

28th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Earth Observation Missions (4)

Author: Mr. Andrew Haslehurst
Surrey Satellite Technology Ltd (SSTL), United Kingdom, a.haslehurst@sstl.co.uk

Mr. Alex da Silva Curiel
Surrey Satellite Technology Ltd (SSTL), United Kingdom, a.curiel@sstl.co.uk
Prof. Martin Sweeting
Surrey Satellite Technology Ltd (SSTL), United Kingdom, m.sweeting@sstl.co.uk
Mr. Andrew Cawthorne
Surrey Satellite Technology Ltd (SSTL), United Kingdom, a.cawthorne@sstl.co.uk

DARKCARB: AN INNOVATIVE INFRARED IMAGING SMALL SATELLITE MISSION

Abstract

DarkCarb is a pioneering Earth observation (EO) satellite, under development at Surrey Satellite Technology Ltd (SSTL), designed to acquire high resolution Mid Wave Infrared (MWIR) imagery and video from low Earth orbit. The mission will set a precedent in IR performance from a small and capable satellite platform while maintaining the SSTL cost effective approach thereby enabling a spacecraft price which makes building constellations, capable of delivering rapid re-visit and wide area coverage, an attractive and worthwhile commercial investment.

The DarkCarb satellite features an innovative low mass and volume MWIR imager which, when combined with the implementation of novel image enhancement algorithms, will achieve high quality 3.5m GSD imagery. Through innovative manufacturing techniques, optimized for production and rapid delivery of multiple instruments to meet constellation needs and a novel sensor architecture, the Darkcarb satellite will have a market leading performance for its size, weight and power.

The high spatial resolution MWIR imagery DarkCarb will deliver provides several key and complementary differentiators to visible imagery and therefore has the potential to become a high value data product for the EO market. MWIR imagery provides the capability to differentiate between objects and surfaces of different temperature and emissivity. As the detectable signal is only dependent on the temperature of the scene, DarkCarb also has the ability to extend imaging opportunities into the night.

The video capability allows information on highly dynamic features in scenes to be provided and will be of key interest for applications relating to human activity. DarkCarb also has the potential to assist with disaster support activities for wildfires, volcanic eruptions and flooding, for example, and may also provide utility in the mapping of heat islands in urban areas to support environmental activities that are threatening our world today through the detection of buildings or installations emitting a significant level of heat.

The DarkCarb mission is therefore a highly innovative development which has the potential to seriously disrupt the status quo of the commercial satellite imagery market by providing affordable high quality and high resolution MWIR data which will address a range of applications.

With the DarkCarb Imager currently in production this paper will showcase the development to date with initial results from recent airborne flight trials and further explain the details of the unique mission design which has been designed to meet the market need for responsive delivery at the right price.