The First African CubeSat, ZACUBE-01

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Overview

• The F’SATI satellite programme

• 1U CubeSat Mission
  – Mission
  – Objectives
  – Subsystems
  – Design Challenges

• Other Projects
Phase 1:
Academic coursework

Phase 2:
Research project
(prototype design)

Phase 3:
Engineers in Training
Programme
(flight model)
Engineers In Training Program

- 8 Engineers in Training
- Main Objective – Design and build a 1U CubeSat in 1 Year
Define a Mission

- SANSA: Space Science – South African National Space Agency
- Space Weather Monitoring
- Ionospheric Studies
• Super Dual Auroral Radar Network
• Ionospheric Studies
• Radars in Northern and Southern Hemisphere
• HF Frequency Bands (8 to 22 MHz)
• Calibration of SANAE Base Radar System
SANSA: Space Science Cape Town

SANAE Base Antarctica
SANAE Base Antarctica
SuperDARN Radar Antennas
Mission Challenges

- Orbit Inclination
Mission Challenges

• HF Frequency Range
Lowest Frequency: 8 MHz
Mission Challenges

• HF Frequency Range
  – Received Licensing for 14.099 MHz

• Antenna
  – 14.099 MHz
  – Full Wavelength: 21.28 m or 69.81 ft
  – Monopole Length: 5.32 m or 17.45 ft
ZACUBE-01 Specifications

• Bought in Items:
  – 1U Structure
  – Clyde Space EPS, Battery & Solar Panels
  – ISIS VHF/UHF Antenna
  – Pumpkin OBC
ZACUBE-01 Specifications

• In-House Developed Subsystems:
  – VHF/UHF Transceiver
    • 145.86 MHz Uplink
    • 437.345 MHz Downlink
  – Payload Board
    • HF Beacon Transmitter
    • ADCS
    • Camera Payload
  – HF Antenna Deployment Mechanism
- VHF/UHF Antenna
- Antenna Deployment Mechanism
- ADCS/camera/HF Beacon
- EPS & Battery
- VHF/UHF Transceiver
- OBC
- Deployable Magnetometer
Completed:
  – Camera, HF Beacon, ADCS

Work in Progress:
  – Mechanical Manufacturing
  – VHF/UHF Transceiver
  – Flight Software

Launching 2012
Other Projects: CanSats
Other Projects - STX

- 2.4 – 2.48 GHz
- 1 Watt RF Power
- 2 Mbps Data Rate
- 6 W Power Consumption
- QPSK Modulation
Ground Station
IAC and CubeSat Workshop

- International Astronautical Congress
  - Cape Town International Convention Centre
  - 3 - 7 October 2011

- 1st International African Cubesat Workshop
  - 30 September to 2 October

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Thank You!

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