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6U CubeSat VERTECS: Data Downlink Pipeline

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What is the origin of the Extragalactic Background Light (EBL)? Observations have shown that the integrated light from individual galaxies in near-infrared is insufficient to explain the near-infrared EBL. Two candidates for the excess EBL light are first-generation stars and intra-halo light, which predict distinct EBL in the visible wavelength. To uncover the true origin of the EBL, precise measurements across the visible spectrum are essential. VERTECS (Visible Extragalactic background RadiaTion Exploration by CubeSat) is an astronomical 6U CubeSat designed to measure the EBL in the visible wavelength. It will survey over 40% of the sky, covering wavelengths from 0.4 to 0.8 microns. VERTECS will measure the blank sky intensity with four filters, then subtract the zodiacal light, diffuse Galactic light, and integrated starlight to get the EBL. In this work, we present the development of the data downlink pipeline of the VERTECS. During the data downlink process from the satellite to the ground station, missing or corrupted data may be encountered. Our data downlink pipeline will identify the missing and corrupted data, send commands to require the desired data again from the satellite, and convert the binary files into the widely-used format known as the Flexible Image Transport System (FITS). This pipeline ensures data integrity and accessibility by enabling error detection, data recovery, and conversion into the FITS format for scientific analysis.

Primary authors: ABDULLA, Hil Kafi (Kyutech); SANO, Kei (Kyutech); RAIHANA, Shams Islam Antara (Kyutech); YAMASAKI, Shotaro (NCHU); HASHIMOTO, Tetsuya (NCHU); GOTO, Tomo (IoA); Mr WADA, Tomoki (NCHU); Mr CHANG, William (NCHU); CHEN, Yu-An (NTHU)

Presenter: CHEN, Yu-An (NTHU)

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