

20th IAA SYMPOSIUM ON SPACE DEBRIS (A6)  
Space Debris Detection, Tracking and Characterization - SST (1)

Author: Mr. Andrew Jolley  
Western Sydney University, Australia, a.jolley@westernsydney.edu.au

Mr. Julian Rodriguez-Villamizar  
Astronomical Institute University of Bern (AIUB), Switzerland, julian.rodriguez@aiub.unibe.ch

Prof. Thomas Schildknecht  
SwissSpace Association, Switzerland, thomas.schildknecht@aiub.unibe.ch

Dr. Alexandre Marcireau  
Western Sydney University, Australia, a.marcireau@westernsydney.edu.au

Dr. Greg Cohen  
Western Sydney University, Australia, g.cohen@westernsydney.edu.au

LIGHTCURVE GENERATION USING NEUROMORPHIC EVENT-BASED SENSORS.

**Abstract**

Frame-based optical sensors have been used for many years to produce lightcurves of space objects, from which information about those objects may be inferred. A relatively new type of optical sensor, known as a neuromorphic, or event-based, sensor is gaining attention as a promising tool for space object detection and characterisation. Comprising an array of pixels that operate entirely independently and asynchronously, event-based sensors operate with microsecond temporal resolution, high dynamic range, and often with far lower data rates than frame-based sensors. A pixel in the array only outputs data when there is a change of brightness incident on that pixel that exceeds set, adjustable thresholds. We used a version of event-based sensor that outputs not only the time of each detected change in brightness, but also the measured brightness at the pixel after the change, to produce lightcurves of several satellites. The temporal resolution of the lightcurves that we produced varied from object to object, but in all cases there were many data per second. Furthermore, since the event-based sensor operates without a shutter or set exposure interval, sudden or short duration brightness changes are not missed during frame readout or smoothed by the effect of an exposure interval. The results demonstrate that event-based sensors have considerable potential as space situational awareness tools.