



Using hand-feel soil texture as a proxy for Digital Soil Mapping predictions of soil particle-size distribution

Anne C Richer-De-Forges, D. Arrouays, Songchao Chen, Román Dobarco, Zamir Libohova, Pierre Roudier, B. Minasny, Guillaume Martelet, Laura Poggio, Marine Lacoste, et al.

► To cite this version:

Anne C Richer-De-Forges, D. Arrouays, Songchao Chen, Román Dobarco, Zamir Libohova, et al.. Using hand-feel soil texture as a proxy for Digital Soil Mapping predictions of soil particle-size distribution. 22nd World Congress of Soil Science - Glasgow 2022, Jul 2022, Glasgow, United Kingdom. hal-03745895

HAL Id: hal-03745895

<https://hal.inrae.fr/hal-03745895>

Submitted on 4 Aug 2022

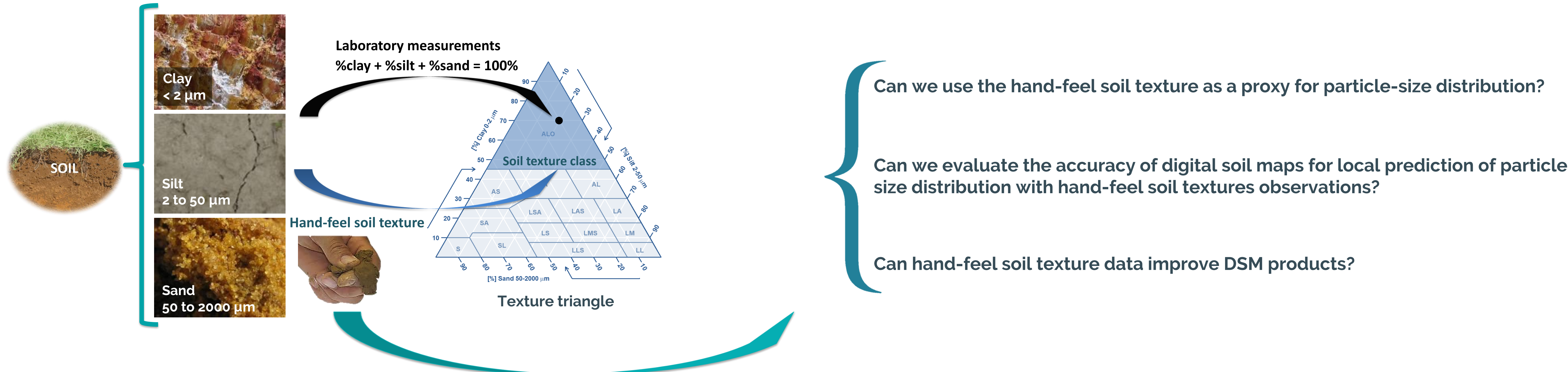
HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

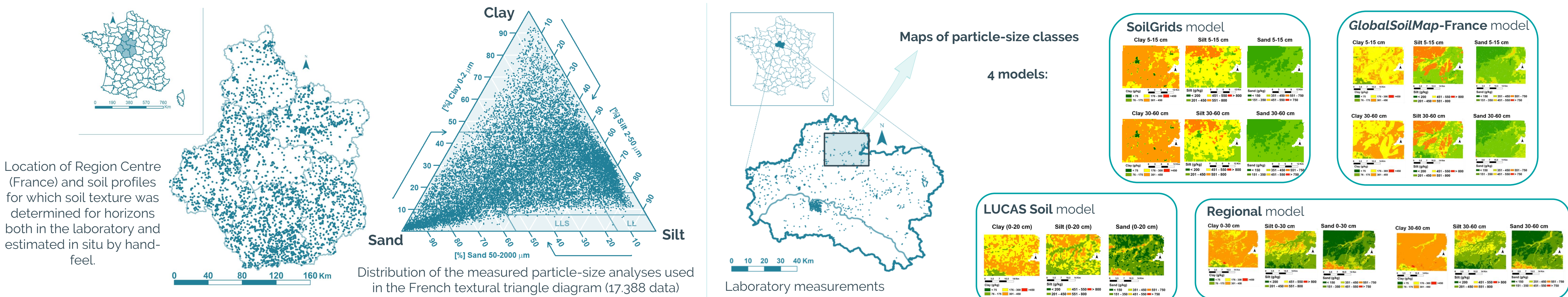
Using hand-feel soil texture as a proxy for Digital Soil Mapping predictions of soil particle-size distribution

Richer-de-Forges A.C.^{1,2}, Arrouays D.¹, Chen S.³, Román Dobarco M.^{4,5}, Libohova Z.⁶, Roudier P.⁷,
Minasny B.^{4,5}, Martelet G.⁸, Poggio L.⁹, Lacoste M.², Mulder V.L.¹⁰, Bourennane H.²

Introduction

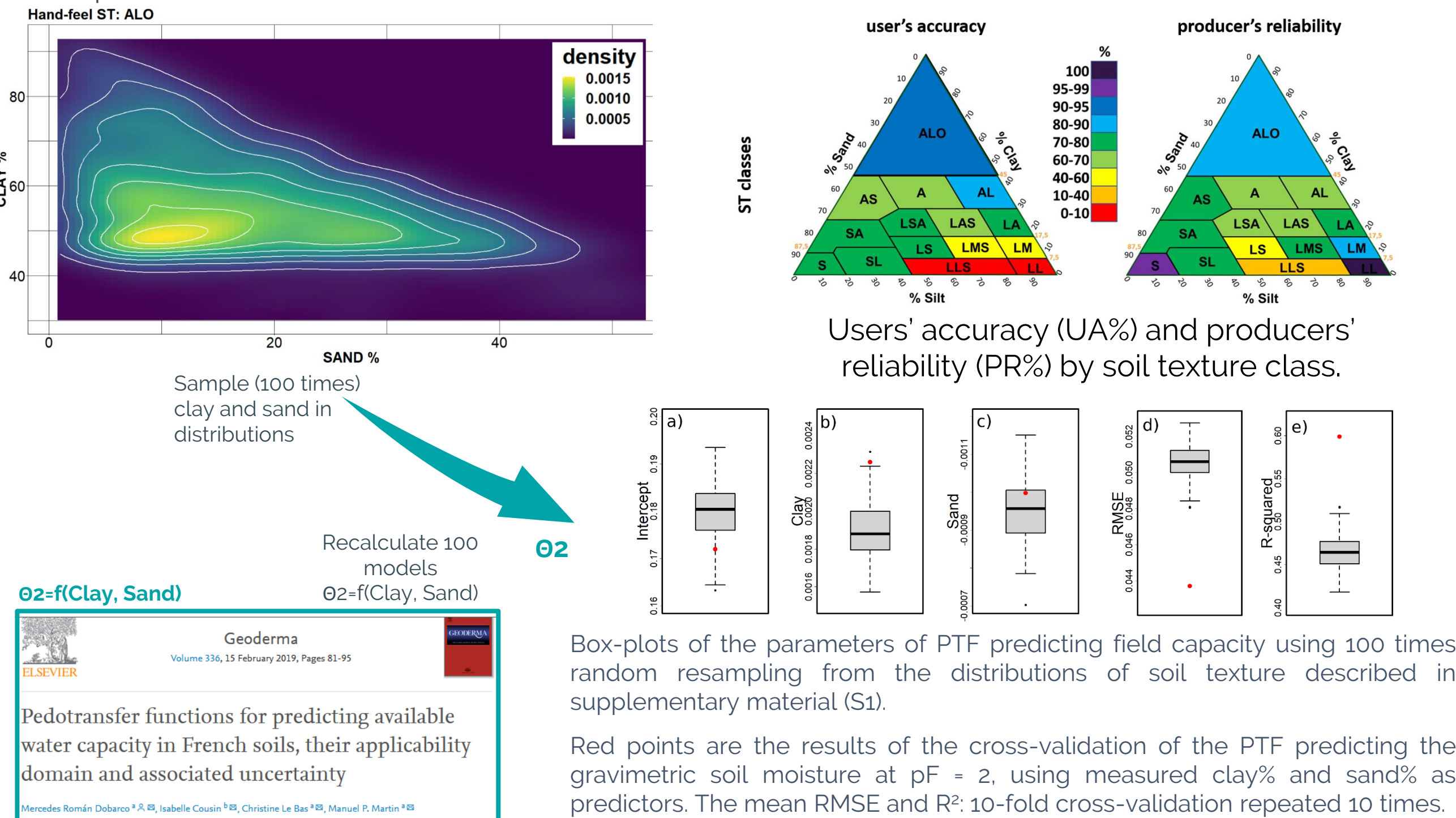


Material & methods

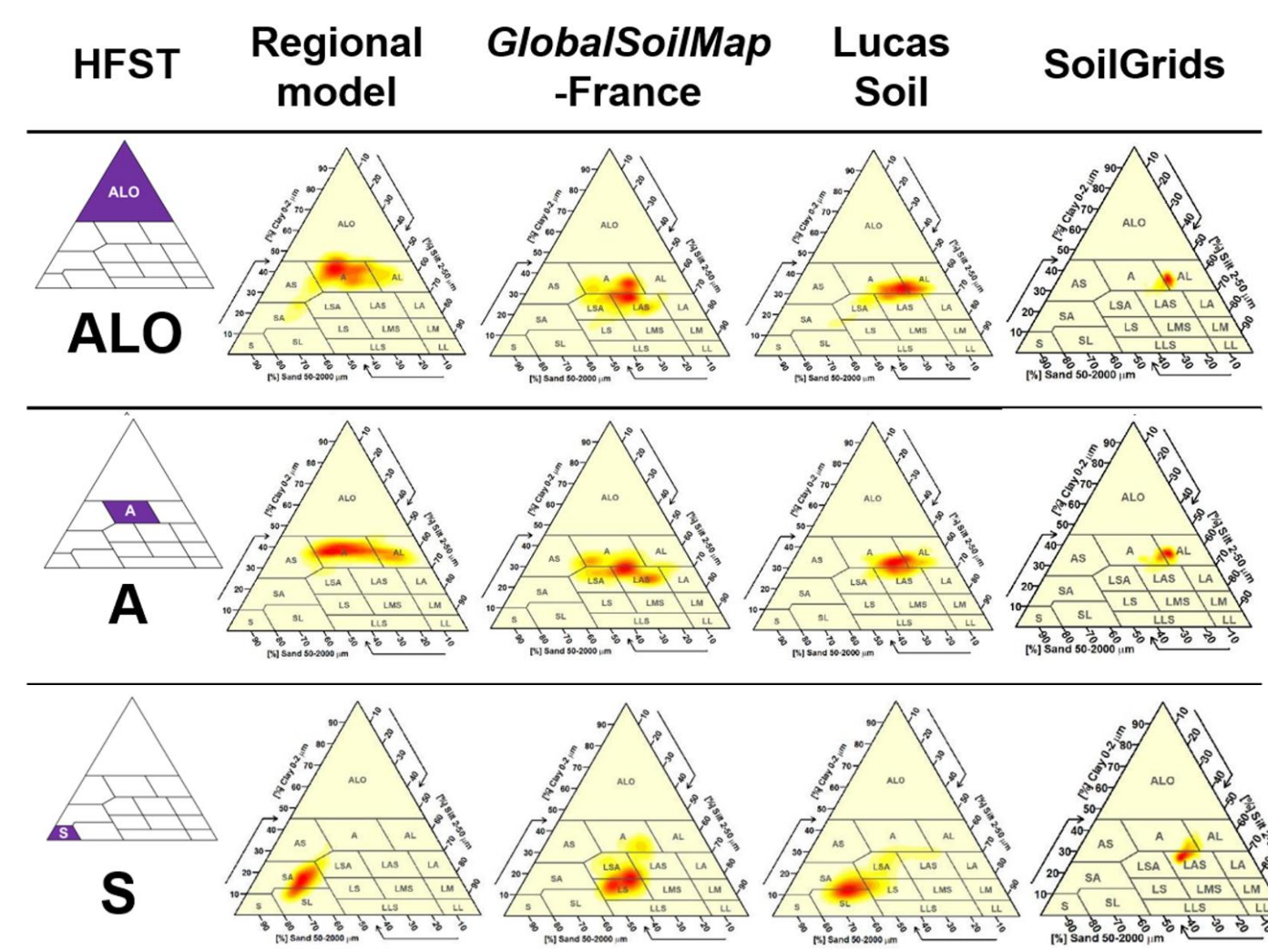


Results

Joint distributions of the LAST particle size distribution for each hand-feel soil texture class. Example for ALO class:

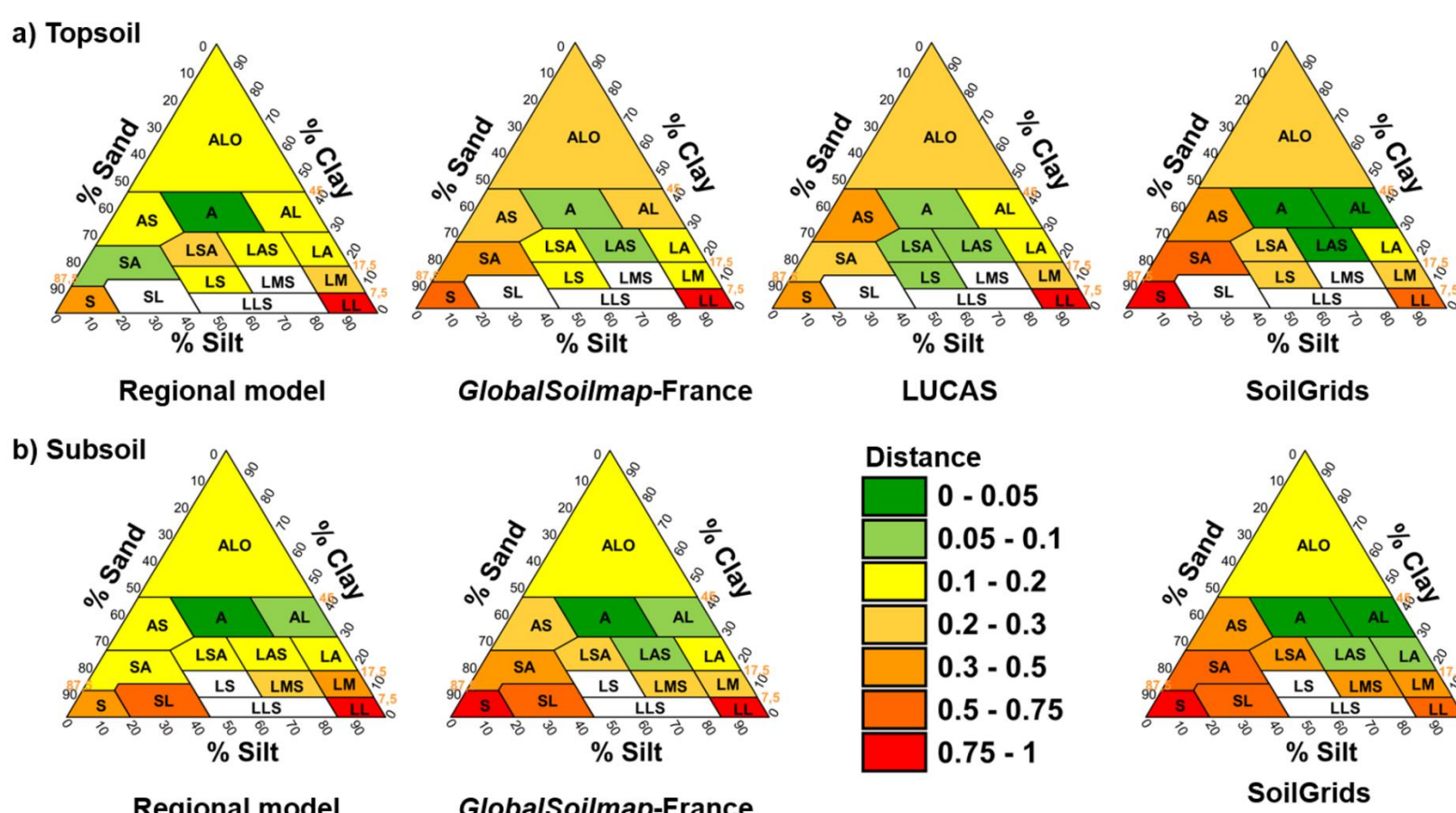


Richer-de-Forges A.C., Arrouays D., Chen S., Román Dobarco M., Libohova Z., Roudier P., Minasny B., Bourennane H. (2022). Hand-feel soil texture and particle-size distribution in central France. Relationships and implications. CATENA 106155. <https://doi.org/10.1016/j.catena.2022.106155>



Density of the predicted topsoil particle size distributions by the DSM models for each observed hand feel soil texture class on the Pithiviers 1:50,000 soil map. The classes with purple colour in the first column indicate the HFST classes.

To calculate the accuracy of the DSM product predictions for each texture class (from soil survey hand-feel soil texture observations), we calculated the normalized distance between predicted points and the closest boundary of their corresponding hand-feel soil texture:



Mean normalized shortest distance to each hand-feel soil texture (white is hand-feel soil texture = no data).

Richer-de-Forges A.C., Arrouays D., Poggio L., Chen S., Lacoste M., Budiman B., Libohova Z., Roudier P., Mulder V.L., Nédélec H., Martelet G., Lemerrier B., Lagacherie P., Bourennane H. (online 5 July 2022). Hand-feel soil texture observations to evaluate the accuracy of digital soil maps for local prediction of particle size distribution. A case study in central France. Pedosphere. <https://doi.org/10.1016/j.pedsph.2022.07.009>

Conclusion

- Hand-feel soil texture and particle-size distribution are compared using a large database
- The overall accuracy of hand-feel soil texture class allocation was 73%
- Most discrepancies were explained by very fine and coarse sand content
- Predicting soil water retention at pF2 using hand-feel texture gave satisfactory results
- Various digital soil mapping (DSM) products are evaluated for local use
- Numerous hand-feel soil texture data (HFST) are used for this purpose
- Low cost HSFT proved efficient to evaluate the accuracy of DSM products
- Simple and visual methods are proposed to achieve this goal
- Broader-scale DSM products were generally less reliable than local ones.
- Can hand-feel soil texture data improve DSM products?
- Work is still ongoing.

anne.richer-de-forges@inrae.fr

LE STUDIUM

Loire Valley Institute for Advanced Studies

GLADSOILMAP

This work (or part of this work) has been supported by LE STUDIUM Loire Valley Institute for Advanced Studies through its LE STUDIUM Research Consortium Programme

- INRAE, InfoSol Unit, 45075, Orléans, France
- INRAE, URSOLS, 45075, Orléans, France
- ZJU-Hangzhou Global Scientific and Technological Innovation Center, Hangzhou 311200, China
- The University Sydney, School Life & Environmental Sciences, Eveleigh, NSW 2015, Australia
- Sydney Institute of Agriculture, Eveleigh, NSW 2015, Australia
- US Department of Agriculture-Agricultural Research Service, Dale Bumpers Small Farms Research Center, AR, USA
- Manaaki Whenua -- Landcare Research, Private Bag 11052, Manawatu Mail Centre, Palmerston North 4442, New Zealand
- BRGM, Orléans, France
- ISRIC, Wageningen, The Netherlands
- Soil Geography and Landscape Group, Wageningen University, P.O. box 47 6700 AA, Wageningen, The Netherlands

INRAE

ISRIC
World Soil Information

WAGeningen
UNIVERSITY & RESEARCH

RÉPUBLIQUE
FRANÇAISE

Geosciences pour une Terre durable
brgm

USDA
United States
Department of
Agriculture

THE UNIVERSITY OF
SYDNEY

Manaaki Whenua
Landcare Research

浙江大学 杭州国际科创中心
ZJU-Hangzhou Global Scientific and Technological Innovation Center