A comparative Digital Soil Mapping (DSM) study using a non-supervised clustering analysis and an expert knowledge based model - A case study from Ahuachapán, El Salvador

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1 Introduction

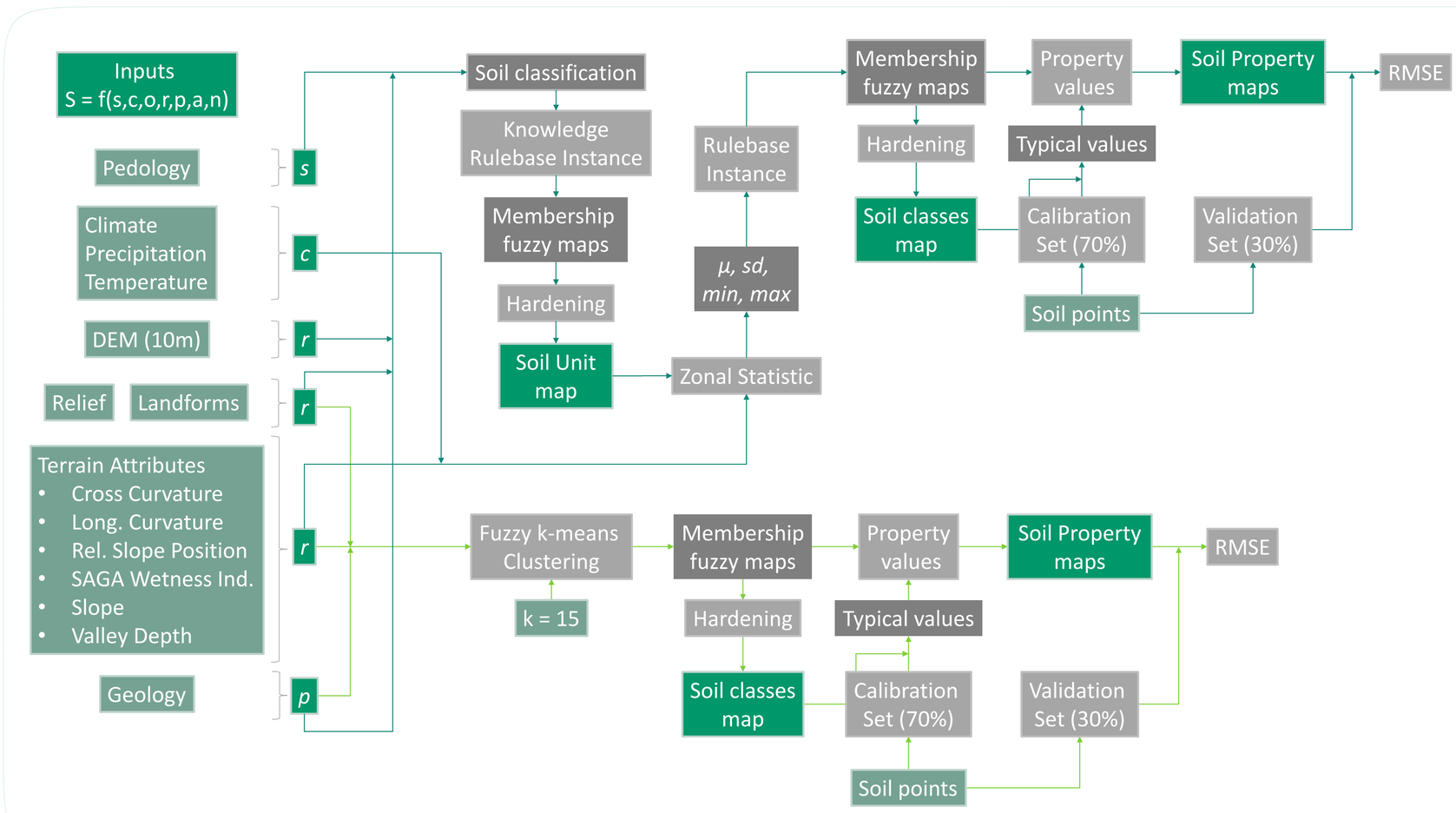
DSM is the inference of spatial and temporal soil property variations using mathematical models based on quantitative relationships between environmental information and soil measurements. The quality of DSM information depends on the method and environmental covariates used for its estimations. We compared two DSM methods to predict soil properties such as Organic Matter “MO” (%), Sand (%), Clay (%), pH (H2O), Phosphorus (mg/kg), Effective Cationic Exchange Capacity “CICE” (cmol/L), Potassium (cmol/L) and Water Holding Capacity (mm/m) for the department of Ahuachapán in El Salvador to support the activities of the Agriculture Landscape Restoration Initiative (ALRI) in the country.

2 Objectives

Image 1. Raíces project

- To compare two Digital Soil Mapping approaches for predicting soil properties.
- To identify advantages and disadvantages for each process.
- To create soil property maps for the execution of landscape restoration, water use efficiency, and fertility management activities in “Raíces-Ahuachapán” project.

3 Methodology



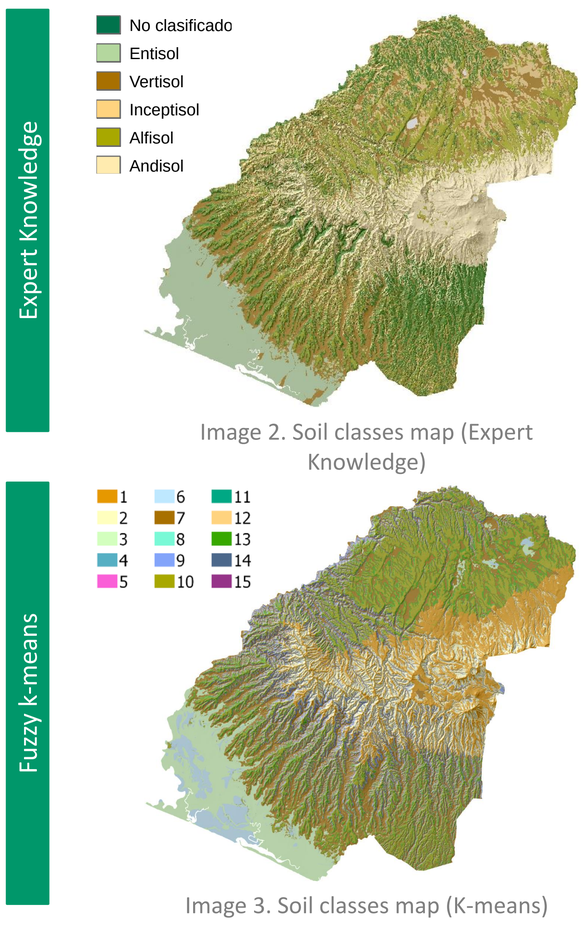


Image 2. Soil classes map (Expert Knowledge)

Image 3. Soil classes map (K-means)

S = f(s,c,o,r,p,a,n): where, S = soil classes (to be modeled), s = soil properties, c = climate, o = organisms or land cover, r = relief, p = parent material, a = age, n = spatial position (McBratney et al., 2003) - DEM: Digital Elevation Model - RMSE: Root Mean Square Error - k: Number of clusters

Results 4

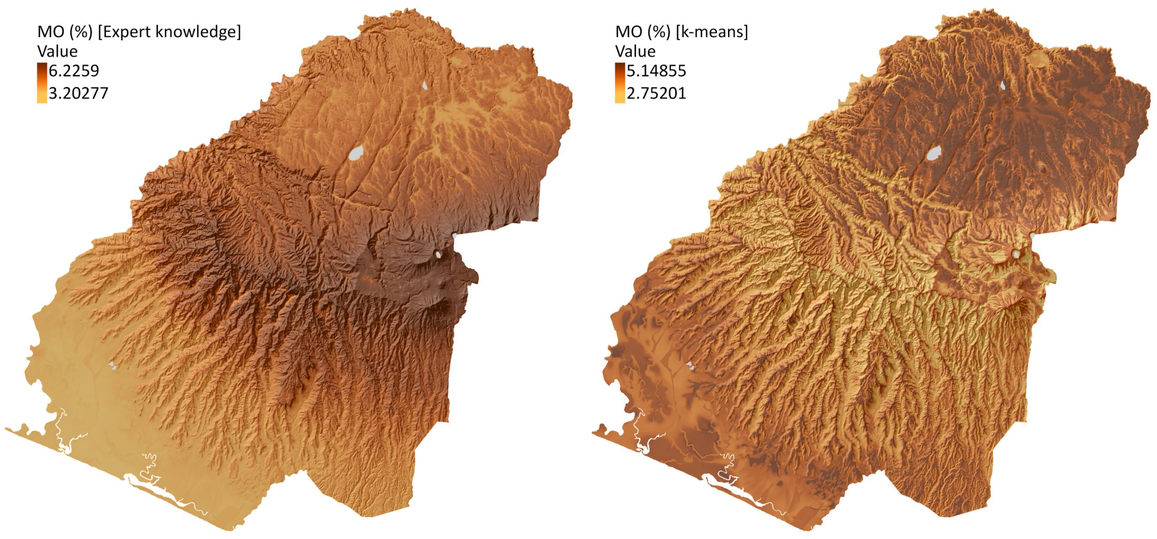
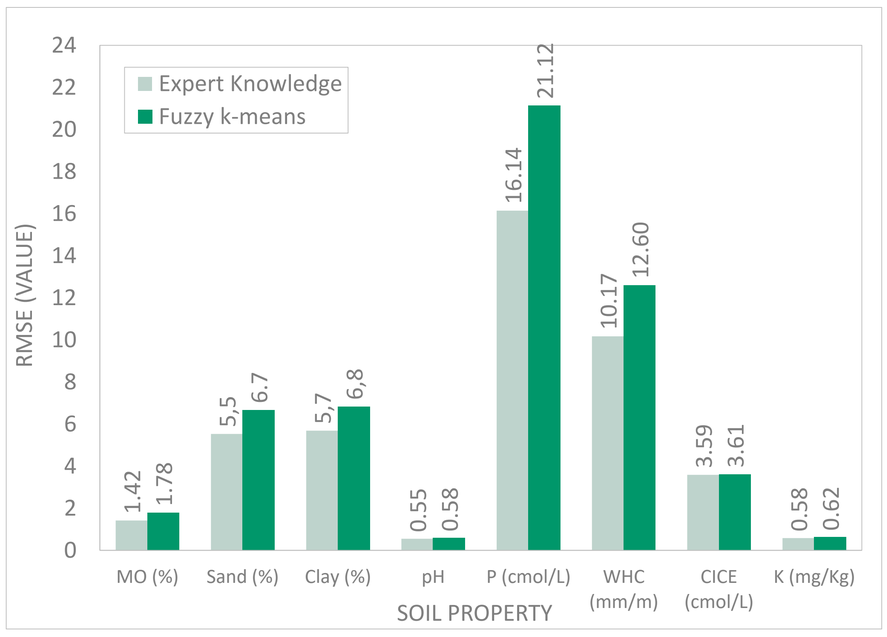


Image 3. MO(%) property map (Expert knowledge & K-means)



Graphic 1. RMSE comparison between different soil properties

5 Conclusions

Expert knowledge method provided a higher soil property prediction for all soil properties than the given by the fuzzy k-means clustering.

6 Acknowledgements

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