

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

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FUTURE EO SYSTEM: THE FIRST VHR CCD CAMERA CONSTELLATION OF 138
MICROSATELLITE**Abstract**

The Earth observation (EO) market which has been driven by the era of smallsat development is expected to have 1,800 smallsats with the majority being 50 kg in the next decade. Future EO system is all about getting smaller, more compact with Very High Resolution (VHR) sensor at accessible cost.

This paper will introduce the new generation of a VHR microsatellite constellation developed by CGSTL and commercialized by HEAD. Currently, the DailyVision@1m constellation are composed of six on-orbit JL1-GF03B satellites providing daily revisit globally at 1m resolution. The constellation will be expanded: 35 JL satellites with confirmed launch schedule in 2021 and the full constellation with 138 satellites in 2023, offering global daily revisit of every 14 minutes at 1m resolution.

This microsat constellation will be composed of 45 kg State-Of-Art satellites. It is the first 1m microsatellite and the only one in the market using linear push-boom sensor instead of frame sensors, offering wide swath at 18km instead of market standard at 5 to 6km. The satellite has long strip continuous imaging capacity while traditional satellite imaging processing method is still applicable. The light satellite mass allows low manufacturing and launch cost, a cost-effective solution to operate a constellation.

This future EO constellation introduces technical improvements in optical sensor, propulsion system, deployable solar panels and array antenna. Those existing 50kg class satellites in the market are usually using CMOS sensors as the optical system required is smaller due to the smaller size of CMOS's pixel. This new generation of JL satellite is the first 1m microsatellite using CCD sensors which gives significantly better Signal-to-Noise Ratio (SNR) and Modulation Transfer Function (MTF), assuring the quality of the imaging system. High performance and ultra-compact Three Mirror Cassegrain (TMC) optical system is introduced to match the optical requirements from CCD sensors. This 45kg satellite carries propulsion system as well for constellation deployment and maintenance. The satellite is equipped with deployable solar panels generating more power instead of body mounted solar panels, allowing higher imaging capacity at higher downlink up to 600Mbps. In addition, it carries phase array antenna allowing imaging and downlinking simultaneously.