
Current Status of "Simeiz-1873" Station

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Abstract

The SLR station "Simeiz-1873" was founded in 1989. After modernization in 2000 we have increased the amount of ranging data by approximately three times. With this modernization we have probably reached a limit of the equipment, due mainly to the shortcomings of the laser transmitter. Independent analysis groups have shown stability problems in of our data.

A permanent GPS receiver was installed at the site in 2000. "Simeiz-1873" became a permanent IGS station (GPS-CRAO) in 2004. Recently in our station began processing GPS data using the GLOBK/GAMIT software. We have obtained and analyzed data for the period 2002-2005.

Introduction

Regular satellite laser ranging started in our observatory in 1976 as an INTERKOSMOS Station with a laser system installed by K. Hamal on a KRIPTON telescope. In 1988 the Crimean Astrophysical Observatory installed a new station (near the old station). Colocations with the IFAG MLTRS system were conducted in 1991.

A modernization program was undertaken in 2000 under a CRDF grant (thanks for M. Pearlman and D. Nugent). New angular encoders and a new time interval counter were installed. After modernization we increased the amount of ranging data by approximately three times (Fig.2).

A permanent GPS receiver has been operating near "Simeiz-1873" since 2000. In 2004 it became an IGS site "GPS-CRAO" (Fig.3, right). The "Simeiz-1873" is a one of four Ukrainian SLR stations. (GLSV-1824, Lviv-1831, KTZL-1893)

Current status

Modernization of station proceeds. It is necessary to carry out the following items:

- Implementation of the new CPF prediction format into the software;
- installation of a new modern control system of engines;
- updating of optical system of a telescope for a new calibration target and replacement of a prism with a mirror;
- ground calibration tests with the new target at 77m east;
- continue processing GPS data with GAMIT/GLOBK.

Ranging and GPS proceeding

In 2006 we suffered appreciable downtime due to two failures of the laser power unit. The Katzively station (1893) has installed a new laser systems and loaned their old power unit to us. The loaned unit also failed and required considerable, time-consuming repair.

As you can see in Fig.2, data has increased with the modernization activities, but we have probably reached the limit with our equipment; the laser transmitter is 18 years

old! The second problem is in tracking. In 2006 we purchased new servo-drivers for the stepper motors and we hope that this will help improve our tracking capability.



Figure 1. SLR-1873. General view.

Table 1. Main elements.

Element	Description
Mount	Alt-Az. 1m mirror.
Angular encoders	FARRAND CONTROLS, 0.4"
Time interval counter	SR620
PMT	H6533
Time & Freq standard	TC-74, sec. from GPS.
Laser	350 ps, 5Hz. (18 years old)
Software	GUI on a JAVA, server on a C++, low level modules on a C. LINUX.
Ephemerides	CPF, (on a F77).

Analysis by two independent groups shows that the stability of the station SLR data still needs considerable work. Results from the Ukrainian Center of Determination of the Earth Orientation Parameters (Bolotina, 2006) are shown in fig.3 (left). Similar results were found by S. Schillak by processing our LAGEOS ranging data for period 1999-2003. (See Schillak, 2004).

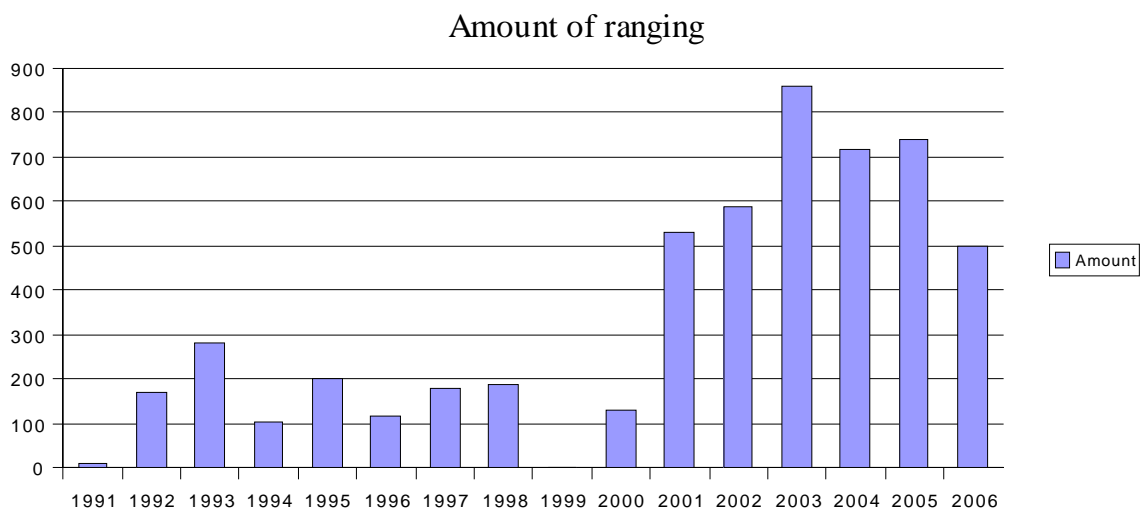


Figure2. Amount of ranging from 1991 to 2006.

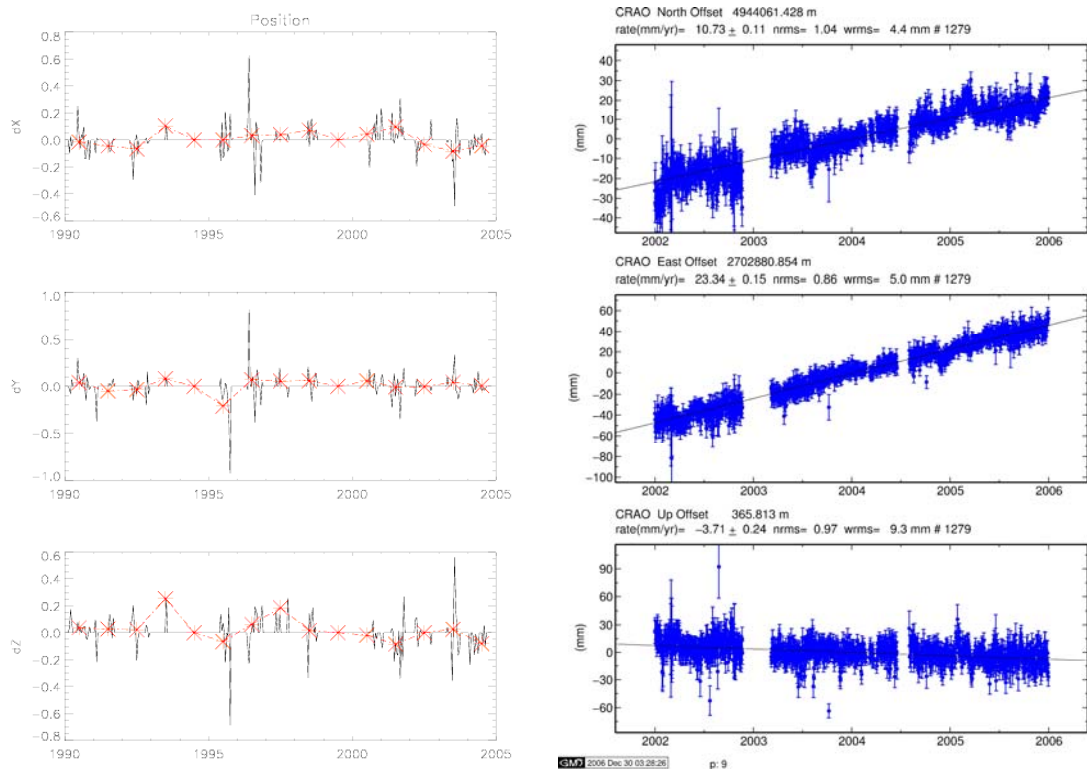


Figure 3. Geocentric coordinates (delta from mean value) obtained by SLR (left) for 1991-2005 (red is a mean by year), meters; topocentric coordinates (delta from mean value) obtained by GPS (right) for 2002-2006, mm

We have also processed GPS data with the GAMIT/GLOBK software on our station (fig.3, right). As you see, results from our SLR location are not comparable with results received by GPS. Also on the GPS results a trend is evident. It not detectable in the lower precision SLR data.

Summary

The analysis of results has shown that we still have stability problems with the Simiez ranging systems; likely causes of the problems are the old laser transmitter, inadequacies in the calibration system, and greater breaks in ranging to LAGEOS because of equipment failure and poor weather.

The basic directions of work will be: creation of a new telescope mount model; better operations procedures, and hopefully, replacement of the laser on new.

Acknowledgments

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References

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