



UNITED NATIONS
Office for Outer Space Affairs

CLTP 6 – Final Report

Werner Balogh
United Nations Office for Outer Space Affairs
Vienna, Austria

Sixth CanSat Leader Training Programme (CLTP6)
Hokkaido, Japan
24 August – 4 September 2015

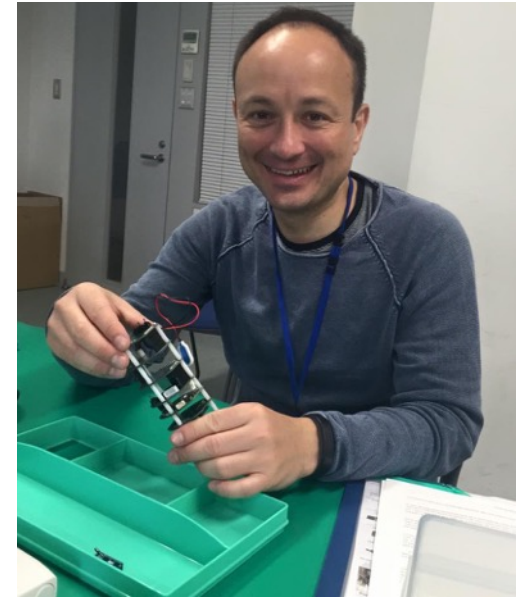
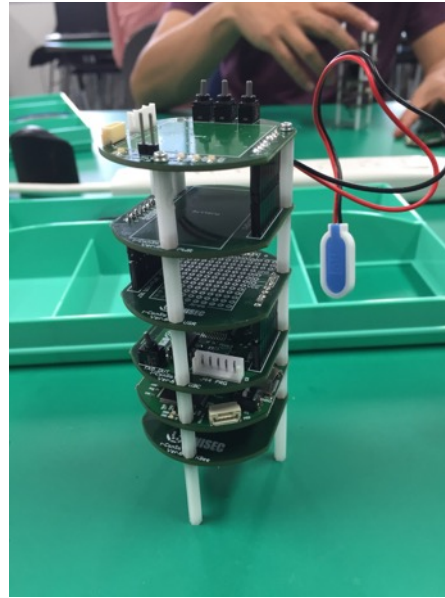
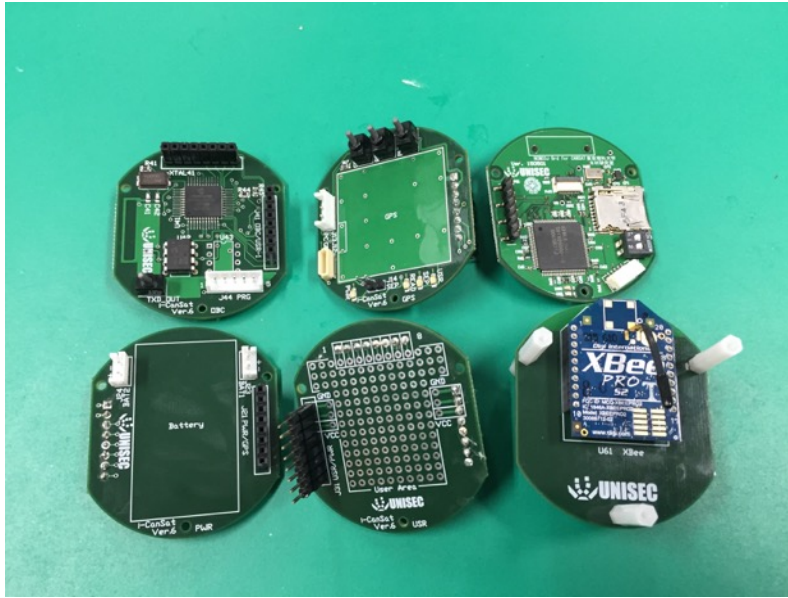
Sixth CanSat Leader Training Programme

- The Sixth CanSat Leader Training Programme (CLTP) was held from 24 August to 4 September 2015 in Hokkaido Japan
- Preceded by preparatory online lectures in July-August 2015
- 8 Participants from Angola, Austria, Bangladesh, Egypt, Mexico, New Zealand, Tunisia, Turkey
- UNOOSA provided sponsorship support to 4 participants
- Lectures, CanSat assembly and testing took place at Hokkaido University in Sapporo
- Rocket assembly and CanSat launch were conducted at Uematsu Electric Co., Ltd in Akabira
- See <http://cltp.info> for detailed information on CLTP

Statement of Purpose

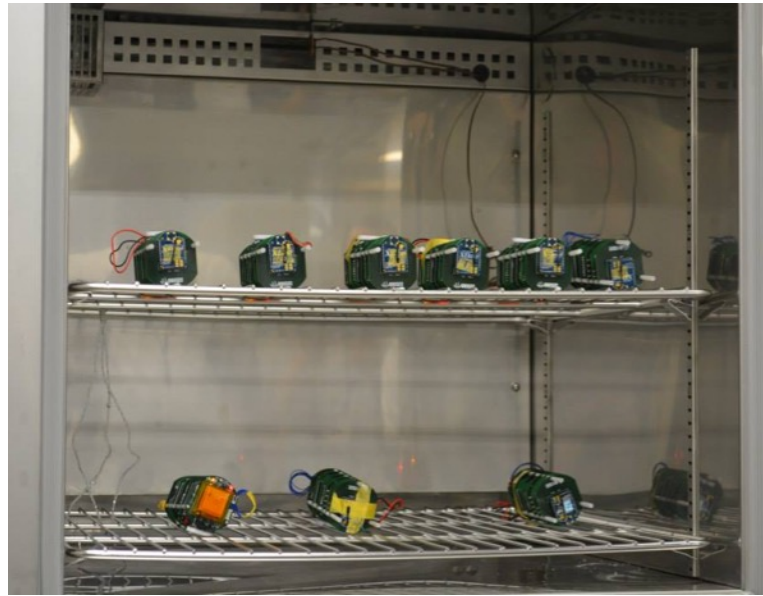
- I participated in CLTP 6 to learn more about how CanSat activities could be used for entry-level space engineering education and capacity building.
- The Office for Outer Space Affairs (UNOOSA) under the Basic Space Technology Initiative (BSTI) of the United Nations Programme on Space Applications conducts several activities to support space technology development capacity building (see <http://www.unoosa.org/oosa/en/ourwork/psa/bsti/index.html>).
- One particular goal of the BSTI is to develop an Education Curriculum on Space Engineering.
- CanSat development could be one of the recommended hands-on training activities included in such a curriculum.

CanSat Kit Assembly



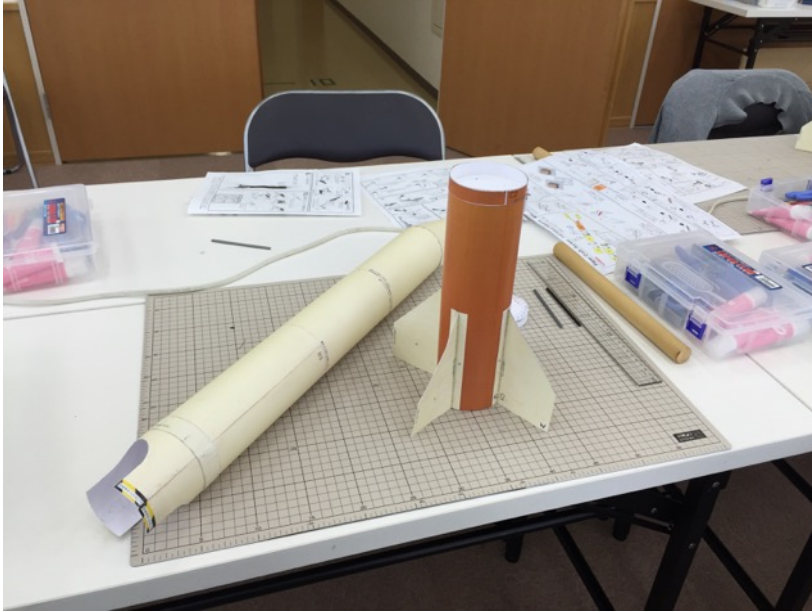
- CLTP6 used i-CanSat kit Version 6 consisting of six boards: 1) GPS, 2) Power, 3) User, 4) On-Board Computer, 5) Camera, 6) Communication (Xbee)
- Resembling a subset of the subsystems of a nano-satellite
- User Board allows to integrate various sensors and I chose to include a 3-axis accelerometer to measure launch loads

CanSat Testing



- CanSat housing consists of a 500ml pet bottle
- Parachutes were constructed using strings and trash bag
- The readily assembled CanSats were submitted to
 - Mechanical Vibration and Shock Testing
 - Thermal Testing (running various temperature profiles)
 - Drop Tests (parachute configuration test)

Rocket Assembly and Launch

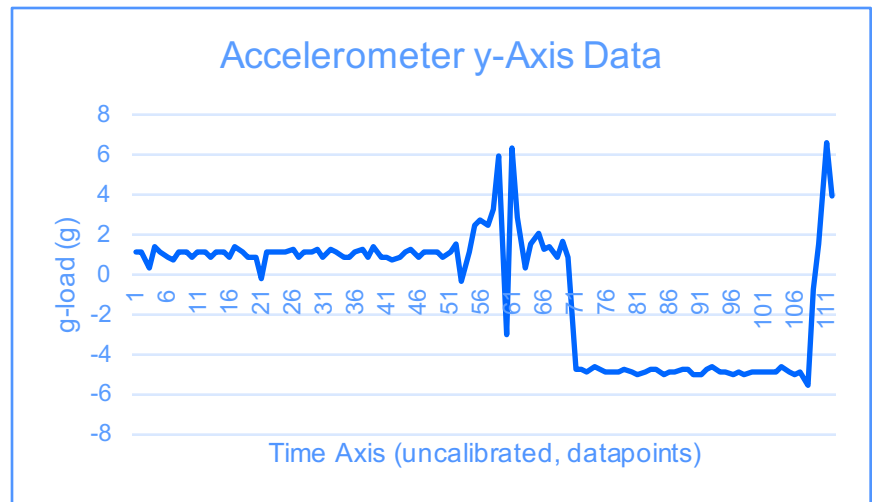
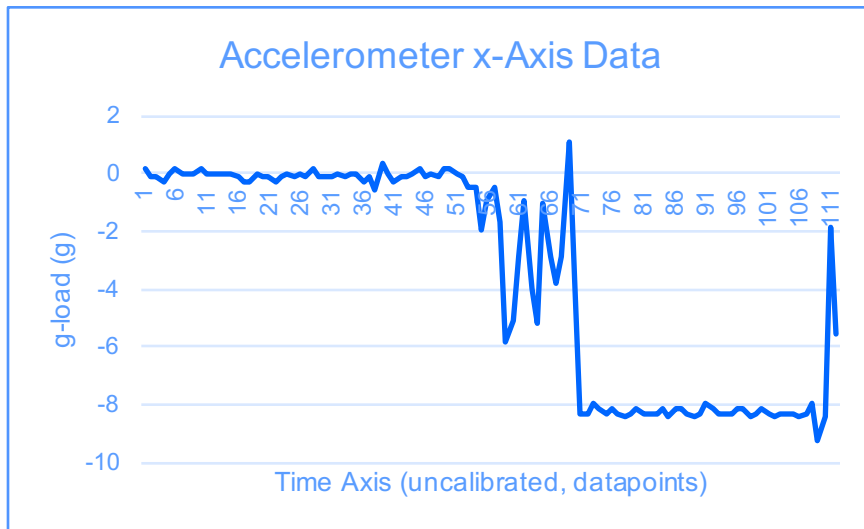
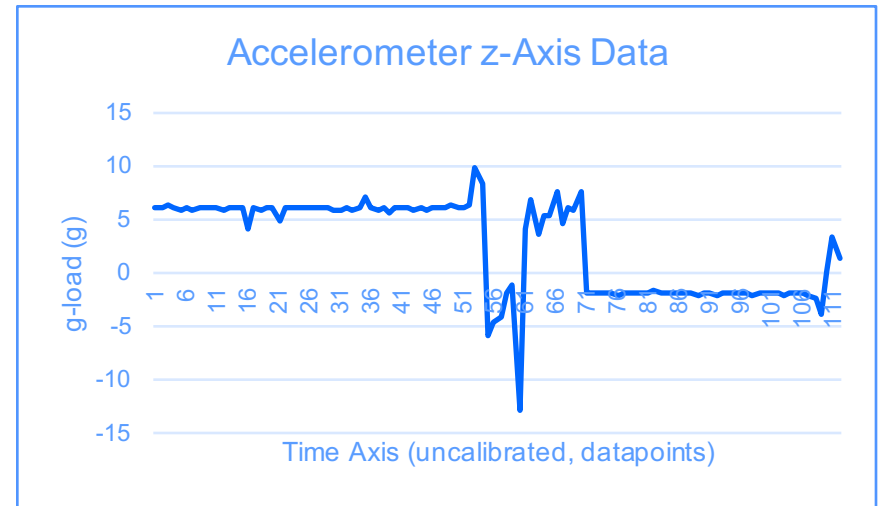
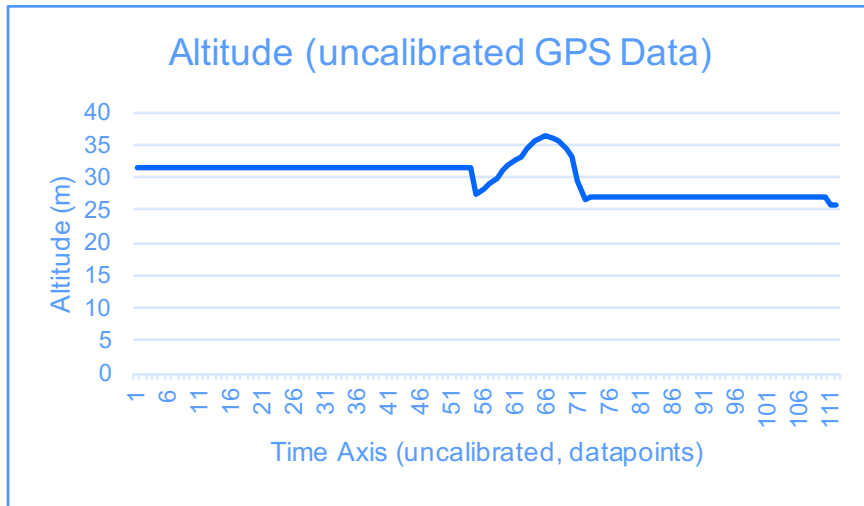


- Rockets were constructed from paper, using a proven design developed by Uematsu Electric Co.
- Estes D-Series Rocket Model Engine allows to launch standard CanSat to altitudes of approx. 100 m
- Alternatively drones or balloons can be used to launch the CanSats, however rocket launch experience is best

1st Flight - Photos



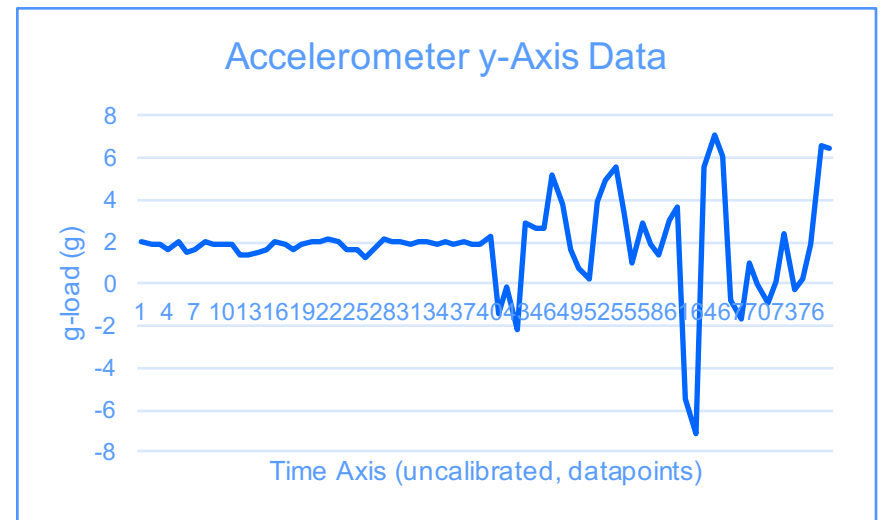
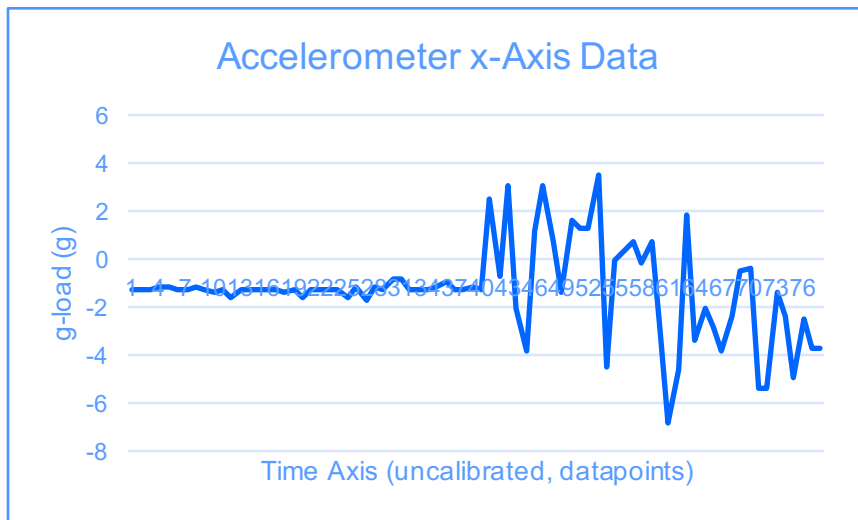
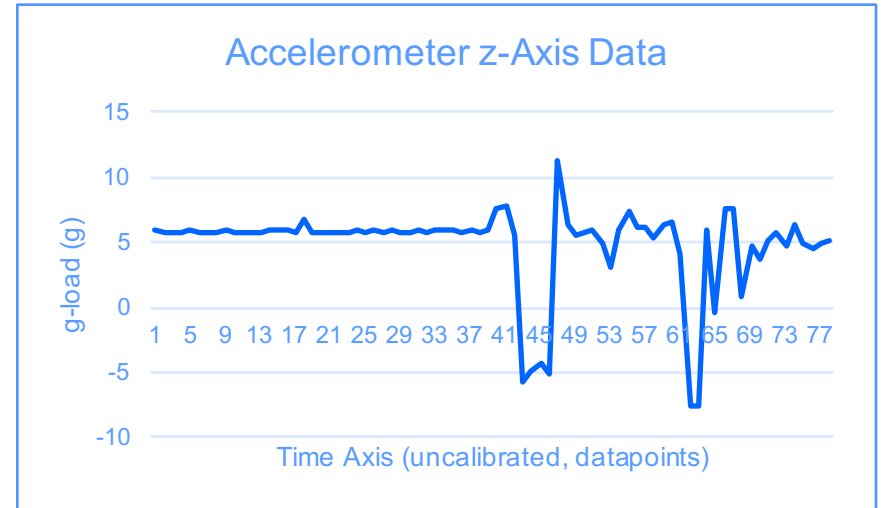
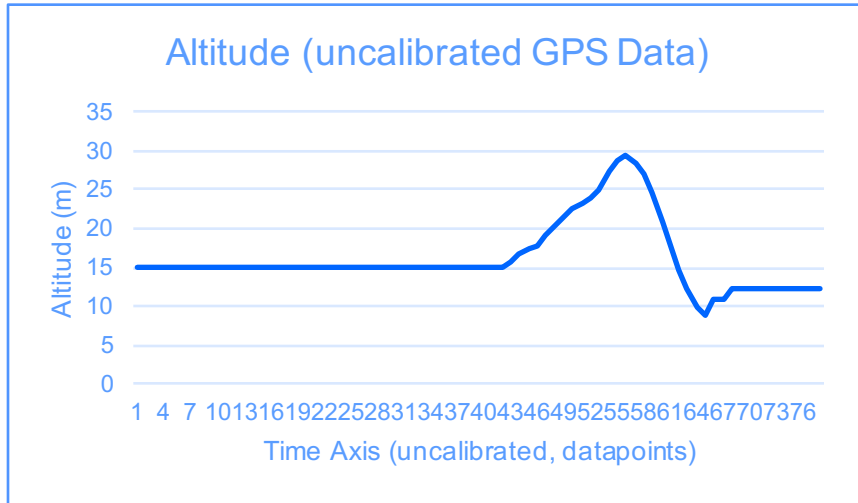
1st Flight – Flight Data Results



2nd Flight - Photos



2nd Flight – Flight Data Results



CanSat Flight Assessment

- Time resolution was too coarse to collect sufficient data points during launch and recovery period
- Launch time should be recorded to make it easier to identify the launch period and to extract the relevant data
- After landing the CanSat should remain untouched for some time (1-2 minutes) to allow the accelerometers to settle back into un-loaded mode and to collect sufficient data points to clearly distinguish launch load acceleration from other loads, resulting from e.g. picking up and carrying around the CanSat
- Two launch opportunities were available and due to time constraints it was not possible to re-fly the CanSat
- The above suggestions can be easily implemented for future flights

CLTP Assessment

- CanSat activities are an excellent, cost-efficient and highly motivating starting point for teaching hands-on space engineering skills.
- CanSat development may be particularly well suited for institutions that are planning to enter the field of space engineering, possibly with the aim to eventually develop, launch and operate a small satellite.
- Several of the skills taught during CanSat development can be transferred to real small satellite development.
- If you are considering to get involved with any of these, I can sincerely recommend that you take a closer look at how CanSat development may help you with developing and sharpening the skills you need to reach your goals.

Thanks to all CLTP Participants and Staff!

