CATAC Meeting Minutes

Tues March 14, 2017. 4pm EDT

CATAC Attendees: Balogh (Chair), Brooks, Carlberg, Davidge, Gallagher, Lafreniere, Metchev, Richer, Simard, Welch, Wilson
Observers: Racine, Schoeck
Regrets: Abraham

Matthias presented a subset of the slides circulated earlier

- The team evaluating ORM consisted of four people working full time for half a year. Mostly the same group as those involved in the original site testing.
- We would have liked 2-3 years of our own testing, but have to make do with what we have. There are a lot of data available, but some differences from what is available for other sites.
- slide 5: TMT3 selected from a choice of 4 sites (TMT1 was actually two sites).
    - Why was not ORM considered originally? We had MK – there is no question that MK is better.
    - Note TMT3 is off the slide to the right of slide 12. It is on the downslope, not the summit ridge. It turns out that the summit sites are not actually better, because of the way the wind blows up the slope. There are legal restrictions on where telescopes can be sited. Though older telescopes are all on the summit, note that GTC is also downslope, as was the EELT site under consideration.
    - It is a busy topography (as is MK13N), but the large enclosure helps get above a lot of it.
- slide 6: Data is available from non-IAC observatories. The investigation involved speaking directly with users and managers of non-Spanish telescopes including NOT, TNG, WHT. It was felt to be important to talk to them in person, not via email.
- slide 7: This is the roll-up summary: note that it gives median values as a simple statistic, but that is not all that goes into the analysis. The full distribution is considered.
- slide 8: of course there is contribution to the seeing below 60m, but it mostly comes from the dome, and is site independent.
- Note that MCAO is very non-linear. So performance doesn't just scale with the seeing.
    - Racine: expressed concern about the lack of a high resolution turbulence profile. Need to know the low elevation seeing at 10s of metres. Notes that the NOT is 12m above ground with a median IQ of 0.85", while CFHT is ~20m above ground with median IQ 0.48" (assuming optimized optics). This suggests ground layer turbulence at ORM is not so benign.

    - Schoeck: it is not trivial to compare telescopic IQ with outside conditions. CFD experts have done a lot of work and are convinced that the ground layer does not matter.
    - Carlberg: Compare with Gemini to validate CFD. Was designed to be a 0.3" telescope using similar arguments. But they have struggled to get to that IQ.
    - Shoeck: Even if the outside conditions at <60m matter (and all evidence suggest that they do not), 7m is definitely not the right number to use – the altitude is too low. Numbers from DIMM are not appropriate.
    - Carlberg: it seems clear that for AO the ground layer is not too important. Only if seeing gets really bad is AO compromised.
    - Racine: for natural seeing we agree MK is 10% better seeing, leading to a 20% better figure of merit.
    - Schoeck: TMT is expecting 50% AO mode to begin with, and more than that after a while.
- slide 9: it is true that we don't know the actual profile on ORM. But best estimate is that it will look like 13N. In fact, Matthias would not be surprised if the ground layer at ORM were even a bit stronger than at 13N.
    - In fact, it doesn't even matter that much what the profile shape is. If you take any of the curves, the seeing at 60m is comparable. Again the ground layer is very well corrected by the AO systems, so errors on the GL are more benign.
- slide 36: Use same AO assumptions as Rene, but predicted performance depends not only on the seeing. The bandwidth and isoplanatism error are significant contributions. This leads to the Strehl merit function given in the table.
    - For high contrast imaging, most relevant parameter is tau0. ORM does well here.
    - For MCAO, isoplanatic angle θ and seeing matter the most. Again θ is good compared with other sites. Expect to be competitive in AO mode.
    - Ray: The GPI team found tau0 to be much smaller than the advertised expectations. Schoeck noted this is a complex issue. He has spoken at length with the GPI team about this. The discrepancy is likely not as bad as it sounds at first, but might still exist. There is not enough information yet and it's a topic of ongoing investigation.
- Unfortunately we ran out of time at this point and adjourned at 5:05 EDT.