



Session Summary Report

- 1. Session Name: POD and Application**
- 2. Chairs: Erricos C. Pavlis (GEST/UMBC) & Daniel Kucharski (KASI)**
- 3. Summary**

7 presentations as scheduled

Recognition of the current situation

- STSAT-2C POD suffers from the poor station yield and distribution, mainly due to poor predictions (due to lack of accurate tracking—Catch-22)
- The ILRS plays an important role in the validation of GNSS orbits and products
- Capabilities of the current Russian SLR tracking stations reviewed
- The accuracy of the position determination of the ZY-3 satellite was verified.
- The multi-static laser ranging to the space debris targets between Graz and the other European SLR stations was demonstrated.
- Shanghai SLR station successfully implemented new laser for space debris ranging.
- The spin parameters of the inactive Envisat were determined.

Presented Topics

- STSAT-2C POD model described, along with its validation on Starlette data
- Results for all different GNSS constellations and targets highlighted
- Ranging, time-transfer and navigation applications of the Russian stations
- Comparison of the ZY-3 satellite position determination from GPS and SLR.
- Results of the multi-static laser ranging from Graz to Herstmonceux, Wettzell and Zimmerwald with 200 mJ / 80Hz / 3ns laser.
- Results of the space debris ranging at Shanghai Observatory with the new 50 W / 200 Hz / 11ns laser. 110 objects and 160 passes have been measured with the new laser.
- The attitude and the spin rate of Envisat have been determined from the global SLR Full Rate data.

Session Summary Report (cont.)

Issues

- Poor predictions cause poor tracking of STSAT-2C, leading to further pain due to the missing data
- More GNSS tracking data needed more often, and on ALL GNSS targets; the role of high repetition rate SLR was underscored
- The current plan is to deploy three more stations by next year, part of Russian pledge to GGOS support as well as national needs
- The comparison of the ZY-3 coordinates measured by the on-board GPS receiver and determined from the SLR data indicate 3D positioning precision better than 4 meters.
- The multi-static ranging to Envisat allows for the laser contact between the multiple ground stations. The experiment has been successfully demonstrated between Graz, Herstmonceux, Wetzell and Zimmerwald.
- Shanghai SLR station has the ranging ability to the space debris of the minimum Radar Cross Section of 0.5 m². The system achieves return rates of 80% and the measured data allows to reach precision of POD better than 50 m.
- The analysis of the SLR full rate data indicate stable orientation of Envisat in reference to the nadir direction. The offset between the spin axis and the nadir direction is 62 degrees and the satellite spins with the period of about 130 seconds.

Takeover items to the next meeting

- ILRS should provide guidance for new missions on how to improve their SLR-based POD
- The need to develop a “concept of operations” for GNSS tracking should be addressed very soon, long before all Constellations are in orbit!
- Experiments at one of the stations should become routine operation at all sites to take full advantage of this new facilities, including increased data yield
- The TWO way multi-static laser ranging is the challenge for the future. It would help to eliminate the influence of the atmosphere on the station-to-station range measurements.
- More SLR data to the space debris will be collected by the Shanghai Observatory. The larger amount of the passes and the longer tracking sessions may help to improve accuracy of the space debris orbit determination.
- The spin parameters of Envisat should be monitored in order to understand its dynamics. The SLR stations are asked to continue tracking of Envisat and provide the Full Rate data for the spin analysis. Thank you for your effort!