THE PERFORMANCE AND OBSERVATION OF MOBILE SYSTEM TROS-I IN CHINA

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Abstract

The TROS-I (Transportable Ranging Observation System) is the new generation mobile SLR (Satellite Laser Ranging) system in China. The TROS-I was set up and began to track satellite in 2000. Since its outset of test operation, a lot of field observations were made successfully in Urumqi and Lhasa, western China and the observations filled up gap of SLR tracking in Asia. A series of field experiments has showed that the single shot precision of the system is about 1 to 3cm and about 10mm for the normal point. The largest ranging distance is 20,000km. The mobile system has achieved outstanding performance and extended remarkably the coverage of the existing SLR network from the eastern China to the western part. The ongoing and incoming observations by TROS-I will enhance greatly the ability of SLR in crustal movement monitoring in China. and contribute to precise orbit determination of scientific satellite missions. For instance, the Chinese satellites and other low orbit satellite such as GRACE and Champ.

The Current tectonic activities in China are intensive, evident by widespread deformation of various patterns and frequent strong earthquakes. At present, the application of GPS(Global Position System) measurements to tectonics have been remarkably increased in China and a great deal of advances on monitoring present crustal deformation has been made in the past decade[1]. SLR is also served as useful tool to addressing tectonic study, for instance, with a contribution to monitoring crustal movement by, verifying GPS-derived velocity field and maintaining the reference frame on a scale of continent. However, SLR capability is limited greatly by few stations and uneven configuration of the existing SLR network, majority of which are located in the eastern China. A mobile SLR system costs nearly as much and performs as outstandingly as a fixed system. Moreover, the mobile system has a great flexibility to set up sites on the request , therefore enhancing the ability in monitoring crustal movement and tracking various satellite missions for precise orbit determination It is logical step to develop a mobile system in China for strengthening the network configuration of the fixed SLR stations

In 1999, ISCEA(Institute of Seismology, China Earthquake Administration) offered a mobile SLR system-CTLRS for Xi'an institute of surveying and mapping[2,3].However, CTLRS didn't enter into a routine operation stage mobile for some reasons since then. In 2000, sponsored by the national scientific project CMONOC(Crustal Movement Observation Network Of China)[4], ISCEA developed a new generation mobile SLR system TROS-I[5]on a basis of the forerunner. A lot of upgrade were made in optical, timing and tracking subsystems. TROS-I started the first experimental observation at Beijing, Oct. 2000. It is proved that ranging precision of the TROS-I is 1-2cm for single shot, at a distance up to 20,000km and

environment temperature for operation in the field is –20ºC~+45ºC. The whole performance reaches or exceeds the specifications proposed by designers. TROS-I has already been a standard station of IRLS network (International Ranging Laser Service), and has joined, as one of few mobile systems, in ILRS organization. We have acquired much high-quality data in Urumqi and Lhasa, China. Here we present the technical performance and the observation status of the TROS-I system.

Table 1. The summary of satellites and passes for four sites

Satellite	**Beijing 7343 51 days**	**Urumqi 73558401 44 days**	**Lhasa 7356 150 days**	**Urumqi 73558402 173 days**	**Total** Passes
LAGEOS-1,2	42	44	120	138	344
GPS35,36				6	6
GRACE-A,B				48	48
ENVISAT				55	55
GLONASS	44	2	14	27	87
ETALON	13	1	9	20	43
ERS-2	17	16	2	74	109
GFO	15	3	5	75	98
CHAMP	8	1	0	15	24
TOPEX,JASON	53	10	27	233	323
BE-C	43	2	10	82	137
AJISAI	60	0	32	133	225
STARLETT	22	0	7	107	136
STELLA	23	3	14	6	46
WESTPAC	4	3	0		7
Passes	344	85	244	1019	1688

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