

Team Name:

Green Skies

Team School/Organization:

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Abstract:

The aviation industry has committed to becoming net-zero by 2050, which is in alignment with the U.S. Department of Energy's Sustainable Aviation Fuel Grand Challenge goals. The ideal solution would be to have reliable and safe electric planes for all flights. This could be possible for 3-4 hour flights in a few decades, but to change all their fleet of airplanes would take much longer. Plant and algae-based sustainable aviation fuel (SAF) is a great solution that could be implemented much faster, which is why the U.S. government is supporting it. To make full-performance SAF that can replace currently used fossil fuels without any changes in the equipment, companies need to make more of plant and algal oil-based SAF, instead of using a smaller fraction of corn-based alcohol as a blend—the way it is done for our cars. While algae can be used as a feedstock for producing SAF, farming algae is not a common thing, and some algae could be harmful to the health of people too. For SAF, specific types/species of algae need to be grown. Also, as the United States wants to have 3 billion gallons of SAF by 2030 and 35 billion gallons by 2050, even if algae-based SAF will be 10%–20% of the target, the country would need to crop 100s of millions of tons (maybe billions) of algae every year. Therefore, finding all the locations in the United States where the algae species required for SAF is a huge problem with great environmental impact.

This project focuses on identifying suitable locations for microalgae cultivation to produce SAF. The project aims to enhance the Biomass Assessment Tool (BAT) by integrating geospatial data from new sources, such as TanDEM-X and Google's MetNet-3. Using machine learning techniques, the team analyzes land suitability, water stress, and economic factors to identify the best sites for microalgae growth in the Midwest. In collaboration with CleanJoule Inc. and Qen Labs Inc. for technical and analytical support, this project aims to make a significant contribution to SAF production, helping to reduce emissions in the aviation sector and supporting the development of sustainable fuel alternatives.



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