Optimizing Buoyant Airborne Turbines for Maximum Performance in Limited Space

Connor Gagliano, Jesse Knott, Kevin Karges, Marquell Lott, Onnie Knott

Introduction:

The purpose of this study is to determine the ideal altitude and environmental conditions for placing buoyant airborne turbines, to maximize the electrical output of both the turbines and coexisting photovoltaic technology. The study will send a package containing atmospheric sensors, wind speed sensors, and solar panels angled to maximize sunlight potential to approximately 100,000 feet on a weather balloon.

Background:

Buoyant Airborne Turbines are blimp mounted wind turbines. These devices are tethered to the ground by an electrically conducting cable. Their ideal weather conditions are high pressure, low humidity and low temperatures.

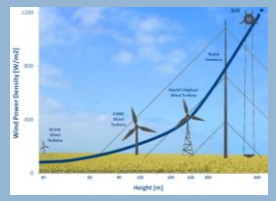
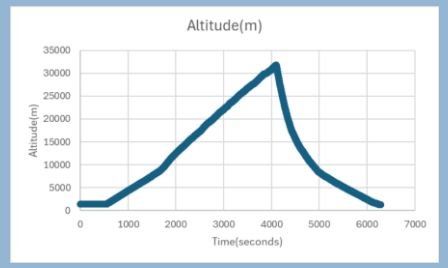


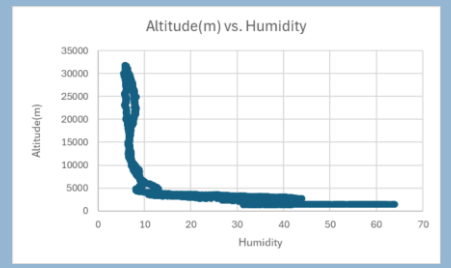
Fig 1: Wind Power vs. Altitude

Fig 2: Buoyant Airborne Turbines

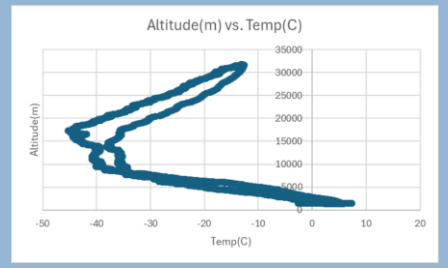
Results:



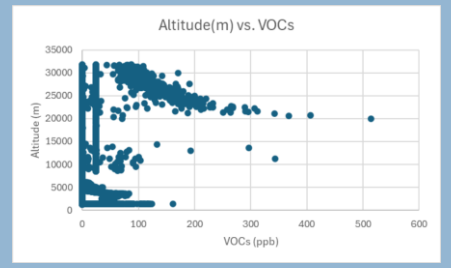
Altitude vs. Time



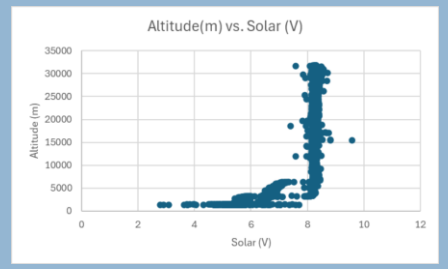
Altitude vs. Humidity



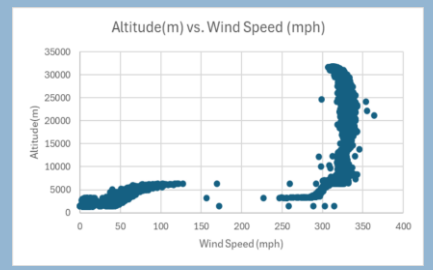
Altitude vs. Temp



Altitude vs. VOCs

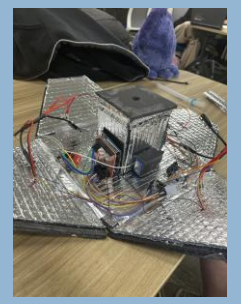


Altitude vs. Solar



Altitude vs. Wind Speed

Payload Design:



Conclusion:

Examination of combined atmospheric parameters suggests that an ideal position for an enhanced BAT is between 6,000m and 7,500m. This altitude offers conditions within operating parameters for the BAT and provides ideal solar panel voltage input [9]. It is likely that atmospheric scrubbers would be effective at this altitude, as they become available. A fixed weather station for all high-altitude AWES is recommended.

References:

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