

V80c **A New Thermo Metrology on ASTE for High Pointing Performance**

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Thermal loadings on a telescope degrade its pointing performance, especially in cases operated in open air. The ASTE antenna has been operating a pointing correction system that incorporates a dual-axis inclinometer on the azimuth axis and 8 temperature sensors on its yoke structure. However, overhead pointing calibrations are required before and after science observations, because correction accuracies with the current metrology have fallen short of acceptable precisions. From 2007-06 to 10 and 2008-08 to 12, observations with AzTEC (a 144- element bolometer array camera) were made, which resulted in 3,400 pointing measurements. After a pointing model is created, science observations shall be corrected for pointing during pipeline data reduction.

In 2007 we installed additional 80 sensors on the yoke to obtain a realistic picture of the temperature distribution. Using these monitor data and those of 150 sensors on the reflector structure, center ring, and receiver cabin, we have searched for a thermal model. As for observing conditions, ambient temperatures varied from -14 to +12 degrees, and wind speeds were smaller than 18 m/s. We have found temperature differences between left and right of yoke arms and between front and rear faces of them are major sources of pointing errors, and temperature gradients in the center hub and center ring to a less extent. A single retrospective thermal model can predict the observed pointing errors with residual errors of 2.3" for both 2007 and 2008.

This new thermo metrology shall be implemented for observations in coming season to provide this level of pointing performance for day and night and all year round.