

## Characterizing Debris in the Infrared with UKIRT

S. M. Lederer<sup>1\*</sup>, M. Jah<sup>2</sup>,  
R. Kendrick<sup>4</sup>, B. Buckalew<sup>3</sup>, J.M. Frith<sup>3</sup>, H. M. Cowardin<sup>3</sup>, M. Bold<sup>4</sup>

<sup>1</sup>NASA Orbital Debris Program Office, NASA/JSC, Houston, TX 77058, USA

<sup>2</sup>Air Force Research Labs

<sup>3</sup>JETS Jacobs Technology

<sup>4</sup>Lockheed Martin

### ABSTRACT

The United Kingdom Infrared Telescope (UKIRT) has been a major asset for the NASA Orbital Debris Program Office (OPDO) since March, 2014. With the UKIRT current contract coming to an end at the finish of FY15, there is a golden opportunity for this community to fund and gain access to UKIRT as an SSA asset through HCAR (Hawaii Center for Astronautics Research).

UKIRT is the only telescope on Mauna Kea dedicated to infrared bands. Spectral coverage ranges from the near- (0.8-5 $\mu$ m) to the mid- to far-infrared (8-25 $\mu$ m) regime. To date, debris observations have been collected with three instruments. Near-Infrared photometry with ZYJHK filters has been obtained with the Wide Field Camera (WFCam). Near-Infrared (1-2.5  $\mu$ m) spectra are the focus of observations taken with the UKIRT Imager Spectrometer (UIST). And Michelle (Mid Infrared escHELLE) is a thermal imager-spectrometer designed for the 8-25 $\mu$ m regime.

With 35% of the telescope time allocated to ODPO, a very steady stream of data has been collected on a variety of debris targets using all the above instrumentation. Initial results from WFCam were discussed at AMOS and NISOI including analyses on IDCSPs, the MSG cooler and baffle covers. The cylindrical HS-376 buses were the focus of recent WFCam runs. Summary analyses of these works will be presented. Focus will be given to initial results of the data collected with the Cassegrain instruments, UIST and Michelle. UIST spectra were collected in September 2014, March and April 2015. Targets included a suite of HS-376 buses, well suited to investigate the signatures of blue solar panels; several dead satellites with solar array wings; Titan 3C transtage debris; the CTA Array cover, and others. In addition, Michelle mid-IR photometry was collected on a select few objects during the April 2015 run.

Using WFCam, UIST and Michelle the Lockheed Martin has been observing operational satellites in the near- mid and far-infrared regime in an attempt to understand the health and status of several satellites that are based on the Lockheed Martin A2100 bus.

The potential insights into debris characterization using this range of assets, and early analyses will be discussed, as well as the opportunities possible for utilizing UKIRT as an SSA asset.