

Spatial distribution of ^{137}Cs in reference soil sites of South America to reconstruct soil erosion in intensive agricultural landscapes during the Anthropocene

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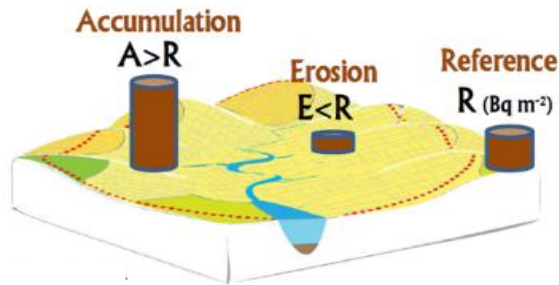
General background

Significant acceleration of **soil erosion** and degradation in **South America** since the **second half of the 20th century**



Related to the transformation in farming practices initiated in the 1960s

Measuring **soil inventories** of ^{137}Cs provide **retrospective information on soil redistribution** rates (1960-2020)



Main issues

- ▶ Information about the spatial distribution of ^{137}Cs in South America is scarce
- ▶ Further investigation is needed to determine the **potential for application** of this technique in this region of the world
- ▶ Rapid land use changes of the last recent decades : **appropriate reference soil sites are increasingly difficult to find** in intensive agricultural landscapes

Objectives

- (1) To reconstruct the spatial distribution of ^{137}Cs inventories in reference soil sites across South America
- (2) To map the initial ^{137}Cs fallout using regression-kriging to provide estimations at unsampled locations

1 Literature overview

Web of Science databases 23 journal articles
2 PhD manuscripts

101 ^{137}Cs inventories at reference soil sites have been compiled

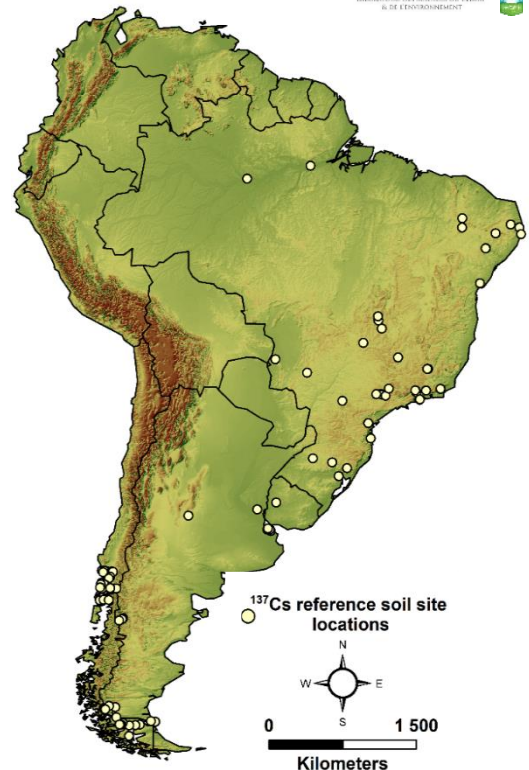
2 Relationships between ^{137}Cs inventories and spatialized co-variables

SoilGrids¹

A global soil information system containing spatial predictions for numerous soil properties at seven standard depths was used

3 Geostatistical approach to predict ^{137}Cs inventories in reference soil sites

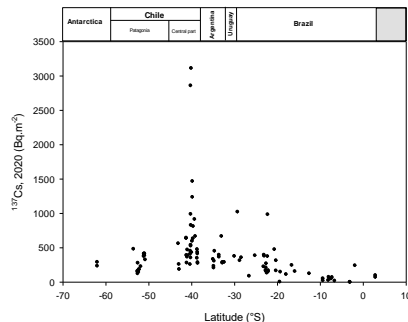
The use of Regression-Kriging through Rstudio



¹ Hengl, T., de Jesus, J.M., Heuvelink, G.B., Gonzalez, M.R., Kilibarda, M., Blagotić, A., Shanguan, W., Wright, M.N., Geng, X. and Bauer-Marschallinger, B., 2017. SoilGrids250m: Global gridded soil information based on machine learning. PLoS one, 12(2).

Preliminary results

^{137}Cs inventories in reference soil sites is **highly latitude-dependent** with a maximum in the 40-50° bands



Provide a free accessible map for the scientific community and public authorities to evaluate the sustainability of farming practices

Perspectives

- ▶ **Additional sampling** in countries where ^{137}Cs inventories in reference soil sites was not documented
- ▶ **Validation of the model** with additional measurements
- ▶ **Avoid the systematic sampling** of reference sites for conducting soil erosion studies using the ^{137}Cs technique

