Educational Activities Related to Satellite Laser Ranging at Hitotsubashi University

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Introduction – Education & Satellite/Lunar Laser Ranging

SLR/LLR: Nice mixture of simplicity and complexity
  - Measurement technique:
    - Simple concept, but complicated system.
    - Observation data:
      - Simple form (epoch & round-trip time), but not easily modelled.

SLR/LLR: Mutual dependence of science and engineering
  - Satellite orbit & orientation, positioning, earth modelling etc.
  - Precise range measurement, new technologies

SLR/LLR: Transparent technology
  - Using visible wavelengths. Driving a large telescope.
  - (Usually) operated by humans.
  - Using visible wavelengths. Driving a large telescope.

“Junior Seminar” (Small class – 8 students)

Example #1: Hand-made corner cubes

↑ Material: “Cutting Mirror”

Manufacturing a ccr.

Example #2: Visiting and “visiting” SLR stations

Half-day tour to NICT Koganei ➔
  - 1.5-m telescope & SLR
  - Time and frequency
  - Exhibition room

“Remote lectures” via Skype: ➔
Virtual visit to SLR stations and discussions.
  - Herstmonceux, UK
    - Appleby, 20 Dec 2007
    - Kucharski, 2 Nov 2010

Visiting Koganei every year from 2008 to 2013.

Quality Check #1: Illuminating a laser pointer.

Quality Check #2: Simply taking a photo.

“Geoscience I/II” (Large class 50-100 students)

Demonstration: Corner cubes around us

“Geoscience I and II”
To widely cover geoscience and astronomy.
To includes 1 or 2 lectures on space geodesy which include SLR/LLR.

Other Activities and Future Works

Senior (Department) Seminar
Goal: To help students to write their graduation thesis.
  4 Examples of last year’s students:
  - SLR modeling (Nagashino; see his poster),
  - Space education,
  - National strategy with QZSS, and
  - Aviation industry and space industry
  3 Examples of this year’s students:
  - SLR QC (Takakura; see his 2-min presentation on Tue AM),
  - Space solar power system, and
  - Augmented reality

To Do in the Future
Open/outward activities via our website, SNS or YouTube.
Any ideas? New collaboration?