

# Exploring Shadows Through OpenSpace: Creating 3D Visualization Assets and Simulations

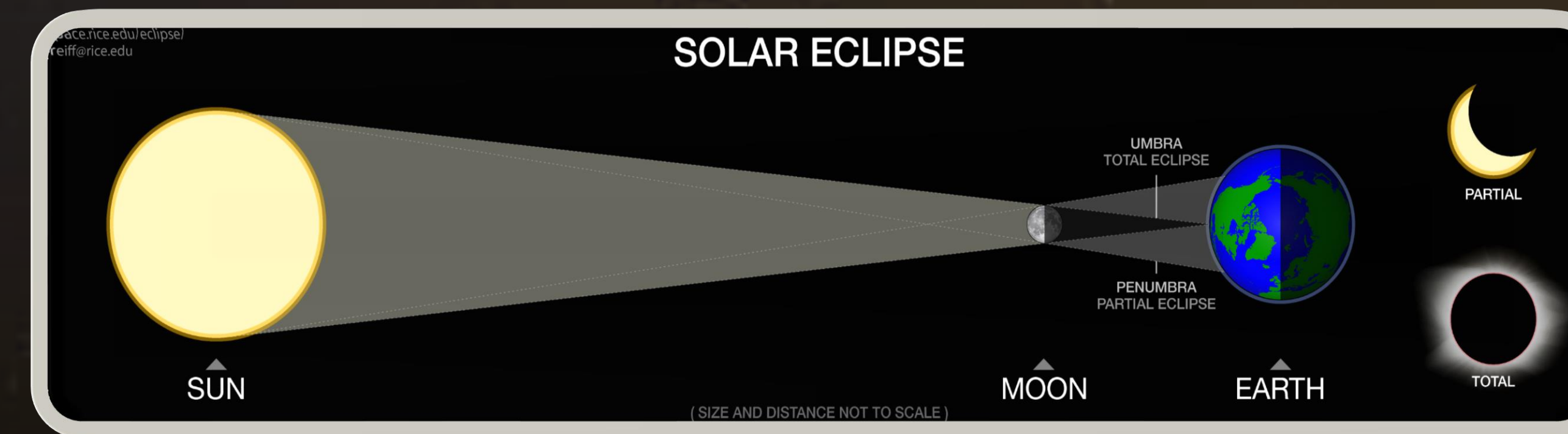
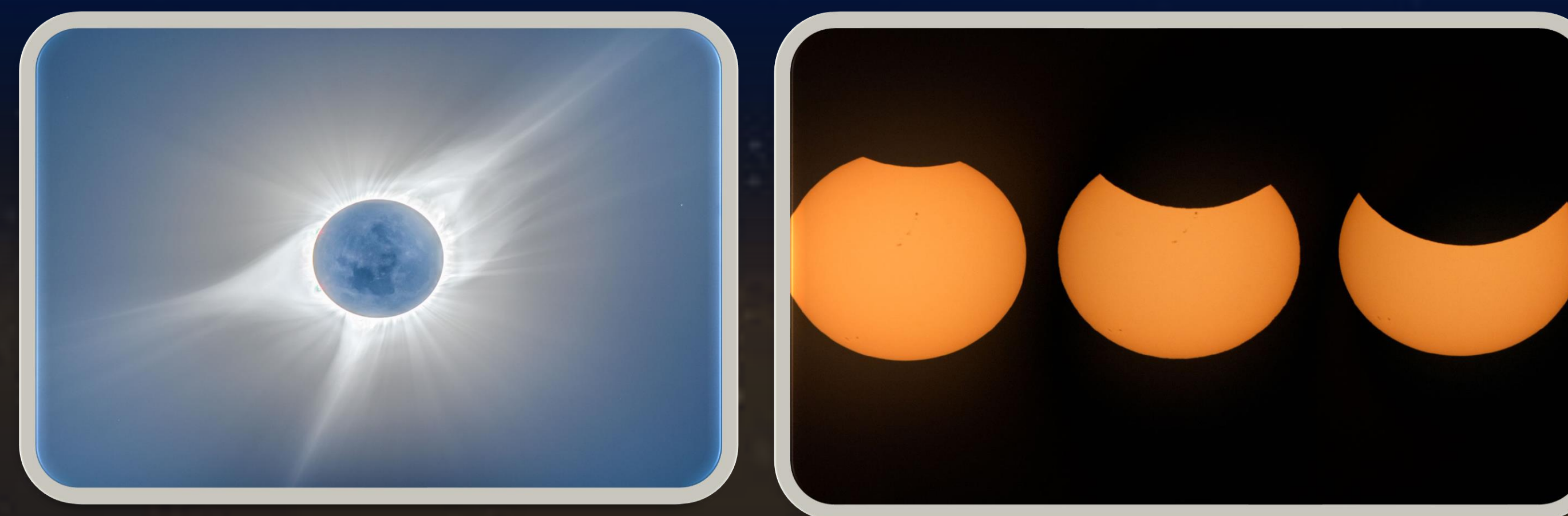
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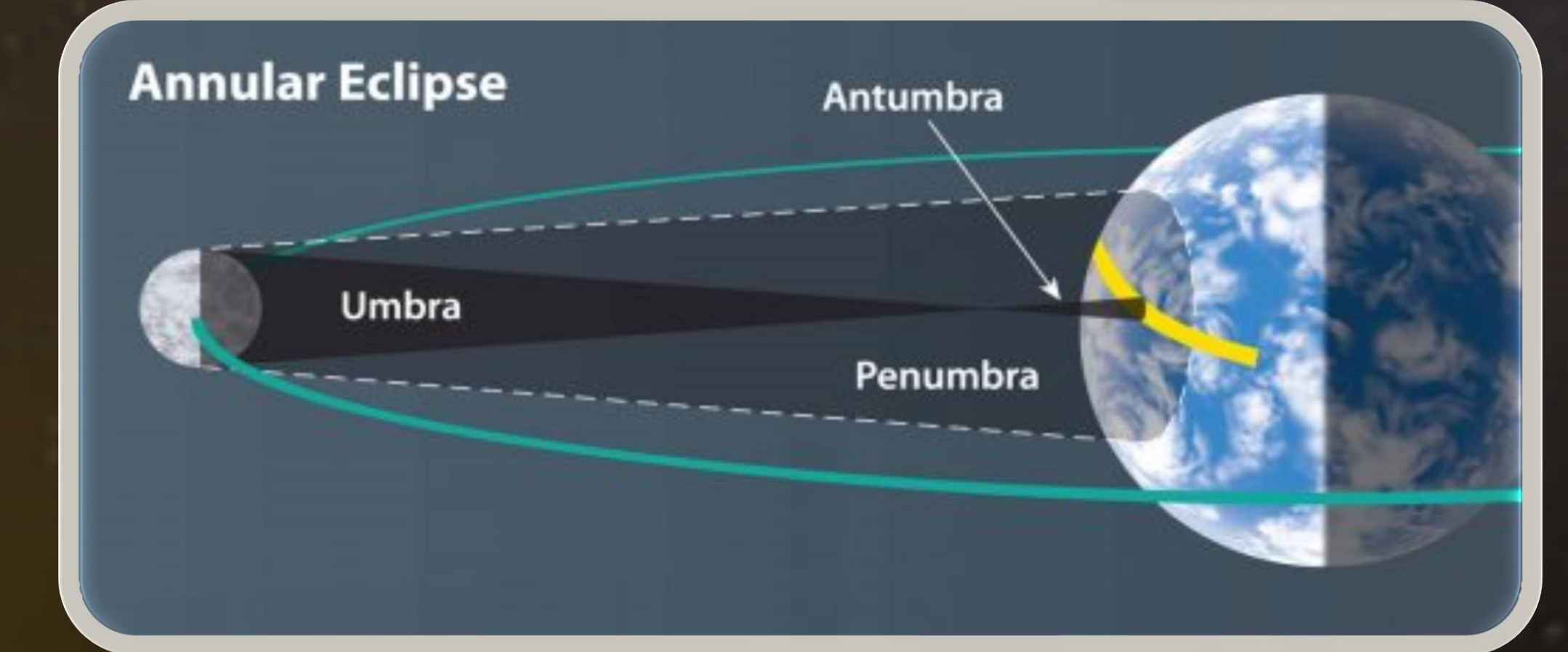
## Introduction

Throughout history, eclipses have captivated human imagination, interlacing with ancient myths, religions, and even medical beliefs. From ancient Mesopotamia to the present day, the delicate aesthetic dance between the Sun, Moon, and Earth has either mesmerized or sparked fear in humanity. Over time, we've discovered shadows hold valuable scientific and astronomical insights about stars and celestial bodies. By studying the shadows, we can gather information about positions, movements, size, shape, and orbits of celestial objects. Working with Science through Shadows, and utilizing OpenSpace, we aim to create stunning visualization and scientifically accurate simulations of past and future solar eclipses within OpenSpace to interactively and immersively explore the different types of eclipses, teach safe viewing practices, and unveil the myriad of knowledge that can be seized from each celestial event.

## Total/Partial Eclipse



## Annular "Ring of Fire" Eclipse



## Methodology: Creating Immersive 3D Solar Eclipse Visualization Assets

### Data Collection

- Gathered KMZ files that uses NASA's FIVE MILLENNIUM CATALOG data on solar eclipses to create eclipse paths and ensure correct simulations.

### Coding Assets

Developed coding that calculated and rendered an ecliptic plane with nodes and 3D cone-shaped shadows of the umbra and penumbra.

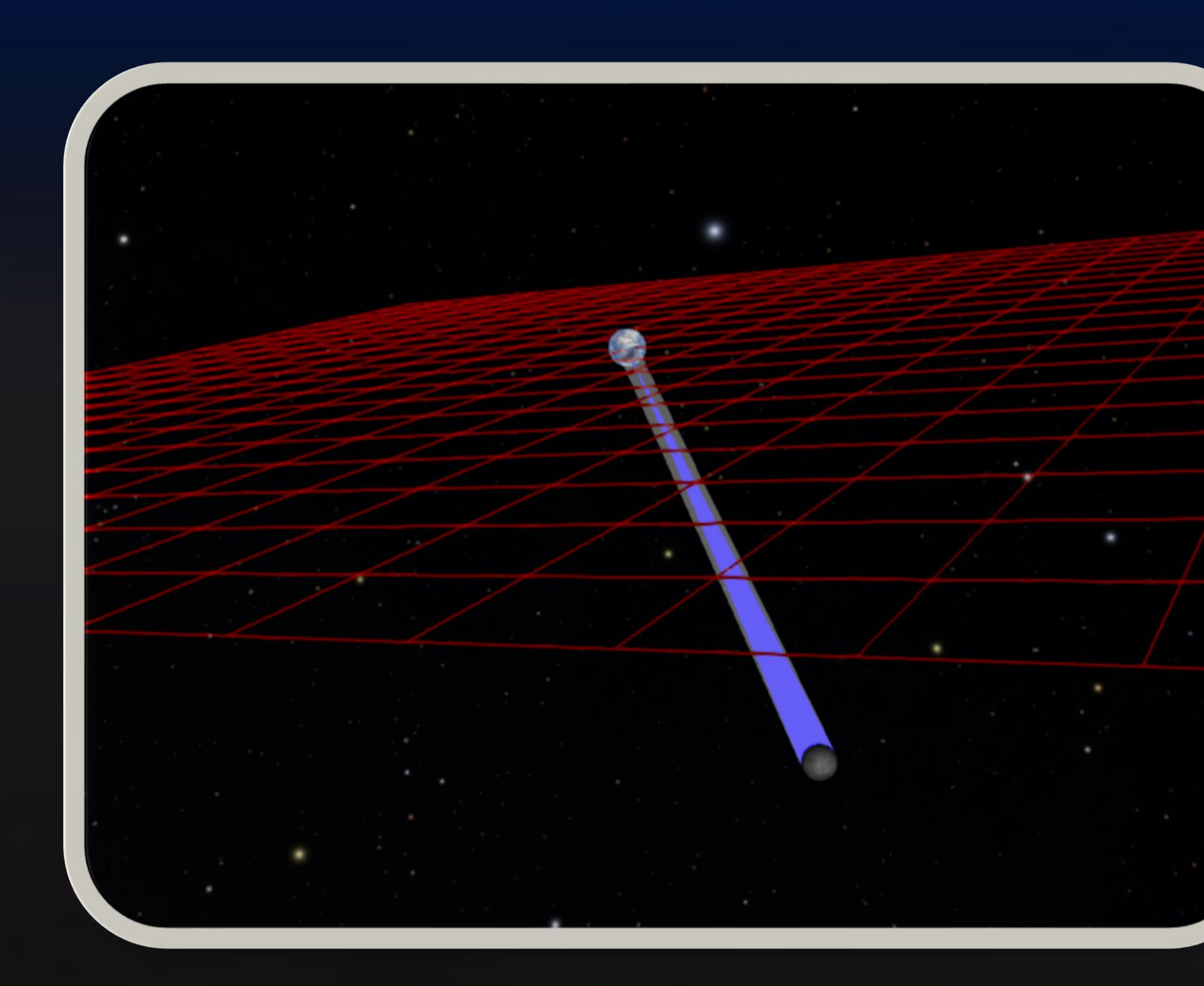
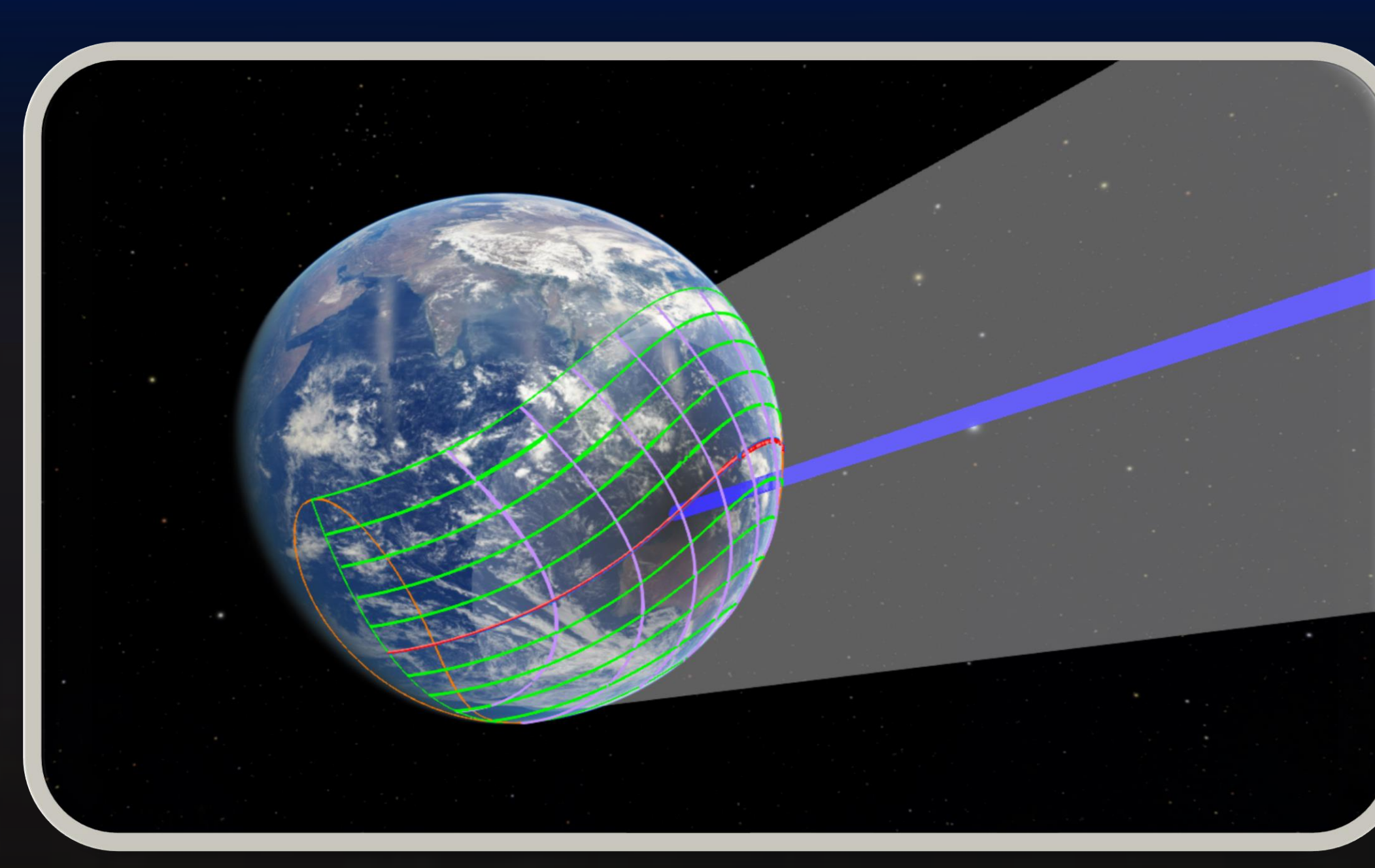
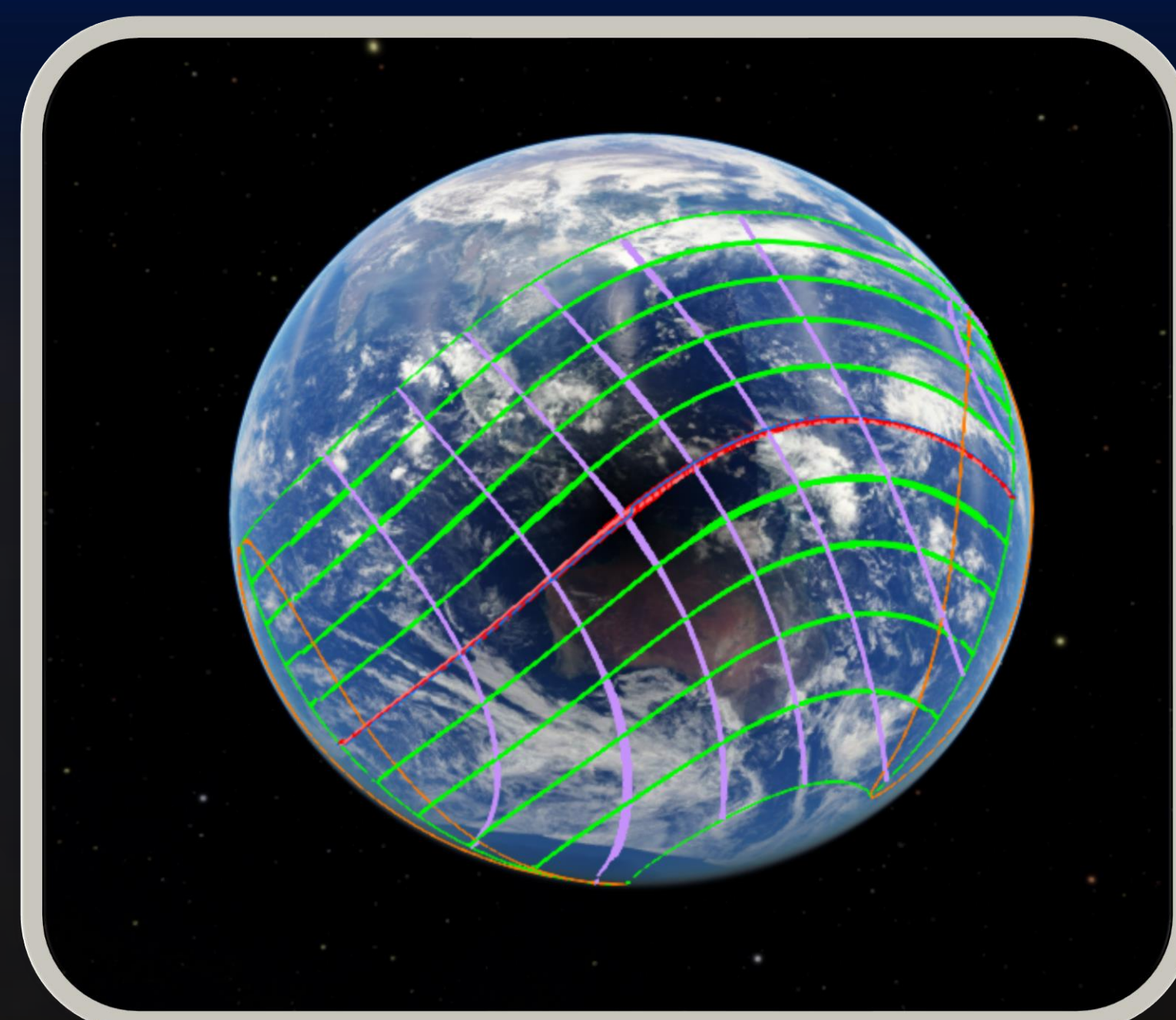
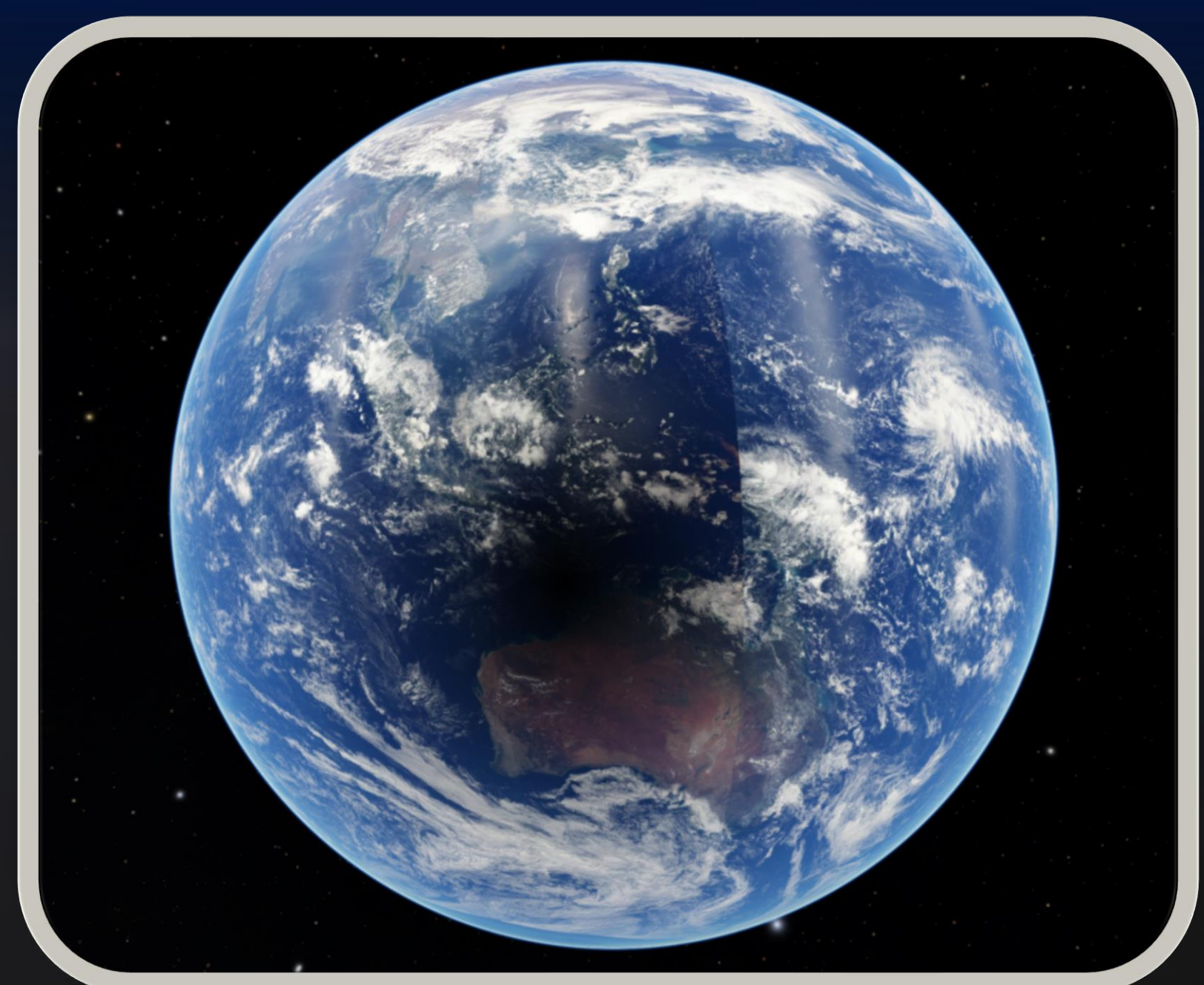
### 3D Modeling and Rendering

Used 3D modeling and rendering to visually portray the moon's shadow, moon's orbit, ecliptic plane and nodes during a solar eclipse.

### Visualization Development

Developed interactive, immersive simulations and animations showcasing solar eclipses with a captivating travel-along experience.

## OpenSpace 3D Simulation Results



## Discussion

In summary, we have developed simulation and visualization assets using OpenSpace to provide a captivating and immersive opportunity to travel along with the moon's shadow to explore and understand this celestial phenomenon. The integration of OpenSpace into this project has allowed us to share this knowledge with others by creating 3D visualization assets that can be displayed on a computer at home or your local planetarium. The immersive and interactive nature of OpenSpace makes it a robust tool for educational outreach by engaging and captivating audiences while instilling scientific knowledge.