Teledyne's Multi-User System for Earth Sensing (MUSES)

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Teledyne Technologies will launch the Multi-User System for Earth Sensing (MUSES) platform in August, 2016. MUSES will attach to the International Space Station (ISS) and is designed to host up to four robotically-installed Earth-observing instruments to return data for commercial, scientific, and humanitarian uses.

Teledyne retains ownership of the MUSES platform and instruments, retains MUSES instrument data rights, and controls all platform tasking. The instruments and platform will be operated through the Teledyne Tele-Science Center in Huntsville, Alabama, under a NOAA commercial imaging license.

MUSES instruments are launched separately from the platform for robotic installation, significantly reducing instrument development time and supporting on-orbit instrument change-out. This approach enables support of both long-term operational instruments and short-duration technology readiness enhancement missions.

The inertially stabilized pointing platform features a two-axis gimbal and provides a 50° field of regard in both along-track and cross-track directions. The platform agility and the ISS orbit support weekly revisit opportunities, enable studies of diurnal variations, and provide varying target aspect angles to support investigation of bidirectional reflectance distribution function effects.

The MUSES system acquires ISS-provided time and ephemeris, adds data from the on-platform Star Tracker and Miniature Inertial Measurement Unit, and then processes this data through a real-time Pointing and Control System (PCS). The PCS has been validated to support the pointing accuracy and pointing knowledge required for both in-flight operations and post-flight ground processing of earth imaging instruments.

Teledyne has established partnerships and agreements with leaders in the geospatial community to advance the state-of-the-art in commercial, humanitarian and scientific uses of remote sensing. We are negotiating a technical assistance agreement with USGS to aid in cross-calibration of our data with LANDSAT data. We have agreements with SERVIR and UNESCO to support humanitarian projects. We have an agreement with the University Remote Sensing Consortium of Alabama to support remote sensing research, instruction, and vicarious instrument calibration. Teledyne has teamed with the GeoCue Group for cloud-based image processing and distribution. We have partnered with DLR, the German Space Agency, to develop the DLR Earth Sensing Imaging Spectrometer (DESIS). DESIS provides a 30 meter pixel, 30 kilometer swath, imaging spectrometer. DESIS will launch in early 2017 and provides imagery from 400 to 1000 nm, recording 235 bands with a uniform 2.55 nm bandwidth. DESIS will provide well-calibrated hyperspectral data, using extensive pre-launch systematic, radiometric, spectral and geometric calibration and characterization combined with periodic on-orbit vicarious calibration and cross-calibration with LANDSAT and other instruments.

The MUSES platform will be the first space-based platform to provide on-orbit replaceable instruments – reducing development costs and schedules for operational and experimental earth sensing instruments. DLR’s imaging spectrometer on MUSES will provide the first commercially available space-based hyperspectral data from a production-class instrument for commercial, humanitarian, and research purposes.