Solar Imaging Radio Array (SIRA)

THERMAL

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Executive Summary

- **Spacecraft Thermal Control Methods**
  - Passive thermal control with heaters, thermostats, MLI, coatings, etc.
  - Common radiator for the whole spacecraft bus.
  - For options 1 and 2, thermally isolate the body mounted solar array panels from the S/C by using MLI and low conduction materials.
- **TCS Risks/Issues**
  - No risk identified at this time
- **Resource Estimates (per spacecraft)**
  - Mass: 2 kg (MLI and coating)
  - Power: 50W (25W for S/C heater, 25W for propulsion system during cruise phase only)
  - Hardware Cost: $50K (heaters, thermostats, MLI and coating)
  - Manpower: $100K equates to 2 FTE over ~4 years for 16 spacecraft

Thermal Accommodations

- **S/C thermal requirements are met**
  - Radiator is sized to dissipate 100W and maintain S/C electronics at +10°C
  - 25 watts of makeup heater power is required during the cruise phase to maintain radiator temperature above –10°C
  - For the baseline and option 2 configurations, radiators are located on various sides of the spacecraft with a low solar absorptance coating (NS43G paint)
  - For option 1, radiators are placed on the anti-sun side of the spacecraft
- **Most bus components kept within a –10°C to 40°C range**
  - S/C bus radiator at 0.5m^2 to maintain temperature at +10°C for the baseline and option 2. For option 1, radiator area is slightly smaller at 0.4m^2
    - Experiments and S/C house keeping components share common radiator
  - Propulsion system maintains 15°C minimum temperature with 25W heaters