NGWFC Status and Performance

November 18, 2006

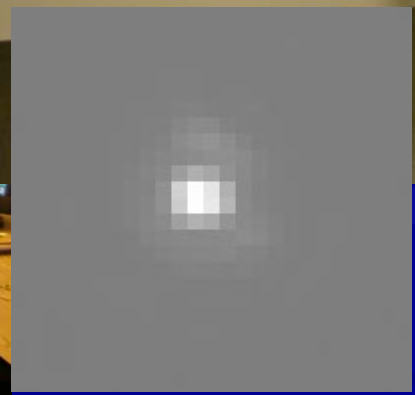
Marcos van Dam, Paul Stomski,
Erik Johansson, Peter Wizinowich,
Jason Chin and Roger Sumner

NGWFC Project Status

First Light on Keck I	October 5, 2006
First Science on Keck I	November 9, 2006
First Light on Keck II	Feb 26, 2007

First light

- One hour on October 5!



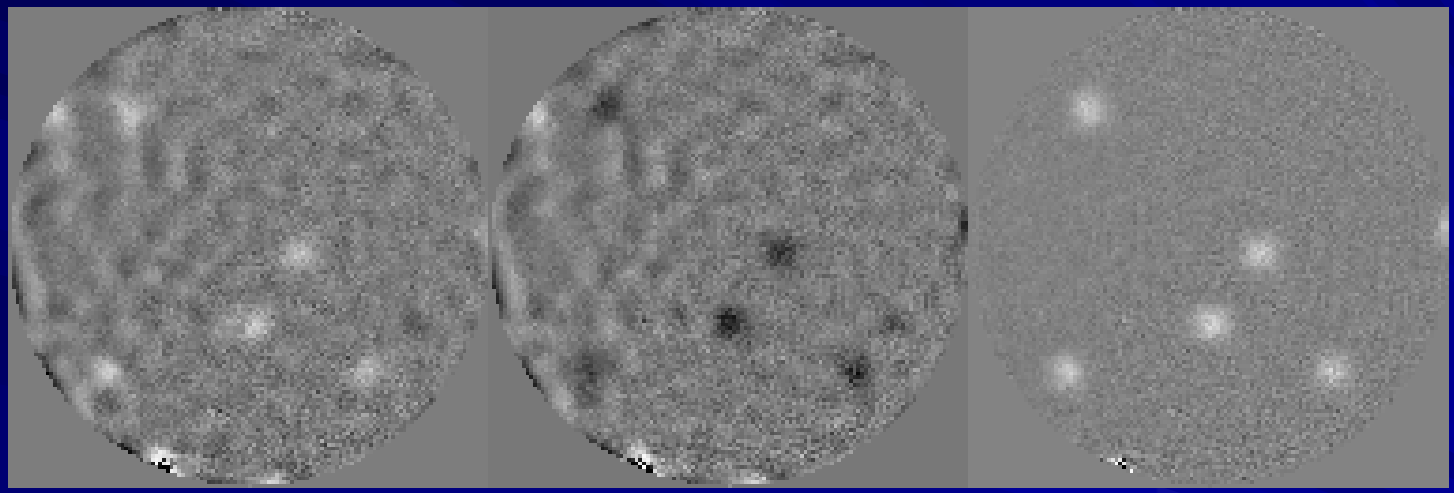
Performance goals

- Goal is to produce Strehl ratios at K-band of 0.65 and 0.3 for magnitude 7 and 14 guide stars respectively for r_0=20 cm.

Error source	RMS WF in nm		
	Current	1500 Hz	2000 Hz
Telescope fitting	60		60
Atmospheric fitting	139		139
Miscellaneous	125		80
Camera	113		70
Tip-tilt bandwidth	75	28	20
DM bandwidth	103	39	28
Total	261	191	188

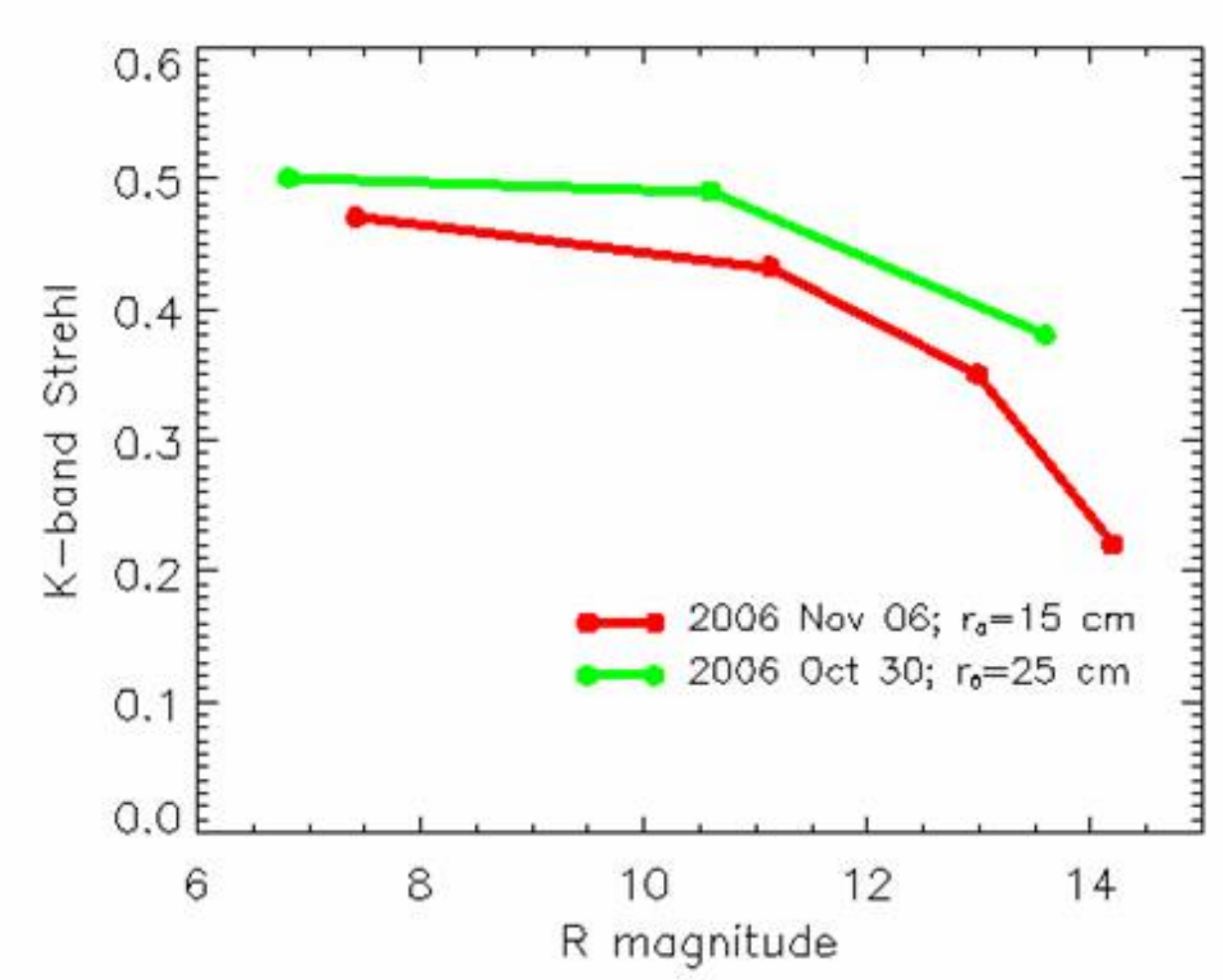
Phase diversity

Camera	**113**	**< 30 nm**



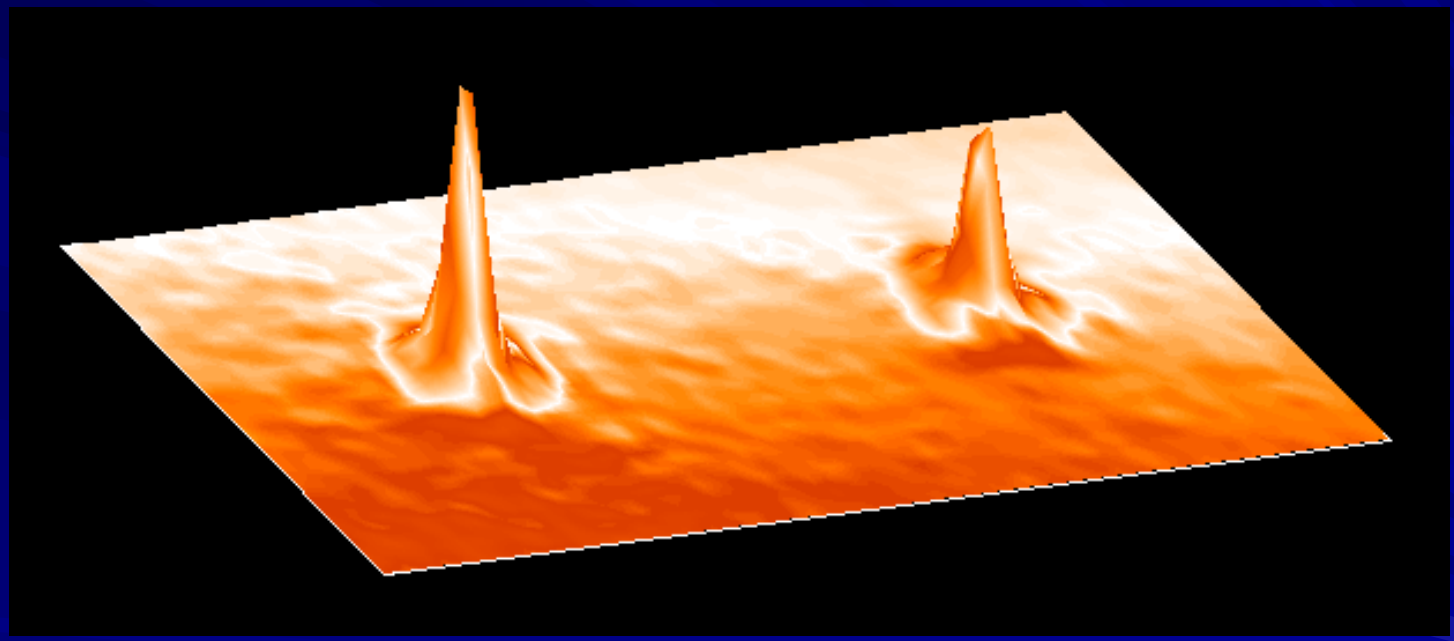
Reconstructed phase: + and - actuator pokes and the difference

Strehl vs magnitude



Before and after

- Vmag=13



Strehl=41%

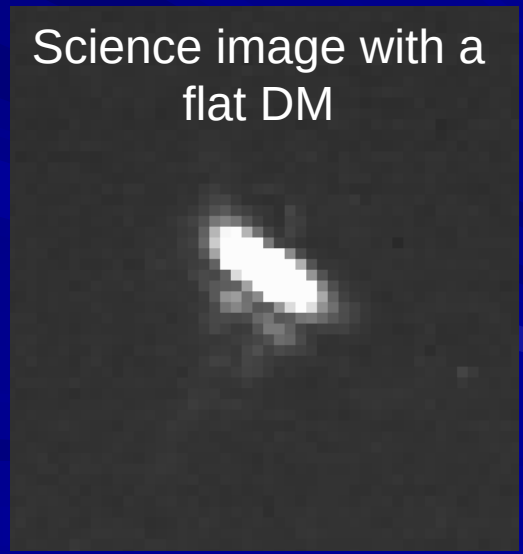
Strehl=23%

Room for improvement…

- There was a software glitch (resolved).
- Needed a very leaky integrator and low loop gain to stop actuators getting stuck

Room for improvement…

- 500 nm of aberrations on Keck I AO bench
- Vibration on bench
- Engineering grade camera (with bad ND filters)
- New lenslets haven't arrived

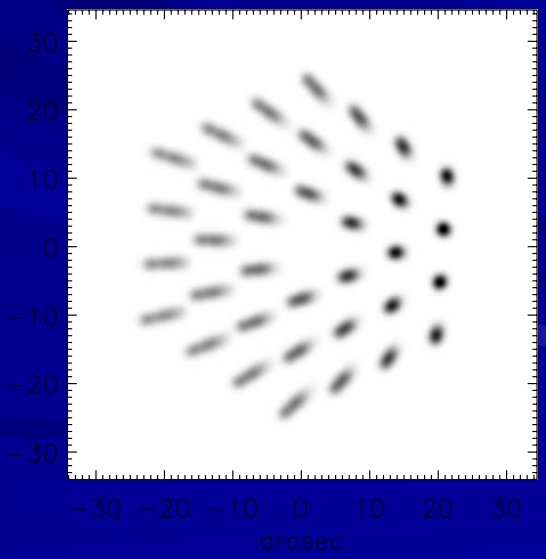


Features

- Flexible software – can use CCD-39 or CCID-56 and easily upgradeable
- 2.4 kHz (limited by the camera)
- Full frame rate telemetry – very useful for debugging!

Features

- Pixel binning to reduce charge diffusion
- Closed-loop tip-tilt mirror positioning using strain gauge feedback
- Centroid gain vector converts from units of centroids to arc seconds
- Denominator-free centroiding



Chopper for Interferometry

- Chopping capability has been built into the closed-loop mirror positioning system