

SITE 2010
Comprehensive Characterization of Astronomical Sites
Kislovodsk, Russia, 4-9 October 2010

Conference Summary

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Abstract

The main topics discussed during the Site 2010 conference are outlined and the outcome is described.

Keywords: Astronomical Site testing, precipitable water vapor, atmospheric turbulence, cloudiness, seeing

1. INTRODUCTION

The SITE 2010 Conference (Comprehensive Characterization of Astronomical Sites) which took place at Kislovodsk, Russia, 4-9 October 2010 was organized by the Sternberg Astronomical Institute (SAI) from Lomonosov Moscow University.

This conference corresponds to the 10th Anniversary of the MASS (Multi Aperture Scintillation Sensor) atmospheric turbulence profiler developed at SAI which rapidly became a standard in the instrument suite of modern astronomical site surveys. After having conducted a detailed site characterization, SAI is now in charge of the construction of a 2.5m telescope on the mountain of Shatdzhataz, 30 km from Kislovodsk (see talk by Nicolai Shatsky).

2. MAIN TOPICS

SITE TESTING PROGRAMS

All ELT projects have completed their site selection process and now concentrate on the detailed characterization of their selected site. Site surveys for National observatory projects in China, India, and Iran benefit from this. Many of their candidate sites are at high altitudes (>4000m) which could open new avenues for classical astronomy with an extension of the atmospheric window. The influx of young students in the various survey teams brings along new ideas for further instrumentation developments.

SITE TESTING INSTRUMENTATION

- Precipitable Water Vapor (PWV) monitoring is mature with a wide suite of instruments (radiosondes, radio and infrared ground based monitors, GPS receivers, Satellite remote sensing) which agree reasonably well with astronomical science data. GPS signals can be useful for estimating PWV in site surveys, more accurate instruments with a real time output are needed for Observatory operation. Global meteorological models can provide accurate forecasts of observing conditions.
- Robotic sky monitoring of cloudiness is still performed by 1D sensors (visual light meter or IR sky temperature sensors). More work is needed to automatically process images from remotely operated all-sky cameras. The feasibility of measuring extinction from large field CCD images is however demonstrated.
- Cn² monitors have evolved over the last decade. A number of complementary instruments (MASS, SLODAR, SLIDAR) are now available to analyze in detail the turbulence profiles along various sections of the line of sight. More work is needed however to understand the remaining discrepancies when comparing to the integral
- given by classical DIMMs. Accurate tools for the monitoring of the temporal coherence time (τ_0) are still not available. There is no standard height above ground for a DIMM tower because each site has a different scale height for the turbulence in the surface layer (first 100m above ground) which can be measured with micro-thermal sensors distributed along a mast.

SITE TESTING DATA QUALITY

The standardization of the instrumentation has improved over the years which allow comparing sites tested by different teams. Data can be shared and sites can be compared worldwide provided that much care is taken to maintain a high quality standard of the data.

- Instruments within the same group should be inter-compared not only in the lab during acceptance tests but also after installation in their operating environment.
- Inter-organization campaigns should be organized with several different instruments running in parallel on the same site for further comparison and to attempt resolving pending questions (possibly Izaña 2011).

END USER REQUIREMENTS

- The E-ELT shall be operated mostly with partial or total adaptive correction of the atmospheric turbulence. This sets new requirements on the site monitoring which require developments of new tools in the coming years. In particular for the monitoring of the sodium layer, cirrus clouds, higher resolution $Cn^2(h)$ profiles, outer scale and coherence time.
- Forecasting of atmospheric conditions will be a requirement for modern observatories. The output of models (CFD or meso-scale) should be checked against field data to establish confidence.
- Service observing is included in the operation plan of most facilities and also in the merit functions used for site selections. A main strength of Service Observing is that it allows making use of the best atmospheric conditions – for a given scientific purpose - which are present only for a small fraction of the time. Describing sites by the median value of relevant parameters is thus not anymore appropriate. An accurate estimate of the lower percentiles imposes stringent requirements on the performance of the monitoring instruments.

3. CONCLUSIONS

REMAINING PARAMETERS

SOME ISSUES WHICH HAVE NOT BEEN ADDRESSED IN THIS CONFERENCE SHOULD NOT BE FORGOTTEN:

- Contrails
- Climate Change
- Definition of clear sky, photometric nights
- More.....

RESOLUTIONS

- To have written records of this conference (contributions should be send before end-December using SPIE templates)
- To share site testing data, either in raw or filtered form, with the community at large. The web site of the IAU working group on site testing instrumentation developed by A. Tokovinin could be used as portal for this purpose with the help of A. Otárola. Proper documentation should be made available following TMT example.

The SOC is congratulated for the great job accomplished and the success of this conference