**Objective**

- Demonstrate high-performance, long-wave infrared (LWIR, 10.3 – 12.5 mm) focal plane array (FPA) technology with significantly higher operating temperature and sensitivity than previously attainable, and with the flexibility to meet a variety of Earth Science measurement needs, particularly those associated with Small Satellite missions. Targeted performance include:
  - Operating temperature: ≥ 80K
  - Quantum efficiency: 50%
  - Noise equivalent temperature: ≤ 25 mK
  - Demonstrate the use of meta-lens technology to raise the operating temperature of mid-wave IR (MWIR) FPAs from 150K to ~200K, and thus, significantly relax the cryocooling requirement for spaceborne operations

**Approach**

- **JPL** will develop high quantum efficiency (QE), low dark current, very long wavelength infrared (VLWIR) detectors based on type-II superlattice (T2SL) barrier infrared detector (BIRD) technology for high operability/uniformity and low 1/f noise focal plane arrays.
- **GSFC** will apply the light-trapping meta-surfaced resonator pixel concept to ease the detector material demands and provide further QE enhancement.
- Use Copious Imaging, LLC., high dynamic range Digital Readout Integrated Circuit (DROIC) with very large electron well capacity for improving operating temperature and sensitivity.

**Key Milestones**

- Grown LWIR T2SL detector pathfinder material 06/18
- Fabricated pathfinder LWIR BIRD FPA 10/18
- Completed LWIR (11 mm) resonator pixel (RP) design 10/18
- Fabricated pathfinder LWIR RP BIRD FPA 07/19
- Designed MWIR meta-lens 12/19
- Procured DROIC wafer, test dewar, etc. 03/20
- Completed material growth for MWIR & LWIR DFPAs 11/20
- Demonstrate single pixel meta-lens couple detectors 12/21
- Fabricate MWIR & LWIR DROIC FPAs 08/22
- Characterize LWIR & MWIR DROIC FPAs 10/22

**Co-Is/Partners:**

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**TRL**

- TRL_{in} = 2
- TRL_{current} = 3