Investigating the impact of ozone dry deposition on saguaro cacti (Carnegiea gigantea) in Saguaro National Park, Arizona

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Background

- Surface-level ozone pollution negatively impacts vegetation health through ozone dry deposition
- In contrast to commonly studied vegetation, plants that photosynthesize through crassulacean acid metabolism (CAM) pathways open their stomata at nighttime
- We hypothesize that because CAM plants open their stomata at night, they are more protected against ozone damage

Data

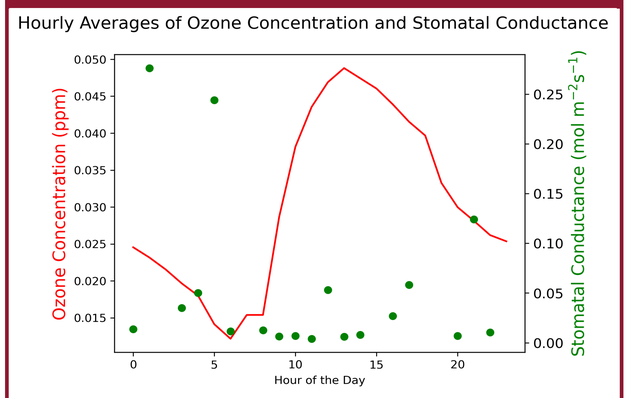


Figure 1. *Relationship between stomatal conductance and ozone concentration*

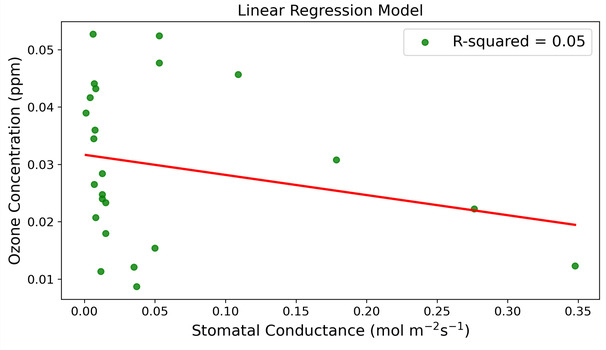


Figure 2. *Ordinary least squares regression fit of stomatal conductance and ozone concentration*

- Relationship between ozone concentration to saguaro cacti stomatal conductance is anticorrelated

CAM Stomatal Controls Reduce Ozone Deposition Fluxes

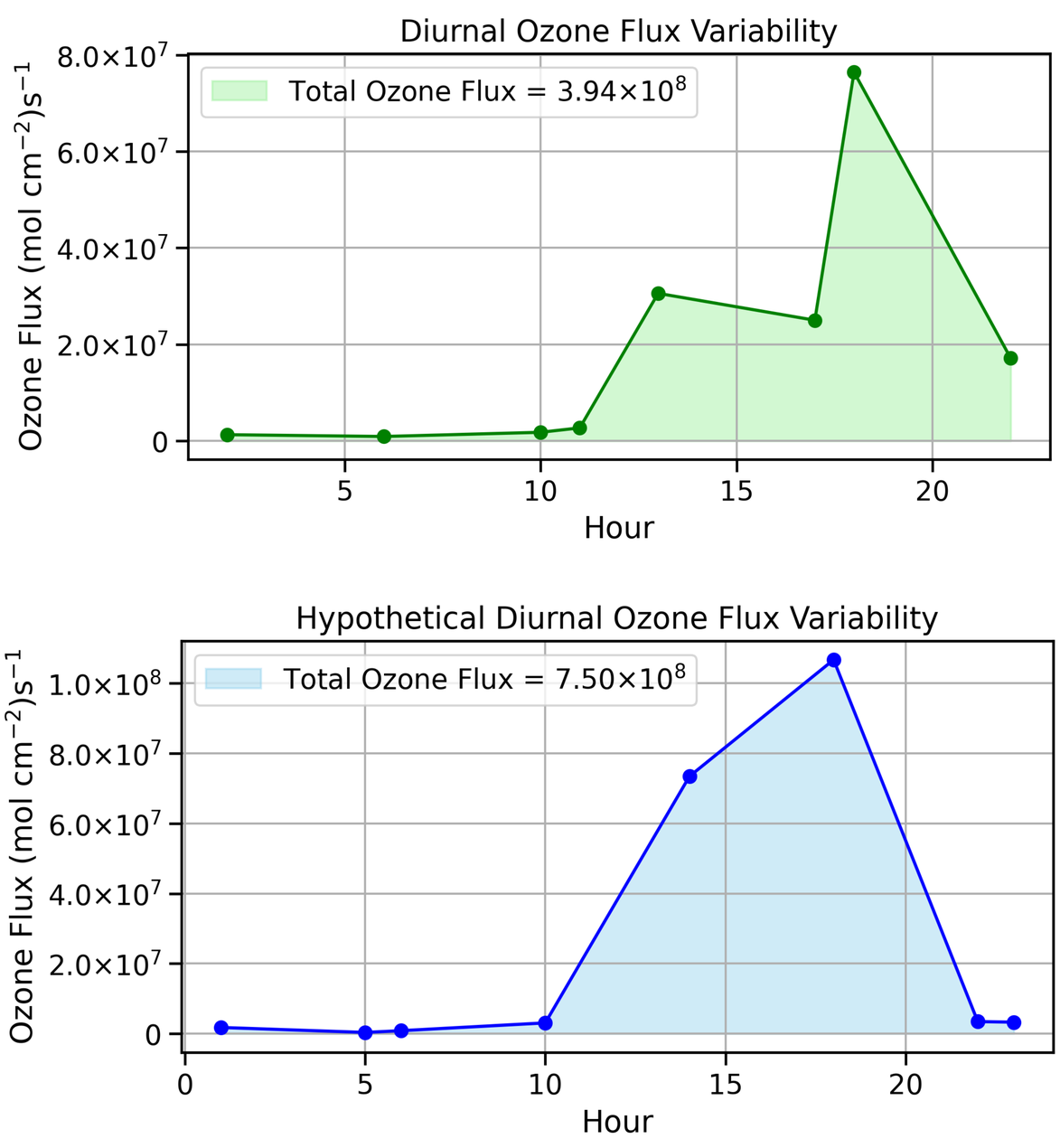


Figure 3. *Graphical representation of shifted to unshifted ozone flux values*

- Observed ozone flux values for stomatal conductance values shifting 12 hours
- Greater total ozone flux is observed in the hypothetical dataset compared to normal diurnal values, indicating higher photochemical pollution during the daytime
- Highlights increased ozone uptake if CAM plants' stomatal timing occurred during the daytime

Discussion & Conclusion

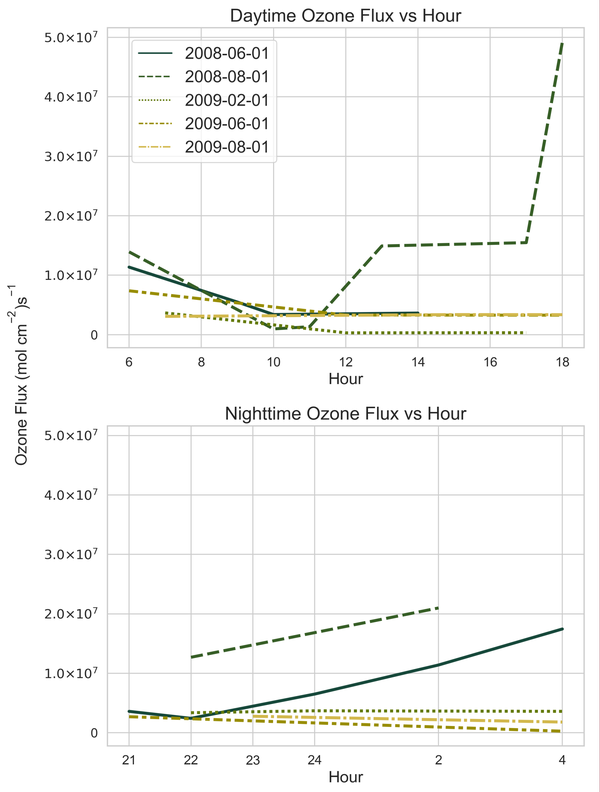


Figure 4. *Graph representation of day and nighttime ozone flux patterns*

- Daytime ozone flux is greater throughout each month compared to nighttime hours
- Our results indicate that because saguaro cacti open their stomata at night, their ozone uptake is reduced compared to if the stomata were open during the daytime
- This suggests plants that photosynthesize through CAM pathways are more resilient and protective against ozone pollution

References

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