

# Remote Operation of GUTS SLR

June 9, 2004

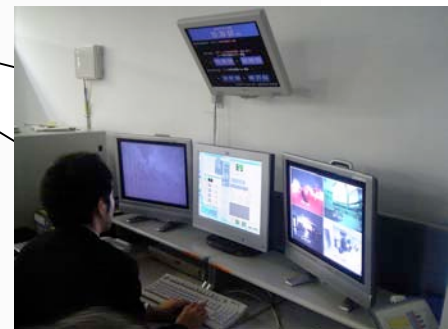
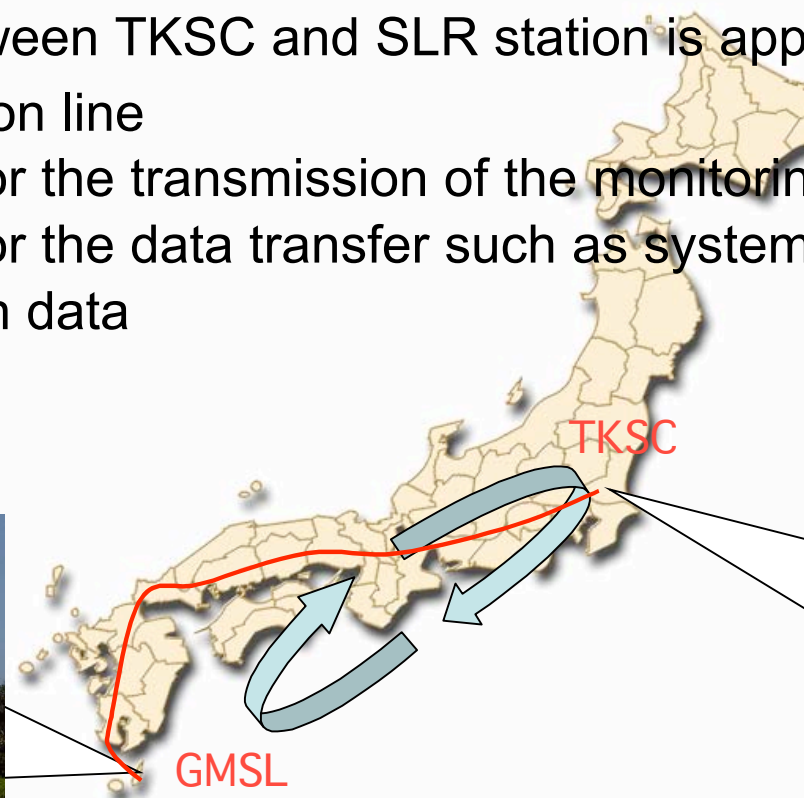
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# Overview



The GUTS-SLR (GMSL, Tanegashima) is operated by remote control from the Tsukuba Space Center (TKSC).

- Distance between TKSC and SLR station is approx. **1100km**
- Communication line
  - 256kbps for the transmission of the monitoring camera image
  - 512kbps for the data transfer such as system status, command and observation data



# Functions for remote control



The system has the following functions for remote control.

## ◆ Weather monitoring system

Wind direction, Anemometer and the raindrop sensor, etc.

Memo; The weather in Tanegashima can't be grasped precisely at TKSC. We depend on the weather information such as the conditions of the present sky and weather forecast on the Internet at present.

## ◆ Station Monitoring System

5 ITV cameras: Video transfer rate 5frame/sec, 3 Door sensors ;

Memo; There are two screens which can be monitored at TKSC. One screen of 4 division is indicated for the station environment monitor. The other is used for the optical tracking.



## ◆ Aircraft surveillance radar

always slaves a telescope, and also installed the wide-view camera as the backup (Daylight only).

## ◆ Sun avoidance

Sun avoidance are automatically performed by software and hardware in daylight operation.

Memo; A mirror cover closes before enter the solar interference area, and it opens automatically when go out of solar interference area.

Therefore, the sun sensor is also equipped. An operator can be applied without being conscious of interference with the sun.

# Functions for remote control



## ◆ Star Calibration and Satellite tracking

This system has a video tracker. Video tracker will support for the star calibration operation and flashing satellite tracking.

## ◆ Communication Outage

In case of abnormalities such as communication outage between TKSC and SLR station, SLR station's computer detects abnormalities and it performs the stop of laser radiation, homing a telescope, closing of the dome and set a whole subsystem to the standby mode until the restoration of communication line.

## ◆ Operation Plan

The tracking schedule of SLR is planed automatically using the latest TIRV on daily basis. GMSL will be operated 24hours a day.

*Memo; Operation plan is automatically generated considering interference with the sun, satellite priority and satellite elevation angle (>20deg)*

## ■ What does operator need to do?

Weather check, Schedule check, Dome open/close, Primary Mirror Cover open/close, Laser on/off

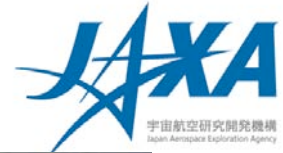
# Conclusions



This would be the first experience ever in the world with such a long distance for routine SLR remote operation !?

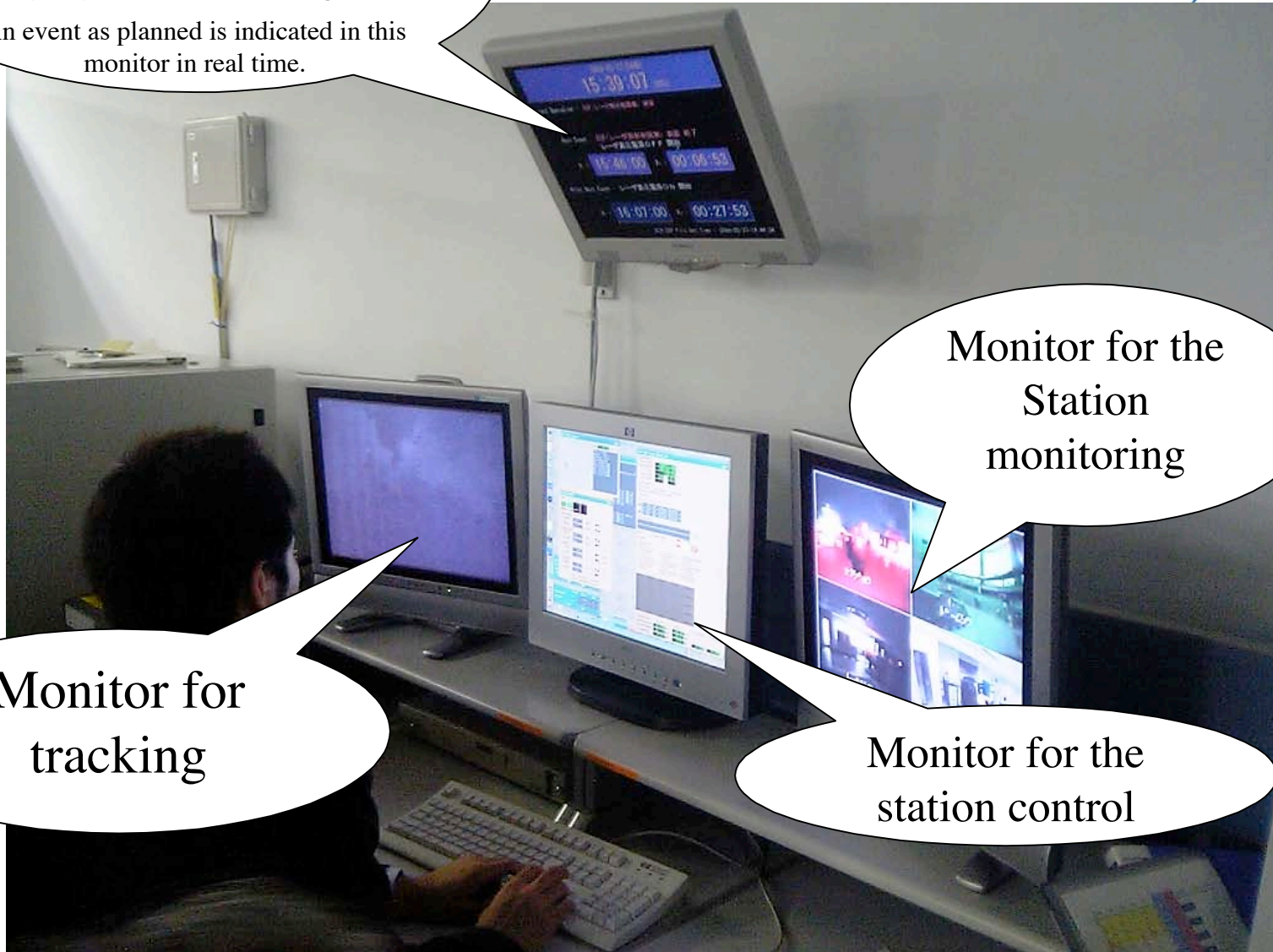


# The appearance of the station control system in Tsukuba



Monitor for Station event indication

An event as planned is indicated in this monitor in real time.



Monitor for the Station monitoring

Monitor for tracking

Monitor for the station control

