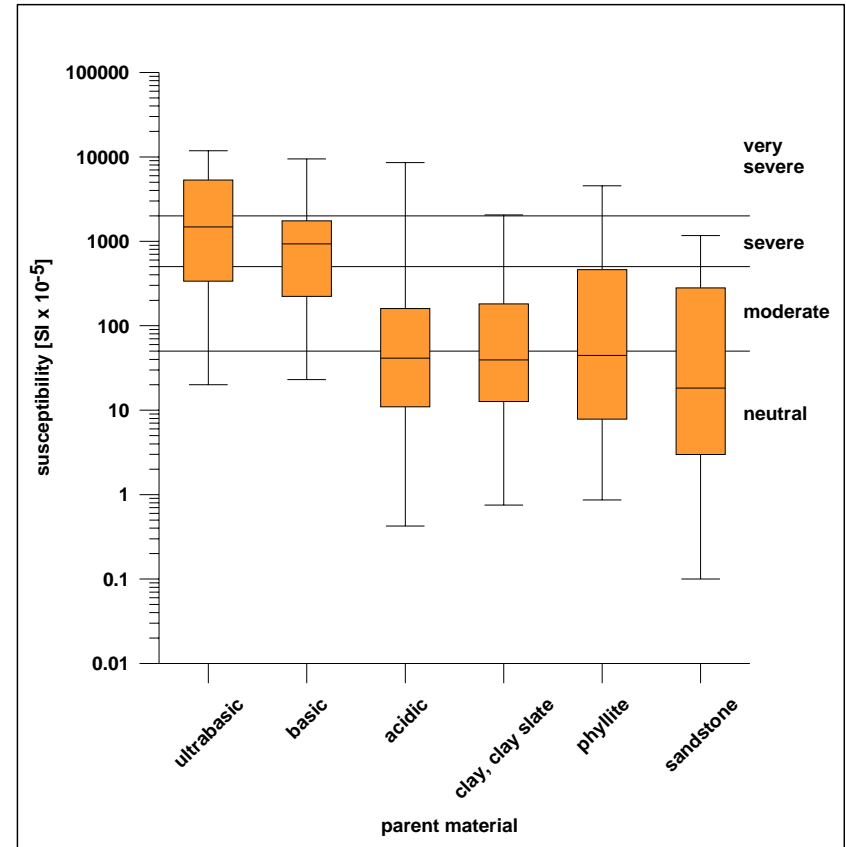


**Classification of soil magnetic susceptibility and  
prediction of metal detector performance  
- case study of Angola**

**H. Preetz & J. Igel**

**Leibniz Institute for Applied Geophysics , Hannover**

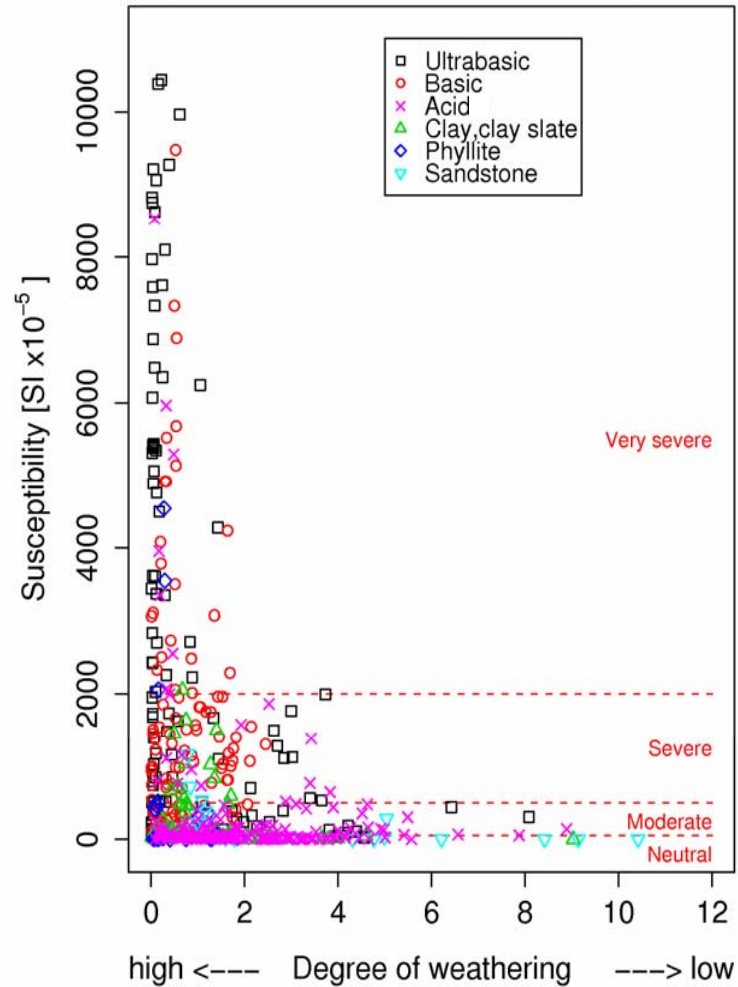
# Investigation of the magnetic susceptibility of tropical soils

























# Statistical analysis of susceptibility and chemical data of the soil samples

degree of weathering





$$\frac{\text{SiO}_2}{\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3}$$



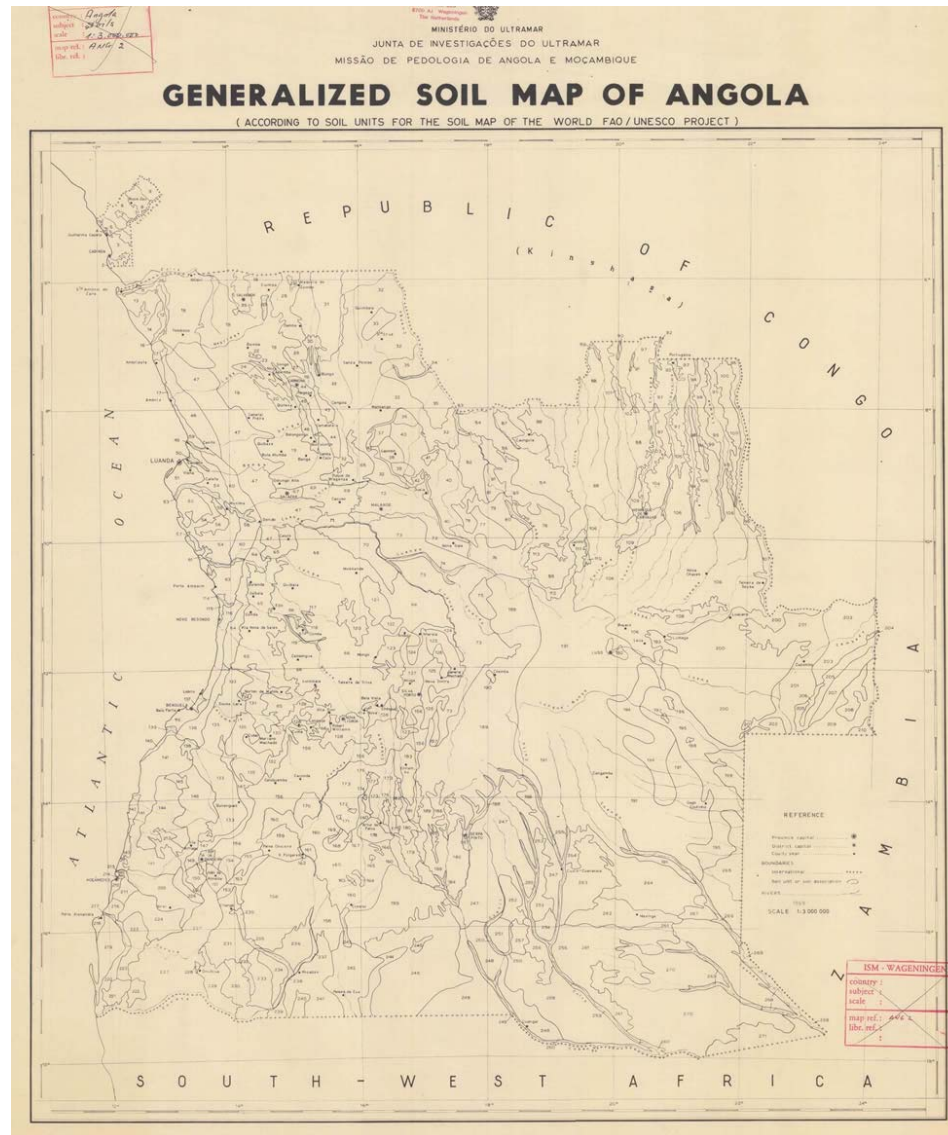
# Classification of the data set due to the performance of metal detectors

Parent Rock	Ignoring Weathering	Degree of Weathering		
		high	medium	low
ultrabasic				
basic/ intermediate				
acid				
Clay/ -slate				
Phyllite				
Sandstone				

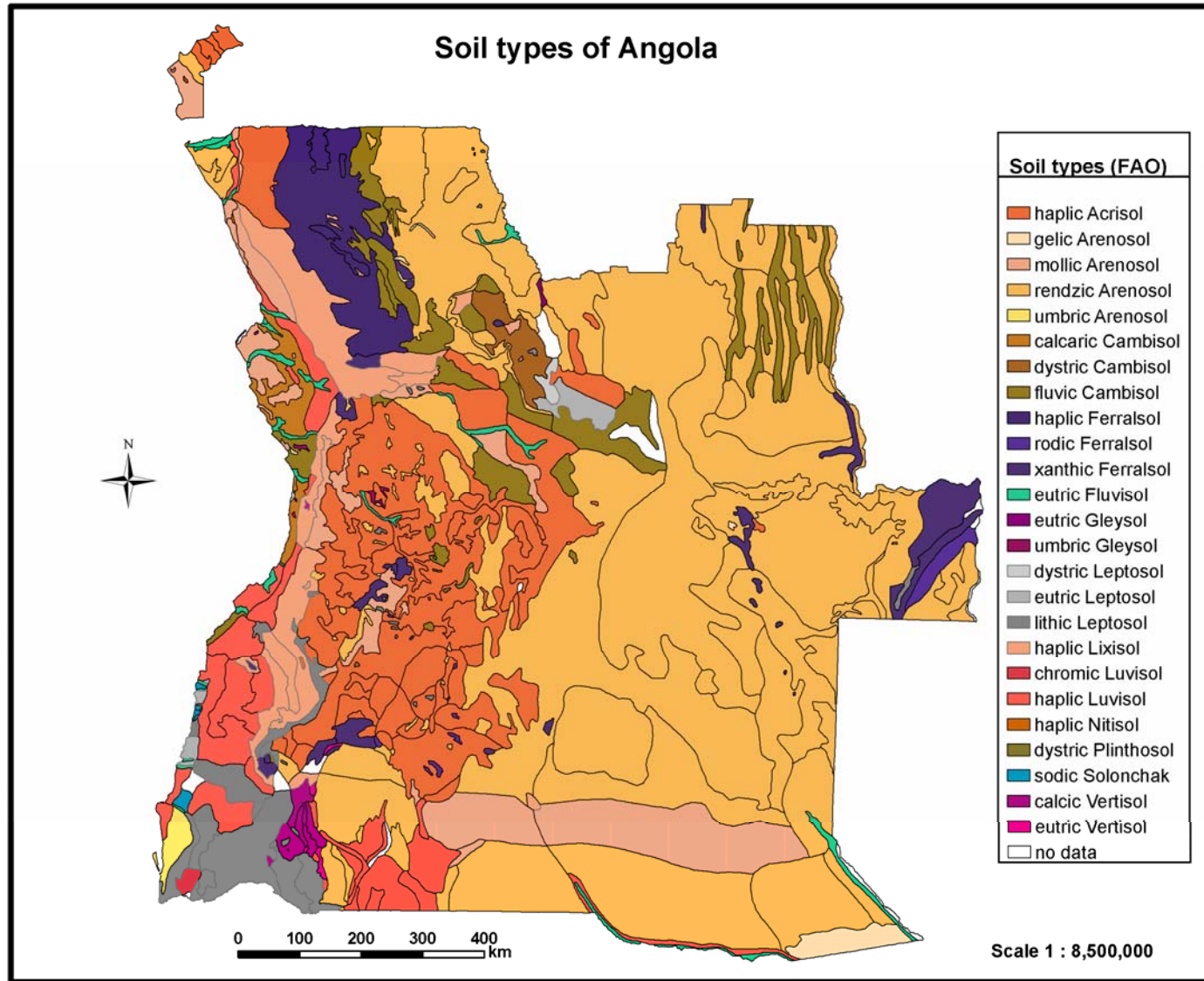
## Limitation of Metal Detector:

-  neutral (0 – 50 \* 10<sup>-5</sup> SI)
-  moderate (50 – 500)
-  severe (500 – 2000)
-  very severe (> 2000)







# Application of the system using the example of the soil map of Angola



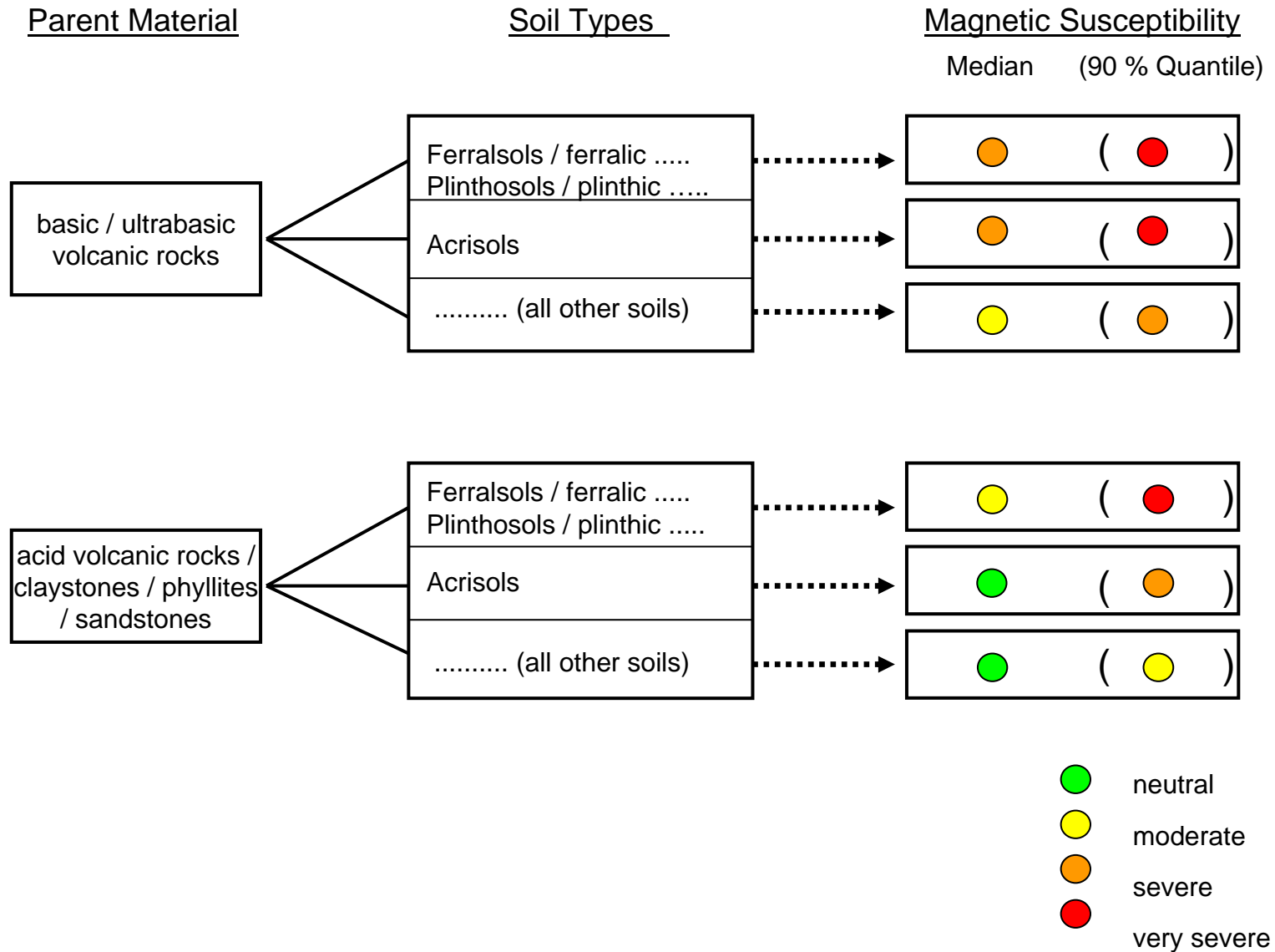
# Utilising the soil map of Angola by a geographical information system



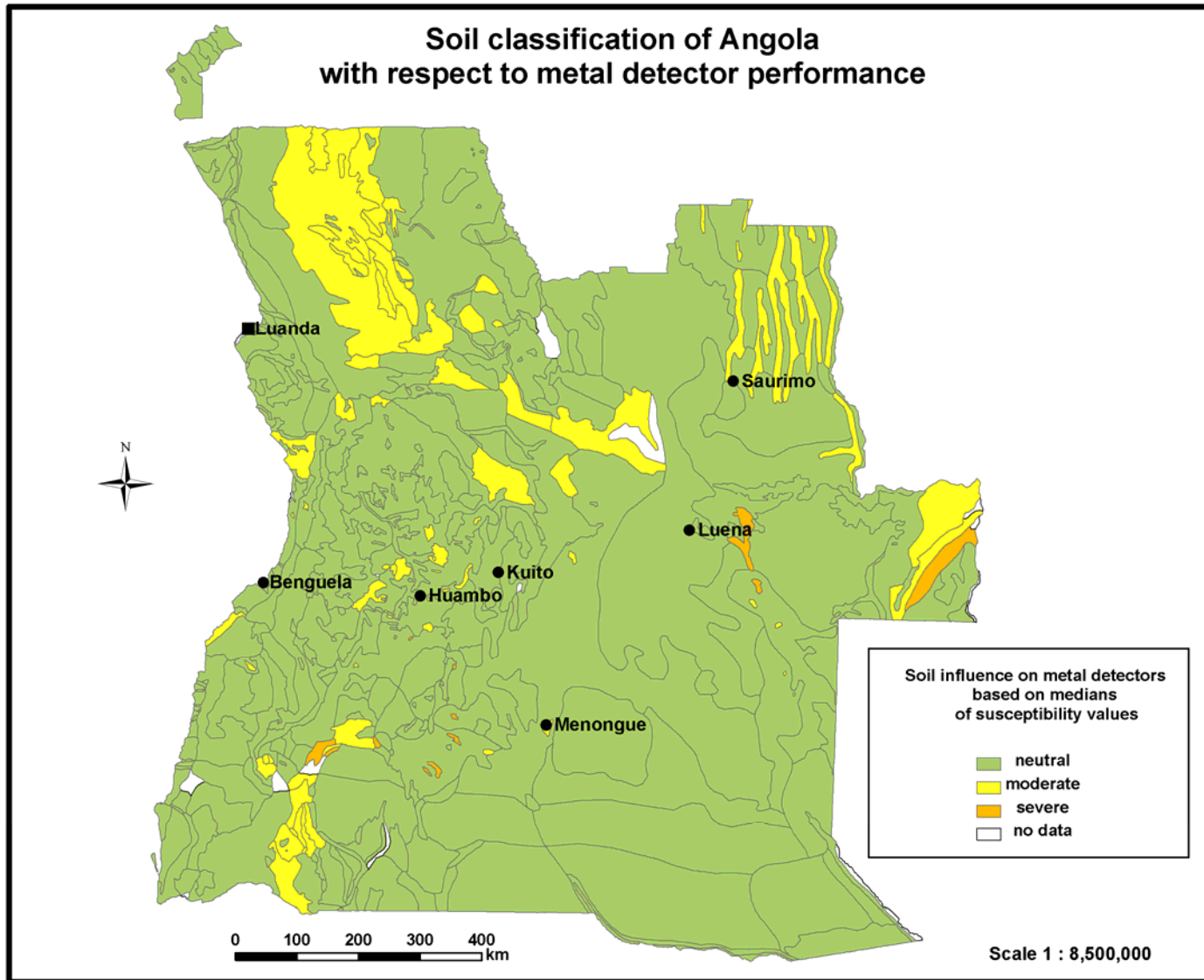
# Allocation of soil types of Angola to degrees of weathering

Degree of weathering (schematic)	Soil types according to FAO (1988), WRB (2006)	Soil map of Angola (Min. do Ultramar, 1965)	Degree of weathering according to Preetz et al. (2008)
	(all other soils)	.....	3 – 10 (low)
	Nitisols (NT)	slightly leached to leached soils (Lessivés)	3 – 10 (low)
	Lixisols (LX)	fersiallitic soils	3 – 10 (low)
	Acrisols (AC)	paraferalitic soils, slightly ferralitic soils	1 – 3 (moderate)
	Ferralsols (FR)	slightly ferralitic soils, typical ferralitic soils	0 – 1 (high)
	Plinthosols (PT)	soils with lateritic materials near the surface	0 – 1 (high)

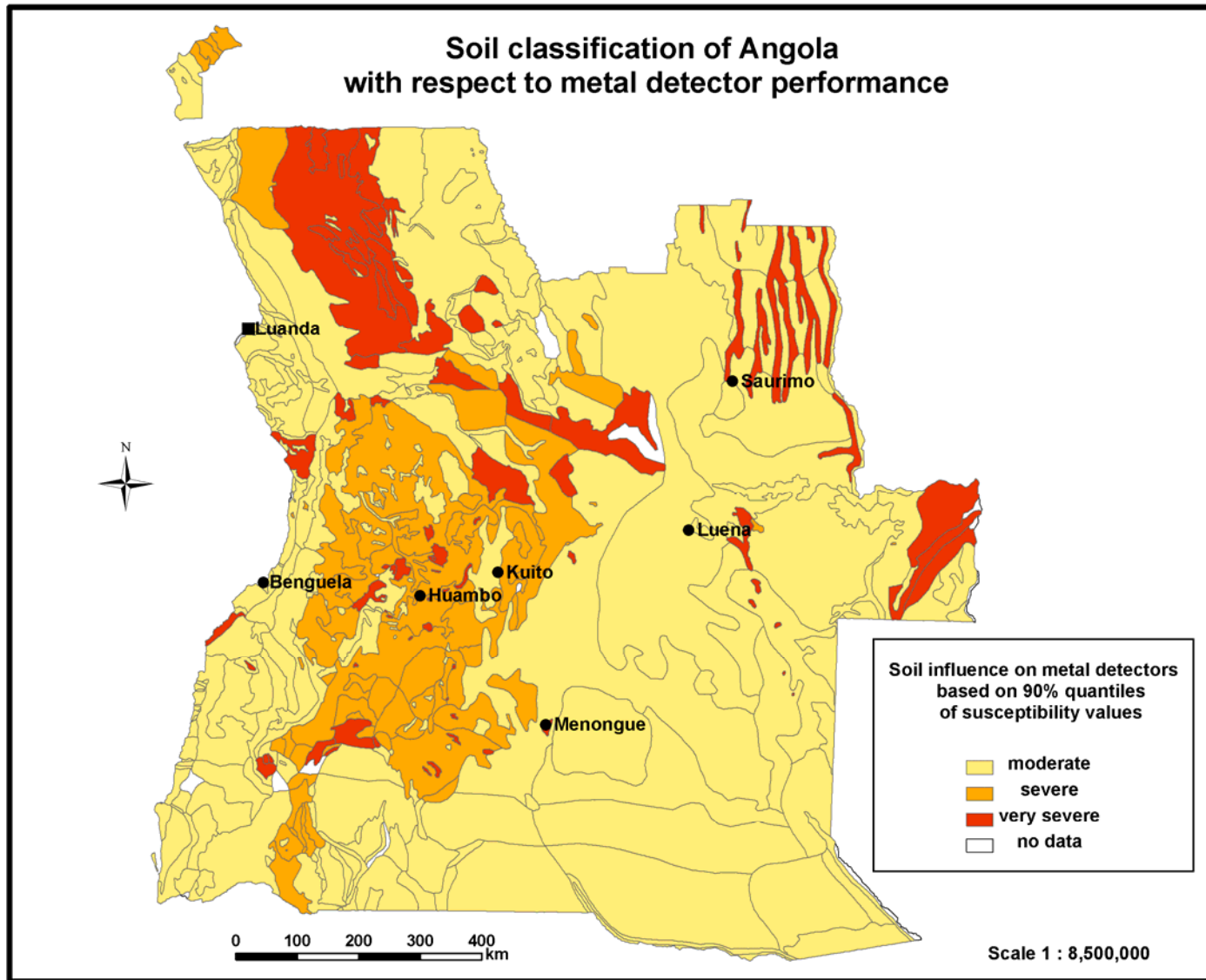
# Comprising allocation of parent material and soil types to susceptibility classes



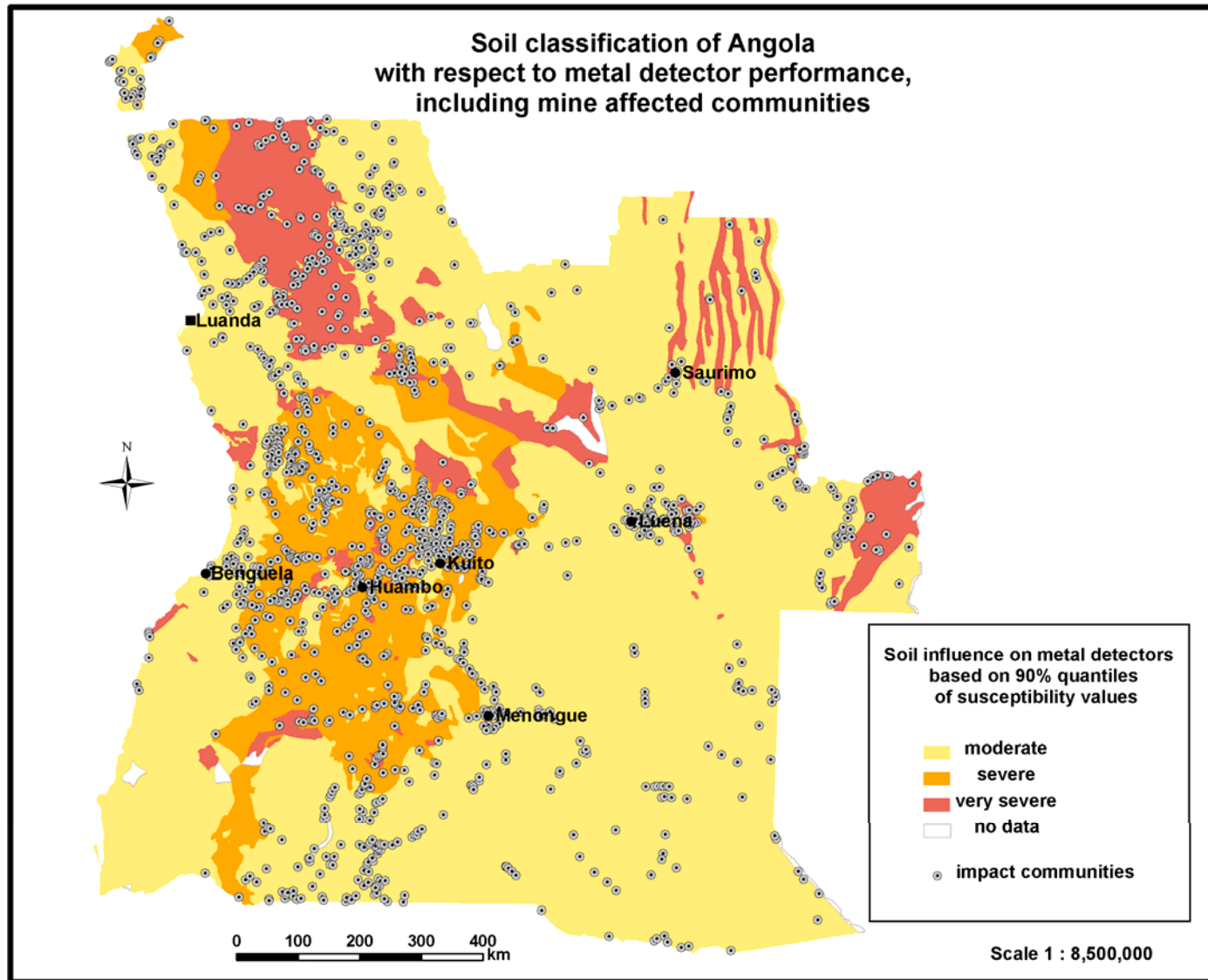
# Predicted soil magnetic susceptibilities based on the medians



# Predicted soil magnetic susceptibilities based on the 90 % quantiles

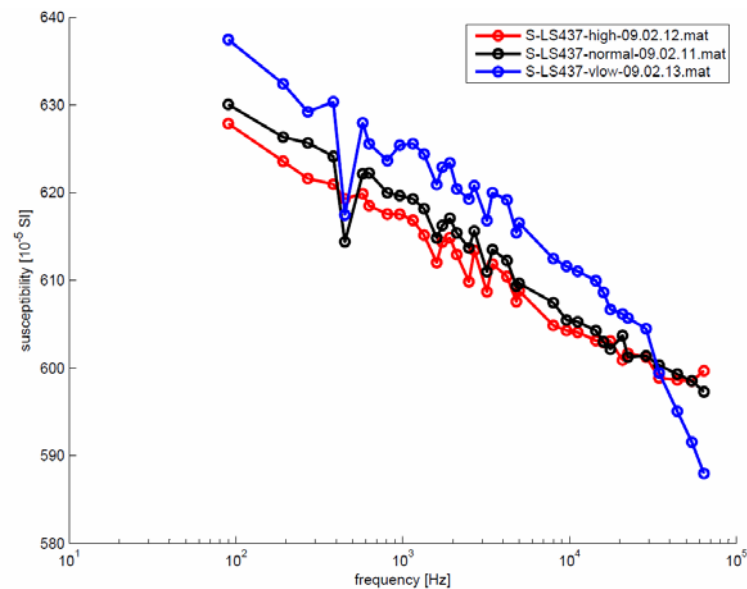
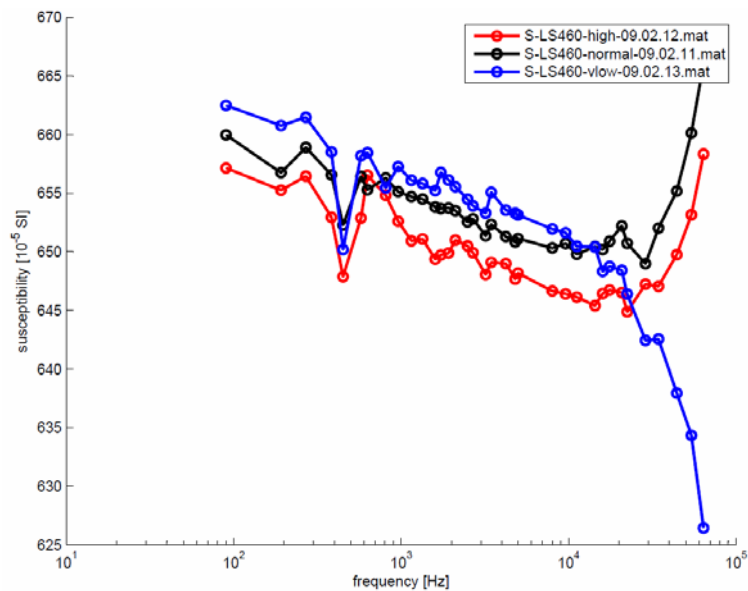


# Predicted soil magnetic susceptibilities including mine affected communities



# Outlook 1: Investigation of susceptibilities over a wide frequency range

## Collaboration with Yoga Das, DRDC Suffield



## Outlook 2: Long-term test of soil influence on GPR performance

### Collaboration with Prof. Sato, Tohoku University

