Introduction
Landscape Evolution Observatory (LEO) is sized 30 meter in length by 11 meter in width covered with 1.1 meter layer of granular basalt rock at an average 10° slope inside a climate controlled environment. LEO aims to understand how soil, water, and air interact spatially and temporally[1]. miniLEO, approximately 2.5 m in length by 2.5 m deep, was constructed to test small scale experiments prior to implementation on the full scale LEO slopes.

Objective
For this experiment, rain events occurred three times a day in two hour increments at a rate of 30 mm/hr for 14 days to determine if exchangeable ions and targeted elements dissolve over time.

Targeted elements and ions include:
- Total amount of Carbon (TOC)
- Total Inorganic Carbon (TIC)
- Total Nitrogen (TN)

+ Bromide + Nitrate + Calcium
+ Chloride + Phosphate + Magnesium
+ Fluoride + Sulfate + Potassium
+ Nitrite + Ammonium + Sodium

The results of this miniLEO experiment were compared to previous LEO experiments.

Results

![Graph showing the results from miniLEO experiment compared to previous LEO results.](image)

The data points on the primary y-axis depict the concentration of Total Inorganic Carbon (TIC) present and the data points on the secondary y-axis show the concentration of Organic Nitrogen (ON) of the experiment. The blue shaded regions emphasize the relationship between the increase and decrease in concentration of TIC and ON during rainfall and water discharge events, respectively.

Discussion
Calcium and Magnesium
- Generally the amount of Calcium and Magnesium decreased; however, a sudden increase occurred approximately half way through the experiment
- Amount of dissolved CO₂ in system increased – higher affinity for ion exchange
  - Formation of Carbonate and Magnesium Carbonate
  - Ca + CO₂ → CaCO₃
  - Mg + CO₂ → MgCO₃

Potassium
- Dissolved Potassium combines with other minerals to form Orthoclase, decreasing the concentration of Potassium ion in solution
- Potassium is leached from Orthoclase, which increases the concentration of Potassium ions in solution and creates K-feldspars

3:1 Carbon to Nitrogen Ratio
- Carbon to Nitrogen Ratio in soil is usually 8:1
  - The concentration of Organic Nitrogen decreased
    - Possibly greater amount of denitrifying bacteria compared to the amount of Nitrogen fixing bacteria
  - Without vegetation there is no photosynthesis occurring
    - Inorganic Carbon is not converted to Organic Carbon
    - Limited amount of organic matter available for decomposition

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References

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