**Introduction**

Atomic Oxygen (AO) affects the optical properties of materials in space. Missions like OSIRIS-Rex are bringing asteroid samples back to Earth from space; these samples are going to change once they reach our atmosphere due to AO.

**Objective**

1. Determine the angle between the direction of motion (RAM) and the payload samples (always facing the Sun).
2. Determine the amount of expected AO.

**Approach**

1. Determine Sun vector, with no Earth tilt.
2. Determine Sun vector with Earth tilt included.
3. Include orbital orientation.
4. Determine AO flux on payload samples.

**Results**

**Step 1 Assumptions:**
- The Sun is a fixed point.
- Circular Earth orbit.

**Step 2 Assumptions:**
- The Earth’s tilt is 23.5°.

**Step 3 Assumptions:**
- The satellite’s orbital plane precesses due to the oblateness of the Earth.
- Orbital inclination: 51.6°.
- Altitude: 400 km.

**Conclusion**

The previous analysis used classical orbital mechanics to predict atomic oxygen exposure to the Iris payload.

While AO may pose a problem, it is only present less than a quarter of the year. With this information, colleagues at the University of Winnipeg, can now predict the optical changes caused by AO.

**Acknowledgments**

Stephanie Connell
Dr. Alfred Ng
Jaime Campos, Mitesh Patel, Nathan Wilson, Aayush Vij, and Riley Sweeney

**References**