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Element Levels in Soil Depend on Elevation

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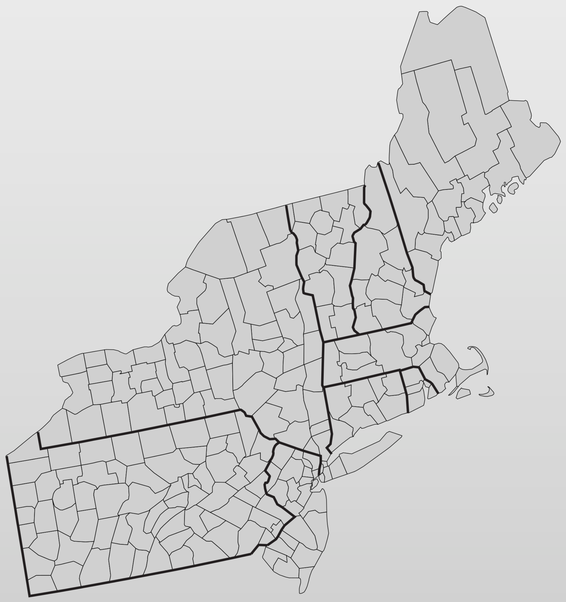
Background

Elements, such as arsenic, copper, phosphorus, and calcium, in soil can help biological processes if content levels are not too low or excessive. Arsenic in soil is toxic at high levels and so too much is harmful to vegetation. Copper is important for plants because it helps with chlorophyll and seed production. Phosphorus helps with plant growth, especially for new seedlings. Calcium in soil is not completely needed at high levels, but it does strengthen plants' health. However, with factors such as different environments, average precipitation levels, and elevation levels in different counties in the Northeast, element content level differ. Therefore, the relationship between Northeast county average elevation and Northeast county element levels were compared to study any correlations. I believe with increasing elevation, there will be an increase in all four of the studied element levels in the soil because there is less vegetation at higher altitudes to use the elements in the soil.



Methods

Collected NGS Geochemistry element data by county from USGS.gov website. Only arsenic, copper, phosphorus, and calcium element levels in the soil were used from the data set. Collected data on elevation averages from counties in America from reddit user gnarsify tasked with the project from his work. This data set gave minimum, maximum, and mean elevation levels for every county in the United States. Only the mean elevation and Northeast counties were used.

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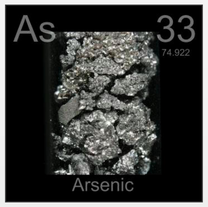
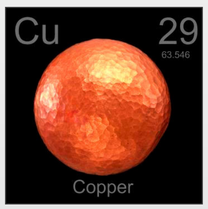
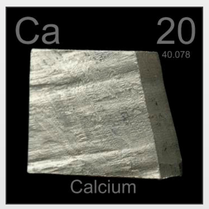
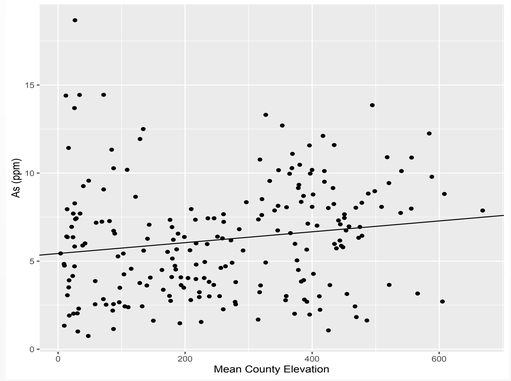


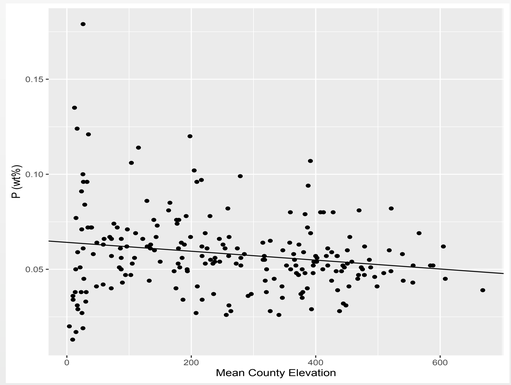


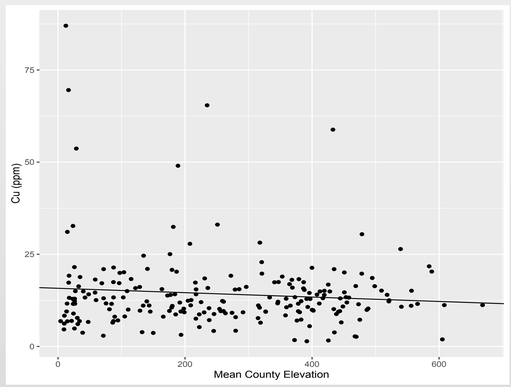


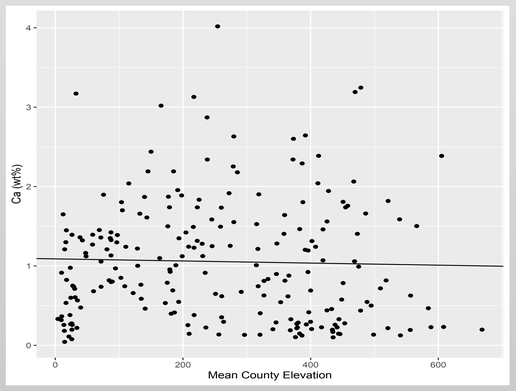
Results

There is significant data (ANOVA on LM, F = 7.39, df = 1, 216, p < 0.01) that phosphorus levels decrease with increasing elevation. This went against my hypothesis that the element level would be higher with higher elevation. There is significant data (ANOVA on LM, F = 5.77, df = 1, 216, p < 0.05) that arsenic levels increase with increasing elevation. This supported my hypothesis that there would be a positive correlation between element level and elevation. There is no significant data (ANOVA on LM, F = 2.01, df = 1, 216, p < 1) that copper levels decrease with increasing elevation. There is also no significant data (ANOVA on LM, F = 0.184, df = 1, 216, p < 1) that calcium levels decrease with increasing elevation.









Conclusion

This study suggests that elevation does have an effect on the element levels of phosphorus and arsenic in the soil in the Northeast. The phosphorus level decrease with increasing elevation may be due to the phosphorus cycle and how weathering causes the element to flow from high elevation to low elevation. Arsenic levels' positive correlation with elevation may be due to less soil turnovers and less vegetation at higher altitudes which allows higher arsenic levels at higher altitudes. The study also suggests that elevation does not have an effect on the element levels of copper and calcium in the soil in the Northeast. Further research on the subject could include studying the relationship between elevation and other element levels in soil in the Northeast. Other research could also include other regional data for elevation and soil element levels in order to compare different regions in the United States.

Acknowledgements

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References

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