An Overview of Small Satellite Activities in South Africa

Prof WH Steyn
University of Stellenbosch, South Africa

Abstract

The Electronic Systems Laboratory (ESL) within the Faculty of Engineering at Stellenbosch University (SU) started a microsatellite program in 1992 to build Africa's first satellite successfully launched and operated in low earth orbit. More than 100 Masters and PhD students developed SUNSAT-1, a highly capable 60 kg microsatellite with full 3-axis control and as main payload a 3-colour pushbroom imager with a ground resolution of 15 meter. SUNSAT-1 was launched as a piggyback payload in February 1999 on an USAF Delta rocket. The satellite was commissioned and operated from the ground station at the ESL for a period of 2 years. The last communication took place during the end of January 2001, then the satellite stopped responding to ground commands.

In 2001 an university spin-off company SunSpace and Informations Systems (Ltd) was established to commercialise the technology developed during the SUNSAT program. A 200 kg earth observation minisatellite was developed for an international customer. The satellite with a 3-colour multispectral pushbroom imager was completed and shipped ready for launch in 2005. The launch finally took place in April 2007 from a Russian Dnepr launch vehicle and the satellite was successfully commissioned and still currently operated successfully in a 650 km sun-synchronous orbit.

The South African government Department of Science and Technology (DST) sponsored the development of South Africa and Africa's second indigenous 83 kg microsatellite SumbandilaSAT. The name came from a word in the local Venda language meaning "lead the way". The satellite was developed and build by SunSpace and SU was tasked by DST to do the project management and technical supervision. The satellite was ready for launch within two years, but due to launch delays only delivered into orbit by a Soyuz-2 rocket with a Fregat final stage on the 17th of September 2009. SumbandilaSAT was commissioned successfully in a 505 km sun-synchronous orbit and is currently scheduled on a daily basis to take high quality, 6.25 meter GSD, 6-colour multispectral images of 60 km by 50 km each.

The Cape Town University of Technology (CPUT) and the SU started a Cubesat student program in 2009, with the aim to develop a 3-U Cubesat for launch within a 3 year time frame. The aim will be to train more than 40 students in the field of satellite engineering and focus their project work into the development of novel Cubesat systems.