

Rainbow Horizons

High Altitude Visible Spectrum Analysis

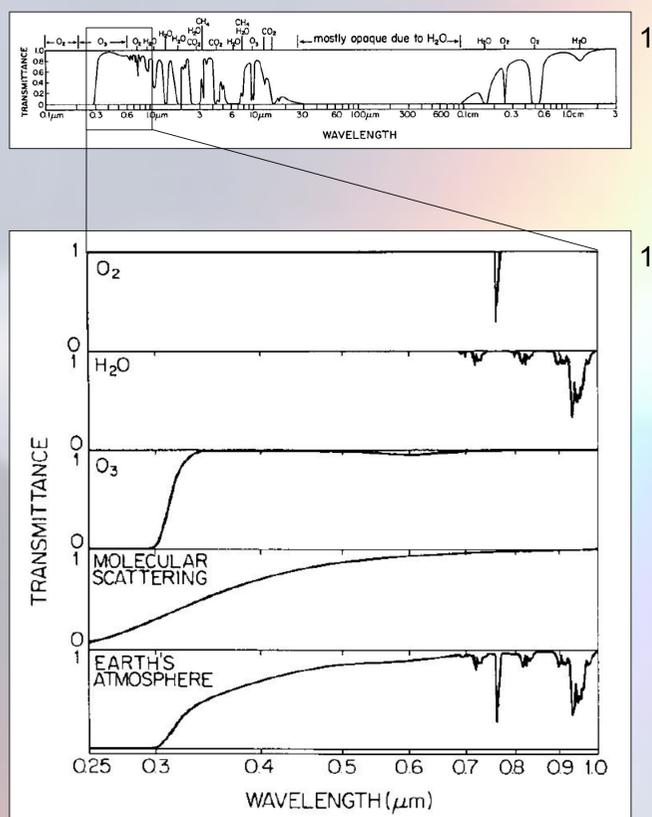
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Overview

Rainbow Horizons is a high-altitude ballooning atmospheric observation project with the UAH Space Hardware Club. The goal of the project is to observe absorption lines in the solar spectrum caused by the presence of oxygen, ozone, and water vapor in Earth's atmosphere and investigate how their concentrations change with respect to altitude.

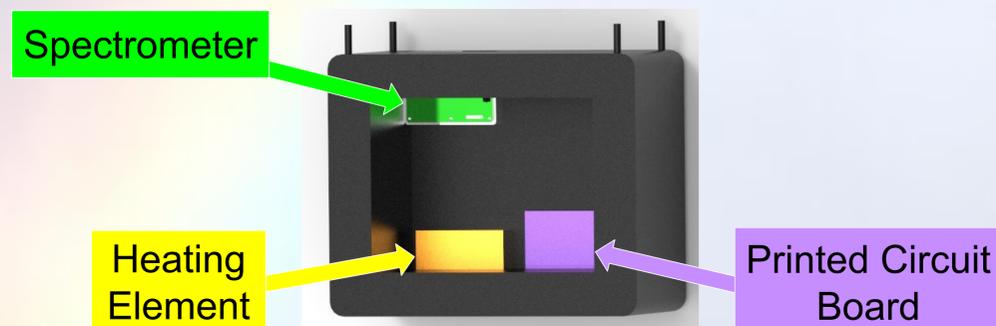
Anticipated Findings

With the data collected from our first flight, we expect to see changes in the observed spectrum as a function of the payload's altitude. As the altitude of the payload increases, we expect the spectral features caused by oxygen, ozone, and water vapor to become less pronounced. This rate of spectral feature smoothing could be correlated with the quantities of these gases in the atmospheric layers the payload is passing through.



Instrumentation

The instruments will be housed in a styrofoam box for environmental protection. The main sensor will be a near-UV, visible, and near-IR spectrometer fitted with a cosine corrector to observe a 180° view and keep the sun in view regardless of the payload orientation. The payload will feature a student-designed printed circuit board which will utilize a microcontroller to interface with the spectrometer along with an inertial measurement unit, barometric pressure sensor and temperature sensor.



Future Plans

In the future this project can be flown many times in order to monitor the spectral characteristics of Earth's atmosphere over time. Another possible objective could be to observe more spectral features of the Sun's corona and photosphere at our maximum altitude of 30 km. The data collected would show changes in the spectral characteristics of the Sun over time.

Acknowledgements

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 1. Kidder SQ, von der Haar TH. Satellite meteorology - An introduction. Amsterdam: Academic Press; 1995.
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