From the on-sky experimental system to science operation

The AO point of view

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Current Goals:

First LGS MCAO System

Stabilize current performance and reliability

Commissioning and operational for science observations in Sept. 2013
27 science nights selected from Dec 2012 to May 2013

GeMS Raw results

1127 processed IR SR maps with synchronised LGS, NGS slopes and volts + status of the instrument.

3NGS only

10s < IR exposure < 3mn

All “K-like” Bands
All “H-like” Bands
All “J-like” Bands
GeMS Raw results

Strehl ratio distribution in K-Band

20%SR in K

working point

Strehl ratio distribution in K-Band
GeMS Raw results

fwhm distribution in K-Band

Diffraction limit (59mas)
fwhm distribution in K-Band

GeMS Raw results

different scenarios
OMC south east (Orion)

GeMS 1st “real” science target (SV)
Observed in Dec 2012
<SR>@2.2μm = 32%
<SR>@2.2μm = 13%
2 ≠ nights of observations
2 days observations
RCW41

2 days observations

SR = 30%

SR = 12%

night1

night2

Strehl Ratio

seeing (")

2 days observations
RCW41

2 days observations

night1

night2

SR = 30%

SR = 12%

2 days observations
2 days observations

Same seeing conditions

SR = 30%

SR = 12%
RCW41

Same seeing conditions
Same Noise in Loop (same NGS, same LGS flux)
Same BW (250Hz)
RCW41

Same seeing conditions
Same Noise in Loop (same NGS, same LGS flux)
Same BW (250Hz)

Tomography? \( \text{Cn}2(h) \) more favorable in second night

\[ \text{rms error LGS} = \text{noise} + \text{bandwidth} + \text{tomography} \]
Galactic center

Performance seems to be ok but...
Performance seems to be ok but...
LGS rms OK
- low noise
- low BW error
- favorable Cn2

Galactic center

High Flux
400 - 600Hz
LGS rms OK
- low noise
- low BW error
- favorable Cn2

high Flux
400 - 600Hz
Vibrations!

Galactic center

worse case in 6 month (not typical TT PSD)
Galactic center

Vibrations

worse case in 6 month (not typical TT PSD)
NGC 6624

- High Flux
- Running Fast 800Hz
- Low Noise
- ‘Good’ Cn2

\[
\langle SR \rangle \approx 40\% \\
\langle \text{fwhm} \rangle \approx 61\text{mas}
\]
How to simplify operations procedures?
Telescope is a subsystem of the instrument. Software complexity?
Big difference between a demonstrator and a science instrument

commissioning

operations
Big difference between a demonstrator and a science instrument

Key people OR “1 Click Button”

if people are leaving?

Money !

Ressources !

if problem(s) knowledge is probably lost (count only on documentation)
How to simplify operations procedures?

MYST: 12 “tabs”

- Buffers
- Status
- NCPA & offsets
- Loops & offloads
- AOM controls
- BTO
- RTD
- Loops control
- Power
- Tasks & offloads
How to simplify operations procedures?
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Big difference between a demonstrator and a science instrument

- commissioning
- operations

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Money !
Ressources !

Time !

Do not underestimate the integration/commissioning
GeMS experience

In term of performance, the system doesn’t meet the specifications BUT we understand the perfs (errors budgets...) and know how to improve it!

In the meantime we can do some really exciting science!

Speak to astronomers community to use the system if specifications are not fulfilled (i.e perf)

Long learning curve on Multi-WFS systems (MCAO, LTAO, MOAO...)
