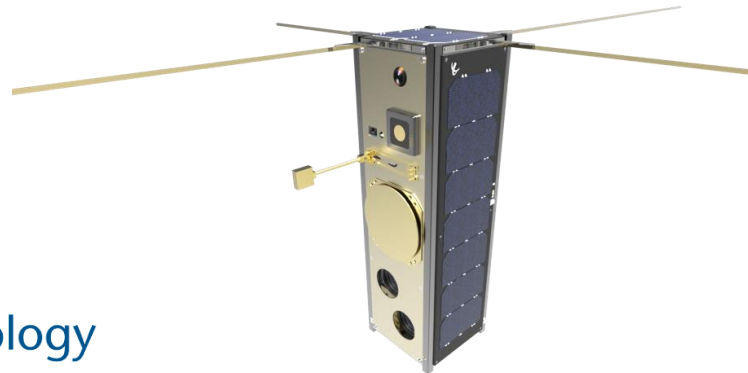


ZACube-2 - Launch and Early Operations Phase

16th Annual CubeSat Developers Workshop
San Luis Obispo, 23 - 25 April
Leon Steenkamp, Robert van Zyl



Cape Peninsula
University of Technology



CPUT Satellite Programme



- Near Cape Town in South Africa
- Satellite programme established in 2009
- The only University of Technology in the Western Cape
- The largest university in the Western Cape, 32 000 students
- Merger of two technikons in 2005 – we are only 14 years young!



Workshops



F'SATI

Industry Seminar

Series 2012



Thematic areas:

- Value proposition and business opportunities
- Emerging technologies
- Applications
- Quality assurance
- STEM education and awareness

Abstract deadline:
17 October

Cape Peninsula
University of Technology

Bellville Campus

fsati@cput.ac.za | cput.ac.za/fsati



CUBES
FOR AFRICA

First Call

24-26 FEB 2016

Cape Town

- Emerging & Disruptive Technologies
- Value Proposition & Business Opportunities
- Human Capacity Development
- Applications for Sustainability and Prosperity
- STEM Education & Awareness
- Space Governance & Policies

✉ fsati@cput.ac.za

🐦 #IACW2016

3RD INTERNATIONAL AFRICAN CUBESAT WORKSHOP 2016



Facilities

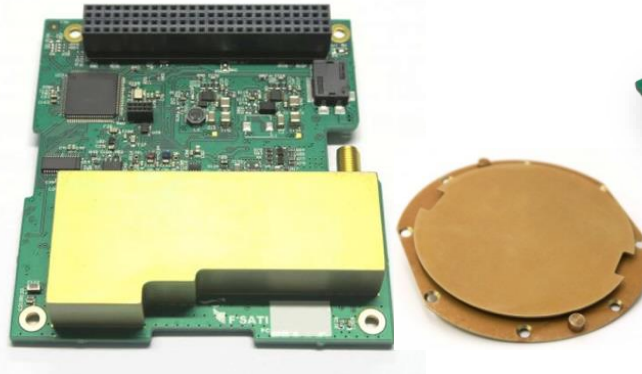


What we do

Technology innovation | Subsystems Payloads Missions



UHF/VHF and UHF/UHF Transceivers
(Amateur and commercial)



S-band Transmitter and Antenna
(Amateur and commercial)

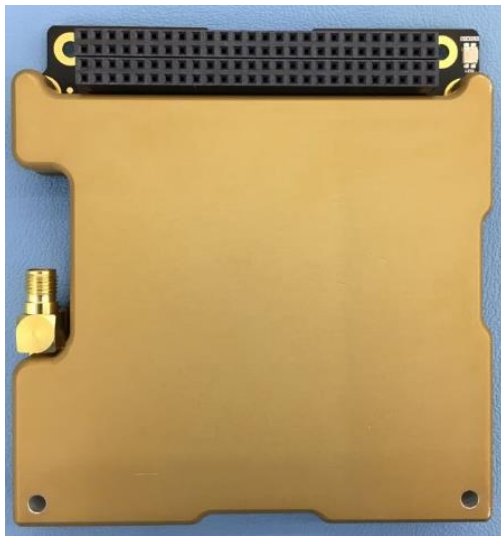


X-band Transmitter and Antenna
(Commercial)

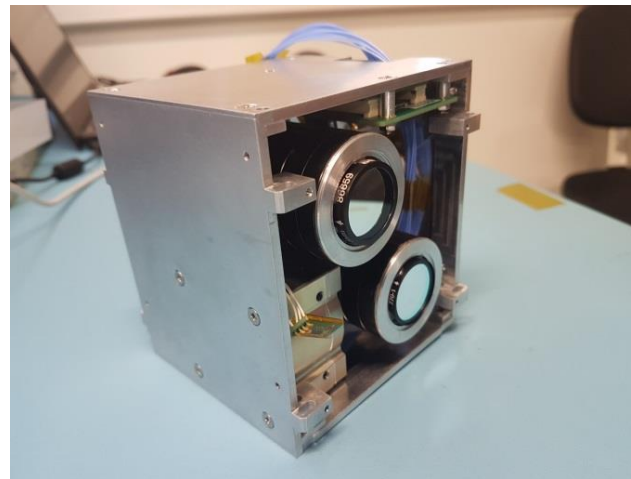


What we do

Technology innovation | Subsystems Payloads Missions



SDR for ship tracking AIS/VDES receiver
(Phakisa)

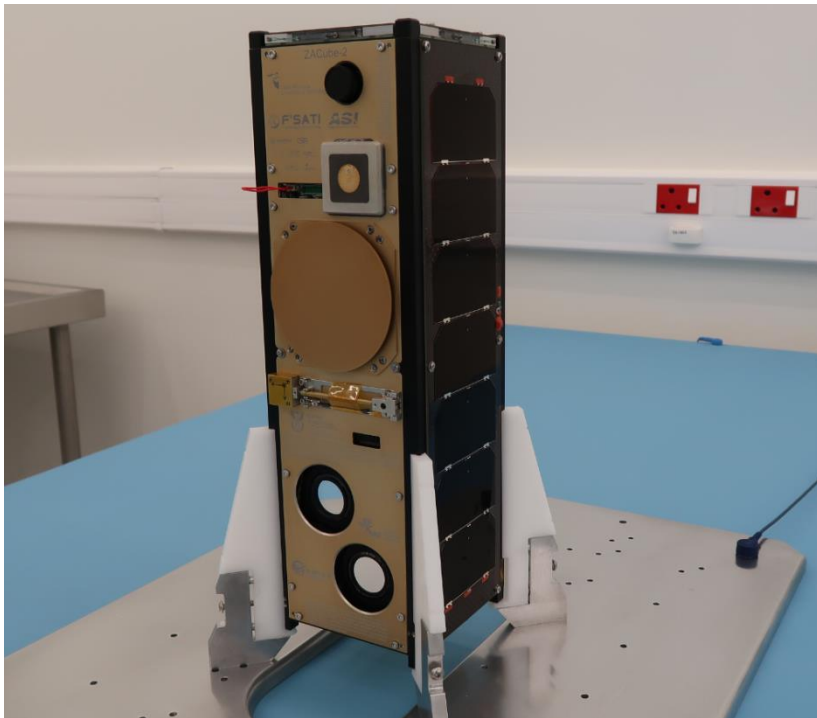


Fire detection camera (ZACube-2)



What we do

Technology innovation | Subsystems Payloads Missions



ZACube-2

(Launched 27 December 2018)



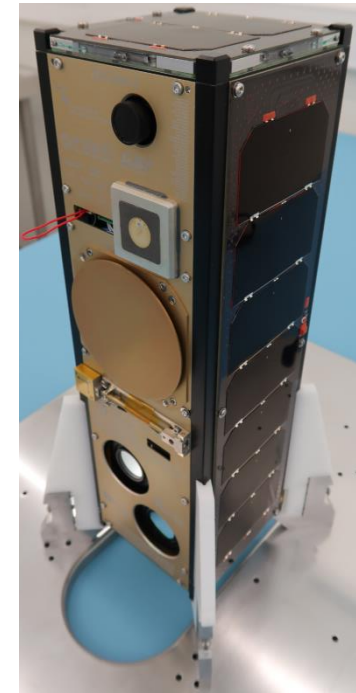
ZACUBE-1 / "TshepisoSAT"
Launched 21 November 2013

Phakisa Phase 1 | ZACube-2



Mission Objectives

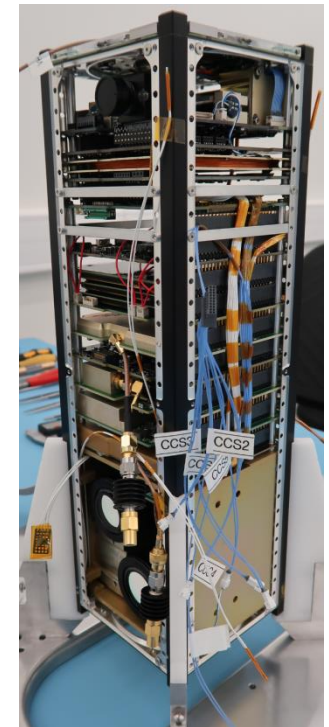
- Precursor to MDASat constellation
- Technology demonstration of AIS/VDE message reception using the primary payload
- Technology demonstration of a medium resolution imager payload



Phakisa Phase 1 | ZACube-2



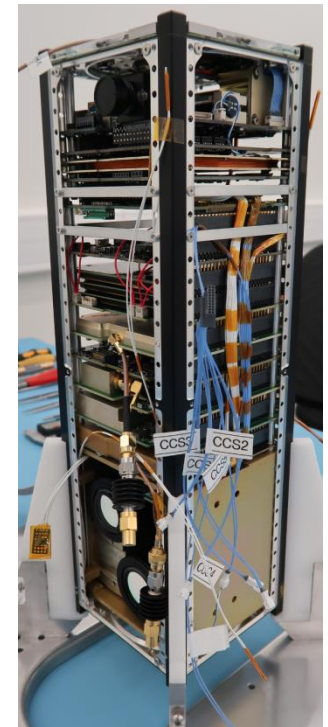
- Software Defined Radio AIS/VDES receiver
- K-line fire detection imager



Phakisa Phase 1 | ZACube-2



- CPUT UHF/UHF telemetry and tele-command transceiver (UTRX)
- Two CPUT payload data transmitters
 - S-band HSTX (10 Mbit/s)
 - X-band XTX (50 Mbit/s)
- CubeSpace ADCS 3-Axis stabilised
- SPACETE@ Mission Control System (MCS)
- In-flight reprogrammable



Phakisa Phase 2 | MDASat

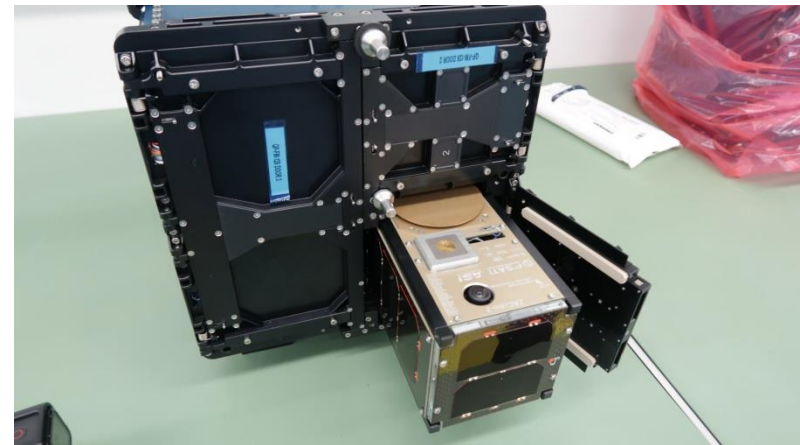
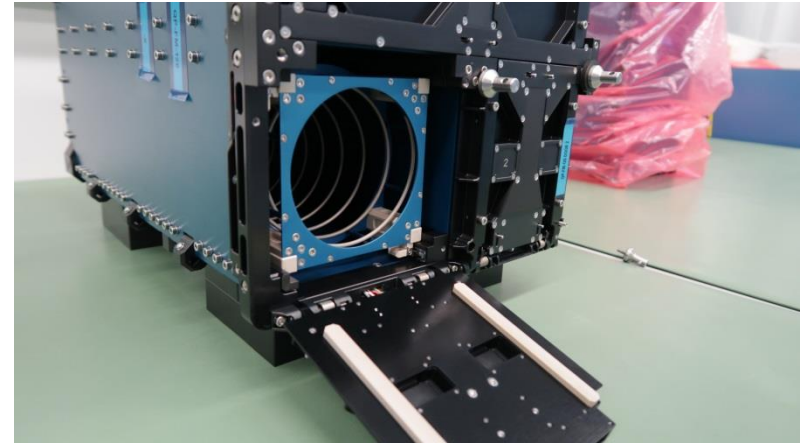
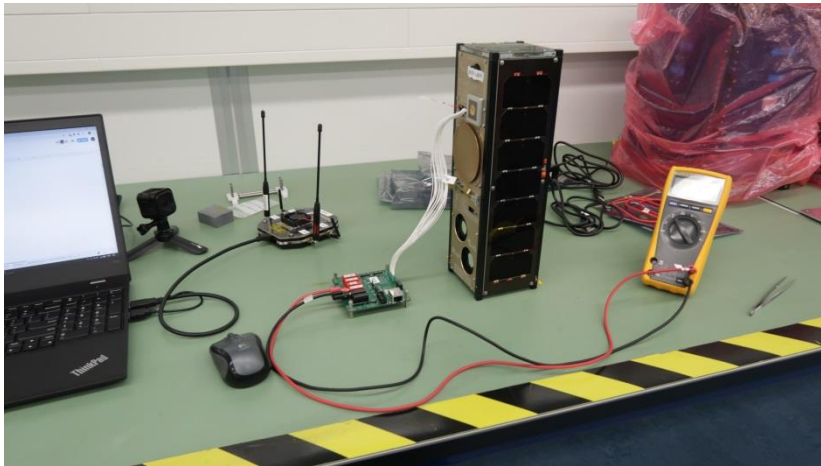


- Maritime Domain Awareness constellation
- Collection of statistical data in the South African maritime zone, with a special focus on vessel detection.
- The primary geographic focus is the coastal waters of South Africa but also offers MDA expansion to a global scale.
- Three satellite constellation funded



Checkout and integration

- Innovative Space Logistics (ISL) in Delft, Netherlands



Launch

- 27 December 2018 02:07:00 UTC
from the Vostochny Cosmodrome



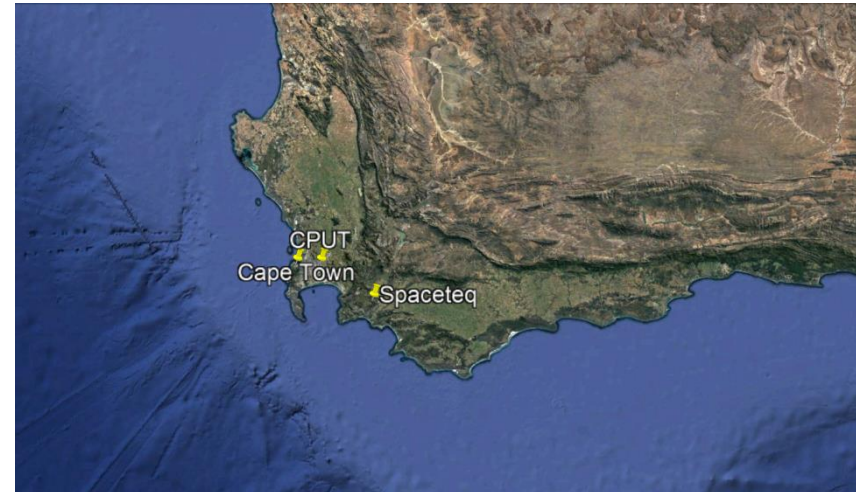
Launch - Soyuz

- 27 December 2018 02:07:00 UTC
from the Vostochny Cosmodrome



Ground stations

- CPUT Bellville Campus
- Spaceteq at Houteq near Grabouw



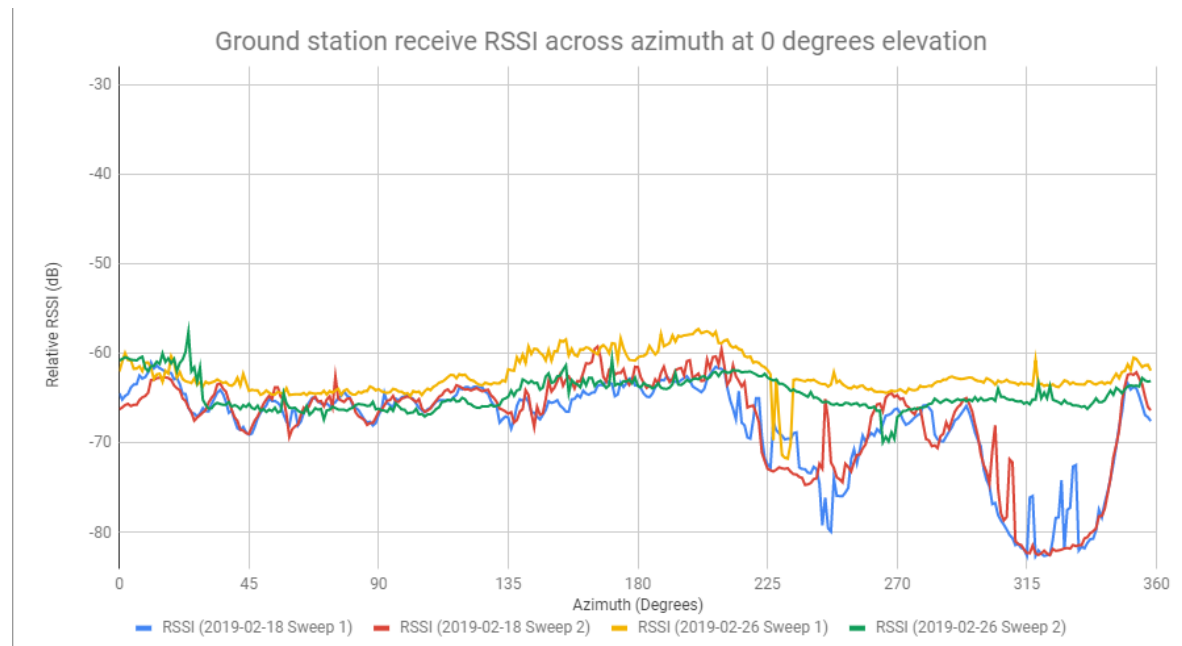
CPUT Ground Station

- Custom ground station
- FUNcube dongle Pro Plus *
- ETTUS USRP SDR
- GNURadio
- Spaceteq MCS
- Load shedding
- RF interference



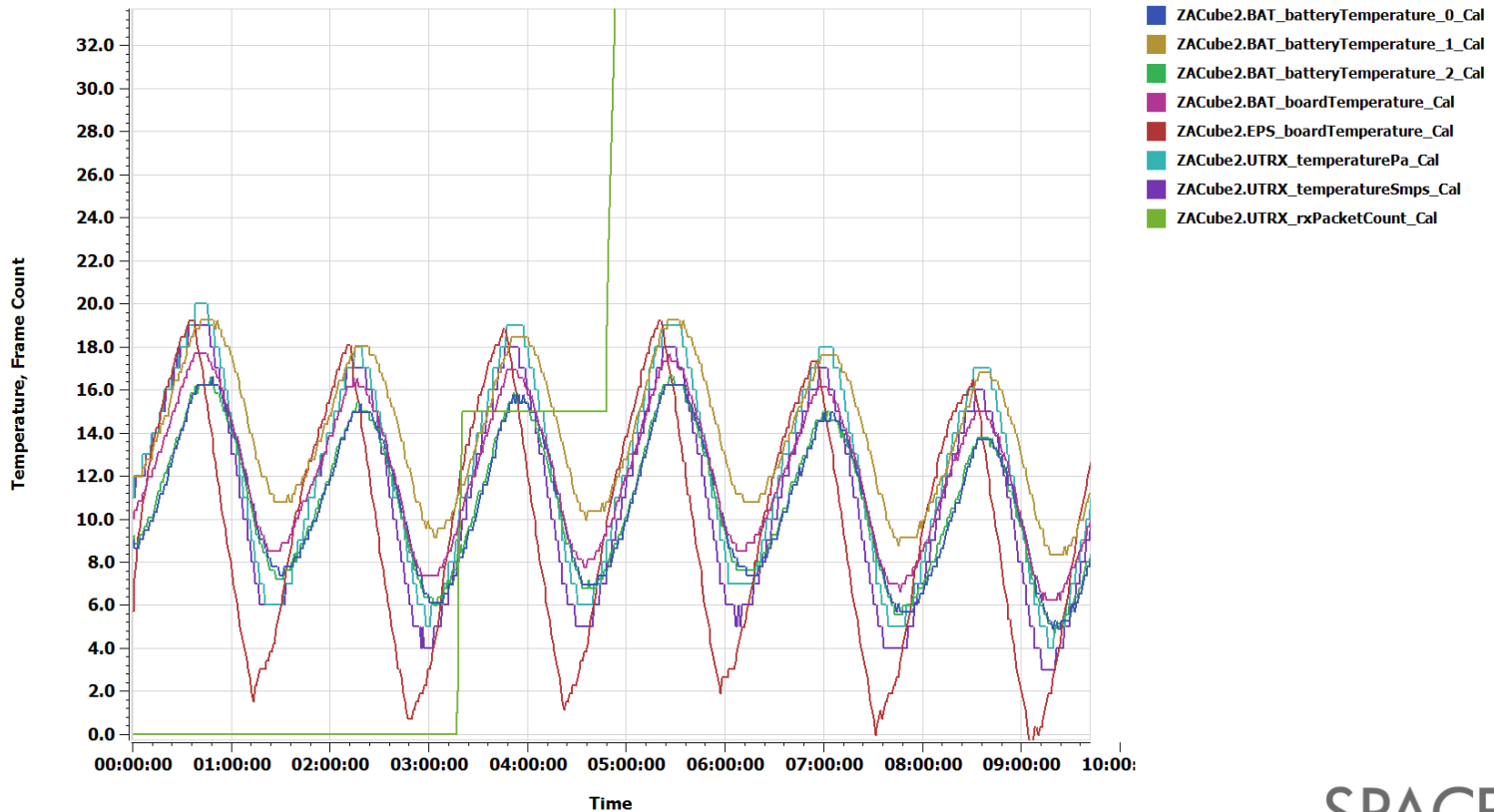
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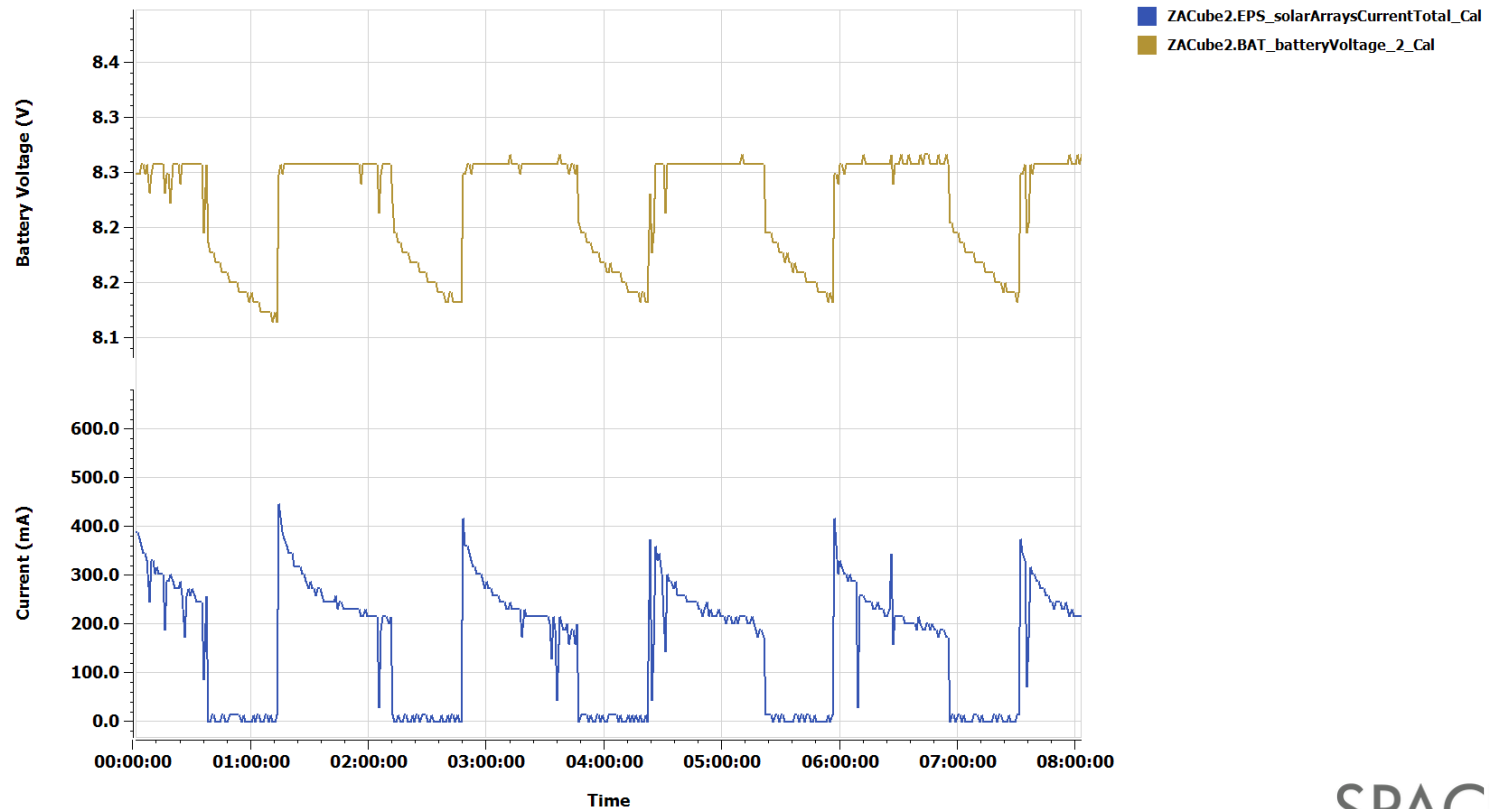
ZACube-2 Platform data

- Whole orbit data



ZACube-2 Platform data

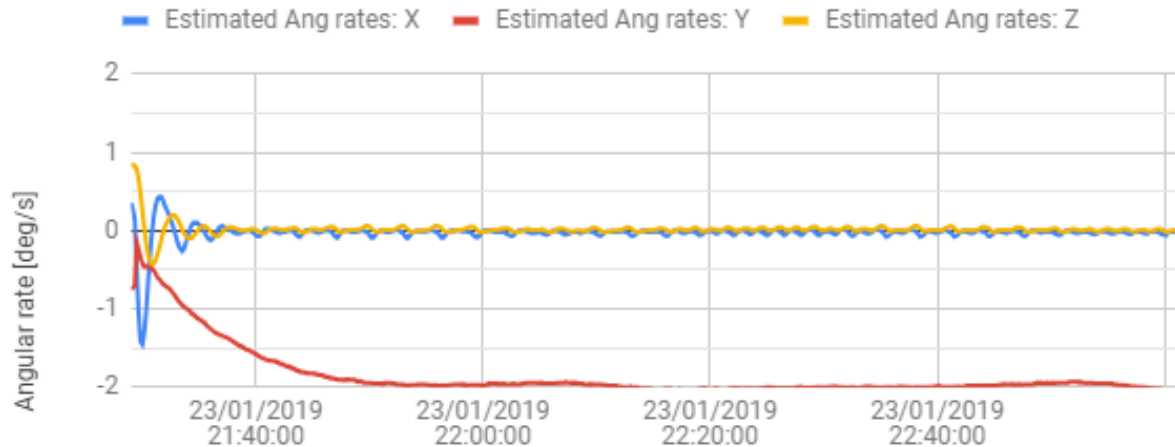
- Whole orbit data



ZACube-2 Platform data

- ADCS commissioning

Estimated Ang rates: X, Estimated Ang rates: Y and Estimated Ang rates: Z

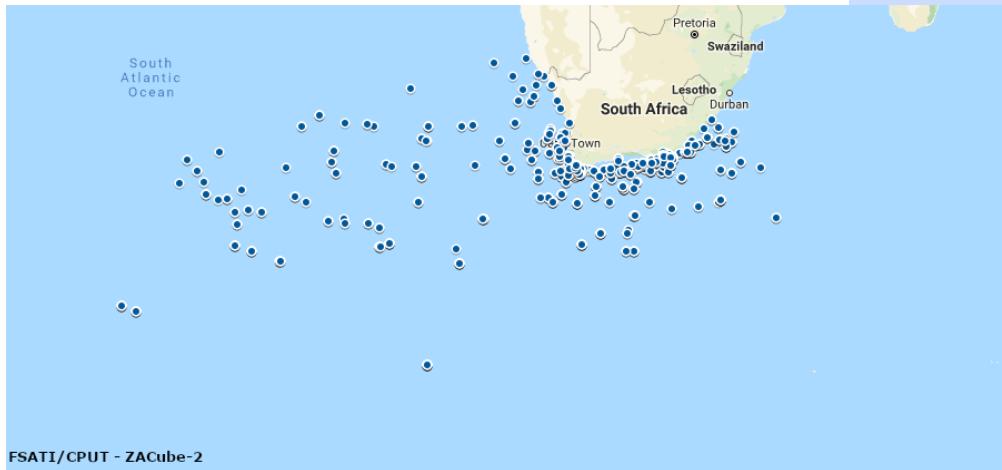
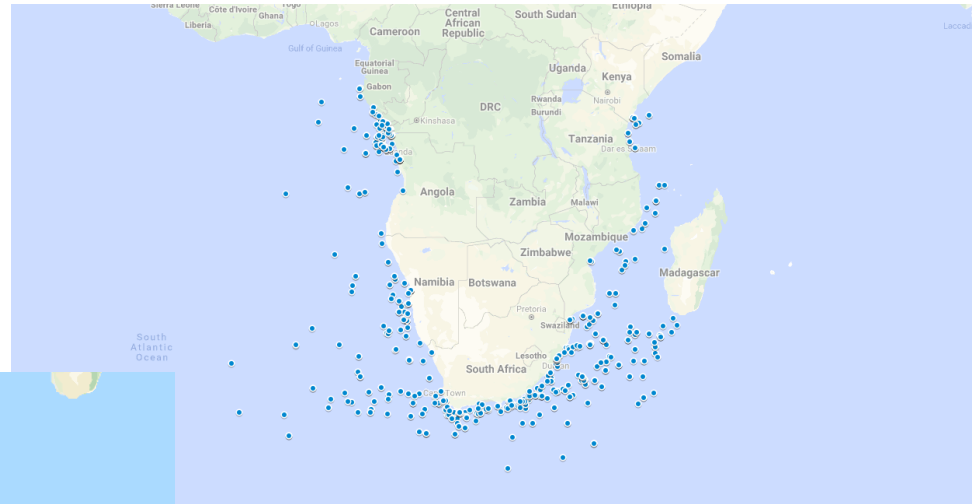


Datetime



SDR AIS receiver payload data

- Preliminary data



FSATI/CPUT - ZACube-2

K-line imager payload data

- Preliminary data



Phakisa Phase 2 | Partners

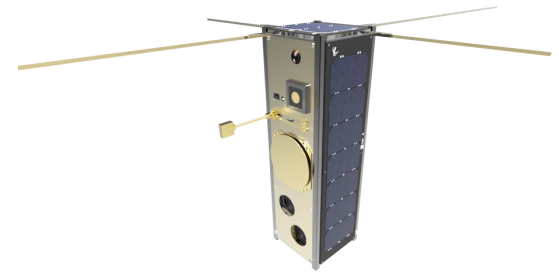
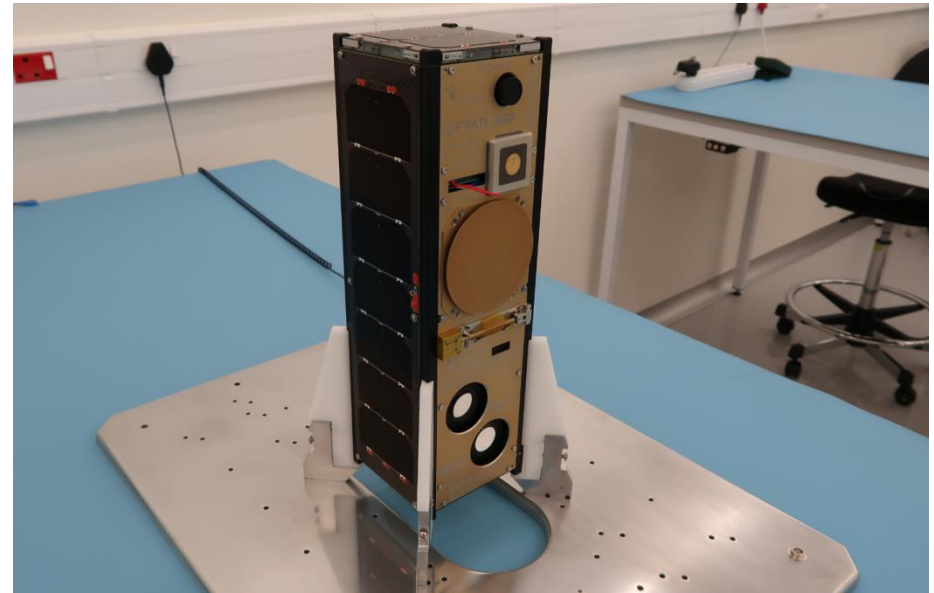


Thank you

 fsatispace

<http://www.cput.ac.za/fsati>

French South African Institute of Technology



F'SATI
French South African Institute of Technology

title

- text

FireSat

- UK Space Agency International Partnership Programme
- Global fire detection services

