POINTING, TRACKING, GUIDING, AND DOME SEEING AT THE AAT.

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Abstract.

The Anglo-Australian Telescope (AAT), though based on the design for the Kitt Peak and Cerro Tololo 4 metre telescopes, differs in many significant respects. E.g. its declination axis is offset from the polar axis and its polar axis structure is much stiffer. Also the computer was, from the outset, more closely integrated with the telescope drive and control than was previous practice. The sound structural design, good gearing, and accurate mirror supports, together with thorough computer calibration, allowed the AAT to set new standards in pointing by the time it was fully operational in 1975. Good pointing saves time in acquisition, greatly aids day time observing, and leads to good blind tracking. Currently, calibrations covering the whole observable sky give rms radial residuals very near 2 arc sec. Blind tracking errors are generally within ± 1 arc sec for 1 hour or more and natural frequency oscillations less than 0.1 arc sec peak to peak. Better tracking is, of course, available using the offset autoguiders, which employ image dissectors and function on stars to about 15^m. Intensified SEC Videcon television cameras are used for acquisition and for guiding with light reflected from spectrograph slit jaws.

Initially, the AAT seeing suffered from poor matching of inside and outside air temperatures because the intended active cooling of dome air was cut from the installation to save funds, leaving an inadequate capacity for forced ventilation. Correlation of observed seeing with dome temperature excess indicated degradation of about ½ arc sec/°C. In 1980 the forced ventilation was upgraded to change the dome air in less than 4 minutes, with optional flow direction, upwards (exhausting out the observing aperture) or downwards. Measurements of seeing within the dome, but with the dome open, now show degradations typically 0.4 and 0.6 arc sec diameter with upwards and downwards ventilation respectively. Stellar seeing measurements, including routine observations in which the ventilation direction was alternated nightly, have also indicated superiority of the upwards flow. Taking advantage of this, filters can now be installed on the air supply to keep the optics cleaner.

Proceedings of the IAU Colloquium No. 79: "Very Large Telescopes, their Instrumentation and Programs", Garching, April 9–12, 1984.

DISCUSSION

G.J. Odgers: Do your fans change good seeing to excellent or poor seeing to moderate?

P. Gillingham: The seeing at Siding Spring is apparently not as good as at the world's best sites, our average recorded during routine observing being about 2 arcsec FWHM. However, a very useful fraction of the time, around 1/4, the seeing is better than 1.25 arcsec. It is, of course, when the external seeing is good that improvement due to the increased ventilation is most marked.

R. Wilson: How often do you perform a full pointing calibration; how often do you correct the varying terms such as the two index errors and the collimation error?

P. Gillingham: 1. Recalibration at intervals of about 6 months for each telescope configuration is desirable. The rms pointing error is then unlikely to be worse than about 3 arcsec, compared with its freshly calibrated value typically 2 arcsec. However, we have sometimes allowed a year or more to elapse between tests. 2. The declination zero error and east-west collimation error (i.e., non-perpendicularity of optical and declination axes) are checked and reset each night.

https://doi.org/10.1017/S0252921100108553 Published online by Cambridge University Press