Upcoming Missions
ADEOS-II Mission status report

Takashi Uchimura

Flight Dynamics Group
Office of Satellite Technology, Research and Applications
Satellite Mission Operations Department
National Space Development Agency of Japan

ILRS, General Assembly, 25rd April / Nice
NASDA-ILRS-0006
The Latest Information of ADEOS-II

**Launch vehicle**: H-IIA

**Launch site**: Tanegashima (Southern Island of Japan)

**Launch Window (Plan)**: 1st Nov. 2002 to 30th Nov. 2002

**Launch time**: 01h30m +/-15min (UT)

**Preliminary orbit maneuvers (Plan)**:

<table>
<thead>
<tr>
<th>Progress days</th>
<th>Satellite’s event</th>
<th>Orbit maneuvers</th>
<th>SLR</th>
<th>Orbit determination</th>
<th>TIRV</th>
<th>Maneuvers Info.</th>
<th>Experiment in GUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Nominal 1st Nov. 2002**
- **L/O**
- **TIRV**
- **Evaluation of orbit determination technique using GPS with SLR**
- **Precise orbit determination using GPS and SLR**
As a result of detail analysis by ADEOS-II satellite side, it turned out that there were some constrain area caused by GLI (Global Imager: Optical sensor) in ADEOS-II SLR operation. Below figure shows the restriction area that I have reported at Matera meeting (Nov. 2000).
The Latest Information of restriction area in the ADEOS-II tracking

If SLR laser beam enter GLI optics, there is the possibility that SLR beam damage GLI optics. Considering GLI restriction, ADEOS-II SLR restriction area is shown below.
Analysis result of satellite visibility analysis

Variation of satellite (LRRA) visibility

Station visibility becomes short or extinct
**ADEOS-II SLR tracking plan**

*NASDA would like to propose the following operation plan*

- **Launch Phase:**
  
  40 days tracking campaign after launch
  (GLI is under safety mode avoiding any signal through its aperture.)

- **Routine Phase:**

  After launch phase, GLI will start its observation and switch over to the routine operation through the mission check out.

  **All station must be suspended laser ranging to the ADEOS-II from this phase,** and also NASDA will interrupt deliver IRV set to the station at once.

  If we need more SLR data in routine phase, we request to the specified station as an partial campaign. **We under examine a method for concrete operation.**
ICESat Status

- Laser altimetry to detect changes in polar ice sheets; land mapping and atmospheric science
- Geoscience Laser Altimeter (GLAS) testing at Goddard:
  - Acoustic complete (early April)
  - Vibration complete (mid-April)
  - Thermal/vacuum (May)
  - Ship to Ball Aerospace (June)
  - Laser/telescope boresight shifts have been concern (backup alignment mechanism being considered for inclusion)
- At Ball Aerospace, GLAS will be mounted to spacecraft bus, with additional testing of the observatory (GLAS + bus)
- Launch from Vandenberg on Delta-2 in December, 2002
ICESat Operations

- Two BlackJack GPS receivers
- GFO-like LRA
- First 6 months after launch
  - First month: spacecraft commissioning
  - Second month: GLAS commissioning
  - 120 days+ for verification, calibration and validation
  - Intense SLR tracking essential to validate the orbit determination accuracy
- After initial 6 months, normal SLR tracking
- Ground track repeat requires approximately weekly maneuvers
- CSR in collaboration with HTSI will provide tracking predicts
PLAN FOR THE
2001 ILRS ANNUAL REPORT

• Be Concise

• One Version for Paper and Web Reports

• Liberal use of Web Site Links and References

• Fast Turnaround

• Focus on Progress during the Year and Future Plans

• Contributions due May 31, 2002
2001 ILRS Annual Report
Table of Contents

Introduction to the 2001 ILRS Annual Report 1 page
Chairperson’s Remarks (J. Degnan) 1 page

Section 1 – Governing Board Report (J. Degnan) 2 pages
  Governing Board Election Results
  Modifications to Terms of Reference
  Overview of GB/WG meetings/activities in 2001
  Interfaces with other Organizations (e.g. IERS, CSTG, COSPAR)
  New Initiatives
  Future GB Meetings/General Assemblies

Section 2 - Central Bureau Report (Pearlman/Noll) 4 pages
  Status and Activities, Web Site
  Network Performance Evaluation
  Network Priorities and Campaigns
  Upcoming Missions
  Science Coordinator Report

Section 3 - Working Group Reports (M. Pearlman)
  3.1 Missions (Kunimori/Wetzel) 2 pages
  3.2 Networks and Engineering (W. Gurtner) 2 pages
  3.3 Data Formats and Procedures (W. Seemueller) 2 pages
  3.4 Analysis (R. Noomen) 2 pages
  3.5 Signal Processing (G. Appleby) 2 pages

  Progress and Activities

Section 4 - Network Reports (M. Pearlman)
  4.1 EUROLAS (Kirchner/Appleby) 2 pages
  4.2 NASA (D. Carter) 2 pages
  4.3 WPLTN (H. Kunimori) 2 pages
  4.4 Lunar (P. Shelus) 2 pages

  Network Description, New Stations and Major Upgrades

Section 5 - Operations Center Reports (S. Wetzell)
  5.1 Mission Control Center (V. Glotov) 2 pages
  5.2 NASA Goddard Space Flight Center (D. Carter) 2 pages
  5.3 University of Texas LLR Center (P. Shelus) 2 pages

  Functions provided; to whom, Current Status, Future Plans

Section 6 – Data Center Reports (C. Noll)
  6.1 CDDIS Report (C. Noll) 2 pages
  6.2 EDC Report – (W. Seemueller) 2 pages
  6.3 Regional Data Centers (as submitted) 1 page each

  Functions Provided, Current Status, Archive Content, Future Plans
Section 7 – Analysis Center Reports (R. Noomen)

7.1 Satellite Laser Ranging (Peter Dunn)
   7.1.1 Analysis Centers
      7.1.1.1 Center for Space Research (Richard Eanes) 2 pages
      7.1.1.2 Delft Analysis Center (Ron Noomen) 2 pages
      7.1.1.3 Mission Control Center (Vladimir Glotov) 2 pages
      7.1.3 Associate Analysis Center (as submitted) 1 pages each

7.2 Lunar Laser Ranging (Peter Shelus)
   7.2.1 Analysis Centers
      7.2.1.1 Paris Observatory (Jean Chapront) 2 pages
      7.2.1.2 FESG/TUM (Jurgen Muller) 2 pages
      7.2.1.3 Jet Propulsion Lab (James Williams) 2 pages
      7.2.1.4 University of Texas (Judit Ries) 2 pages

Data Products Provided, Current Activities, Future Plans

Section 8 – ILRS Information (Van Husson and Carey Noll)

ILRS Terms of Reference
ILRS Website Reference Card
ILRS Components
ILRS Participating Institutions
ILRS Associates
List of Acronyms
   Use links to existing web pages
13th Workshop on Laser Ranging
“Toward Millimeter Accuracy”

- Hyatt Regency Capital Hill, Washington, D.C.
- October 07-11, 2002
- Program Committee:
  - Giuseppe Bianco, ASI
  - John Degnan, NASA GSFC
  - Yang Fumin, Shanghai Observatory/Academia Sinica
  - Ben Greene, EOS Pty. Ltd
  - Werner Gurtner, AIUB
  - Hiroo Kunimori, CRL
  - Ron Noomen, TU Delft
  - Michael Pearlman, Harvard-Smithsonian
  - Ulrich Schreiber, TU Munich
  - Peter Shelus, U. of Texas
  - Suriya Tatevian, RSA
- Local Organizers:
  - John Degnan
  - Mike Pearlman
  - Carey Noll
Program Topics

- Overview of Space Geodesy Techniques
- Scientific Achievements, Applications, and Future Requirements
- Lunar Laser Ranging
- Improved or Upgraded Systems
- Station Performance Evaluation
- Station Operational Issues
- Target Design, Signatures, and Biases
- Timing Devices (G. Kirchner and V. Vassiliev)
- Calibration
- Atmospheric Correction and Multiwavelength Ranging
- Detectors and Optical Chain Components
- Laser Technology Development
- Automation and Control Systems
- Advanced Systems and Techniques
- New Ranging Systems Applications