Upgrading Plans of the Chinese SLR Network

Yang FuMin(1), Wu Bin(1), Zhang ZhongPing(1), Guo TangYong(2),

Zhao You(3), Qu Feng(4) and Xiong YaoHeng(5)

1. Shanghai Observatory, Chinese Academy of Sciences, Shanghai
2. Institute of Seismology, China Earthquake Administration, Wuhan
3. Changchun Observatory, Chinese Academy of Sciences, Changchun
4. Chinese Academy of Surveying and Mapping, Beijing
5. Yunnan Observatory, Chinese Academy of Sciences, Kunming

History of the Project

- Period of the Project of Crustal Movement Observation Network of China (CMONOC) : 1997-2000
- Main techniques of the project:
  - ✓ Main technology: GPS Network
  - ✓ Other technologies: VLBI, SLR Gravity, Leveling
- Improvements of Chinese SLR Network during the project:
  - ✓ Precision: Single shot from 3-6cm upgraded to 1.5-3cm
  - ✓ Stability: from 3-5cm upgraded to 1.5-3cm

- **The second stage of the Project:**
  - ✓ **Period: 2008--2011**
  - ✓ **The same technologies with the first stage**
  - ✓ **More core GPS stations (from 25 increase to 260)**

Goals of the Upgrading of SLR

- **Precision:** single shot (rms) <10mm for Starlette, …
  <15mm for Lageos
  normal point (rms) 3-5mm for Lageos
- **Stability:** 10-15mm
- **Ranging capability:** >25000Km (Compass, Galileo, GPS, …)
- **Daylight tracking capability:** All stations

Main Technical Upgrading

- **New lasers**
  - ✓ kHz diode pumping lasers (10ps pulse width, 1 KHz repetition)

    for Shanghai, Changchun, Beijing, Wuhan and TROS-2

    Candidates: Photonics (US), HighQ Laser (Austria), China …
  - ✓ Kunming to be determined

    Due to T/R with the same telescope (1.2 meter)

- **Event timer – for all stations**
  - ✓ Timing accuracy: 10ps
  - ✓ Timing repetition: >1kHz
- **Daylight tracking package – for all stations**
  - ✓ Made by ourselves
- **kHz ranging controller – for all stations**
  - ✓ Made by ourselves

Situation of Mobile SLR Station

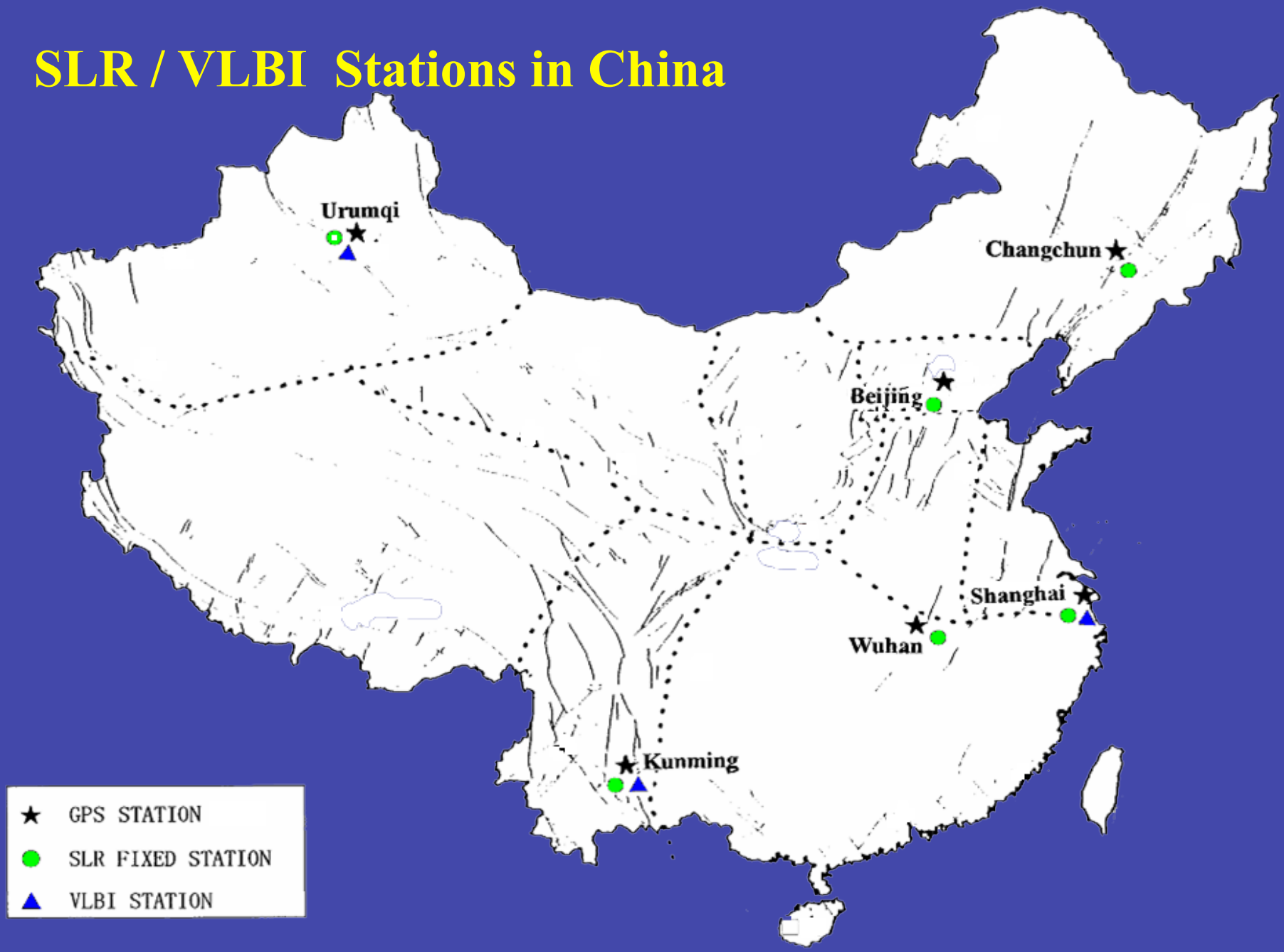
- **TROS-1**
  - ✓ **The TROS-1 now is in KASI, Daejeon, Korea in August 2008.**
  - ✓ **The details of TROS-1 observations in KASI will be presented by Dr. Lim of KASI on this Workshop.**
  - ✓ **The TROS-1 system will not be included in the upgrading plan of the CMONOC.**

- **TROS-2**
  - ✓ **In the project of the second stage of CMONOC, a new powerful mobile SLR system, TROS-2, will be made by 2011. The Institute of Seismology in Wuhan is in charge to develop the system.**
  - ✓ **The main parameters of TROS-2 will be:**
    - ➢ **80 cm aperture telescope**
    - ➢ **kHz laser**
    - ➢ **C-SPAD receiver**
    - ➢ **Event timer**
  - ✓ **The capability of TROS-2 mobile SLR system will be:**
    - ➢ **GEO tracking**
    - ➢ **Sub-cm range precision**
    - ➢ **Daylight tracking routinely**

A new fixed SLR station in Urumqi by 2010

- A new fixed SLR system supported by Chinese Academy of Sciences will be installed in Urumqi station by 2010. Shanghai Observatory is in charge to develop the system.
- The station will be located at Nanshan, 60 km away in the south of Urumqi city, above sea level 2000m. The weather condition is excellent.
- The location of the station is of importance both in Chinese and global network.
- There are a VLBI system and a GPS station already, so the station will be a multi-technique collocation site.

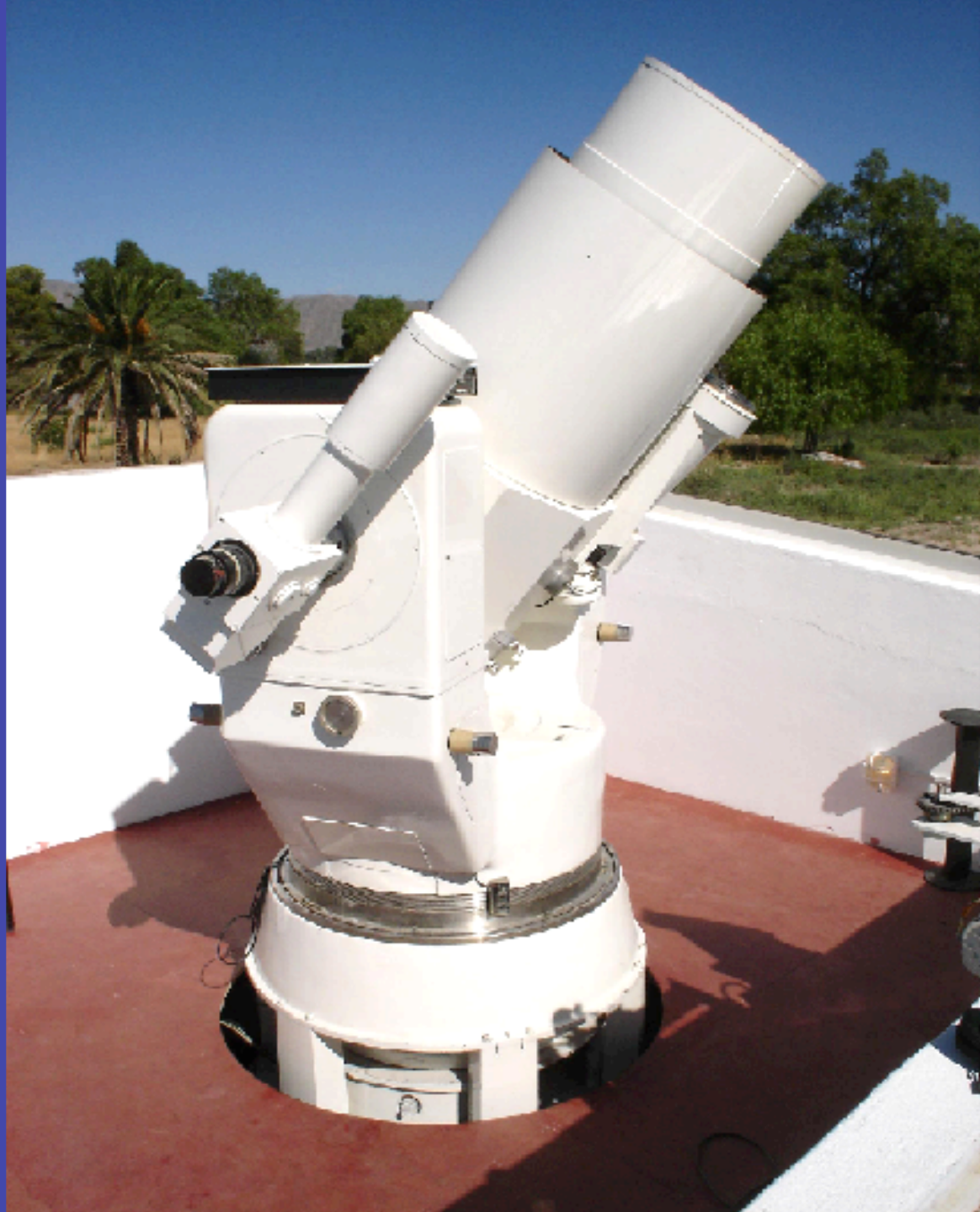
SLR / VLBI Stations in China



- **The main parameters of the new SLR system will be:**
  - ✓ **1 meter aperture telescope**
  - ✓ **kHz laser**
  - ✓ **C-SPAD receiver**
  - ✓ **Event timer**
- **The capability of the new system in Urumqi will be:**
  - ✓ **GEO tracking**
  - ✓ **Sub-cm range precision**
  - ✓ **Daylight tracking routinely**

San Juan SLR Station

- ILRS ID7406
- Cooperation between the National University of San Juan and the National Astronomical Observatory of China (NAOC)
- Operational since Feb. of 2006 with excellent productivity, but the precision and stability are to be upgraded.



- **The upgrading proposal for the San Juan SLR system is under serious consideration by the Ministry of Science and Technology of China.**
- **The main upgrading:**
  - ✓ **kHz ranging**
  - ✓ **Event timer**
  - ✓ **Daylight tracking**
  - ✓ **Sub-cm range precision**

Summary

- Under the support of the National Project “CMONOC”, the Chinese SLR network will be upgraded in two years
- 1 fixed station in Urumqi and 1 mobile system will be added into the CSN
- All systems will go to kHz ranging and daylight tracking, the performance of the CSN will be great upgraded
- San Juan station will get the funding for same upgrading soon.

Thank you !