2026 Planet Hack Challenge – Day 1

Inspired by Prof Helmut Jerjen, Research School of Astronomy and Astrophysics.

The mission

The year is 2028. The International Space Exploration Coordination Group (ISECG) is preparing to launch a **$100 billion deep-space satellite system** in 2035. Every electronic component on board is delicate. Every one of them is vulnerable to solar weather. In 2022, a single geomagnetic storm destroyed 38 Starlink satellites in a matter of hours and in 2026 Nasa had to launch an emergency mission to save the SWIFT space telescope (https://www.bbc.com/news/articles/c0ry4xx7rk8o). ISECG cannot afford a repeat at one hundred times the scale.

Your team has been called in as scientific advisors. You will analyse real solar data from the **SDO/HMI archive**, develop your own findings, and pitch your recommendation to the ISECG launch panel on video no longer than five minutes.

No written reports. No textbook answers. Show your evidence. Convince them.

Supplementary Information

You need access to the SDO/HMI image archive: https://jsoc1.stanford.edu/data/hmi/images/

Juniors Challenge: Risk Assessment

Background

The ISECG needs to understand how dangerous the Sun is likely to be at the time of launch. The Sun follows a sunspot activity cycle. Sunspots are the underlying drivers of geomagnetic storms on Earth. While sunspots themselves do not reach our planet, they act as launchpads for massive eruptions of energy and plasma that travel through space and disrupt Earth's magnetic field.

These events threaten satellites, GPS, weather systems, communications, and power infrastructure. Your team has been asked to predict sunspot activity in the year of the Rabbit, 2035 and advise ISECG on the implications for the planned launch.

Make a compelling, evidence-based video proposal recommending whether the 2035 launch should proceed. Identify potential hazards, analyse what could happen if a disaster or hazard occurs, and evaluate the risks. If your team recommends for the launch to proceed, explain what precaution(s) should be taken. If your predictions suggest the launch should not proceed, provide clear reasons and propose an alternative launch year.

Hack:

- Use SDO/HMI imaging data to identify the solar maximum years between 2012 and 2024.
- Download a high-resolution image from the SDO/HMI archive. Use an image analysis program of your choice (e.g. Fiji) to determine the centre coordinates and pixel diameter of a large sunspot.
- Compare the sunspot's size to Earth's diameter using a pixel-to-kilometre conversion. Make this scale comparison the visual centrepiece of your pitch.
- Track a sunspot across a time series. How many days does it remain visible on the solar disk? Bonus credit if you identify one that lasts at least 30 days and present it as a short time-lapse for the panel.
- Investigate whether there is a correlation between sunspot size and lifespan. Does size influence longevity?
- Make a prediction of solar flare activity for the 2035 launch year.
- Pitch your video proposal to the ISECG launch panel. Present your sunspot analysis, scale comparison, time-lapse, and solar activity predictions. If your predictions advise against the launch, clearly justify your reasoning and propose an alternative launch year