity and intelligibility can be the three pillars of an user-oriented evaluation of DSM products
- Pedometricians have a lot to bring for increasing the user-perceived quality of DSM products
- Close collaboration with future users is mandatory (co-construction)