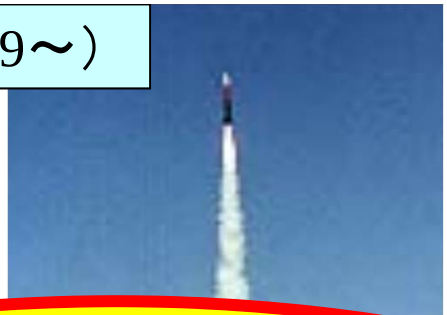


3rd UNISEC-GLOBAL Meeting
- Opening Remarks and Introduction -

Shinichi Nakasuka
University of Tokyo

Previous Meetings

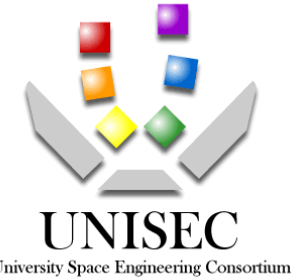
- 1st UNISEC-GLOBAL meeting
  - November 23-24, 2013, University of Tokyo, Japan
  - With 5th Nano-satellite symposium
  - With Pre-MIC3 presentations

- 2nd UNISEC-GLOBAL meeting
  - November 18-20, 2014, Kyushu Institute of Technology, Japan
  - With MIC3 final presentations

Objectives of 3rd Meeting

- Pre-MIC4 presentations
- To review the on-going activities of the new local chapters (11 countries/regions and one association of local chapters)
- To acknowledge new applications for the local chapters
- To provide a forum for the UNISON-Global (student organization) to exchange their opinions about research activities and issues they face for closer cooperation at a student level around the world,
- To explore every possibility of using micro/nano-satellites for scientific, social and economic needs, with technical and financial feasibilities
  - Also to identify and find new aspects of space science and engineering

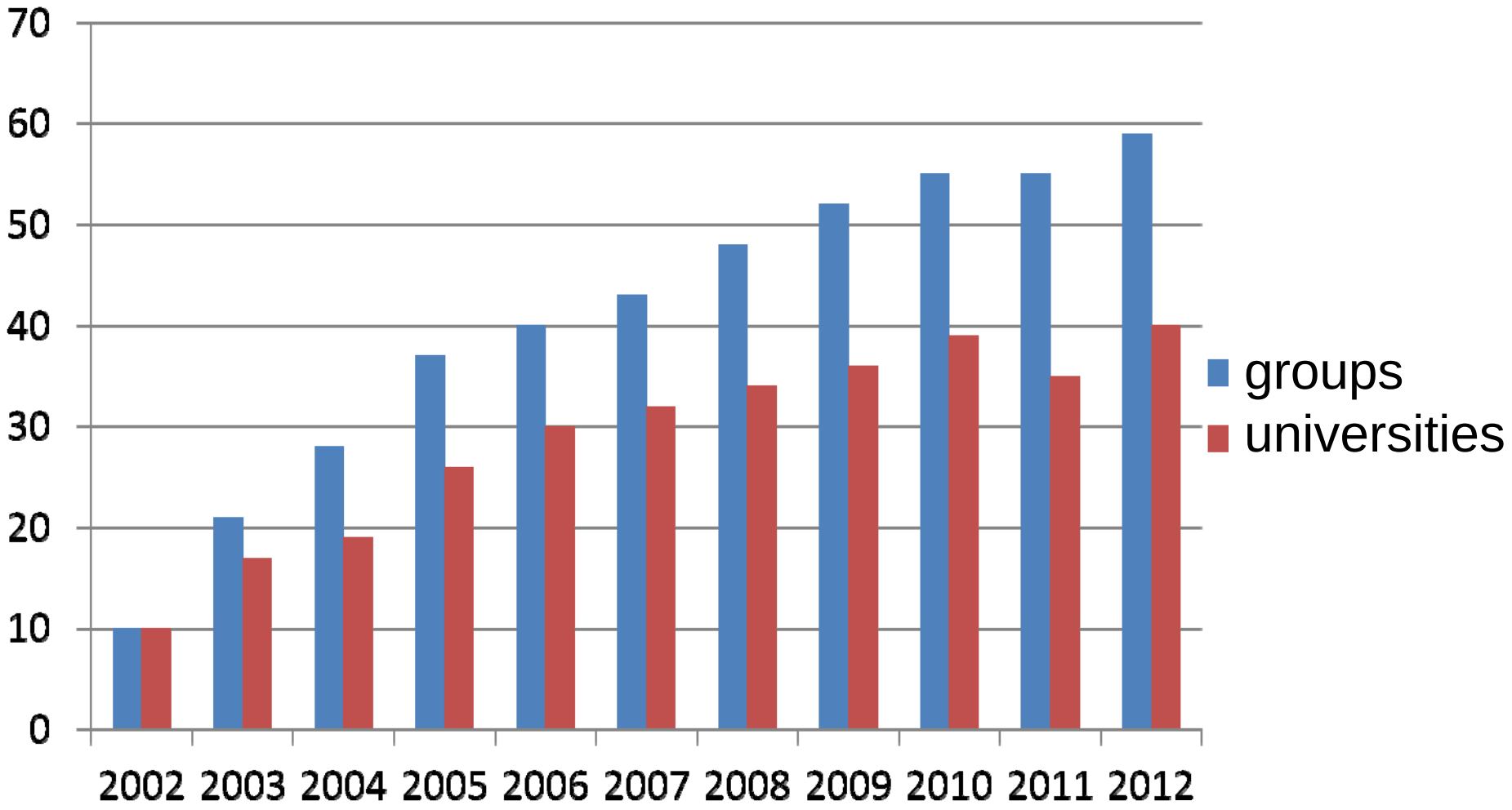
UNISEC (UNIversity Space Engineering Consortium)



- Founded in 2002, became NPO in 2003
- 67 laboratories from 47 universities (2015)
- 811 students, 267 individual and company members
- UNISEC Missions:
  - Education and human resource training for space development/utilization
  - Innovative space technology “seeds” development
- Activities to be Supported:
  - Joint experiment, joint development, joint education, etc.
  - Workshop, symposium, technology exchange, etc.
  - Consultation on legal matters (frequency, export law, etc.)
  - Finding “rivals” within the community !
  - “UNISEC Lecture Series”

http://www.unisec.jp

Participating Groups & Universities

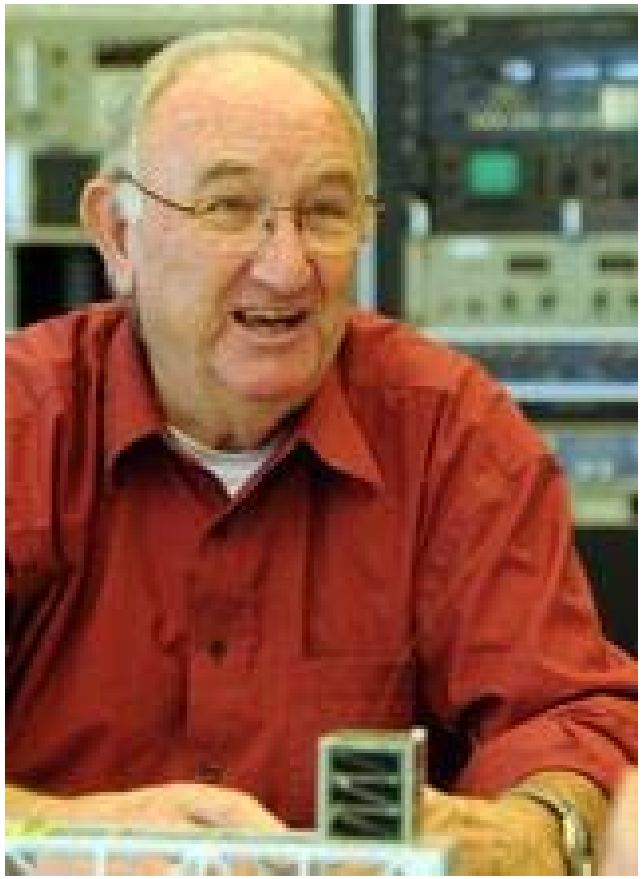


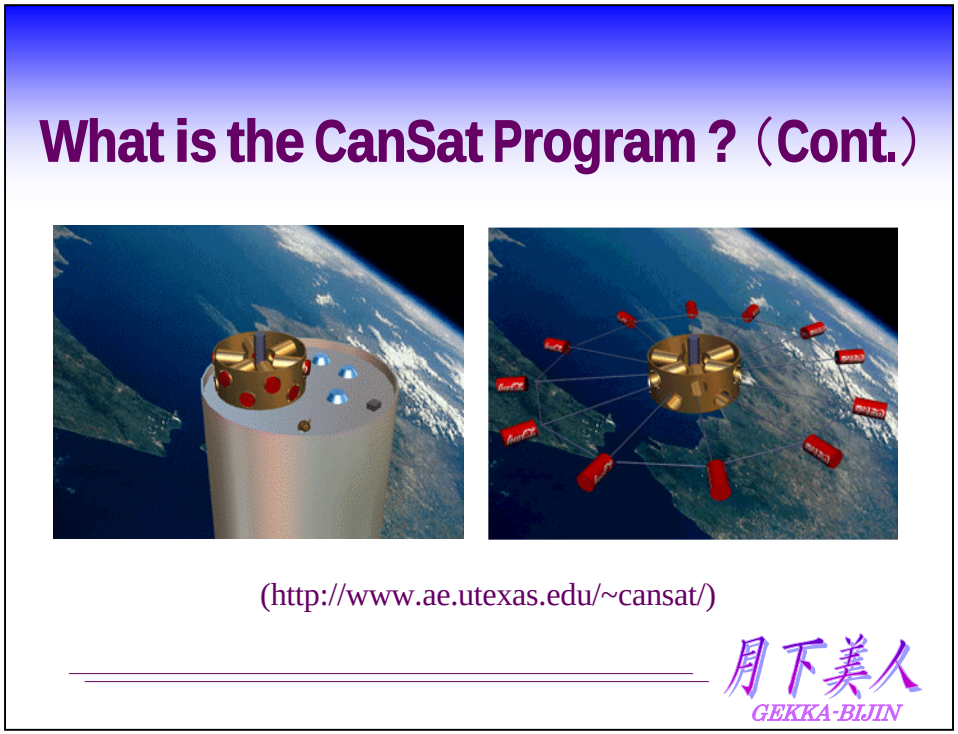
USSS 1998 ~ 2005

University Space Systems Symposium

US-JAPAN Joint “Real” Project
Discussed by University Students

Birth of CanSat (USSS in 1998)

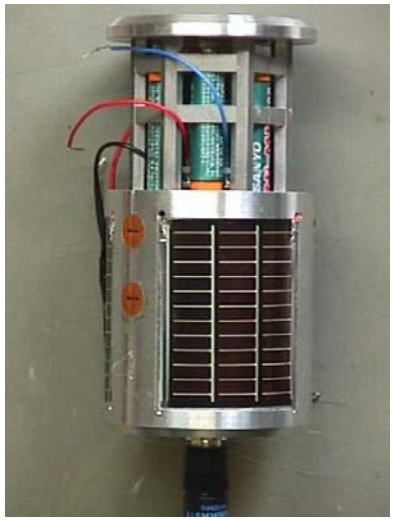




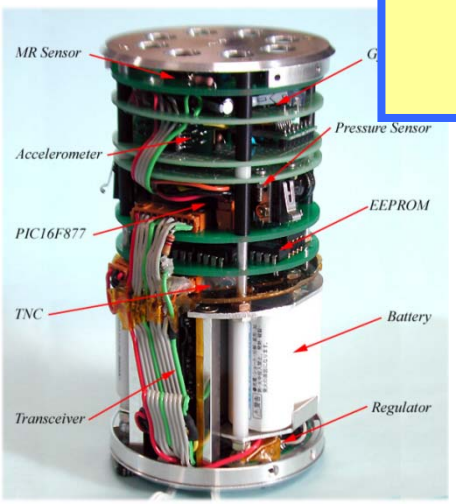
Initial Concept: In the next year's USSS
All CanSats in space will be operated.

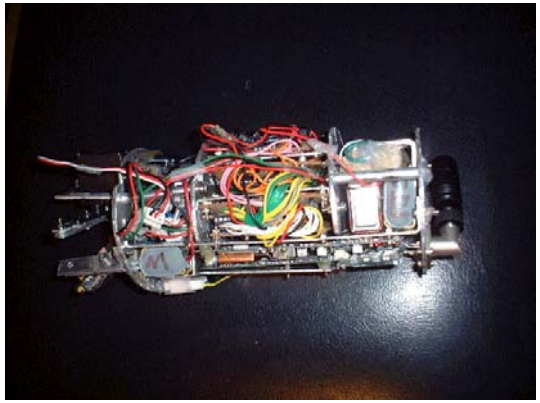
"Let's make a satellite out of this Coke-can !!"

Prof. Bob Twiggs, Stanford University



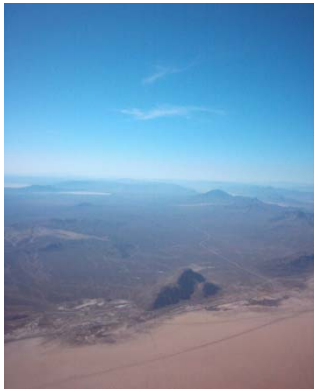
Training step: CanSat 1999-now





ARLISS (A Rocket Launch for International Student Satellites)
- Annual suborbital launch experiment -

- ARLISS 1999 : Sept. 11 (Japan:2, USA:2)
  - Univ.of Tokyo, Titech, Arizona State, etc.
- ARLISS 2000: July 28-29 (Japan:4, USA:3)
- ARLISS 2001: August 24-25 (Japan:5, USA:2)
- ARLISS 2002: August 2-3 (Japan:6, USA:3)
- ARLISS 2003: Sept.26-27 (Japan:6, USA:3)
- ARLISS 2004: Sept.24-25 (Japan:6, USA:3)
- ARLISS 2005: Sept.21-23 (Japan:7, USA:3)
- ARLISS 2006 Sept.20-22 (Japan:8 USA:3 Europe:1)
- ARLISS 2007 Sept.12-15 (Japan:10 USA:3 Korea:1)
- ARLISS 2008 Sept.15-20: 10th Memorial ARLISS !
- ARLISS 2009 Sept.15-19 (Japan:12 USA:3 Korea:1)
- ARLISS 2010 Sept.13-17 (Japan:13 USA:2 Korea:1)
- ARLISS 2011 Sept.12-16 (Japan:14 USA:2 Korea:1)
- ARLISS 2012 Sept.10-14 (Japan:12 USA:2 Korea:1)



CanSat Workshop (2007.2)

- 16 Countries
- Contest started in Europe (Spain, Norway---)
- Strong desire of educational support from Japan to emerging countries

CLTP History & Participants

48 participants from 25 countries

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

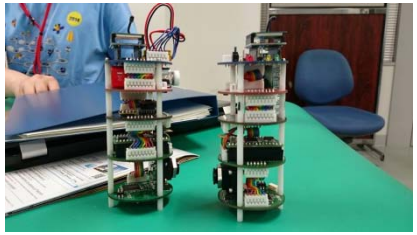
12 participants from 10 countries, namely Algeria, Australia, Egypt, Guatemala, Mexico, Nigeria, Peru, Sri Lanka, Turkey (3), Vietnam.

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

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

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

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



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

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

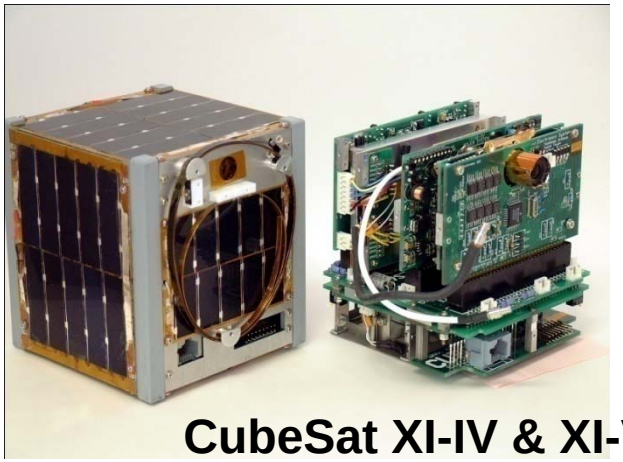
CLTP5 (Hokkaido Univ. in Sept 8-19, 2014)

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

Emerge of Nano/pico-Satellites in Japan

World First CubeSats launch by Univ.Tokyo and Titech (2003.6.30)

- University level budget (30K$)
- Development within 2 years
- Surviving in space for >12 years
- Ground operations, frequency acquisitions, launch opportunity search processed by ourselves



CubeSat XI-IV & XI-V

Russian Launch

1～50kg (Micro/Nano-sat):
Starting from education but higher level satellites appears

University Satellites in UNISEC Community

More than 30 university satellites launched in 12 years

From CanSat to CubeSat, Nano-Satellite

From Educational purpose to Practical application

Launchers for 34 university satellites

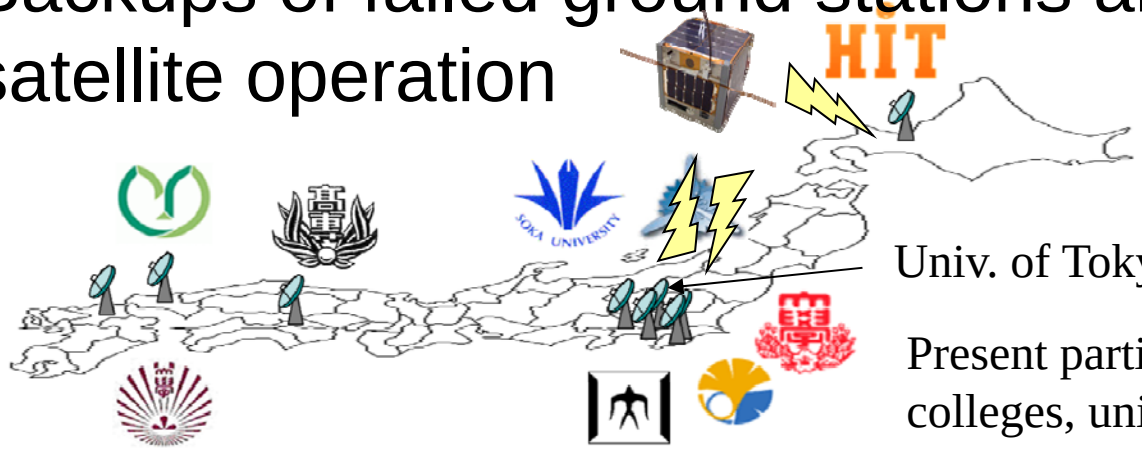
- Foreign Rocket: 12
  - ROCKOT（Russia） 2 (2003)
  - COSMOS（Russia） 1 (2005)
  - PSLV（India） 3 (2008, 2012)
  - DNEPR (Russia) 6 (2014)
- Japanese Rocket: 22
  - M-V 2 （2006）
  - H-IIA 17 （2009～）
  - HTV⇒ISS deploy 3 （2012）

JAXA has been helping us for our activities!!

RAIKO, FITSAT-1　deployment from ISS (2012.10)

Ground Station Network (GSN)

- If many universities' ground stations are connected by internet, then it provides
  - Extended operation windows of their own satellite.
  - Backups of failed ground stations and rapid satellite operation



- Worldwide network is under construction
  - Germany (Wurzburg), Sweden (Lurea Univ. in Kiruna),
  - USA (Calpoly, Hawaii, Stanford, Santa Clara, etc)

Noshiro Space Event

Noshiro-space-event is the most big competition of the rockets and also the can-sats and rovers for university students in Japan. Japanese university students around japan come to noshiro every year and work hard by competing with each other.

Then, students will become important persons who will carry space world in Japan.

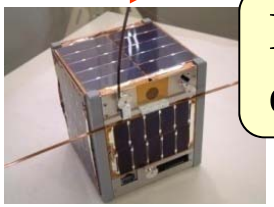
Rocketeers!!

Educational Significances of Micro/Nano/Pico-Satellite Projects

- ***Practical Training of Whole Cycle of Space Project***
  - Mission conceptualization, satellite design, fabrication, ground test, modification, launch and operation
  - Know what is important and what is not.
- ***Importance for Engineering Education***
  - Synthesis (not Analysis) of an really working system
  - Feedbacks from the real world to evaluate design, test, etc.
  - Learning from failures (while project cost is small)
- ***Education of Project Management***
  - Four Managements: "*Time, human resource, cost and risk*"
  - Team work, conflict resolution, discussion, documentation
  - International cooperation, negotiation, mutual understanding
- ***The effects were found more than expected !!***

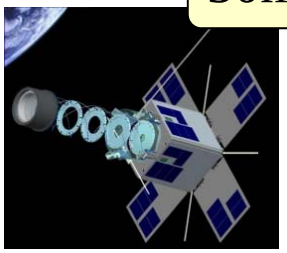
University of Tokyo's History of Micro/nano/pico-satellite Developments

2003 04 05 06 07 08 09 10 11 12 13 14



Education, camera test

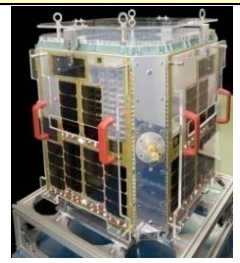
CubeSat XI-IV
(ROCKOT) 2003/6



30m GSD Remote Sensing

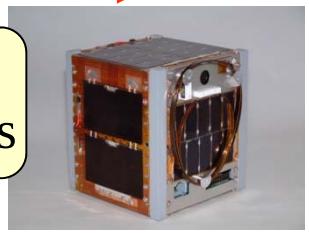
PRISM
(H-IIA) 2009/1

Astrometry (top-science)



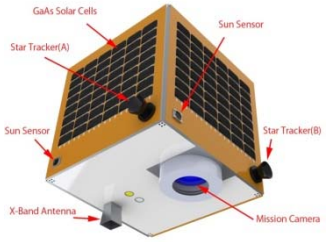
NANO-JASMINE
(CYCLONE-4) 2015

Education, CIGS solar cells



CubeSat XI-V
(COSMOS) 2005/10

Remote Sensing, S&F

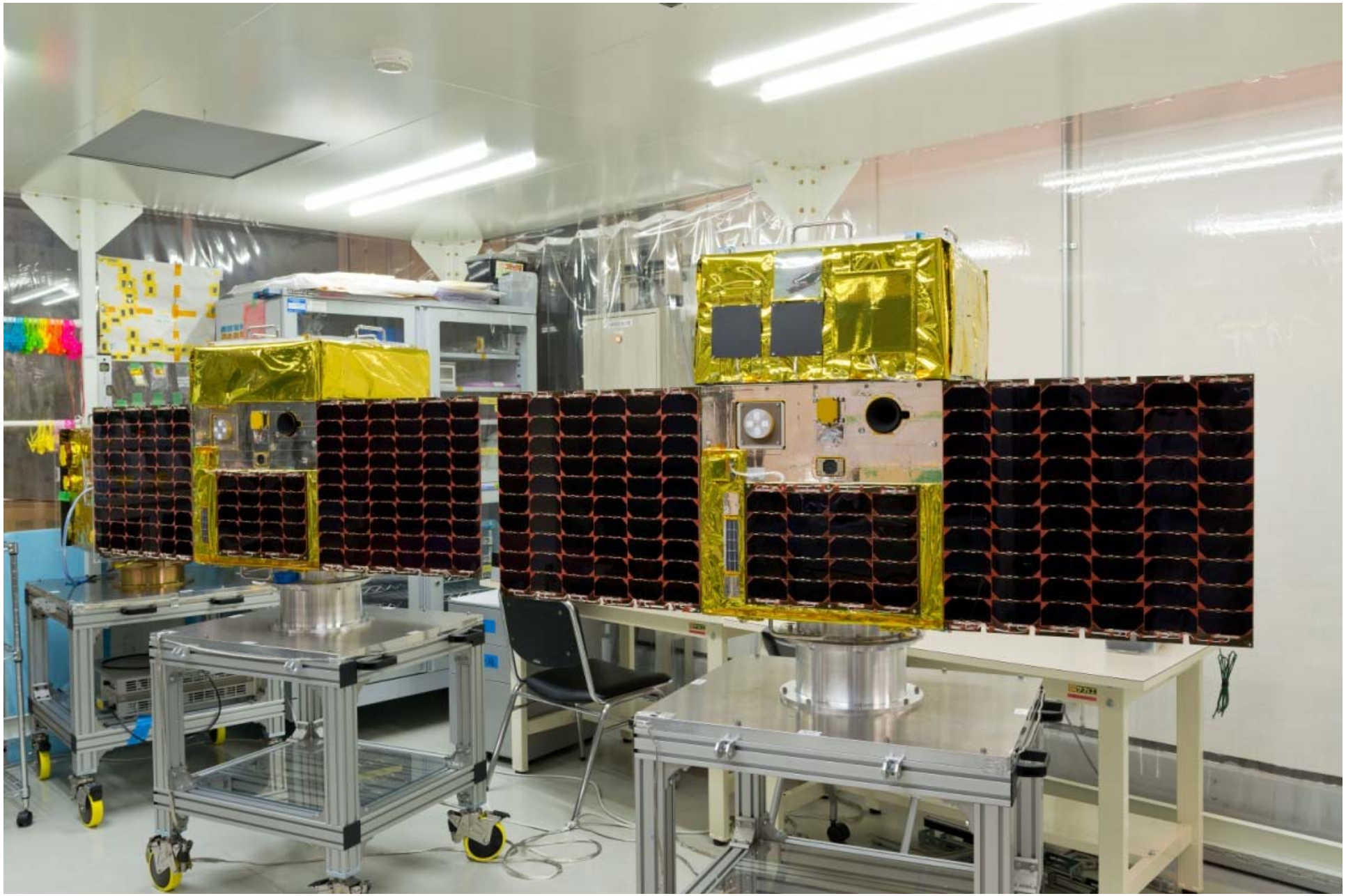


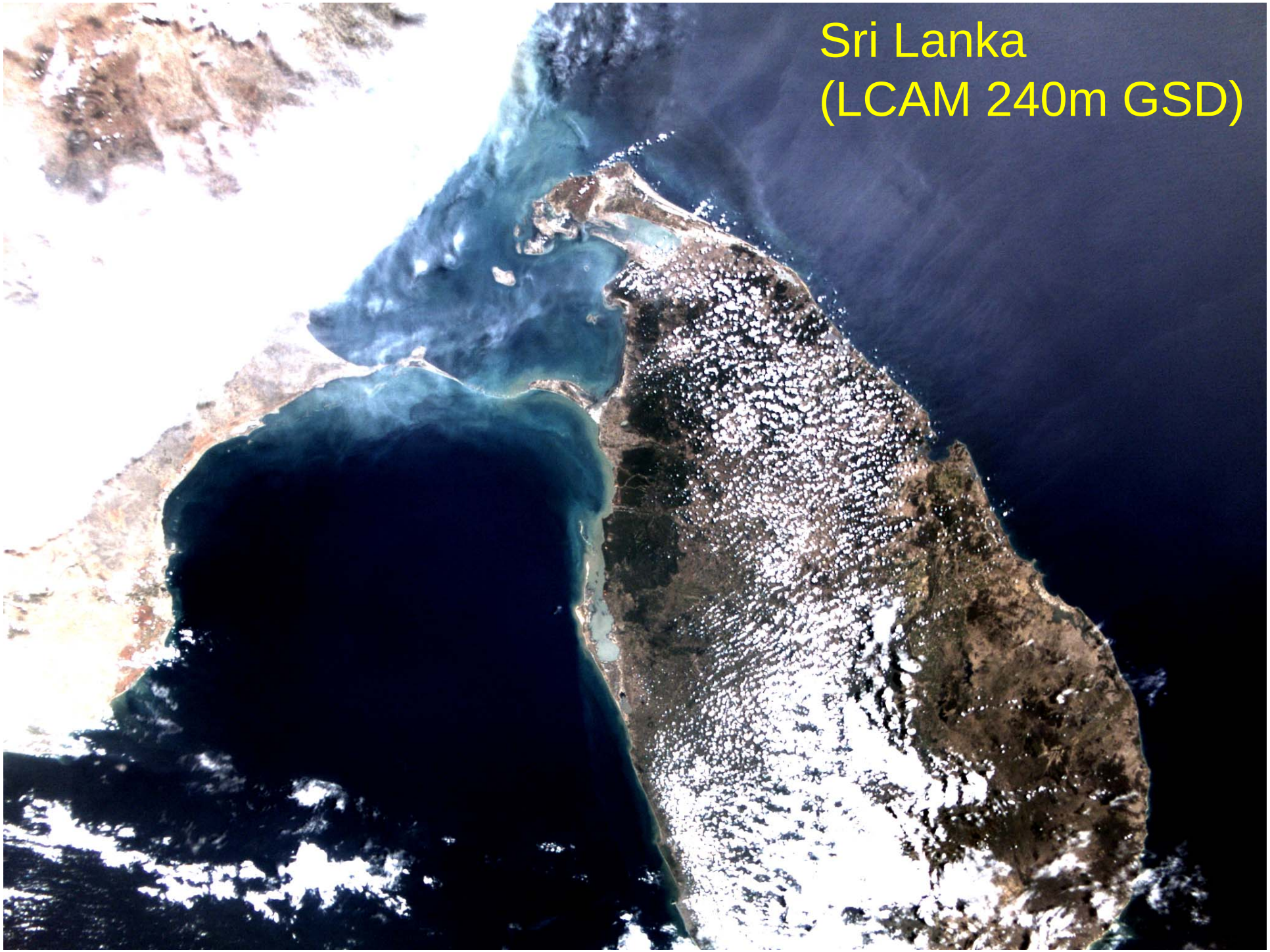
HODOYOSHI-1,3,4
(DNEPR) 2014

→ Development ▼ launch

7 satellites launched successfully, 1 waiting for launch, 31 years' total operation on-orbit

Hodoyoshi-3 (left) and Hodoyoshi-4 before Shipment (April, 2014)




Sri Lanka
(LCAM 240m GSD)


Chiba
（6m GSD)

What realized UNISEC Achievements ?

- UNISEC provided university students with

  platform = opportunities to observe and exchange;

  What other universities achieved and how, leading to

  – strong motivation (we can do something similar!!)
  – hints of achieving something (rocket, satellite, CanSat,--)
  – competitive feeling (if they can do it, we can do it better !!)
- Highly motivated leading persons (such as professors) continually have had to consider what they can achieve even without enough resources.

ISTS and Nano-sat Symposium

- Joint Symposium on July 6th -10th in Kobe

“ Space Voyage –

Frontier for Better Life on Earth ”

- More than 1200 papers
- 6th Nano-satellite Symposium held as one session (f) Small satellite: about 90 papers
- World Space Highlight 2: Easy access to space Monday (6th) afternoon
- Exhibition, panel discussion, poster session (Wed), student session (Thu), control design contest (Fri)

Future Plan of Nano-satellite Symposium

- 5th Sympo.: Univ. of Tokyo, Nov, 2013
- 6th Sympo.: ISTS Kobe, July, 2015

- 7th Sympo.: Turkey, 2016
- 8th Sympo.: ISTS, Japan, 2017
- 9th Sympo.; Australia, 2018 (just decided)
- 10th Sympo.: ISTS, Japan, 2019
- 11th Sympo.: ???

3rd UNISEC-Global Meeting

- Program:
  - Pre-MIC4 workshop
  - Activity Report from Countries
  - Group Discussion
  - Student Session (UNISON-Global)
  - Acknowledgement of new local chapters
- We encourage all of you to:
  - learn from other countries activities
  - strengthen the community with same direction
  - find rivals and collaborators
  - improve your technology level, etc.

http://www.unisec-global.org/