Renovational Improvement of Optical Performance of Kottamia 188cm Telescope in Egypt

Toshiyuki Sasaki, Takeshi Noguchi, Hisashi Koyanao, Kazuhiro Sekiguchi (NAOJ), Gamal B. Ali, Hamed Ismail, Ahmed Essam, Aly Haroon、Ibrahim Selim (NRIAG)

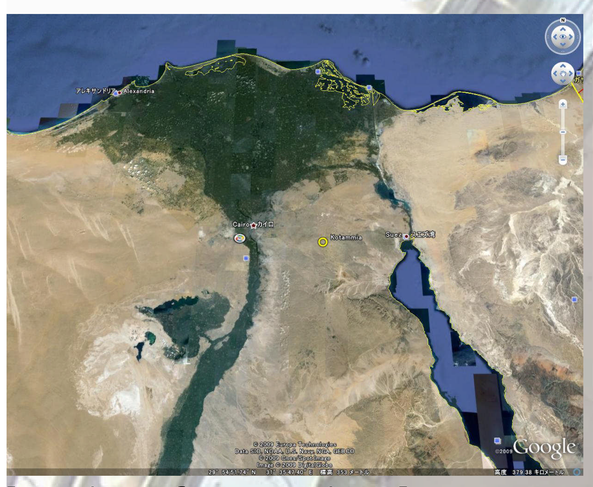
Some axial support pads were measured as detached from the back-surface of the main mirror（M1）. By adding thin sheets, stellar images were improved stable but separated bad in 3 segments, which means clearly the fixed points of axial support system（AFP） may affect much on bad images by pushing up M1 with larger force. As height levels of the 3 AFP were measured above other axial supports, AFP heights were shifted down and finally good round stellar images are observed. We conducted Hartmann Test to obtain Hartmann constant of 0.3 currently, which is good in use for real astronomical observations. We also confirmed the Coma-free center fixed.

1. Kottamia 188cm Telescope

National Research Institute of Astronomy and Geophysics (NRIAG), Helwan,Cairo,Egypt

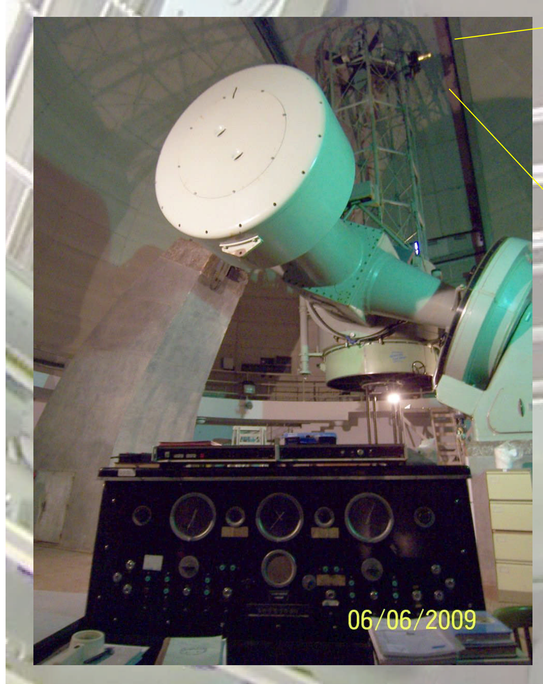
On the desert 60km east from Cairo situates Kottamia Observatory, where 188cm Optical astronomical telescope locates. The telescope is one of sister telescopes at OAO/Japan, Mt. Stromlo/Australia (burned), and Sutherland/South Africa.

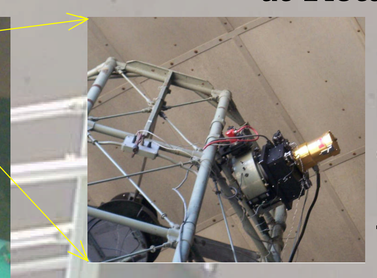
Statistical data shows **200** clear nights a year at the site (Hassan 1998), but some researcher says about **300** photometric nights a year.



location of Kottamia Observatory

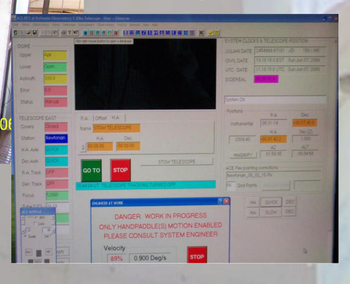
Dome for 188cm Telescope at Kottamia





188 cm Telescope, its control cabinet, and CCD camera installed at New-tonian focus.

Computerized Telescope Con-trol System



2.Trouble Shooting of the Telescope

Mirrors, M1 and M2, with its mirror cell were remade by Carl-Zeiss in 1995 with its initial image quality of 0.25 arcsec in diameter. After settling them to the telescope, stellar images have been splitted into three segments nearly over 10 years!

bad stellar images under the previous state on 2009-06-07

We have fixed the problem during two-time visits of Japanese astronomers/engineers in 2009.

2.1 checked counter-weight balance, which shows nearly good balance within 10% variations around 90 kg (=1.6 ton of M1 weight devided by 18 supports).

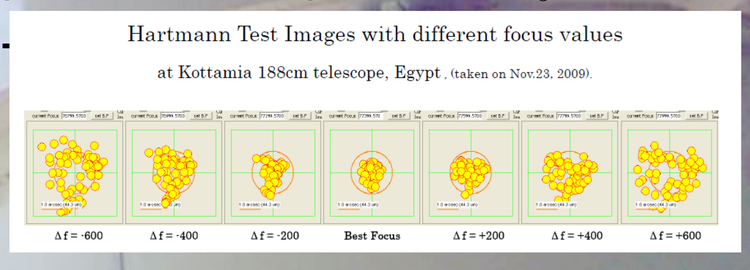
2.2 checked and adjusted **unbalanced heights of axial support system**, which causes the bad 3-segmented stellar images. it's **Fixed.**

2.3 fixed the Newtonian support structure to stabilize stellar positions despite celestial positions of stars.

3.Hartmann test

After adjusting axial support system, we conducted Hartmann test by observing stellar images with a Hartmann plate to evaluate its optics. Hartmann constants(*) using two different stars have been of 0.29 (3377 33 Lyn) and 0.32 (4309 51 UMa).

*) Hartmann constant is the radius of minimum images in arcsec

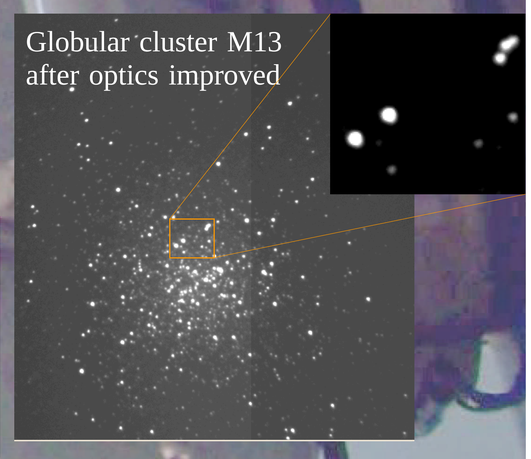


4.Future works

Still some **astigmatism** has been observed which should be corrected for by adjusting axially supporting forces by removing their 10% variations.

Dome-Flat facility should be inplemented to get more precise photometric calibration for astronomical observations.

Removal of the mirror cell



Nicely inspected by Egypt Governmental Science Advisors and Observatory Director, we discuss on future collaborations bewteen Egypt and Japan.