### SDSU RadSat

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**Abstract**

SDSU RadSat functions as a test bed to allow companies to fly their hardware to a radiation-rich environment and test this equipment’s durability in space. This allows the companies to sell their products as a “Flight Proven” or Technology Readiness Level 9 component. This increases the likelihood that a customer will purchase this component, and in the case of component failure, the manufacturer can redesign without crippling a customer’s satellite.

**Mission Objectives**

**Primary**
- Achieve and maintain SSO orbit
- Fully deploy solar arrays
- Receive nominal communication from satellite
- Monitor payload and verify readiness level of components

**Secondary**
- Ensure payload lasts for the mission’s two-year life span
- Achieve nominal articulation in relation to the sun for max solar efficiency
- Successfully deorbit satellite at end of life

**RadSat Overview**

- **Deployed Solar Panels**
- **Passive Solar Panels**
- **Payload**
- **Communications**
- **ADCS**
- **OBC**
- **EPS**

**Orbit & Attitude Determination**

SDSU RadSat will be launched into a circular sun-synchronous orbit 600 km from earth using SpaceX rideshare program. RadSat will utilize three momentum wheels placed along the $x$, $y$, and $z$ – axis. A redundant liquid propulsion system will be implemented in RadSat for ADCS, orbit stabilization and deorbit.

**Communication**

SDSU RadSat will be operating in the S-band frequency range in order to ensure efficient and reliable communications. RadSat will utilize the TDRS system along with the ground station at NASA White Sands. RadSat also possess a contingency mode which orients our antennas down towards the Earth’s surface in the event of our connection with TDRS goes down.

**Power**

Power is generated by an array of solar panels with 29.5% efficiency with each panel capable of producing 16.31 V in ideal conditions. This power is then stored in two ISIS space iEPS battery packs capable of storing up to 90 Wh of energy for use during eclipse and contingency operations.

**Technology Readiness Level (TRL)**

- TRL 9: Mission "flight proven" through successful mission operation
- TRL 8: Mission system completed and “flight qualified” through test and demonstration (ground or space)
- TRL 7: Precursor design demonstration in a space environment
- TRL 6: Preceptor design demonstration in a relevant environment (ground or space)
- TRL 5: Component and/or breadboard demonstration in relevant environment
- TRL 4: Component and/or breadboard demonstration in space environment
- TRL 3: Preliminary design and experimental breadboard or proof-of-principle component
- TRL 2: Conceptual design and experimental breadboard or proof-of-principle system
- TRL 1: Ground principles conceived and reported

**Radiation Effects**

- **Additional Radiation Hazards**
  - Electronic degradation from total ionizing dose
  - Solar array loss power from non-ionizing radiation dose
  - Spacecraft components become radioactive

- **Image Focal Planes**
  - No Pictures
  - During Exposure to Medium-Footprint

- **Additional Space Hazards**
  - Spacecraft charging
  - Micro-meteoroid and debris impacts

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