



Welcome to 12th Virtual UNISEC-Global Meeting

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The story of Space in Africa

- **14 African Countries have a total of 41 orbiting satellites:**
Egypt (9), South Africa (8), Algeria (7), Nigeria (6), Morocco (3), Ghana, Sudan, Ethiopia, Angola, Kenya, Rwanda, Mauritius, Tunisia
- **Only 11 orbiting Satellites build in Africa:**
2 Microsatellites: South Africa
9 CubeSats: South Africa (1U, 2 x 2U, 3U), Mauritius (1U), Kenya (1U), Rwanda (3U), Egypt (2 x 1U)
- **Other 30 Satellites build as multi-lateral projects: 3 GEO Comsats & 27 LEO Earth Observation micro/mini-satellites and Educational CubeSats** by France, UK, Japan, Italy, China, Ukraine, Russia
- **20 African Countries have Space Programs/Space Agencies**



11 African Country POCs out of 54 UNISEC-Global



POC in 54 regions: Algeria, Argentina, Bangladesh, Belarus, Bolivia, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Egypt, Ethiopia, Germany, Ghana, Guatemala, El Salvador, India, Indonesia, Italy, Japan, Kenya, Lebanon, Lithuania, Luxemburg, Malaysia, Mexico, Mongolia, Morocco, Nepal, New Zealand, Nigeria, Oman, Peru, the Philippines, Saudi Arabia, Singapore, Samara, Slovenia, South Korea, Serbia, Spain, South Africa/Angola/Namibia, Sudan, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Ukraine, USA and Vietnam



(Local Chapters are written in Red)

21 Local Chapters,
54 Points of Contact,
188 university members,
7 corporate members



CLTP History & Participants (1)



96 participants from 46 countries

CLTP1 (Wakayama Univ. in Feb-March, 2011)

12 participants from 10 countries, **Algeria**, Australia, **Egypt**, Guatemala, Mexico, **Nigeria**, Peru, Sri Lanka, Turkey (3), Vietnam.

CLTP2 (Nihon Univ. in Nov-Dec, 2011)

10 participants from 10 countries, Indonesia, Malaysia, **Nigeria**, Vietnam, **Ghana**, Peru, Singapore, Mongolia, Thailand, Turkey.

CLTP3 (Tokyo Metropolitan Univ. in July-August, 2012)

10 participants from 9 countries, **Egypt (2)**, **Nigeria**, **Namibia**, Turkey, Lithuania, Mongolia, Israel, Philippines, Brazil.

< 2013~2016: iCanSat kit CLTP4-7 >

CLTP4 (Keio Univ. in July-August, 2013)

9 participants from 6 countries, Mexico(4), **Angola**, Mongolia, The Philippines, Bangladesh, Japan.

CLTP5 (Hokkaido Univ. in Sept 8-19, 2014)

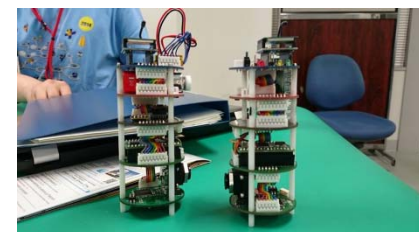
7 participants from 5 countries, Korea (2), Peru, Mongolia, Mexico (2), Egypt.

CLTP6(Hokkaido Univ. in August 24-Sept4, 2015)

8 participants from 8 countries, namely Angola, UN(Austria), New Zealand, **Tunisia**, Turkey, **Egypt**, Bangladesh, Mexico

CLTP7 (Hokkaido Univ. in Sep 21-Oct 1, 2016)

8 from 7 countries, namely **Egypt**, Myanmar, Peru, Nepal (2), Mongolia, Serbia, Dominican Republic





CLTP History & Participants (2)



96 participants from 46 countries

< 2017~2019: HEPTA-Sat Kit: CLTP8-10 >

CLTP8 (Nihon Univ. in Sep 7-Sep 16, 2017)

9 from 7 countries, namely Bolivia, **Egypt**, El Salvador, Malaysia, Nepal, Turkey (+Japanese Students)

CLTP9 (Nihon Univ. in August 20- August 31, 2018)

8 from 6 countries, namely Argentina, India, Japan, Malaysia, Mongolia, UAE (+Japanese participants for 3-day teaching practice)

CLTP10 (Nihon Univ. in August 19-August 30, 2019)

15 from 11 countries, namely Australia, Bhutan, Bulgaria, Cambodia, Colombia, **Kenya**, **Morocco**, Myanmar, Peru, **Rwanda**, **Zimbabwe**





HEPTA-Sat Training History



- **Ghana**, Feb. 2015.
- **Angola**, Oct. 2015.
- Japan (CLTP8), Sep. 2017.
- Bulgaria, Oct. 2017.
- Nepal, Nov. 2017.
- **South Africa**, UN Workshop, Dec. 2017.
- UAE, March 2018
- Japan (CLTP9), Sep. 2018
- France (ISU-SSP), Nov, 2018
- Oman, Dec 2018
- Australia (ISU-SHSSP), Jan 2019
- Japan (CLTP10), Sep. 2019
- **Kenya**, Nov 2019
- Australia (ISU-SHSSP), Jan 2020
- Japan (Kyoto Univ), May 2020



Ghana



Angola



Japan



Bulgaria



Nepal



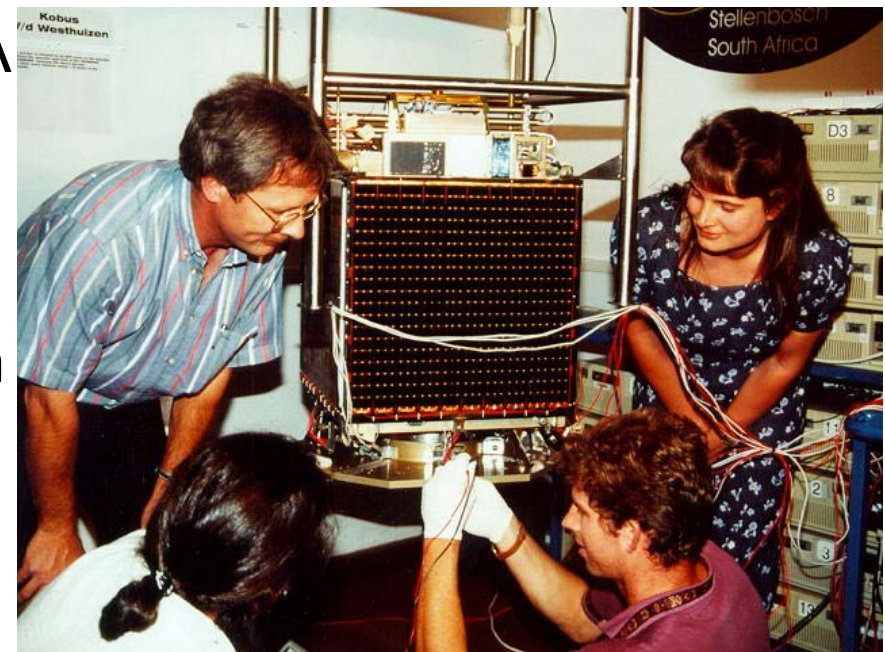
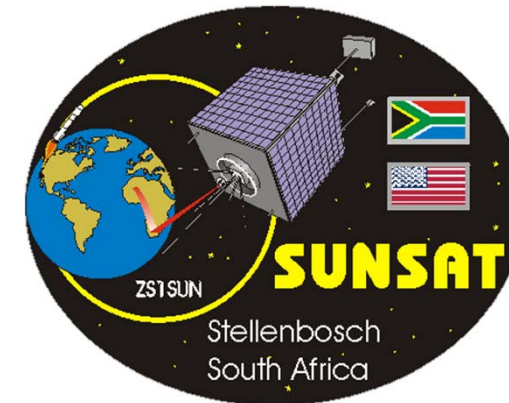
South Africa



SUNSAT Birth



- SUNSAT student project in E&E Eng Department of Stellenbosch University started in 1992
- Aims were to:
 - Train engineers for a future SA space industry
 - Challenge graduate students
 - Inspire school kids in science
 - Have international cooperation
 - Get sponsorships from SA industry

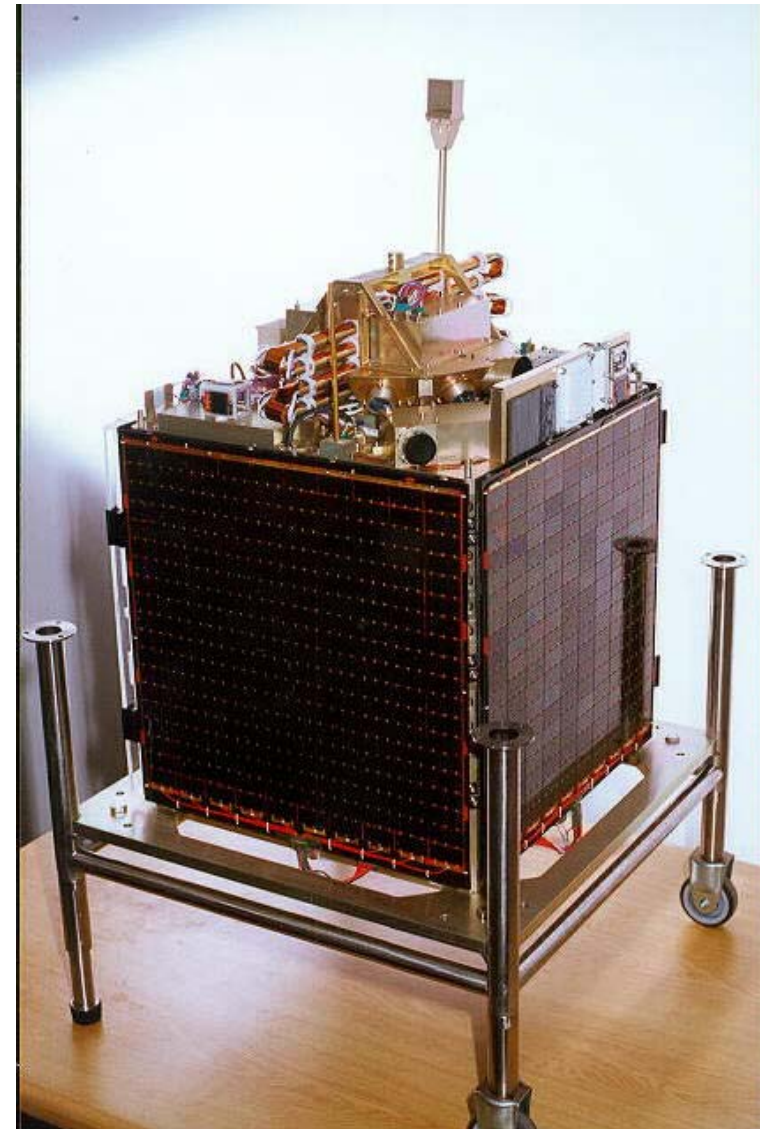




SUNSAT Project

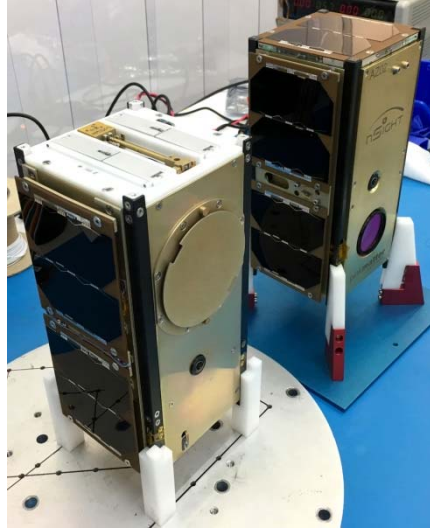


- Africa's first indigenous (locally built) orbiting satellite
- Satellite was designed and developed without any technology transfer help
- Developed by graduate students and staff in period 1992-1998
- Produce more than 100 Masters and PhD degrees
- First microsatellite (64kg) with SPOT-5 type 3-band multispectral imager
- 3456 pixel push-broom sensor giving a 52 km swath and 15 m GSD from 800 km

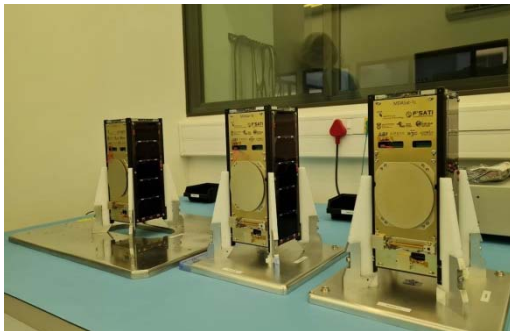




SA University CubeSats



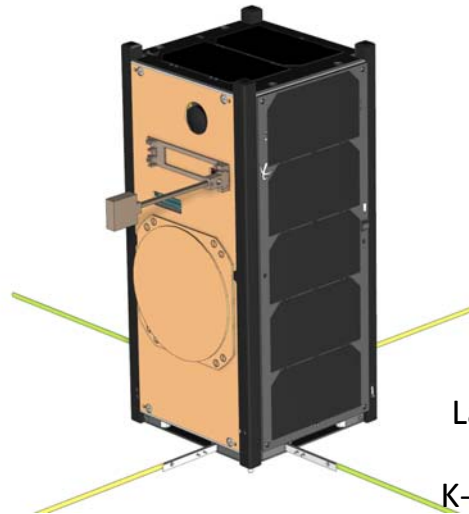
ZA-AeroSat & nSight-1 (2U)
Launched Apr/May 2017
QB50 Science Fipex sensor
CubeStar star tracker
Gecko CubeSat imager



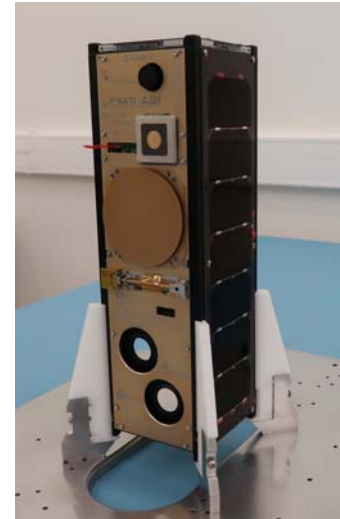
MDASat-1, -2, -3 (2U)
Launch December 2021
SDR for AIS and VDES services



ZACube-1 (1U)
Launched 21 November 2013



ZACube-2 (3U)
Launched 27 December 2018
SDR for AIS data
K-line imager for fire detection





Conclusions



- 20 African countries are currently involved in space
- Not a lot of university educational space training available
- PAN African University of the African Union with a Space Sciences Institute will be established in South Africa, still a lot of political issues to solve, i.e. source of funding
- Several countries already have technology transfer activities with some spacefaring countries, educational and governmental for EO and GEO communication satellites
- UNISEC Global made a big contribution through CLTP, HEPTA-Sat workshops, the Birds CubeSat missions and graduate student training in Japan

Thank You !