

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

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FUTURE EO SYSTEM: THE FIRST OPERATIONAL SUBMETER CCD CAMERA
CONSTELLATION WITH 138 MICROSATELLITES**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 an operational VHR microsatellite constellation, DailyVision constellation, after its successfully launch in 2021 and 2022. The constellation was developed by Chang Guang Satellite Technology Ltd. of China and commercialized by HEAD. Currently, the DailyVision constellation are composed of 19 on-orbit JL1-GF03A/B/D satellites providing up to 6 times a day revisit globally at ≤ 1 m GSD resolution. The last launch occurred on 27.02.2022 when a Long March rocket set in orbit 9 DailyVision satellites (from 03D10 to 03D18). The constellation will be expanded for a total of 138 satellites in 2023, which will offer the exceptional global revisit of every 14 minutes.

This DailyVision microsatellite is the first 0.75m resolution 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 ≤ 50 kg 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 Jilin 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.