

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

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OPTICAL NANOSATELLITE AND MICROSATELLITE MISSIONS WITH A NEW LEVEL OF  
PERFORMANCE**Abstract**

The Space Flight Laboratory (SFL) at the University of Toronto Institute for Aerospace Studies has been developing three state of the art optical instruments for nanosatellite and microsatellite. The first instrument is a 3 cm aperture telescope intended for bright-star photometry with an expected photometric accuracy of 0.1 percent, has a mass of less than 1 kg and a dimension of 190 mm by 65 mm by 65 mm. Six nanosatellites equipped with this instrument are scheduled to launch, two of which are awaiting launch at the end of February 2013. The second optical payload is a three-band, dual polarization, 6 cm aperture polarimetric instrument intended for atmospheric aerosol studies with an equivalent ground sampling distance of 38 m. This instrument is expected to have a polarimetric accuracy of better than 2 percent, has a mass of less than 5 kg and a dimension of 190 mm by 195 mm by 195 mm. The newest optical payload is a six-channel multi-spectral imaging instrument with a ground sampling distance of 2.8 m and 1080p Full-HD video capability. The first prototype of this instrument has a mass of 32 kg, a dimension of 600 mm by 280 mm by 280 mm. The first prototype has an optical MTF of better than 0.3 and has been designed to achieve a minimum SNR of 75. This paper outlines the expected performance of these optical payloads based on simulations and the implementation of each payload in their respective spacecraft. This paper further correlates the simulation results to ground test results.