

Integrated Vehicle, Payload, and Trajectory Design for a Stratospheric Climate Observatory



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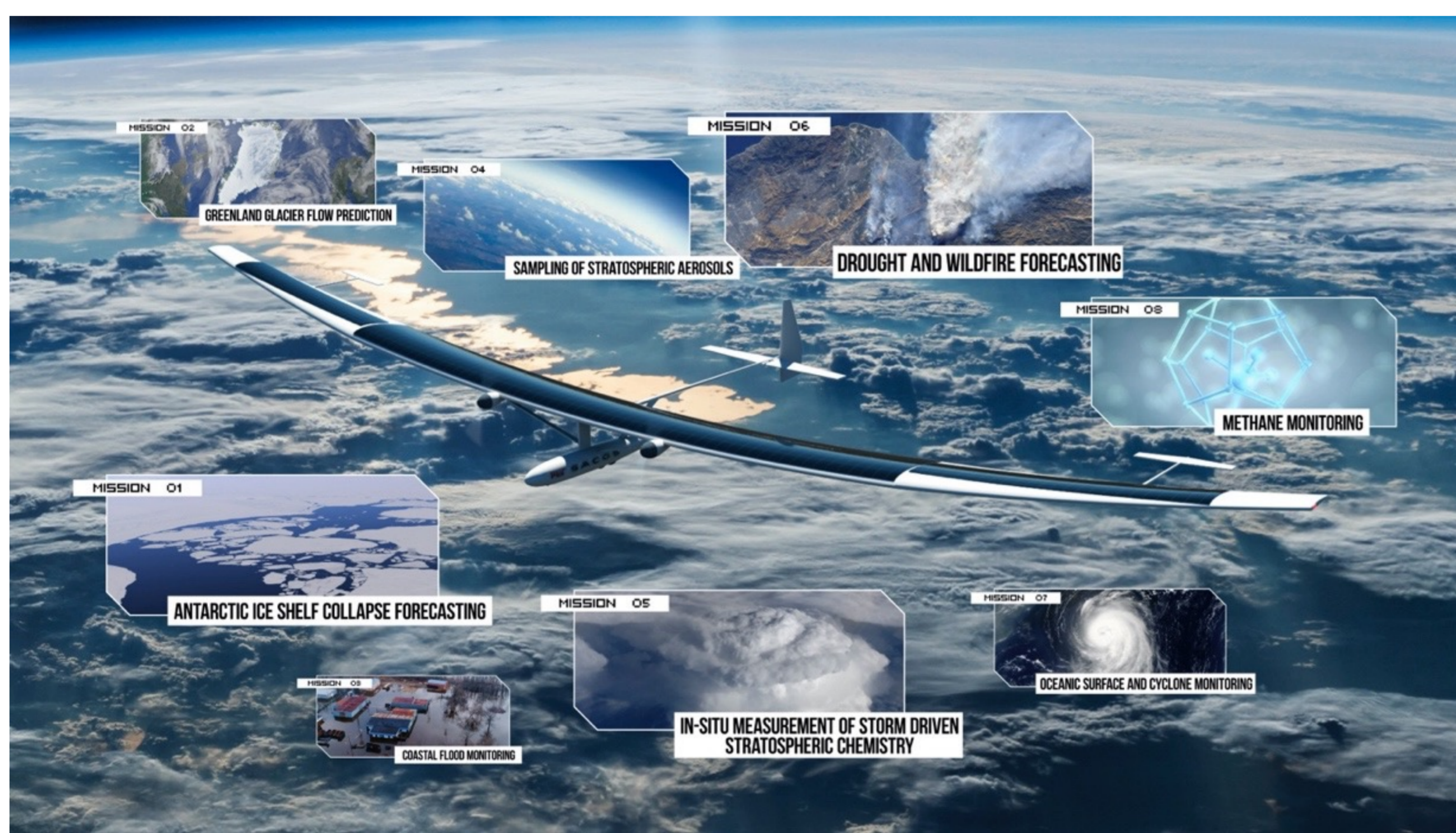
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SACOS

Stratospheric Airborne Climate Observatory System to Initiate a Climate Risk Forecasting Revolution



SACOS is a fleet of unmanned solar powered aircraft, each operating for weeks or months in the stratosphere and designed with an instrument systems focused on a particular climate risk area.

Student-Led Vehicle Development

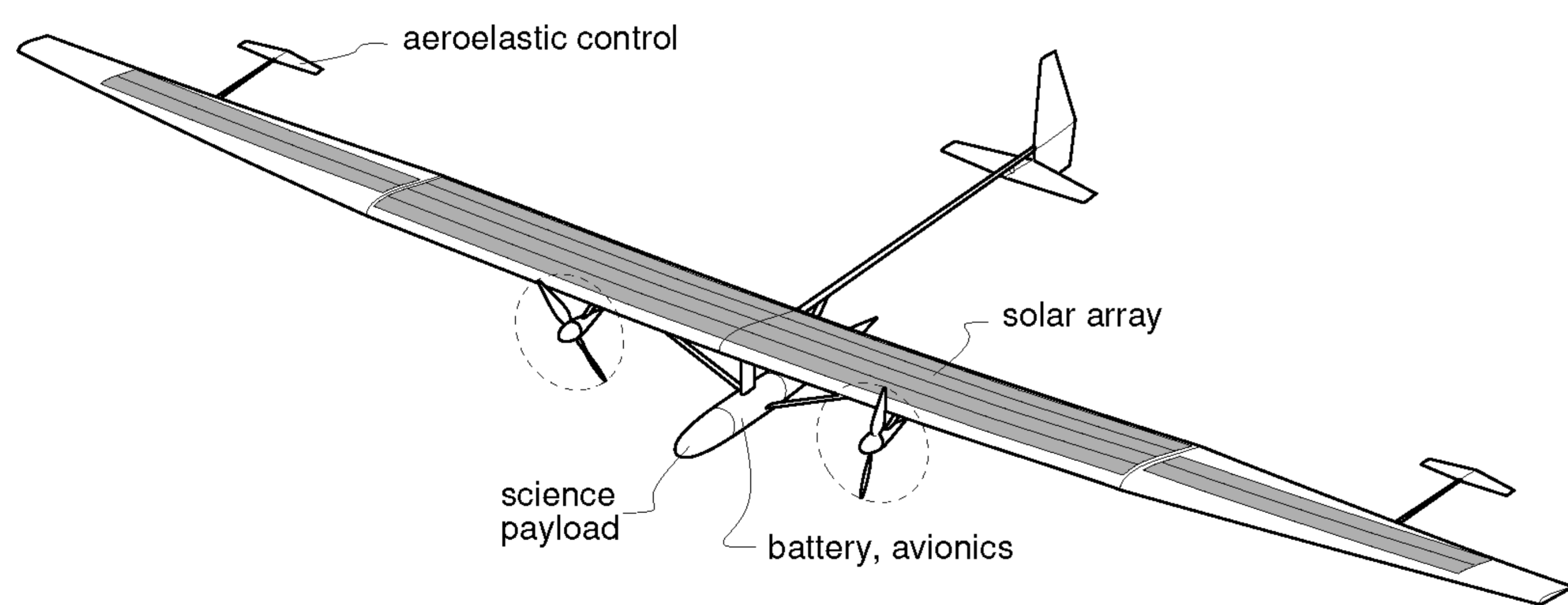


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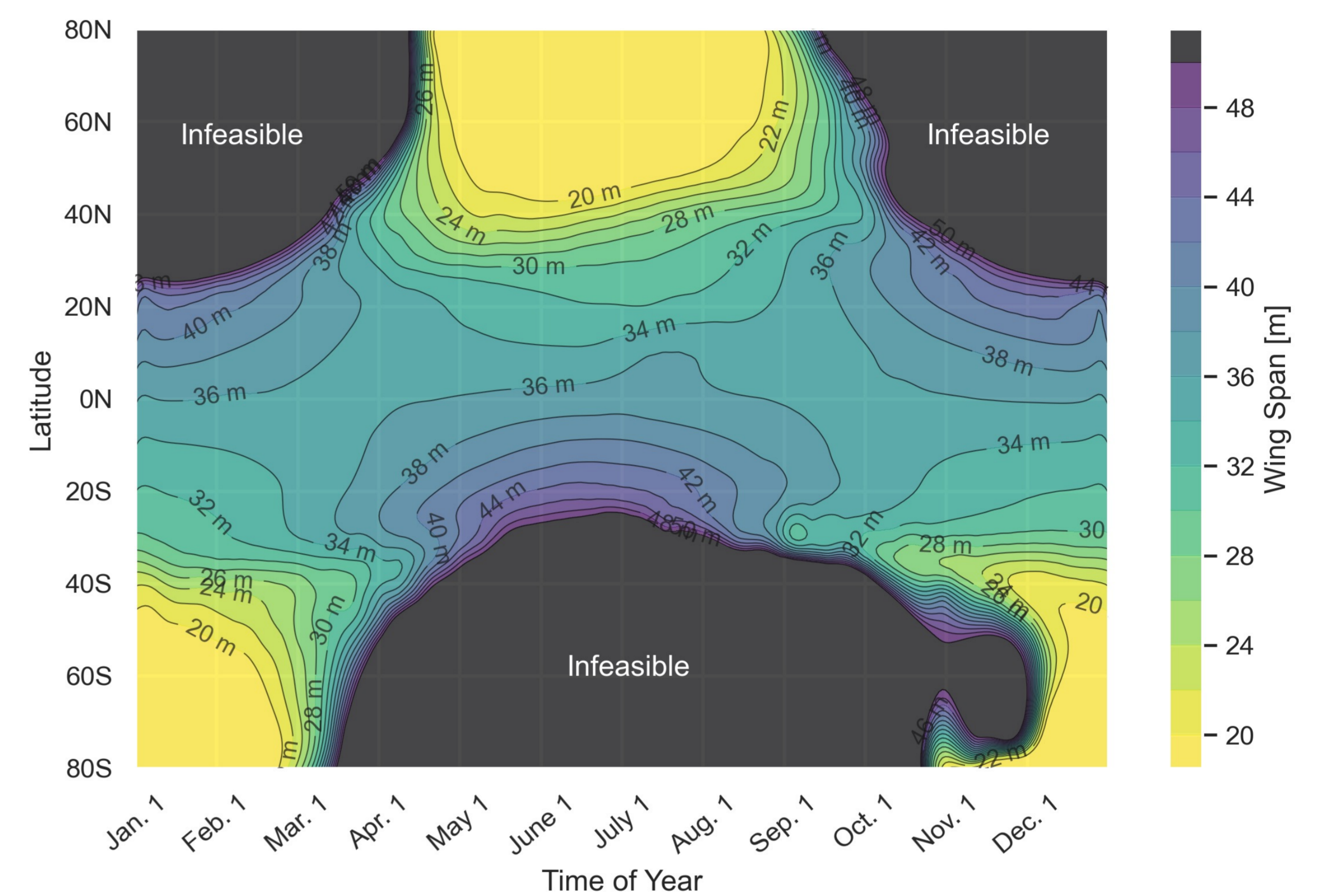
In response to the covid remote learning environment, eight IST students were able to collaborate with a MIT AeroAstro capstone course where the SACOS vehicle design (pictured below) was developed.



Student teams demonstrated the aircraft concept could enable critical climate observations, particularly in high latitude regions where nights are short at the high of the stratosphere reduces the minimum cruise altitude, therefore we focus on an Antarctic Ice Monitoring Mission.

Feasible Mission Space of SACOS Aircraft

Minimum Wingspan Airplane by Mission
10kg Payload with 100W of Continuous Power



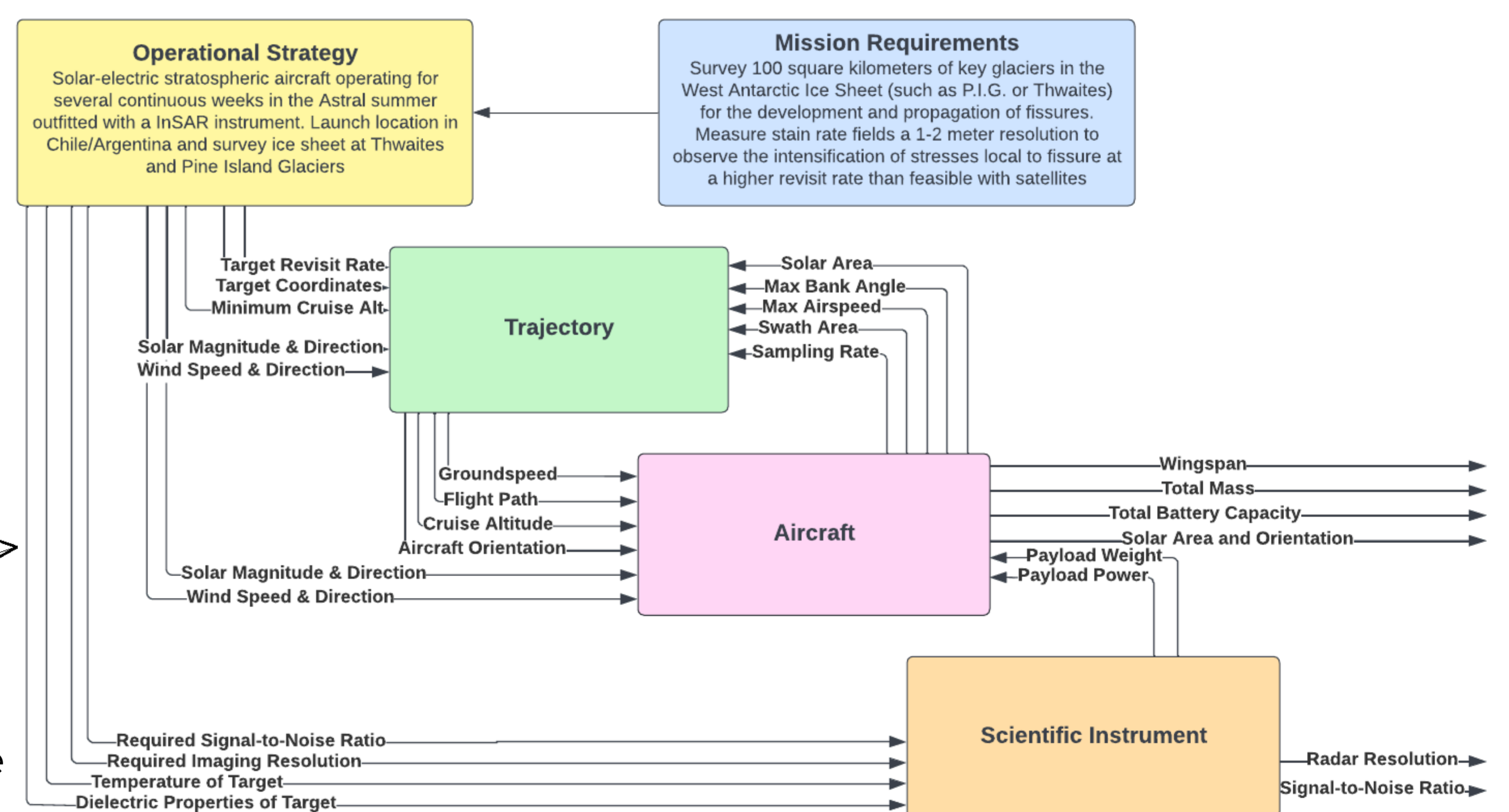
Focus Climate Mission: Antarctic Ice Shelf Collapse Monitoring



Forecasts of sea-level rise through high temporal and spatial frequency of observations of ice shelf fissures that cause to rapid mass loss via ice-shelf collapse.

Integrated Optimization Block Diagram

Vehicle sizing changes based on the payload mass and power, location, trajectory, and time period of the proposed mission, which requires a highly coupled design and optimization of all aspects of the design and operation of the aircraft as shown below.



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MPP Project: Student Based Collaboration on Environmental Monitoring Flight Systems

