

# RESULTS OF SEEING MEASUREMENTS AT THE SOUTH POLE

T. Travouillon, M.C.B Ashley, M.G Burton, J.W.V. Storey  
 (School of Physics, UNSW, Sydney, NSW, 2052, Australia )  
 P. Conroy, G. Hovey, M. Jarnyk, R. Sutherland  
 (Mount Stromlo Observatory, ANU, ACT, 2611, Australia)

## Abstract

In order to further the statistics of the seeing conditions at the South Pole station in Antarctica, the University of New South Wales (UNSW) and the Australian National University (ANU) have installed a fully automated Shack-Hartmann wavefront sensor as part of their site testing campaign in Antarctica. This instrument uses a differential motion technique across an array of sub-apertures in order to calculate the seeing. We present the results taken in 2001 as well as an analysis of the time variation of this parameter.

### Measuring the seeing using differential motion

DIMMs or Differential Image Motion Monitors measure the seeing by calculating the variation of the distance between the different sub-aperture images of a star. This technique has the advantage of being transparent to telescope and ground vibration.



A-DIMM (right) installed at the South Pole on the G-mount. The instrument on the left is the AFOS

### Seeing Results:

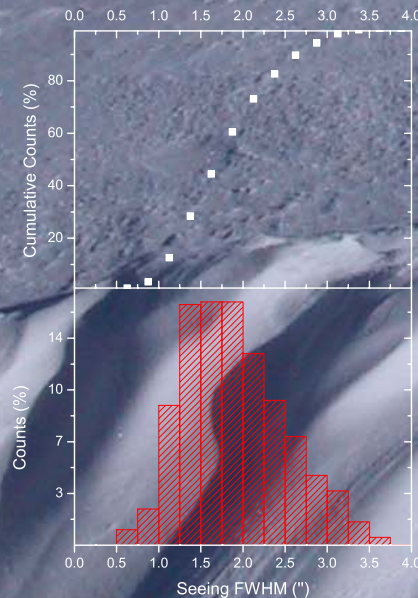
Instrument	Sample (days)	Mean	Std. Dev	Med.	25%	Best	Worst
A-DIMM	101	1.90	0.60	1.82	1.43	0.46	3.72
SODAR	269	1.73	1.07	1.59	1.17	<0.3	8.11
Microthermals	16	1.86	0.75	1.6	1.0	0.8	3.1
H-DIMM	28	1.53	-	1.64	-	0.6	6.2

South Pole seeing as measured by the A-DIMM in 2001 at a wavelength of 500nm. It is compared to other seeing measurements done at the South Pole. All values are in arcseconds.

### The instrument

The A-DIMM was built around the optics of a 35cm diameter Celestron C14. The star is detected and centered, the light is collimated to form a pupil on the surface of a microlens array. Each square lens (0.188mm on a side) forms a separate image of the target star on the CCD detector with a scale of 1.09(H) x 1.26(V) arc sec/pixel, corresponding to an effective 64mm square at the entrance aperture of the telescope. The A-DIMM freezes the seeing with exposure times of 10ms. With this technique, the A-DIMM obtains 24 images from the corresponding sub-apertures, making a total of 215 separate baselines. Sub-pixel centroiding is then used on each individual image in order to determine their respective distances.

The A-DIMM was installed at the South Pole station in the summer 1999. The telescope is driven by the G-Mount, an Alt/Az mount supporting two telescopes. The G-mount can be programmed to schedule the observation of the two telescopes installed. In 2000, the A-DIMM was installed aside the AFOS (Antarctic Fibre Optic Spectrometer). The G-mount was installed on top on a 7.5m high hexapod tower which, in theory, retains its parallelism with the ground under any wind conditions.



AFOS and A-DIMM on the G-Tower.

