Proc. EAMA7 Symposium (Fukuoka, ed N. Kaifu & M. Tosa), 2008 (in press)

Collaborative Site Testing in West China

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The high plateaus in west China may provide good candidate sites for astronomical observations with middle-class telescopes and also possibly for more large telescopes. Two sites have been selected, *Karasu* near the western boundary of China and *Oma* in western area of Tibet, where several site testing instruments have been working. To investigate cloud coverage at the site, we have settled a Cloud Monitor camera at *Karasu* to monitor cloud conditions continuously day and night. We report the short-term results at *Karasu* and collaborative future plans for the site testing in west China.

1. Potentiality of West China as Astronomical Observation Site

As shown using NOAA archival satellite data on cloud distribution for 10 year, potentially good sites are there in west China (Sasaki et al., 2006). Two sites are selected according to available local weather statistics and geographical exploration (Figure 1). Base camps have been settled for site testing (Yao, 2005). Geographical exploration is still run on around west China.

2. Site Testing at Karasu

A weather station has been installed at *Karasu* and weather monitoring observations are continued by observers at the site. Recently we installed a Cloud Monitor camera (CloudMon; the same optical system described by Takato et al. 2003) at

Fig.1. Location of two camps for site survey in west China; *Karasu* (38:10:29.3 N, 74:48:08.7 E, 4495 m) in Xinjiang and *Oma* (32:32:39.8 N, 83:03:22.0 E, 5032m) in Tibet.

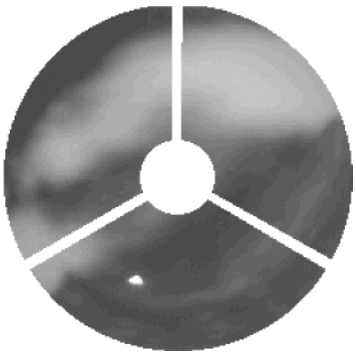

Fig. 2. A CloudMon MIR image obtained at *Karasu* on Mar. 17, 2007. A lower-left bright spot is the solar image. North is at top and East at left.

Karasu. A FLIR A40M camera is used as a cloud-detecting camera in mid-IR band (7.5–13μm). Sky frames taken with CloudMon are reduced for bias subtraction and flat-fielding. Sky background subtraction is important to reduce atmospheric emission in MIR band. CloudMon sky images show capability to detect faint cloud with its transmittance variance of 20% in the case that solar images are used as intensity reference (Figure 2).

Micro-thermal turbulence sensors were installed at five heights (4m, 6m, 10m, 19m, and 37m) on a 40m-tall tower at *Karasu* to measure atmospheric turbulence in ground layer (Figure 3). Seeing distributions can be estimated at each height (Miyashita et al. 1989, Wada et al. 2004). An average seeing size is around 0.12 arcsec at 19 m level (Figure 4).

Fig. 3. A 40 m tall tower with CT2 sensors at *Karasu.*

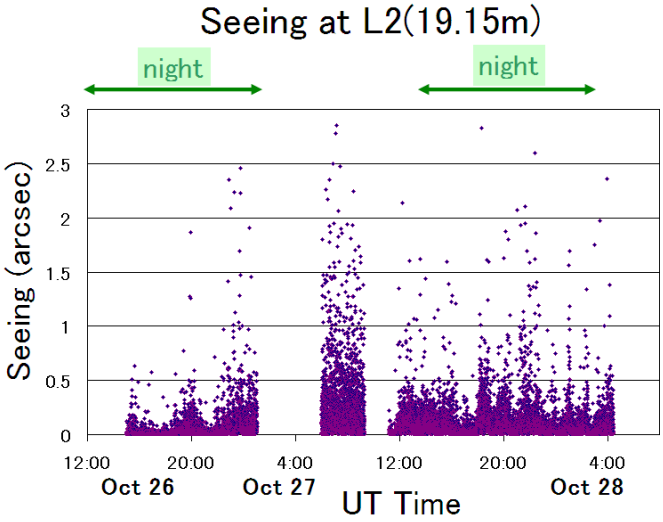

Fig. 4. Time variations of seeing estimated at 19.15m high at *Karasu* during Oct. 26 and Oct. 28, 2007.

2. Future Prospect

As automated-fashioned continuous monitoring is crucially important for the site survey project, manually-operated DIMMs (Differential Image Motion Monitors) will be improved to be in automatically operation as described by Uraguchi et al. (2006). New instrument, MASS (Multi-Aperture Scintillation Sensor), will be installed to obtain more accurate turbulence measurement with height resolution. Comparison of measurements with Micro-thermal turbulence sensors, DIMM, and MASS enables to investigate height distribution of atmospheric conditions at the sites.

Other possible sites should be searched for in west China by introducing a satellite weather database of FriOWL[1] (Sarazin et al. 2006), supplemented with CLAUS[2].

Our collaborative site survey project keeps continuous monitoring of the two sites and other possible site(s) for a few years to characterize the sites to determine a good site for communal telescopes.

Acknowledgement

One of authors (T.S) expresses deep thanks to Heiwa-Nakajima Foundation for their financial support in 2007.

[1]http://archive.eso.org/friowl/, [2]http://badc.nerc.ac.uk/data/claus/

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