A BRIEF REPORT OF ALI SITE SURVEY

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What we want to do

- Seek out a very good (hopefully the best in the world) astronomical site in East Asia.

↓

- Develop East Asian Observatory by mutual collaboration between East Asian countries.

The beginning of the story (for me)

- A small meeting on small- and mid-sized telescopes in East Asia
  - held at NAOC in 2002
  - collaboration between four countries (Japan, China, Korea, and Taiwan)
  - how to construct a mid-sized infrared telescope in East Asia region
  - participants: Sato, Kaifu, Zhao, Yao, Liu, Han, Chen, Ip, and many others, and me

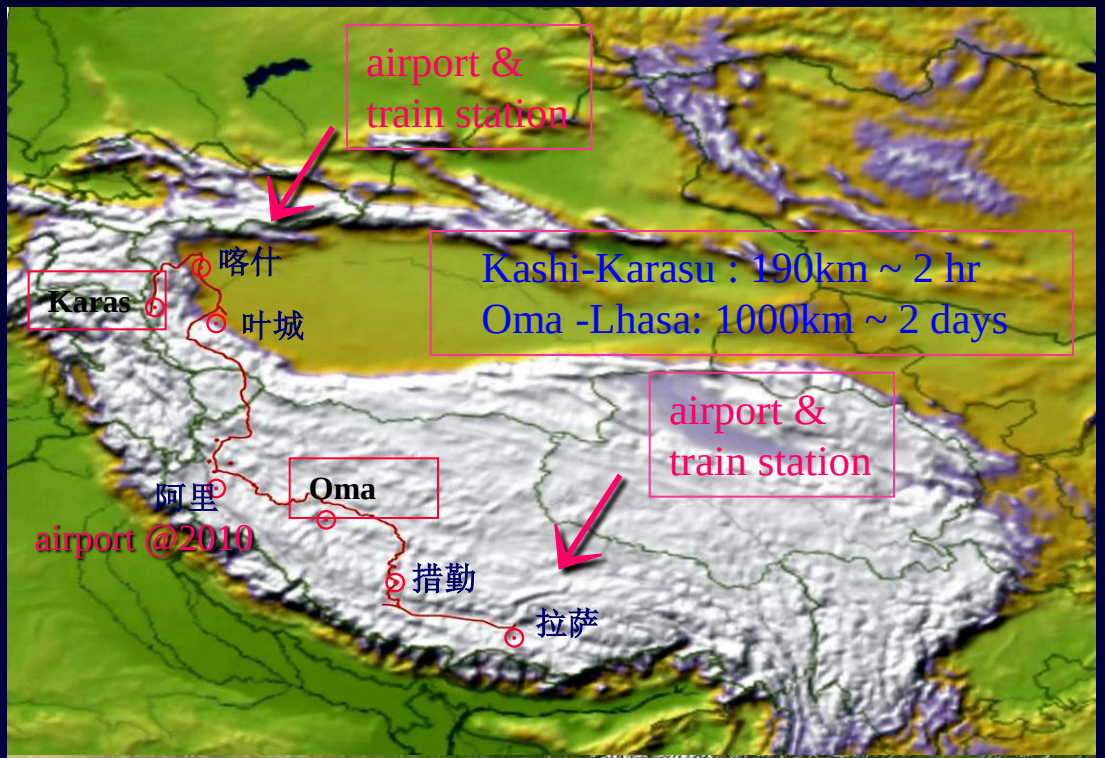
Review of the China Astronomical Site Testing

Phase 1, 2003-2004: Remote study and local survey
Phase 2, 2005-2006: Candidate sites and monitoring
Phase 3, 2007-2008: Instrument setup and campaign
Phase 4, 2009-2010: Project review and future plan

My activites:

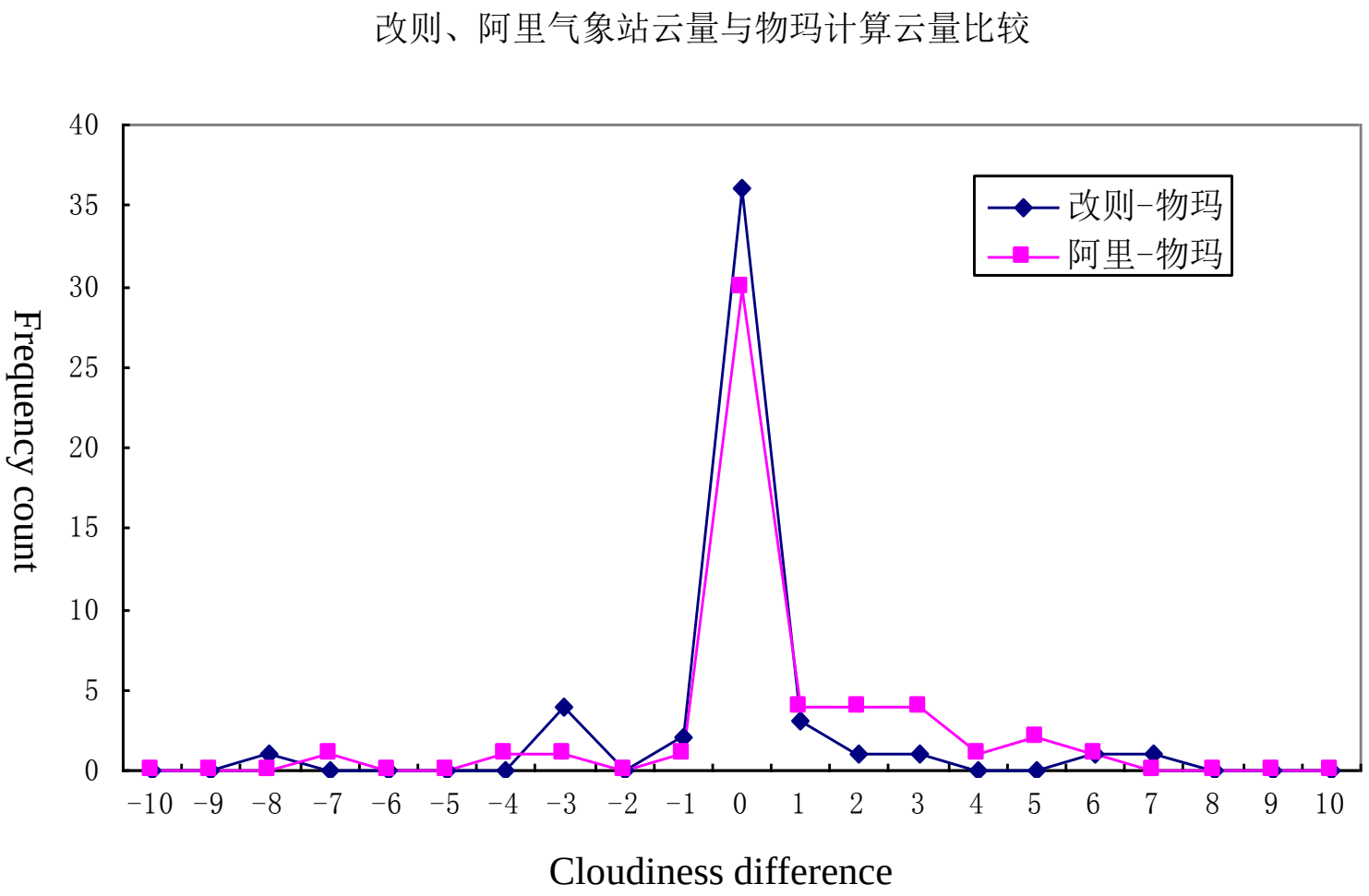
- Site survey workshop in Lhasa (2004)
- Site survey tours in Tibet and Xing-Jiang (2007, 2008)
- Site testing in Tibet, Ali (2011)

CAST 2005: Candidate Sites



CAST 2005-2006: monitoring results

Comparison of monitoring Cloudiness with nearby meteorological stations



CAST 2005-2006: monitoring results

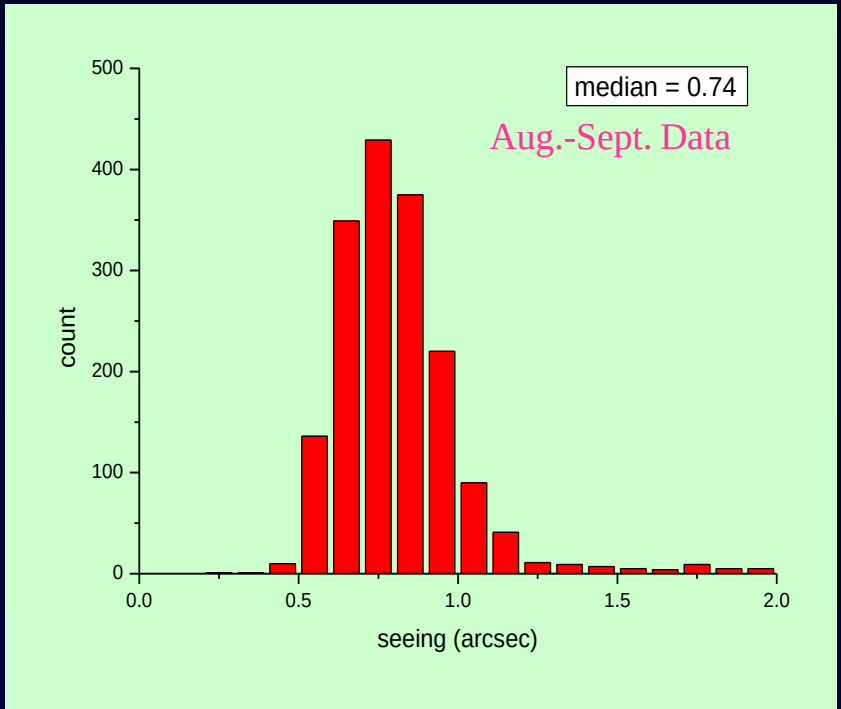
DIMM Seeing

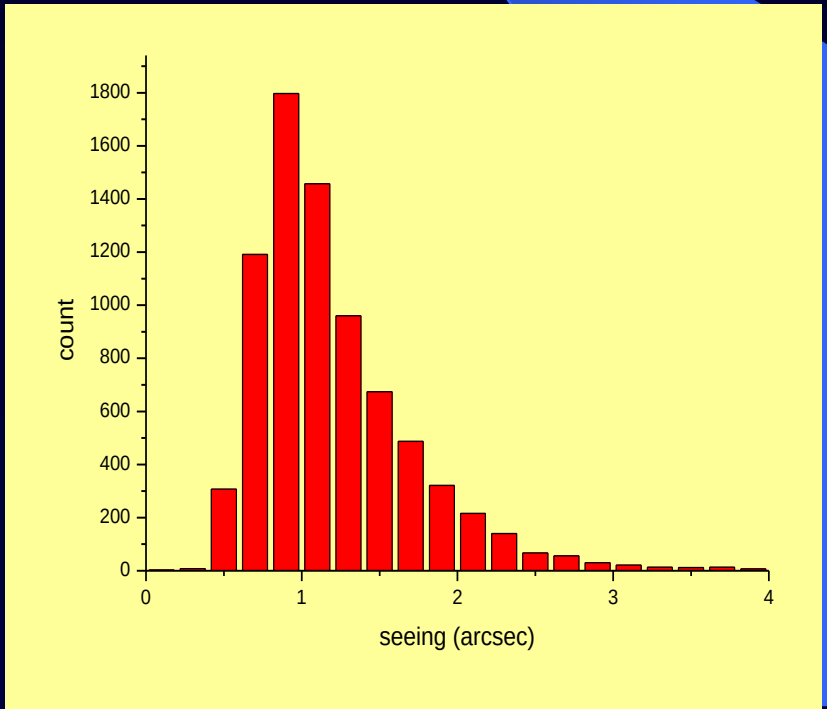
DIMM_seeing, 25cm Meade, 10ms exposure, 4m above ground

Karasu: 20061031-1101

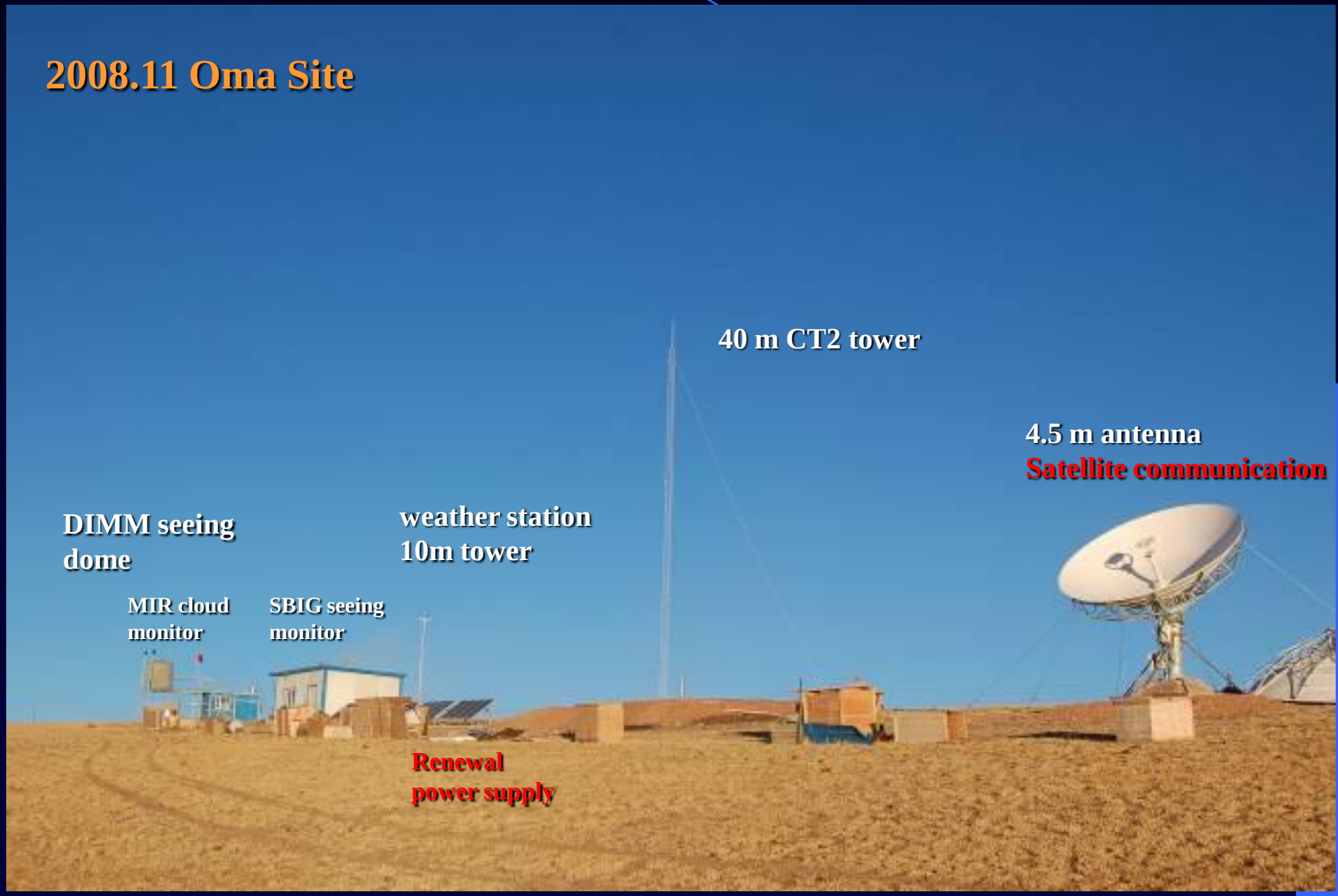
Oma seeing: 2006 May-June, Aug.-Sept.
median 0.92", 22% <0.8",
Aug-Sept median 0.74"

Karasu seeing: 2006 May,Sept.-Nov.
median 0.96", 19% <0.8"

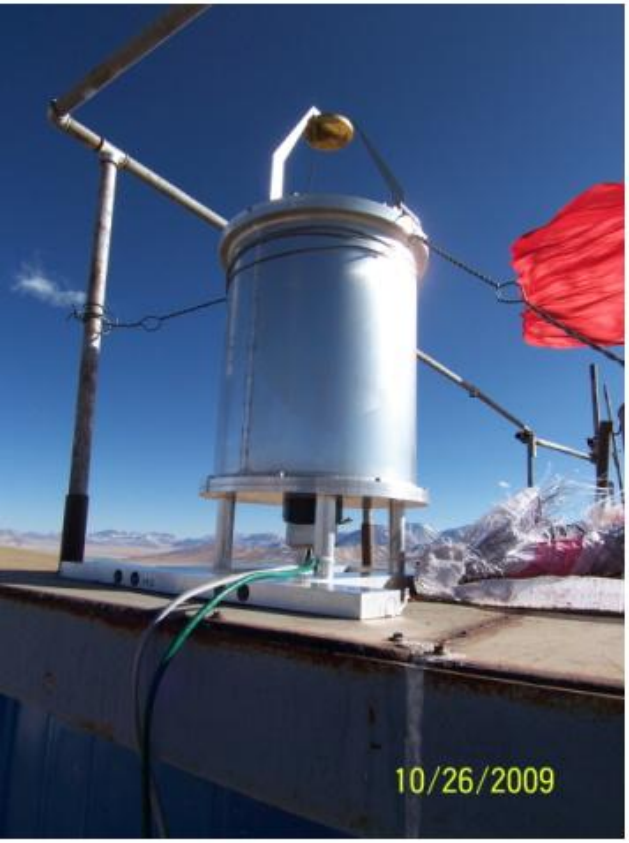




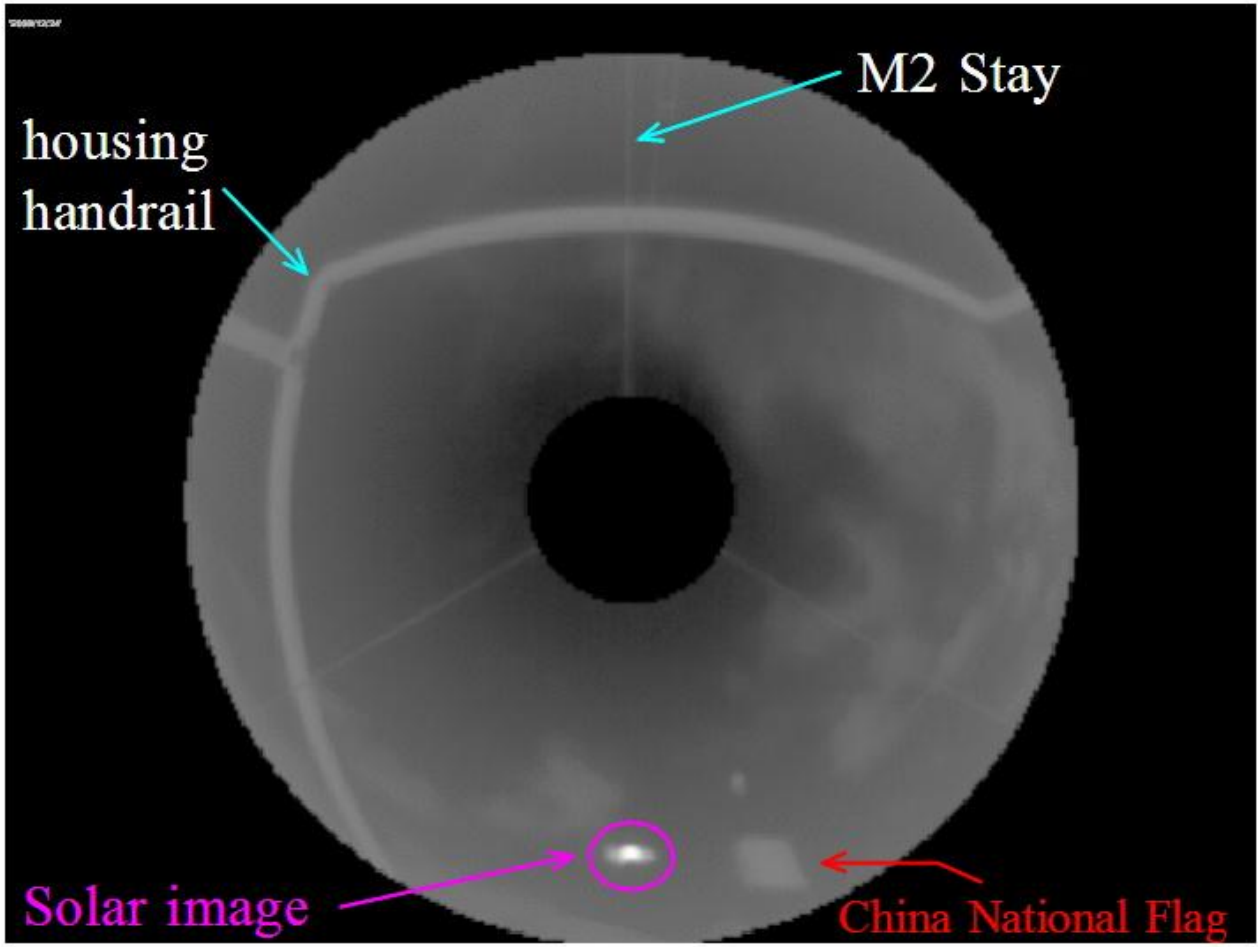
CAST 2007-2008: Instrument setup & campaign



FOV of Cloud Monitor



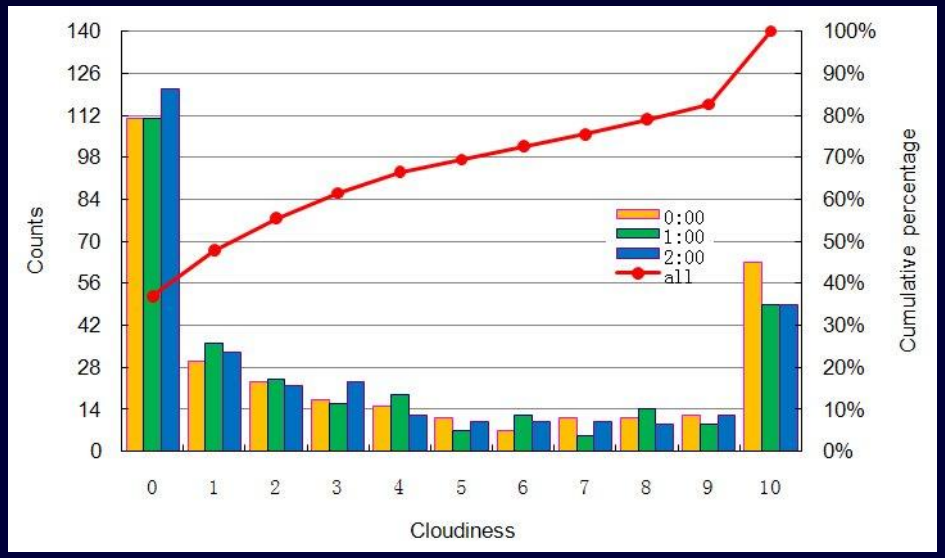
A Cloud Monitor
on housing roof
at Oma, Tibet

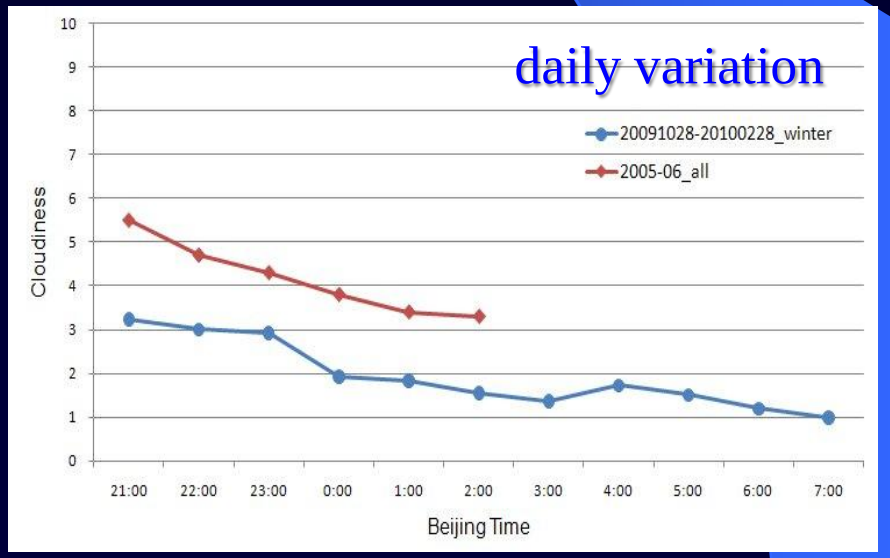


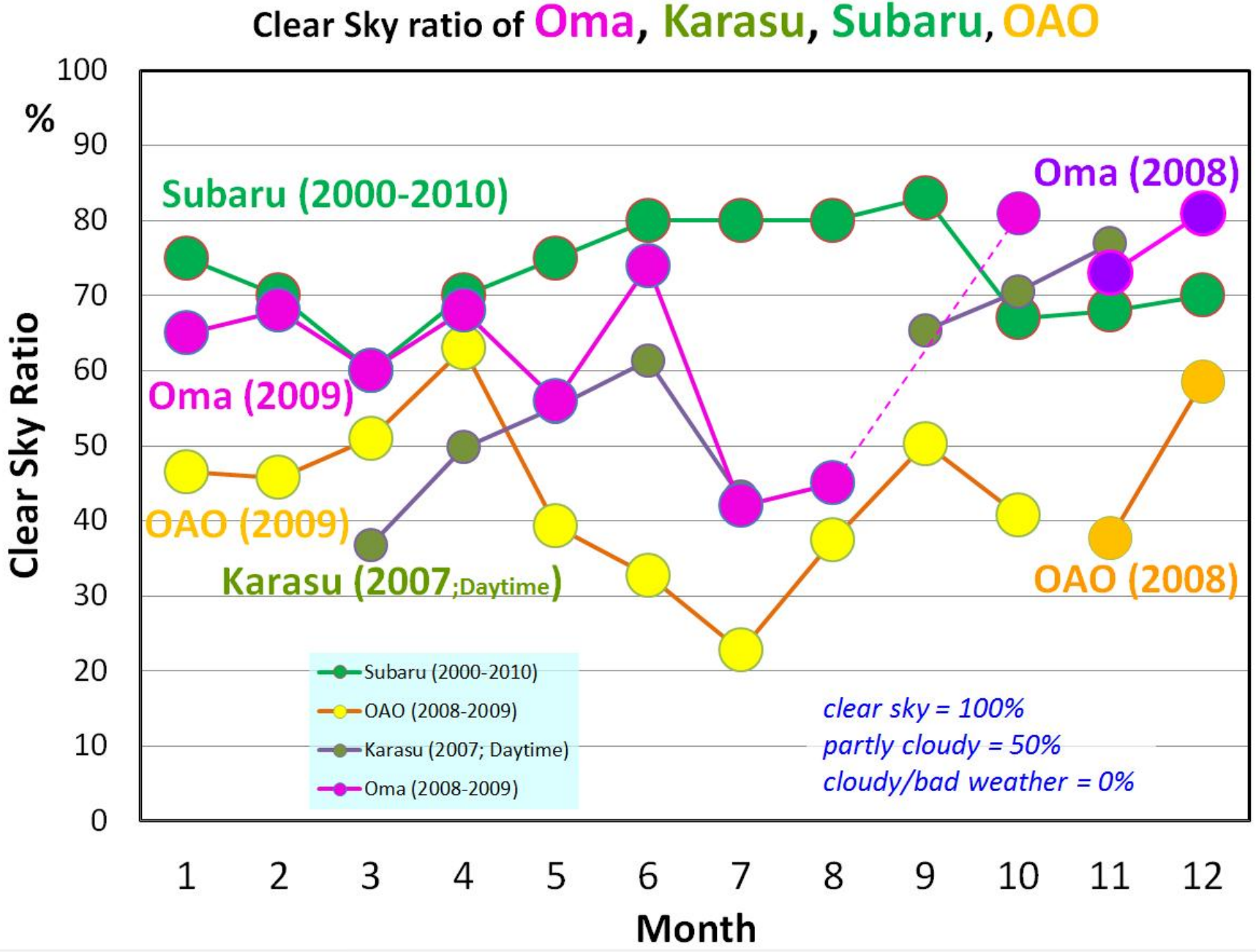
CAST 2009-2010： project review_Oma

Oma: night time cloudiness

Period	Clear night c<1	Partly cloudy c<3	Usable night c<7	Num. nights
2005-2006	42.7%	69.0%	75.4%	310
2008-2010	47.8%	66.5%	75.4%	480
average	45.8%	67.5%	75.4%	790






Clear Sky ratio of Oma, Karasu, Subaru, OAO
%
100
90
80
70
60
50
40
30
20
10
0
Clear Sky Ratio
Subaru (2000-2010)
Oma (2008)
Oma (2009)
OAO (2009)
Karasu (2007;Daytime)
OAO (2008)
Subaru (2000-2010)
OAO (2008-2009)
Karasu (2007; Daytime)
Oma (2008-2009)
clear sky = 100%
partly cloudy = 50%
cloudy/bad weather = 0%
1
2
3
4
5
6
7
8
9
10
11
12
Month

CAST 2009-2010：New Site

ShiQuanHe_25km South: newly selected site near the Ali airport

for simultaneously monitoring and small telescope project

CAST 2009-2010：New Site

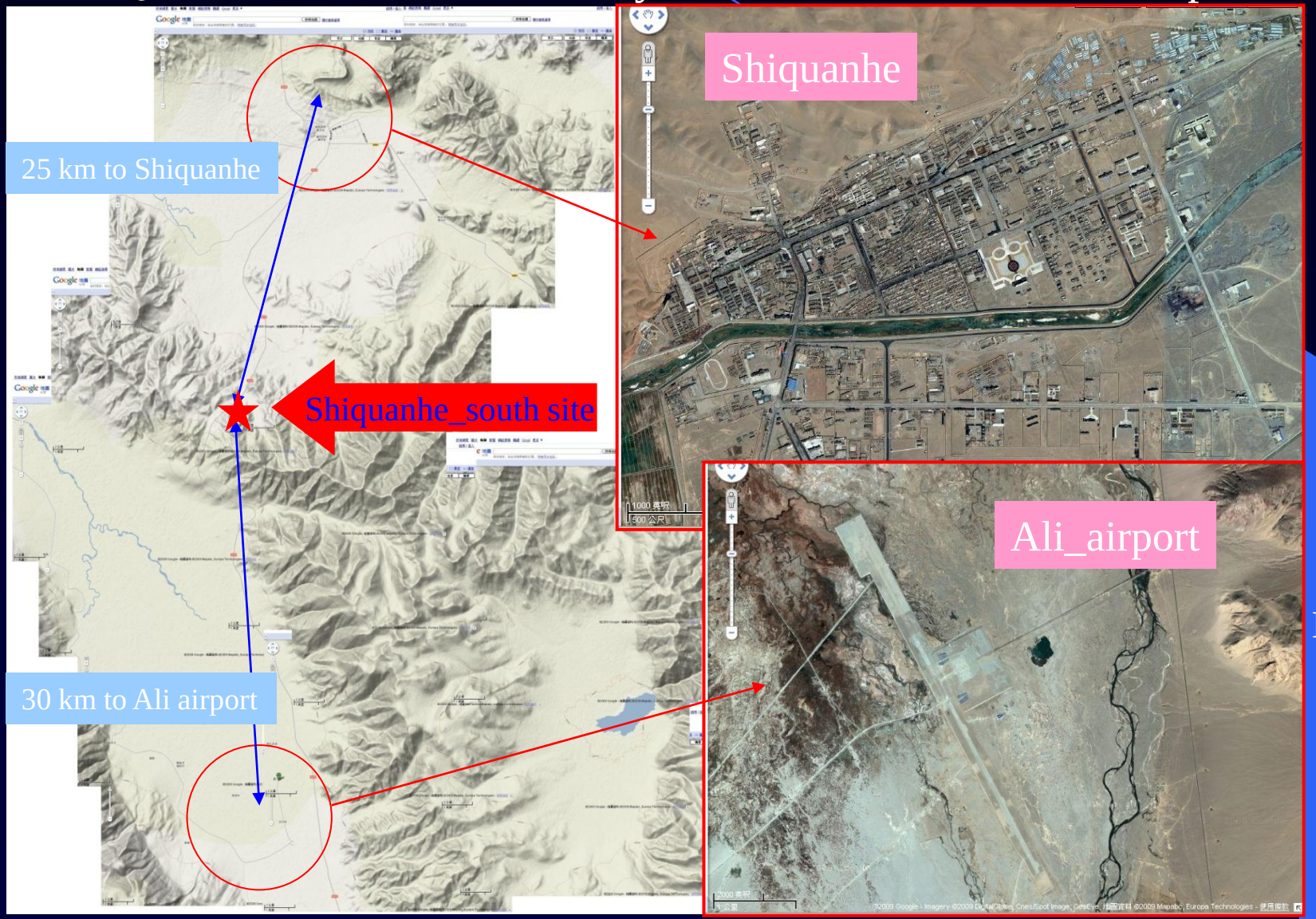
ShiQuanHe_25km South: newly selected site near the Ali airport

for simultaneously monitoring and small telescope project

Topography	A NW-SE ridge, above 5000m
Meteorology	Cloudiness and wind speed may be better than Oma site
Traffic conditions	Paved road from Lhasa or Kashi, Ali airport open in 2010
Road to summit	Simple constructed
Electric power & communication	Pass-way on summit to the airport
Geology for construction	Bed rock underlying less than 1m, common solidity

CAST 2009-2010：New Site

ShiQuanHe_25km South: newly selected site near the Ali airport



Ali Obs., a view from airplane

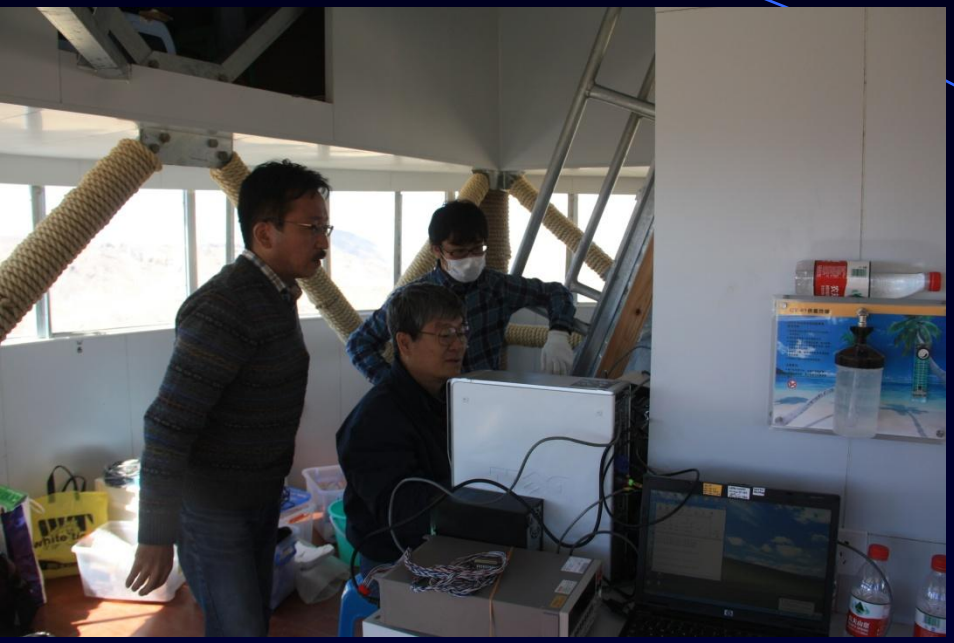
Ali Obs., a view from the northern foot of the hill

Ali Obs., a view from the southern foot of the hill

10m tower for site-testing

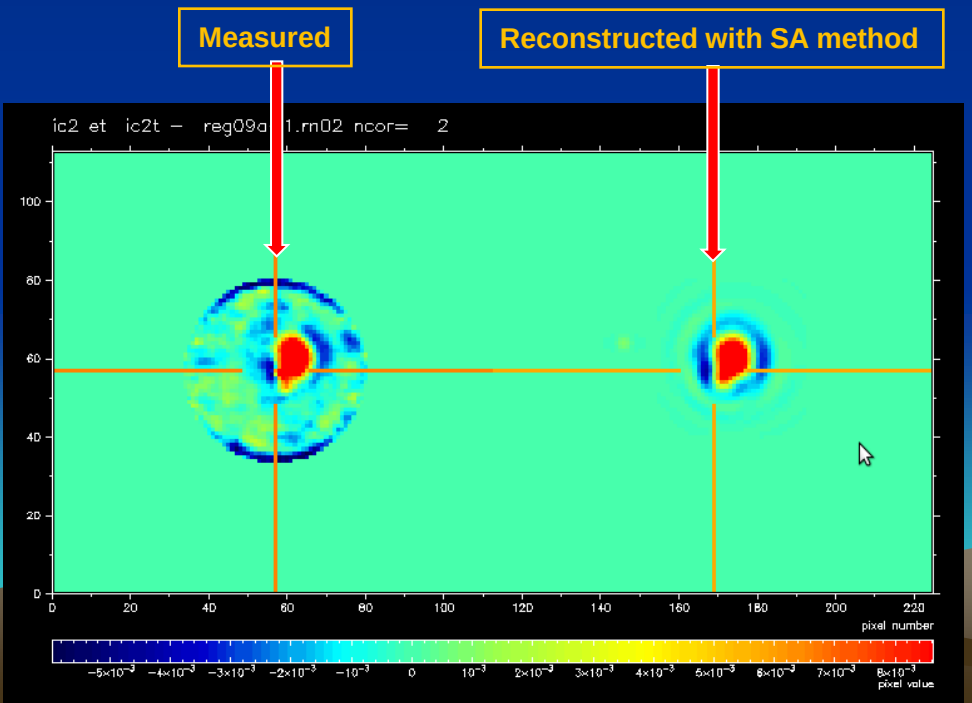
Taiwanese telescope

Instrument setup, on the roof of 10m tower in Sept. 2011



Single Star SCIDAR Instrument

The SSS is a new technique for retrieving atmospheric turbulence profile by analysis of single star scintillation. It can obtain the profiles of optical turbulence and wind speed, as well as the key parameters of optical turbulence, seeing, coherence length, coherence time, and isoplanatic angle.



Observations at Ali site, Tibet

The SSS observations were carried out at Ali site from October to November, 2011. It provide vertical profiles of turbulence intensity and wind speed from ground up to an altitude of 30km.

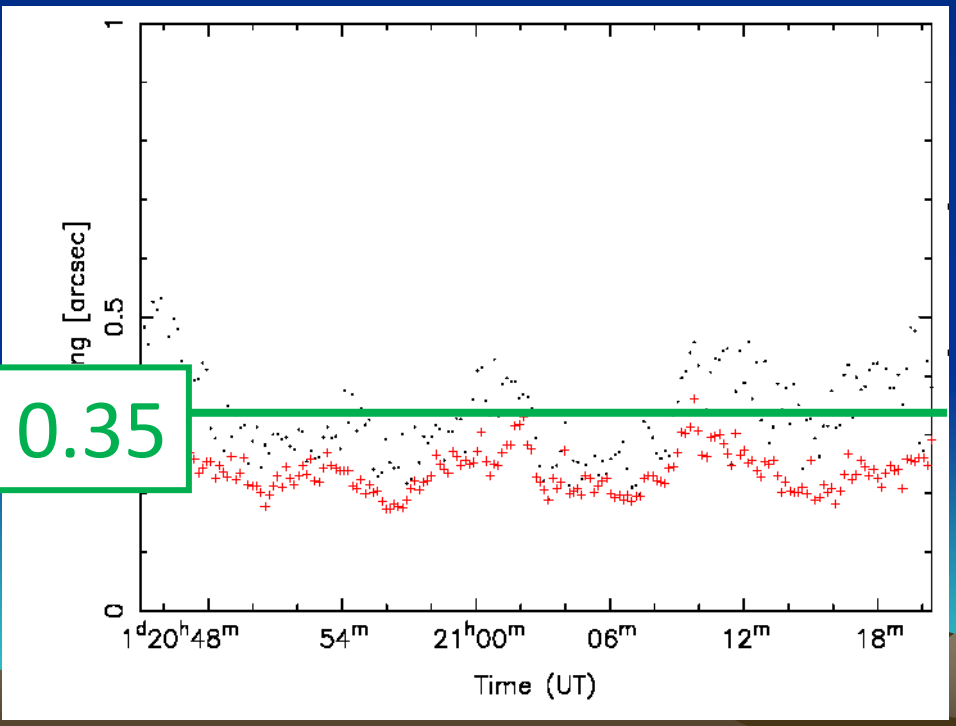
Fig.1 The SSS dome at Ali site

Fig2. The observation at Ali site

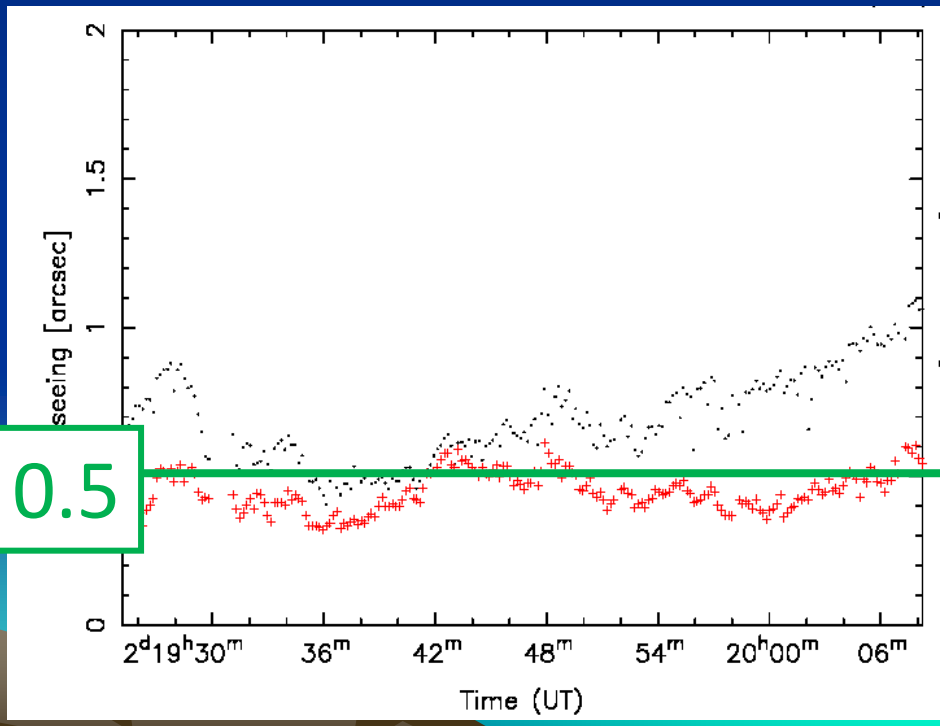
The Seeing Measured by SSS at Ali site.

Black dots refers to integrals over the whole atmosphere and red crosses to integrals above the surface layer.

The best case



The typical case



Summary

- CAST phase 1 – 3
  - Mid-Tibet (Oma site) has a good weather condition (comparable to Mauna Kea) in winter
- CAST phase 4
  - Ali site (near ShiQuanHe) could be one of the best astronomical sites in East Asia
    - weather conditions (cloudiness, wind speed, water vapor, etc.) are expected to be better than Oma
  - Seeing expected by SCIDAR measurements is sub-arcsec (sometimes better than 0”.5)
  - Ali site is a good candidate site for East Asian Observatory

However,

We must be careful to determine the site

- Quantitative evaluation as an astronomical site has not been enough.
- Note that the current test site is a temporary site.
  - close to the main road
  - the area is not wide

- We Japanese team (led by Sasaki san) would like to continue site-testing in collaboration with the China team (led by Yao san) for at least one year.
  - using weather monitor, MIR cloud monitor, SCIDAR, CT2 sensors and DIMM
- Science observations (ex. ToO obs.) with small telescopes are highly encouraged. It would be useful for site evaluation.

Ali Obs. construction plan in 2011