RIO18 21st World Congress of Soil Science
21 WORLD CONGRESS OF SOIL SCIENCE
Sunday 12 – Friday 17 August 2018
Rio de Janeiro, Brazil
Rio de Janeiro August | 12 - 17

Neoformation of soil aggregates after a volcano eruption in meadows of Northern Patagonia, Argentina.

Enriquez, Andrea Soledad[1]; Cremona, María Victoria[2]; Peri, Pablo Luis[3]; Six, Johan[4]

CONICET; EEA INTA Bariloche, modesta Victoria 4450, Bariloche, 8400 (enriquez.andrea@inta.gob.ar)[1]; EEA INTA Bariloche[2]; EEA INTA Santa Cruz – UNPA[3]; ETH, Zürich[4]

In June 2011, a natural event occurred in Patagonia, Argentina: The “Puyehue-Cordón Caulle” volcanic complex erupted, and particles from tephras (1-5cm) to very fine volcanic ash (44-500?m) where deposited in the direction of prevailing winds (West to East). The ash was biologically inert, with no organic compounds, neutral pH and low electrical conductivity. The objective was to study neoformation processes of soil aggregates in wet meadows after volcano eruption. For this, five years after the volcano event, we collected 6 soil samples to a depth of 0-5cm (the depth under influence of ash deposition in Northern Patagonia) in 3 wet meadows (acuic mollisols) under different grassland conditions (good and poor) due to different long-term grazing pressures. In the laboratory, soil samples were separated into different aggregate-size classes by wet sieving: large macroaggregates (LM: > 2000µm); small macroagregates (SM: 250–2000µm); microagregates (micro: 53–250µm); silt+clay (s+c: < 53µm). The macroaggregates-M were separated into coarse POM (c-POM: > 250µm), microaggregates in M (microM: 53-250µm) and silt + clay in M (s+cM: < 53µm). Total carbon-C and nitrogen-N were determined in each fraction with a LECO. Five years after the eruption, the C content in the first 5cm soil layer was 52% lower than before. Ash texture was 59% silt, 3% clay, and 34% sand. The proportion of classes derived from the whole dry soil basis from good meadows accounted for 25%-LM+SM, 45%-micro, and 29%-s+c; classes derived from macroaggregates accounted for 31%-c-POM, 32%-microM, 37-s+cM. No differences between grassland conditions were found in the aggregate proportion; overall, C and N content of the aggregates was significantly higher (ANOVA, $p< 0.05$) in good conditions than in poor ones. We believe that a sequence of neoformation of aggregates is occurring. Aggregates different from micro and s+c (dominant ash granulometry) will develop after different processes, where time, organic matter and biological activity interact. Macroaggregation is low, but with a high C and N content; small macroaggregates predominate that fraction. In contrast, micros and s+c particles are dominant but with small C and N content. On the other hand, grassland conditions modified the quality of the aggregates, so management influence soil formation. To confirm these patterns, similar meadow soils without volcanic ash deposition should be studied, or continue monitoring this processes over time.

Keywords: Volcanic ash; Soil formation; Soil aggregates; Patagonian wetlands.

Financial Support: Agencia Nacional de Promoción Científica y Tecnológica (AGENCIA): PICT-2016-1909; Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET); Instituto Nacional de Tecnología Agropecuaria (INTA), EEA Bariloche; Sustainable Agroecosystems, ETH Zü