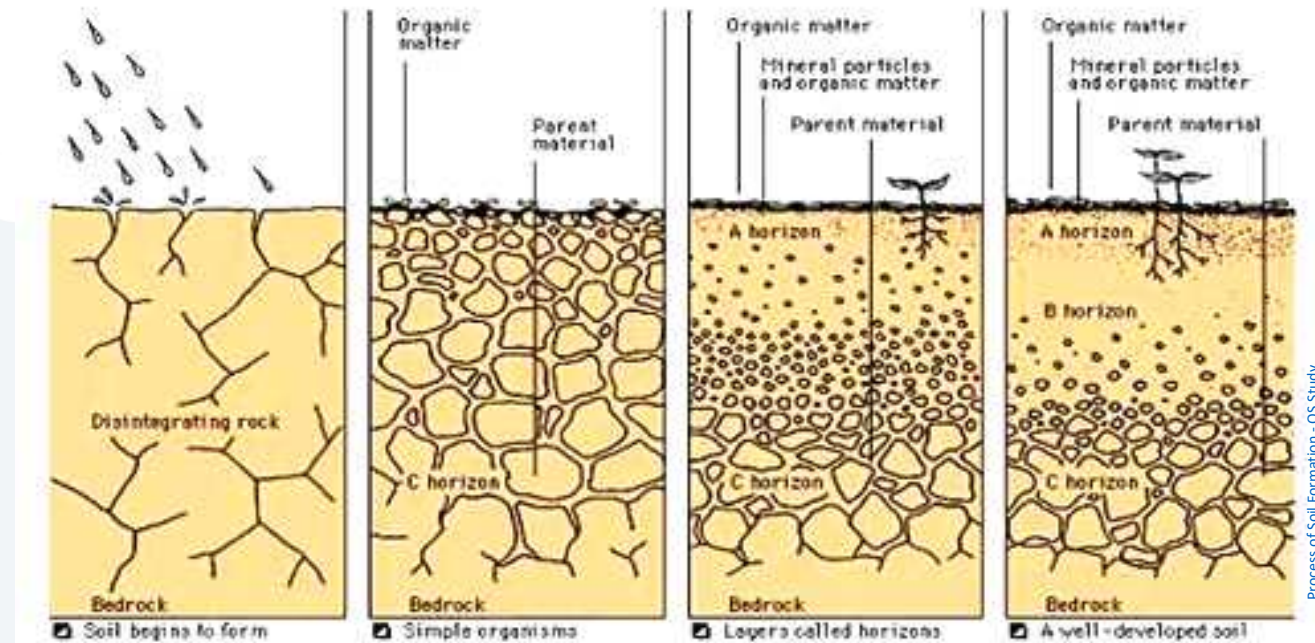






# INTRODUCTION

Fertilizing the land with the same land can represent a viable and easy implementation option for small and medium agricultural producers.



# INTRODUCTION

The technique known as *rochagem*, *stonemeal*, *rocks of crops* consist of the addition of rock powder as a way of increasing soil fertility conditions, considering rocks as natural sources of a series of macronutrients and micronutrients.



- Use of mineral waste
- Reduced use of high-cost fertilizers
- CO<sub>2</sub> capture due weathering of silicate minerals
- Reduction of leaching losses
- Improvement of the fertility of degraded soils

# PROBLEM STATEMENT

In this presentation, preliminary studies on the potential use of basalt rock powder residue from agate and amethyst mining in Uruguay as a source of agrominerals are presented.

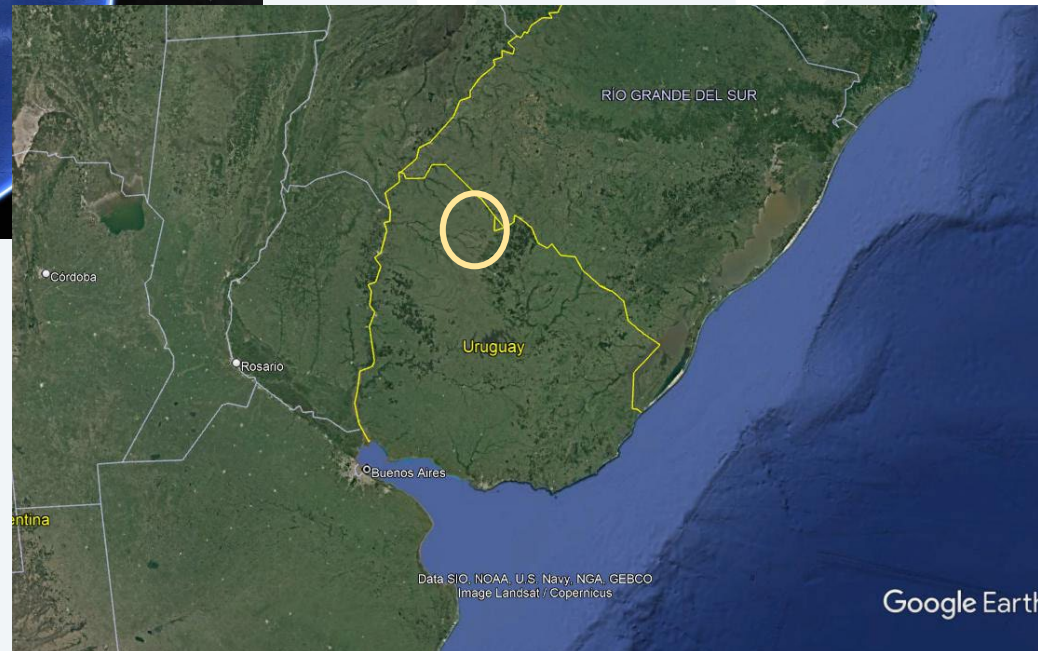
The rocky material must be previously evaluated before being considered as a possible agromineral for the rochagem technique. The geochemical analysis of the residues obtained from the mining activity is the first step for this evaluation.



# LOCATION AND GEOLOGY OF THE STUDY AREA



The study area is located in the north of Uruguay, near the border with Brazil. Inside a quarry of exploitation of agates and amethysts

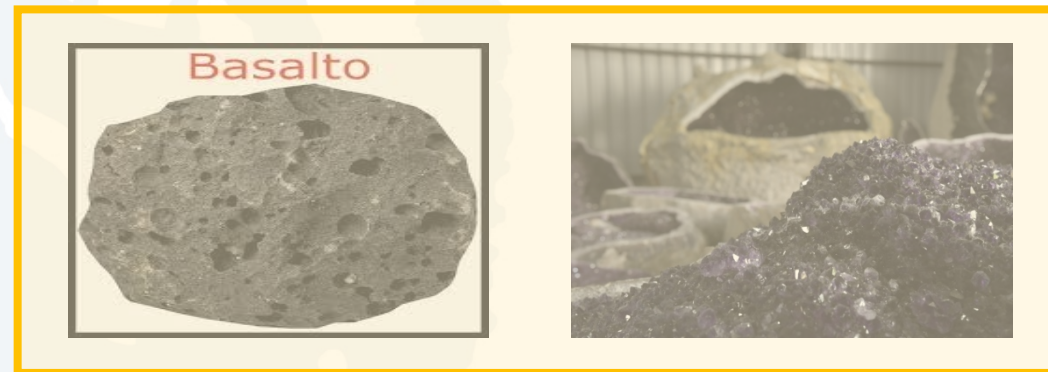


# LOCATION AND GEOLOGY OF THE STUDY AREA



The lithology is defined by a succession of basaltic spills, among which sheets and barjanes (half-moon dune) of aeolian sands, currently silicified, were deposited.

The most characteristic rocks are massive, fine-grained, dark-colored basalts.





# SAMPLING

For this work, three dump areas were surveyed with a total of 10 samples:

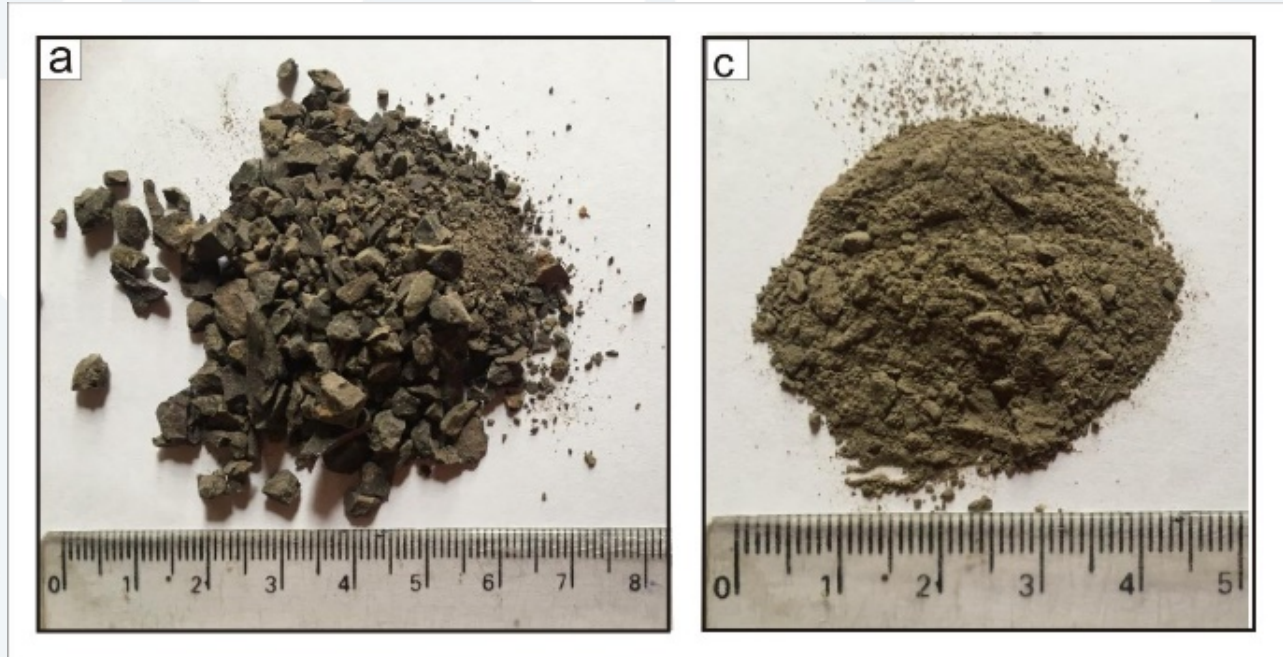
Dump 1 (E1): It is located in the surroundings of the quarry where the piles of oldest material, characterized by being heterogeneous in size.

Dump 2 (E2): Material composed mainly of vacuolar basalt levels, less degree of alteration than the material sampled in the E1 piles, but also easily shelled.

Dump 3 (E3): Represent the piles of material recently removed from the mineralized basalt level.



# SAMPLE TREATMENT



The analytical techniques used were X-Ray Fluorescence to determine the percentage by weight of the oxides present; and Inductively Coupled Plasma Source Emission Spectrometry (ICP – OES), to determine the chemical composition of elements in ppm.



# RESULTS and DISCUSSION

Percentage by weight of the oxides present in the samples of basalt:

SAMPLE	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O	TiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>
	- % -									
E1 mean (n=4)	50.02	13.36	14.12	0.261	2.12	4.98	2.23	1.12	1.92	0.24
E2	46.89	17.77	14.44	0.169	2.23	1.81	0.58	1.57	1.62	0.12
E3a mean (n=3)	47.74	13.85	13.76	0.113	3.24	5.29	1.98	1.01	2.05	0.27
E3b mean (n=2)	49.41	13.11	14.41	0.15	2.81	4.90	1.99	1.59	1.96	0.24

# RESULTS and DISCUSSION

Concentration of some trace elements in the samples of basalt:

SAMPLE	Mn	Li	As	V	Cr	Ni	Cu	Zn	Pb	Ba
	- ppm -									
E1 mean (n=4)	2008	28.28	< 3	207.75	38.75	11.25	95	136	15	546
E2	1360	27	< 3	398	83	64	137	88	7	834
E3a mean (n=3)	886	65.3	3.99	283	11	11.66	132.33	295.33	13.66	351.66
E3b mean (n=2)	1150	50	< 3	282	16.5	12.5	103.5	195	13.5	2



# CONCLUSIONS

- The basalts analyzed for this study show favorable results to be considered as a source of macro and micronutrients for the soil, mainly: Ca, Mg, Si, Fe, Na, Mn, K, P, Cu and Zn.
- More geochemical studies are needed in addition to agronomic tests and evaluation of its economic feasibility to confirm the viability of developing this technology (stonemeal).
- The use of mining waste as agrominerals (fertilizers) is considered an alternative for better disposal and use of rocky waste generated by the mine.
- The concept of circular economy would be applied very well to the proposal to produce agrominerals from the discarded material from the extraction of agates and amethyst in Uruguay.

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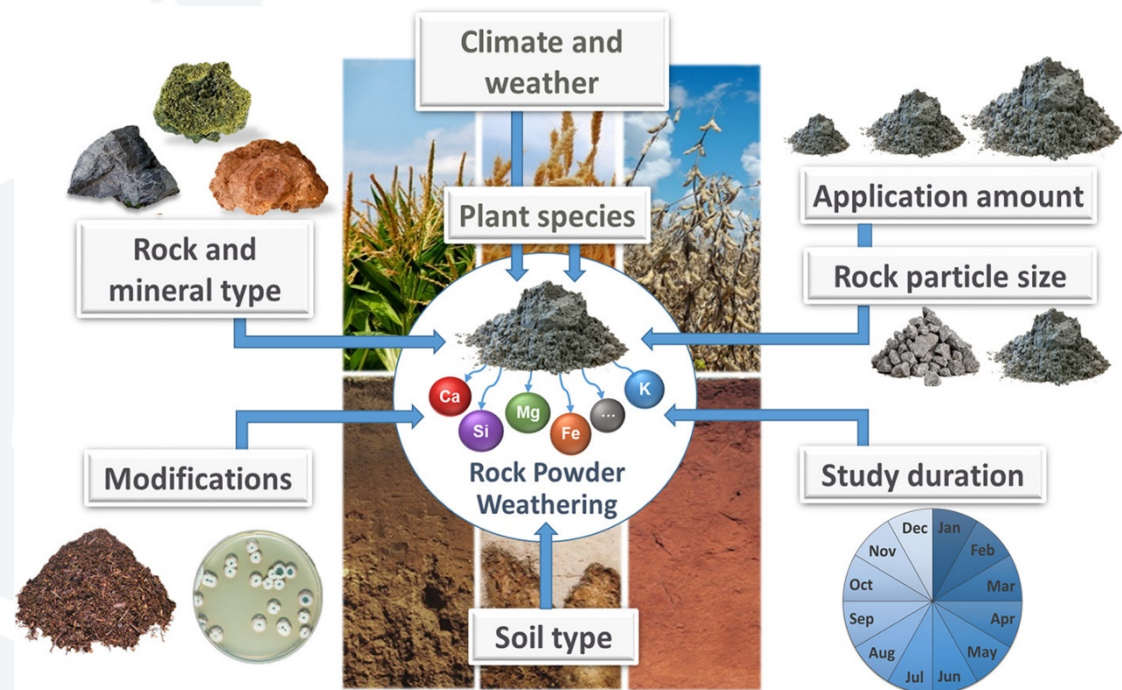
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<https://doi.org/10.1016/j.scitotenv.2021.150976>

**Global Symposium on Soils for Nutrition | 26-29 July 2022**







Thank you !

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