The purpose of NASA’s Ionospheric Connection Explorer (ICON) mission is to explore how both terrestrial and space weather affect conditions in the ionosphere, the region of plasma forming the boundary between Earth and space. The ionosphere is energetically coupled to the thermosphere through collisions between ions, electrons, and neutral gas. These interactions often show extreme temporal and spatial variability, which can be disruptive to global positioning satellites (GPS) and radio communications.

The ICON payload consists of four highly sensitive instruments: 1) the Michelson Interferometer for Global High-Resolution Thermospheric Imaging (MIGHTI) to measure neutral winds and temperatures; 2) the Far Ultra-Violet Imaging Spectrograph (FUV) to measure daytime thermospheric and nighttime ionospheric density profiles; 3) the Extreme Ultra-Violet Imaging Spectrograph (EUV) to measure daytime ionospheric density profiles; and 4) the Ion Velocity Meter (IVM) to measure ion drift velocities, temperatures, and densities. ICON was launched on October 10, 2019, from Cape Canaveral Air Force Station in Florida.

The Space Dynamics Laboratory (SDL) developed Charge-Coupled Device (CCD) cameras for the MIGHTI and FUV instruments and led the payload integration and test (I&T) efforts. SDL has extensive experience flying space-qualified cameras, optical sensors, and electronics and brings this legacy of success in space to the ICON mission.

**SDL Contributions to ICON**

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SDL provided CCD camera systems for the MIGHTI and FUV instruments on ICON, which will make continuous limb-viewing observations of the Ionosphere-Thermosphere system. Image courtesy of UC Berkeley.

This image of the Earth’s limb, taken from the International Space Station, highlights various atmospheric emissions that will be observed by ICON. Image courtesy of NASA.
**MIGHTI**
SDL designed, fabricated, and tested the CCD cameras and control electronics for the MIGHTI instrument.

**KEY FEATURES OF THE MIGHTI CAMERAS:**
- 2048 × 2048 binnable CCD sensor
- Frame transfer, back-illuminated
- Synchronized camera systems
- Ultra-low system noise (10 e-)
- TEC-controlled

**FUV**
SDL designed, fabricated, and tested the two CCD camera systems for the FUV instrument.

**KEY FEATURES OF THE FUV CAMERAS:**
- 1024 × 1024 binnable, frame transfer CCD sensor
- UV converter for single photon detection at 136 & 155 nm
- Dual thermal zones to enable passive sensor cooling