

Upgrading Plan of the Chinese SLR Network

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Abstract

Under the support of the second stage of the state key project “Crustal Movement Observation Network of China”, the Chinese SLR stations will be upgraded to better performance in two years. The main improvements will be kHz ranging and routine daylight tracking. The upgrading proposal for the San Juan SLR station is also under consideration.

Introduction

There was a state key project “the crustal Movement Observation Network of China (CMONOC)” during the years of 1997-2000. The main technique adopted for the project was to set up a national GPS network for monitoring the crustal deformation in the main land of China. The other techniques, such as SLR, VLBI, gravity and leveling measurement, were also used in the project. Therefore, the Chinese SLR network obtained some supports from the project and the performance of the stations had been obviously upgraded with the installation of the new detectors (C-SPAD), GPS time and frequency receiver, etc. Since 2008, the second stage of the CMONOC project has been initiated, and the same techniques will be supported, and more core GPS stations (260 sets) will be set up. Fortunately, the SLR stations are also obtained quite strong supports from the second stage of the project. The goals, main technical measures and the status are introduced in the paper.

Goals and main technical measures of the upgrading

The fixed stations to be upgraded are: Changchun, Shanghai, Beijing, Kunming and Wuhan. The mobile system TROS-1 will not be included in the upgrading plan, but a new powerful mobile system TROS-2 will be supported by the project and be developed by the Institute of Seismology in Wuhan during 2008-2011. The goals of the upgrading for both the fixed stations and the new TROS-2 system are shown in Table 1.

Table 1. Goals of the upgrading

Precision	for starlette-like single shot rms < 8 mm for LAGEOS single shot rms < 12 mm normal point rms < 1-3 mm
Stability	10-15 mm
Ranging capability	up to GNSS satellites > 26000 km
Operation mode	routine daylight tracking to LAGEOS by all stations

The major technical measures for the upgrading are as follows:

1) kHz lasers

5 sets of the kHz picoseconds lasers from the Photonics Industrial International Inc. of USA have been ordered and will arrive at the stations by June 2009. One set of the kHz laser from the High Q laser of Austria for the Beijing station will arrive at the same time.

The main parameters of the Photonics Industries laser are:

3 mJ in 532 nm per pulse, 1 kHz repetition, < 25 ps pulse width, 0.6 mrad divergence, <2 mm output beam diameter, TEM00 mode, $M^2 < 1.3$, 15-30°C operating temperature.

2) Event timers with timing jitter of 10 ps from Riga for all stations.

3) kHz ranging controllers for all stations will be made by ourselves.

4) Daylight tracking packages for all stations will be also made by ourselves.

Having built and completed the kHz ranging controller, some stations will start the kHz ranging to satellites by the summer of 2009.

The TROS-2 mobile system will have 1 meter aperture telescope and kHz laser, and will be operational by 2011.

The proposal of construction of a new SLR station in the Urumqi Observatory, Chinese Academy of Sciences was approved in 2008, but the plan has been postponed. The proposed station will have 1 meter telescope and kHz laser, and will be in collocation with VLBI and IGS/GPS station.

The upgrading proposal for the productive San Juan Station is under serious consideration and is expected to be approved soon by the Ministry of Science and Technology of China.

Summary

Under the support of the state key project “CMONOC”, the Chinese SLR network will be great upgraded in two years. One new mobile system will be added into the Chinese network by 2011. The San Juan station will get the funding for upgrading soon. All the systems will go to kHz ranging and routine daylight tracking.