

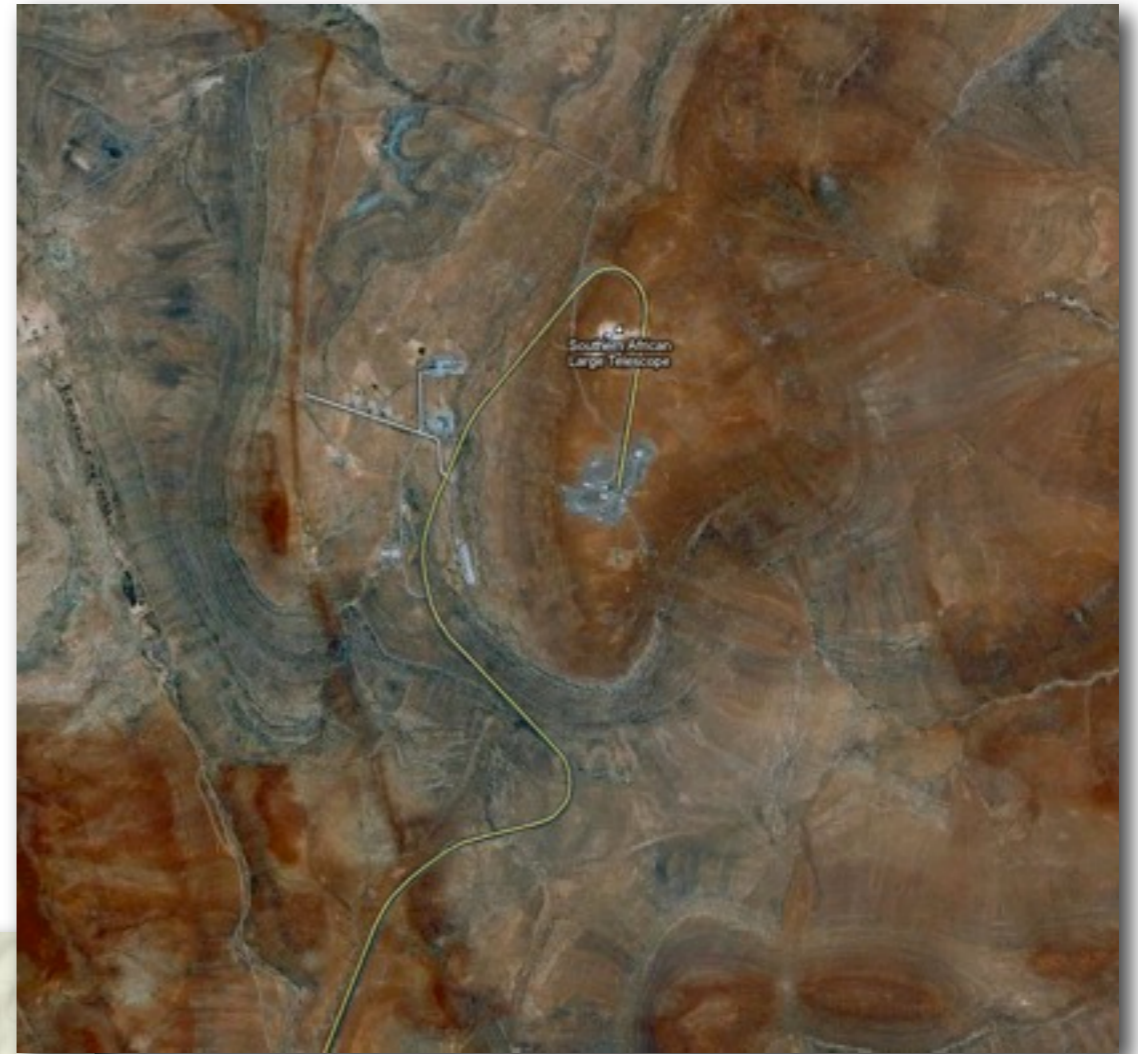
Turbulence Profiling at the SAAO

T. E. Pickering, D. Buckley, L. Catala, S. Crawford, R. W.
Wilson, T. Butterley

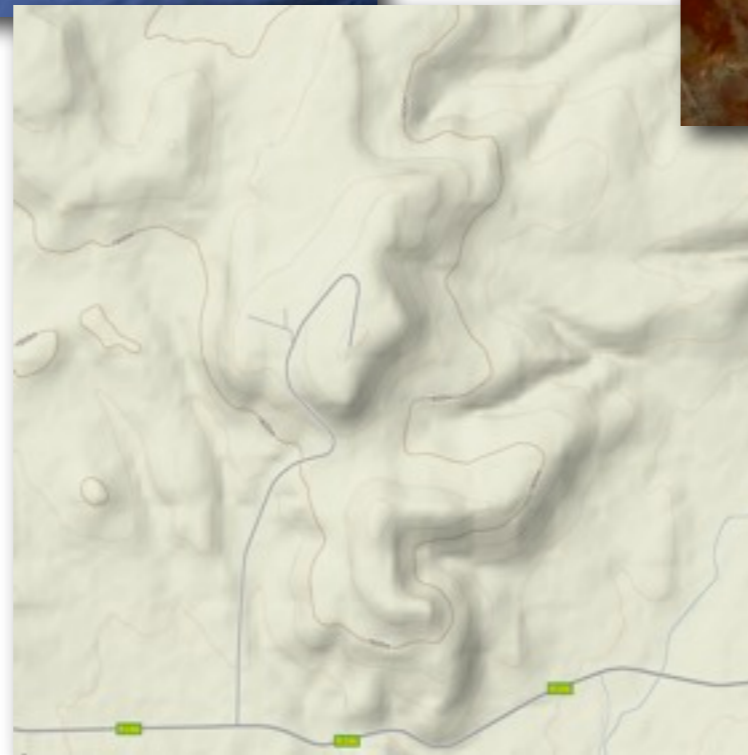
The Instruments...

- SLODAR: On loan from R. Wilson and shipped back in mid-April 2010.
- MASS-DIMM: Deployed at Sutherland site late-March 2010.
- Sutherland DIMM: One of the original site testing instruments. Now upgraded to use IEEE 1394 camera.

The Site



32° 23' S Latitude
20° 49' E Longitude
1760 meters Altitude





Previous Work

Research in Action

South African Journal of Science 96, Month 2000

Meteorological conditions and astronomical observing quality ('seeing') at candidate sites for the Southern African Large Telescope

D.A. Erasmus*

- Median overall seeing of 0.92"
- Seeing is worse with easterly winds
- Ground layer can be significant in light winds
- Overall seeing worse in higher winds

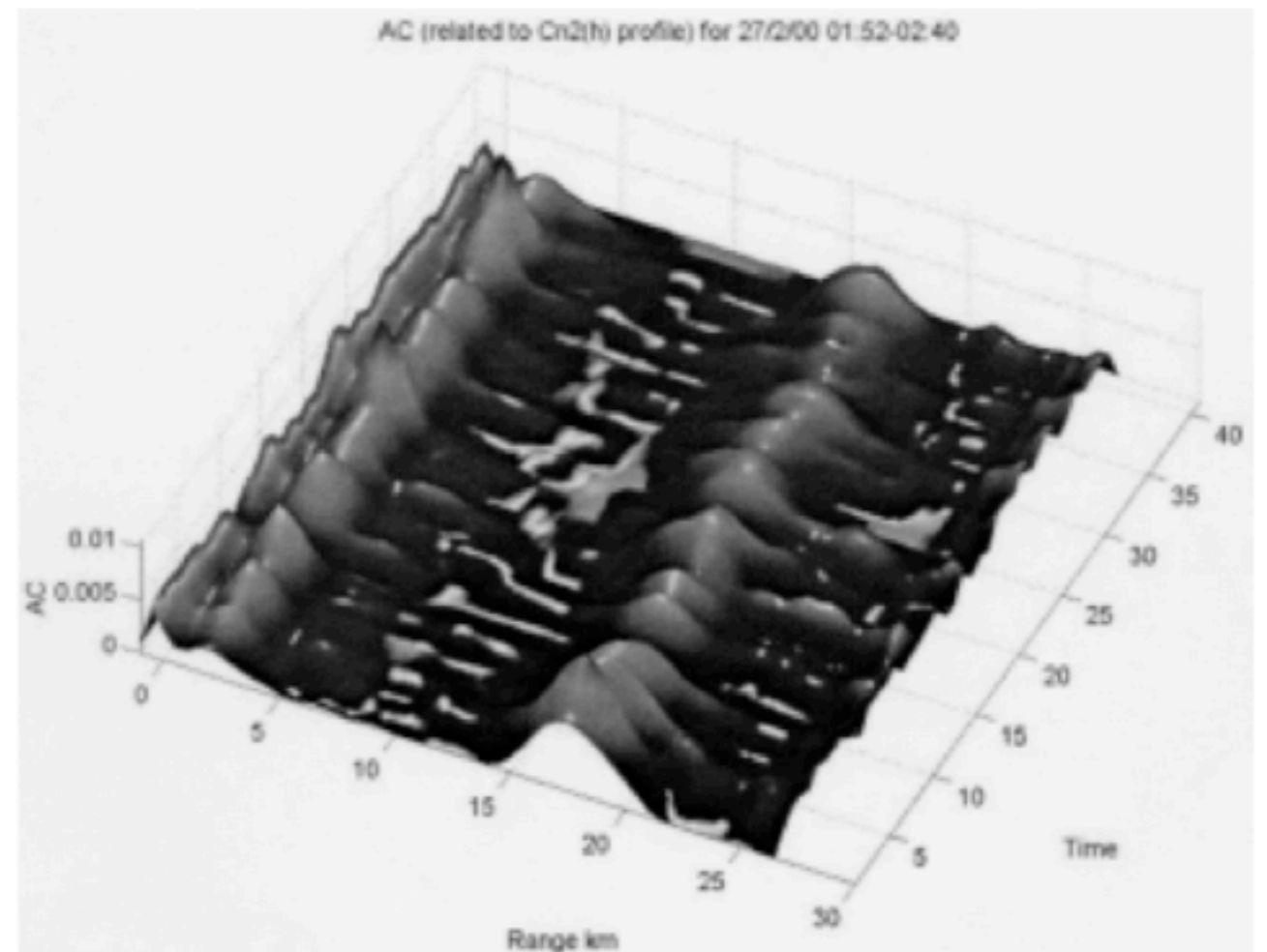


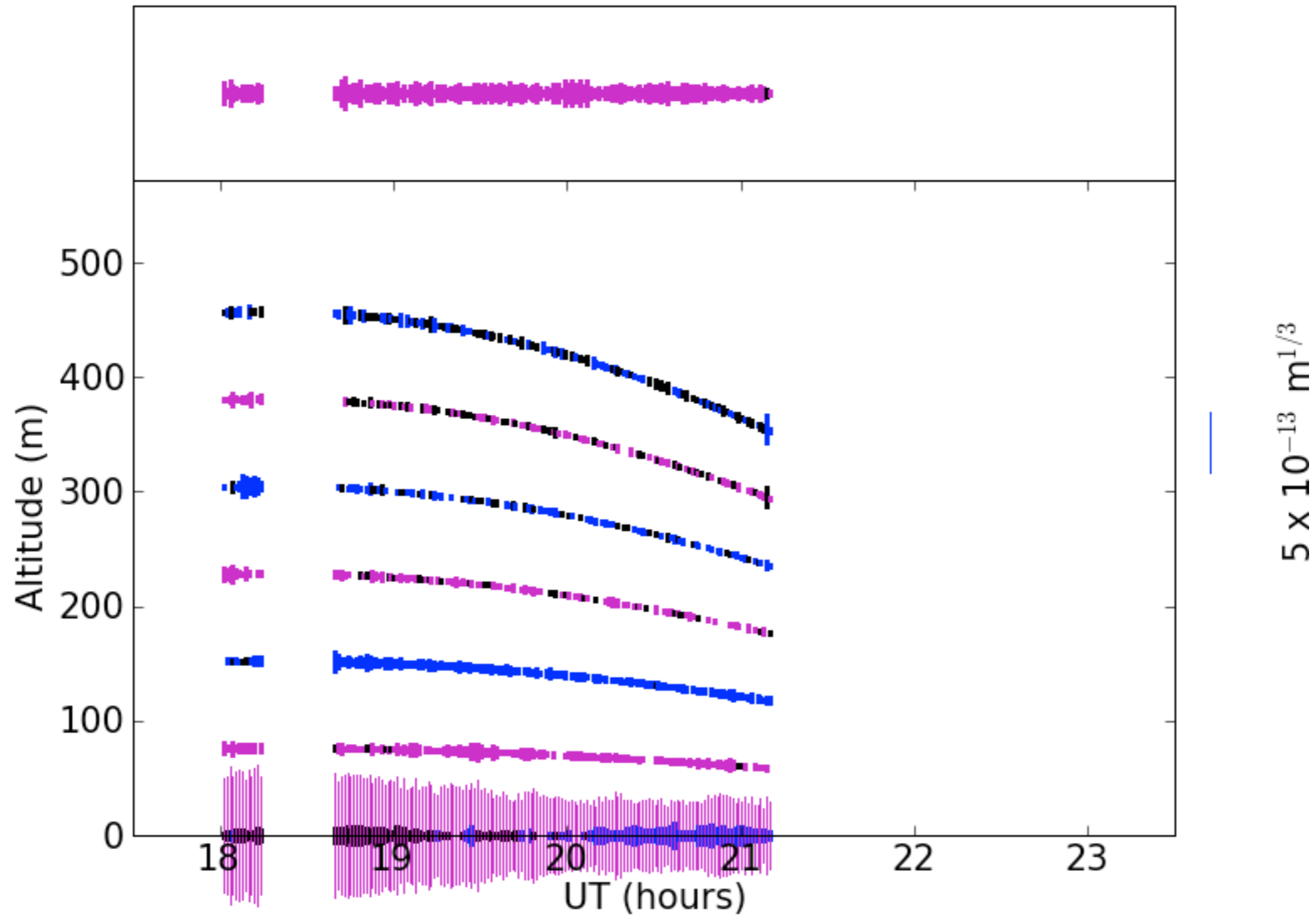
Fig. 2. 40-minute SCIDAR scan of atmospheric turbulent layers made at Sutherland Observatory on 27 February 2000 between 01:52 and 02:40 LST.⁴

SLODAR Results

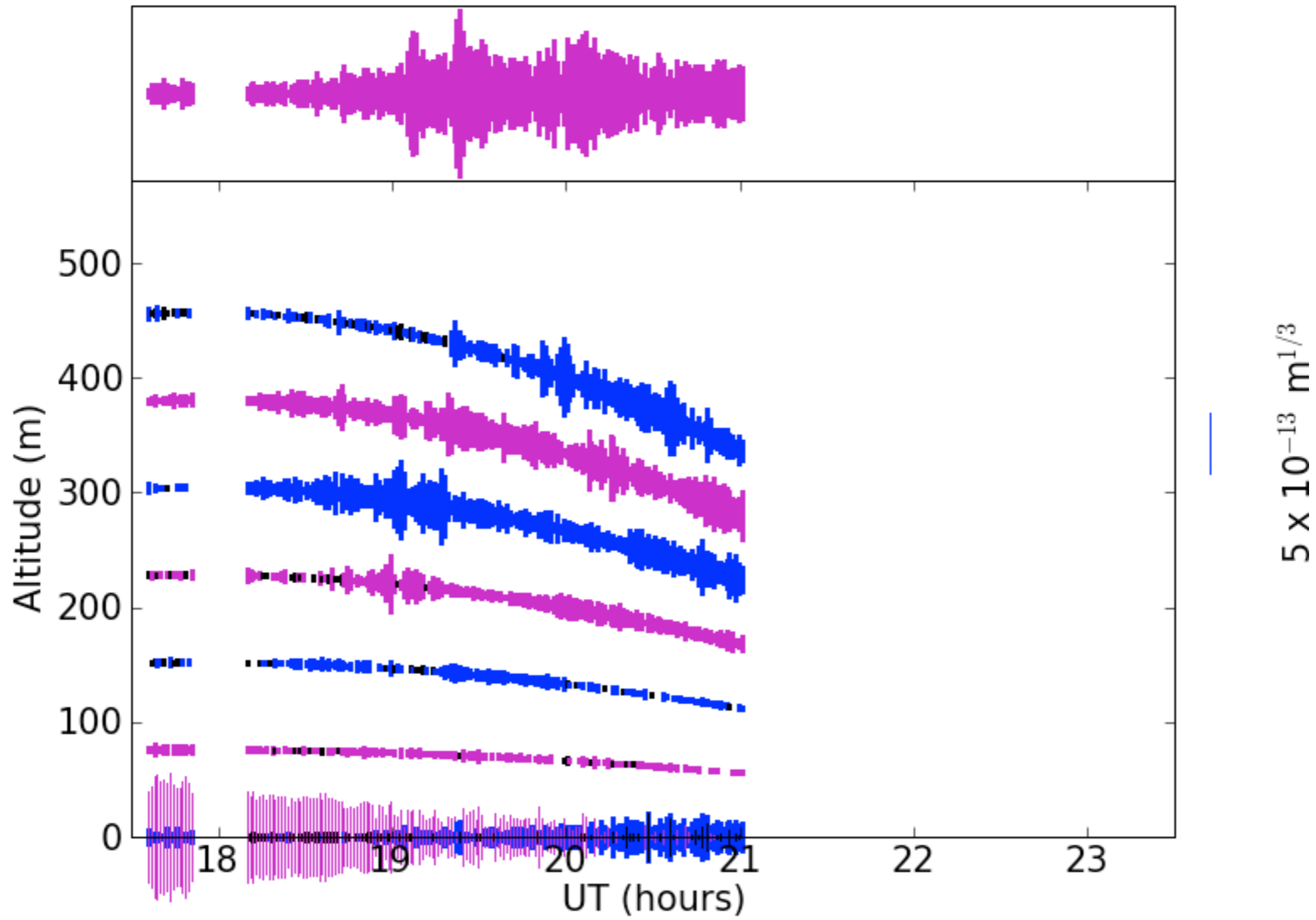


- Described by R.W.Wilson in MNRAS, 337, 103
- Observe double stars with Shack-Hartmann WFS
- System tuned to look at first 500 meters of atmosphere

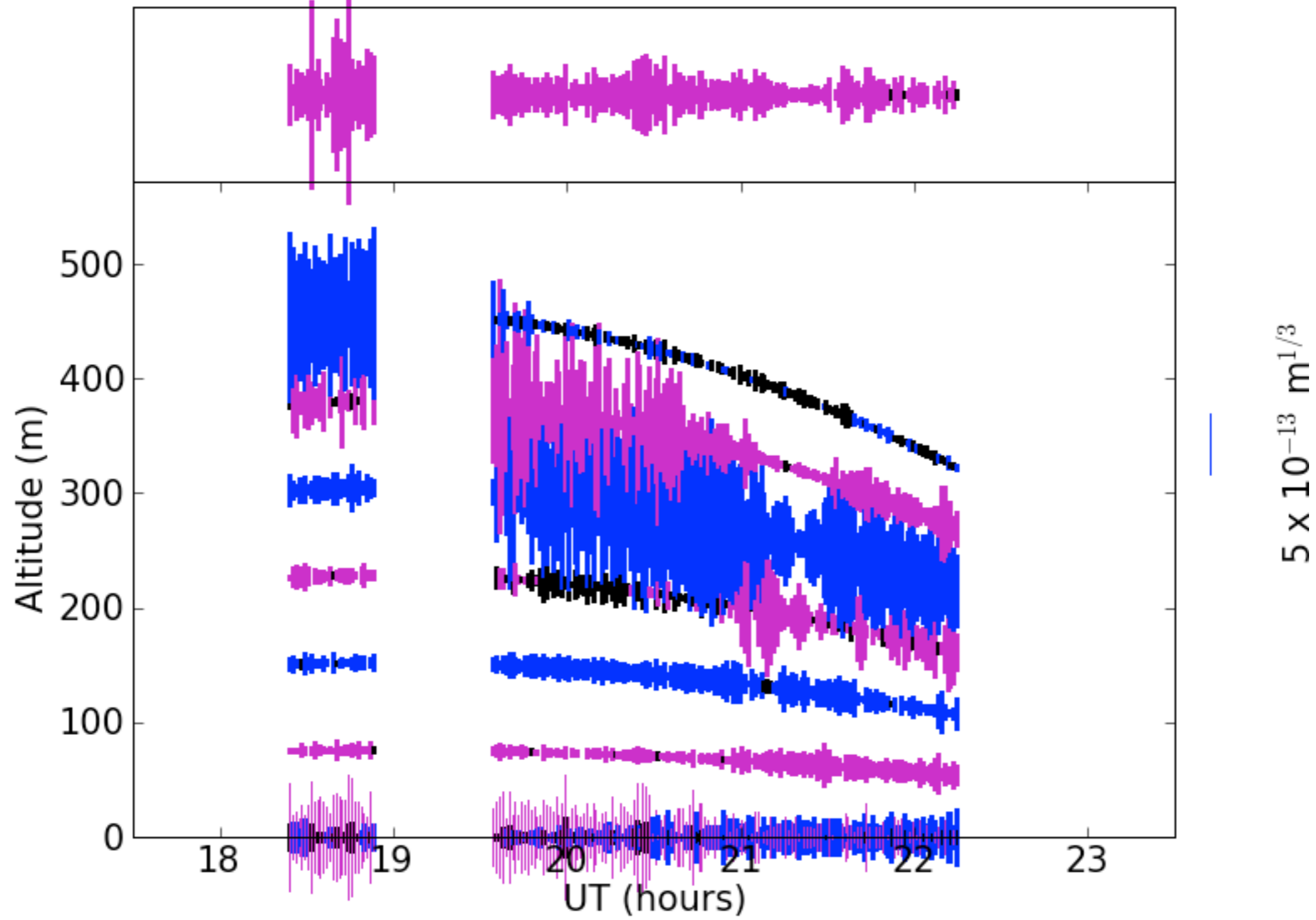
SLODAR profile plot for 24/03/2010



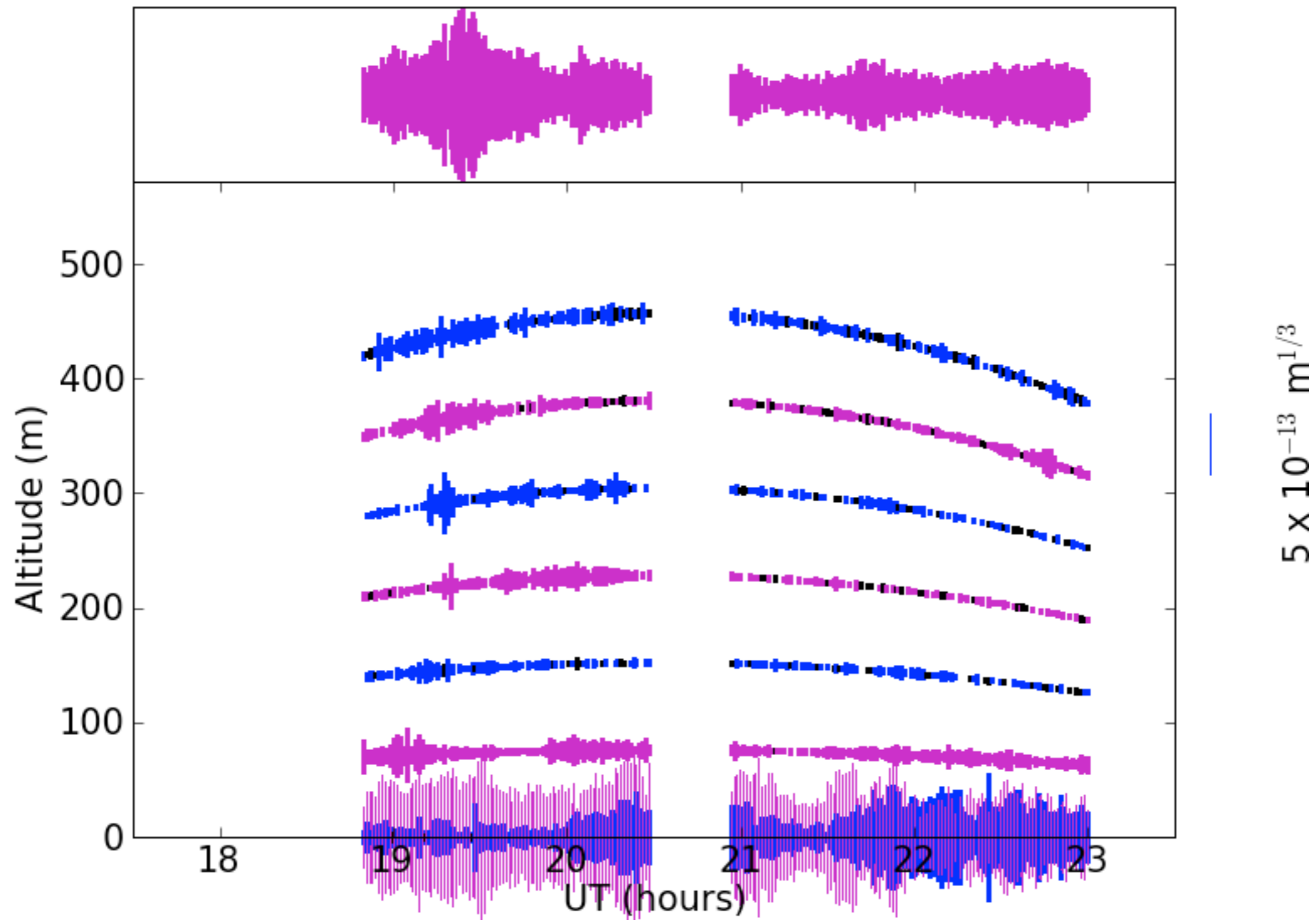
SLODAR profile plot for 30/03/2010

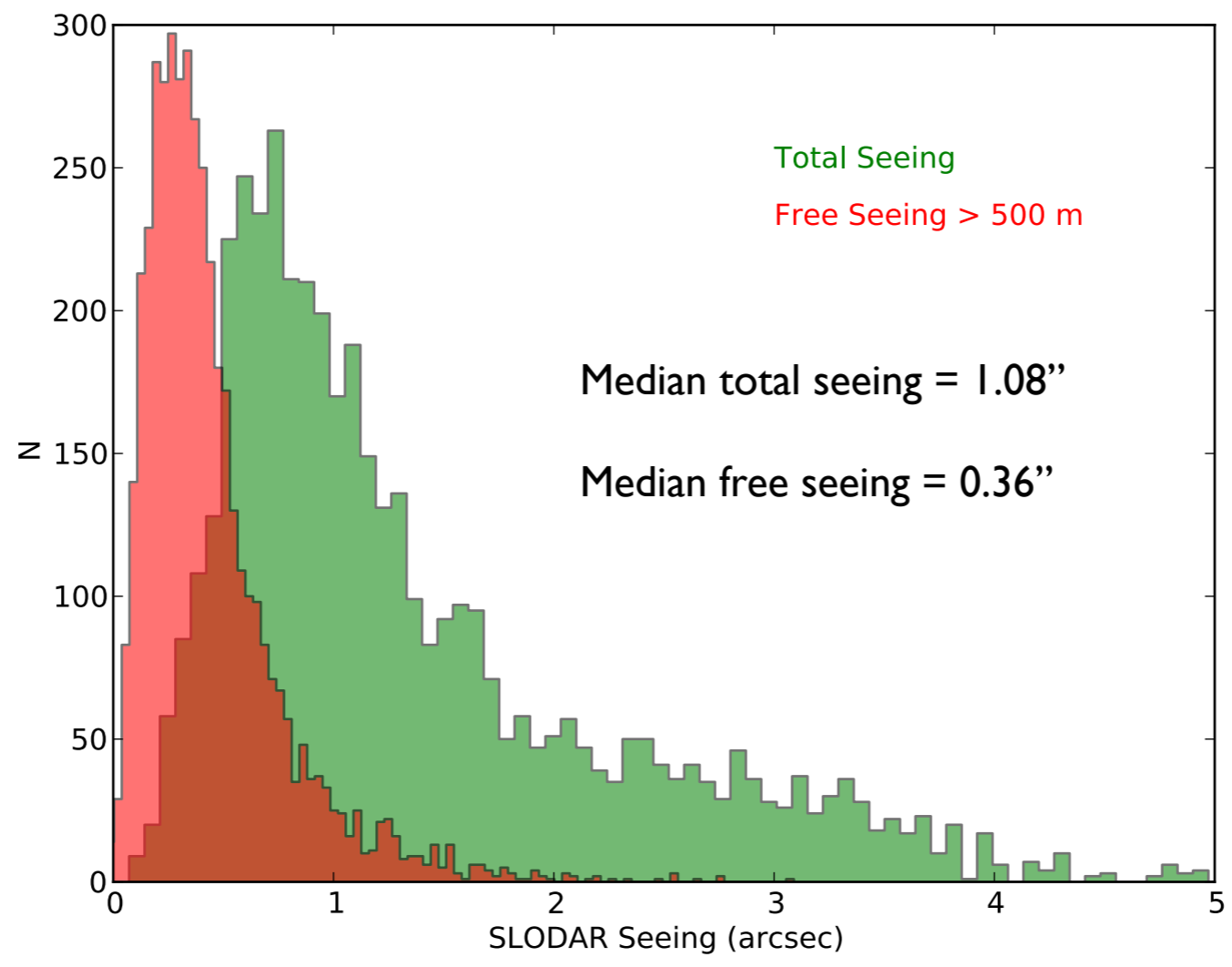


SLODAR profile plot for 14/03/2010



SLODAR profile plot for 18/02/2010

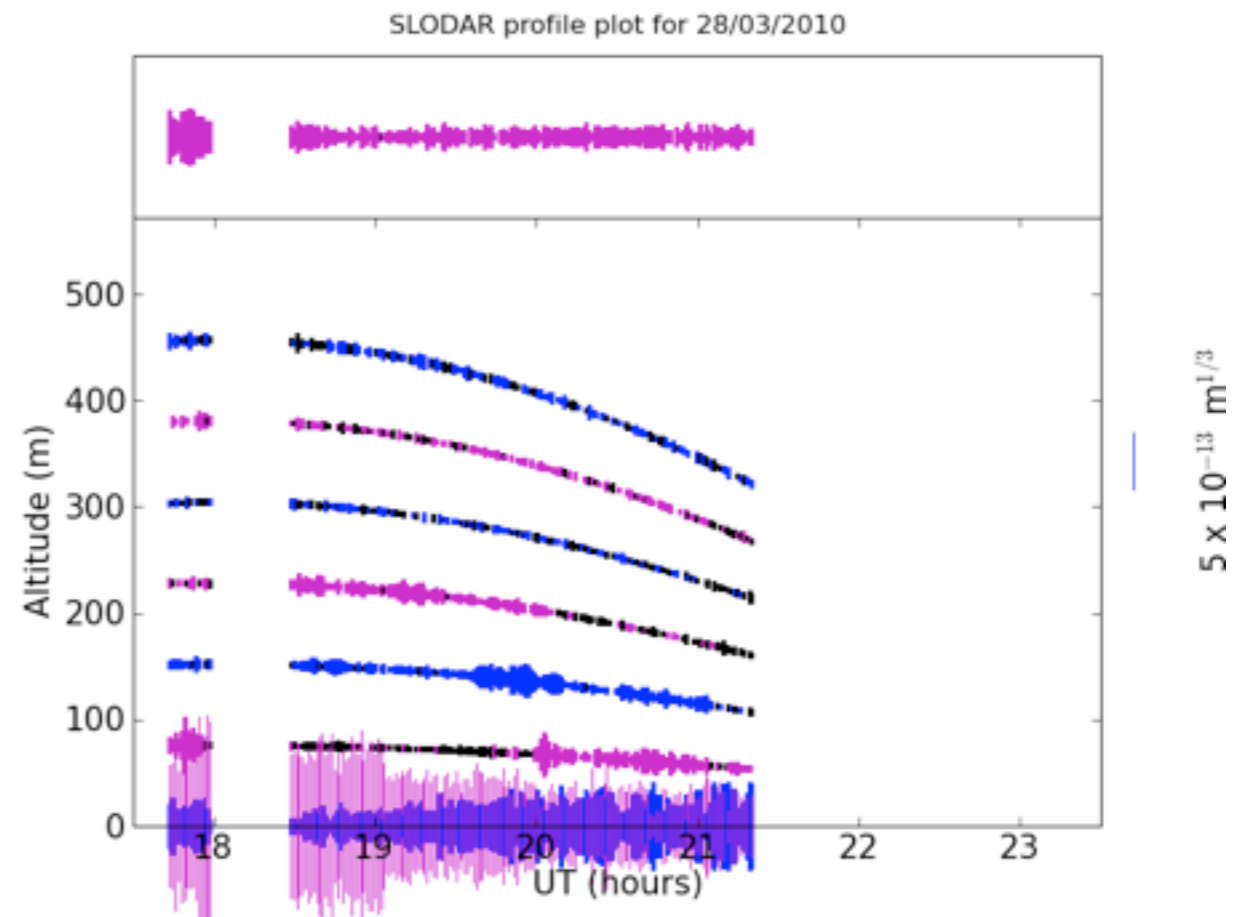
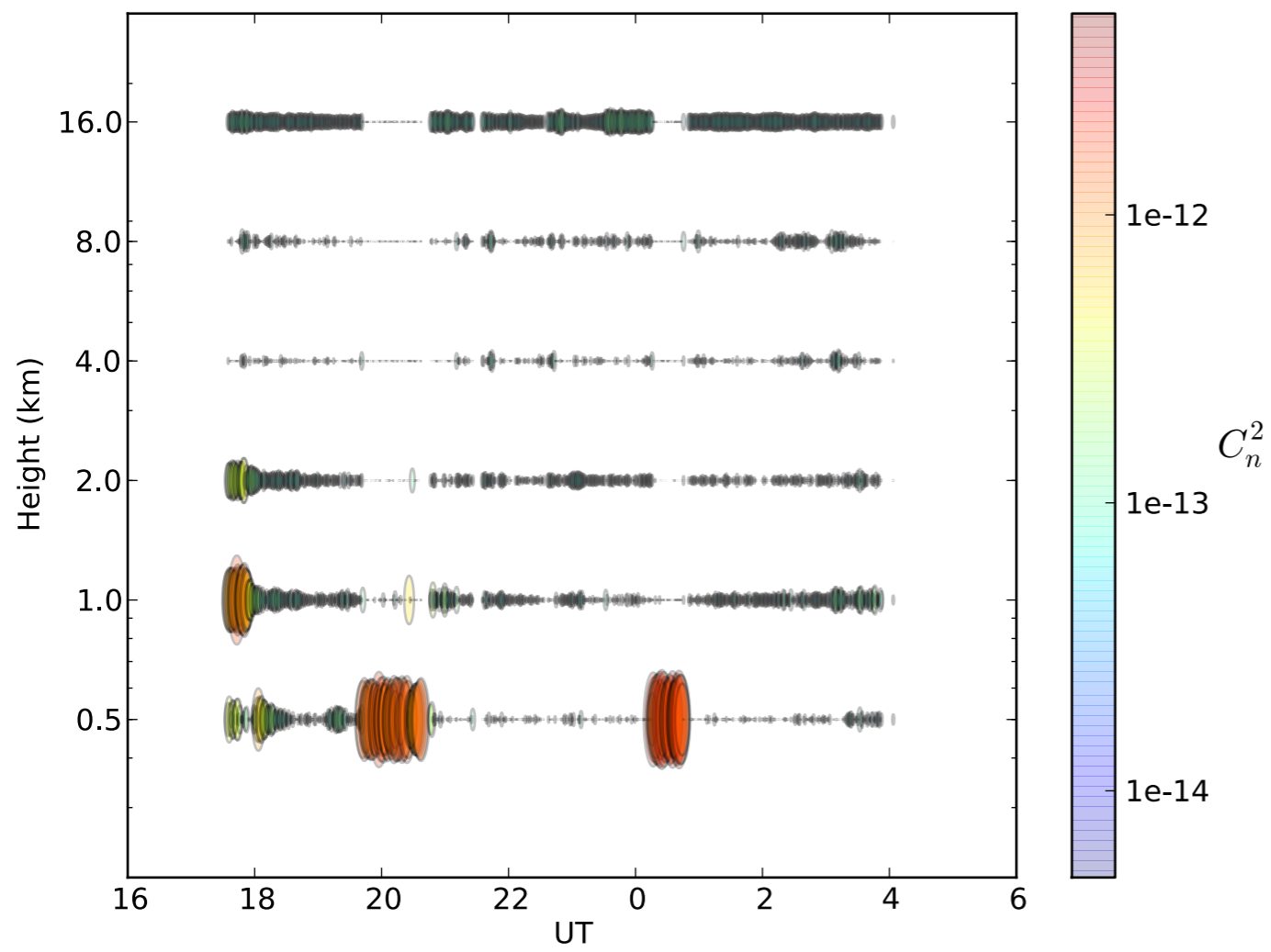


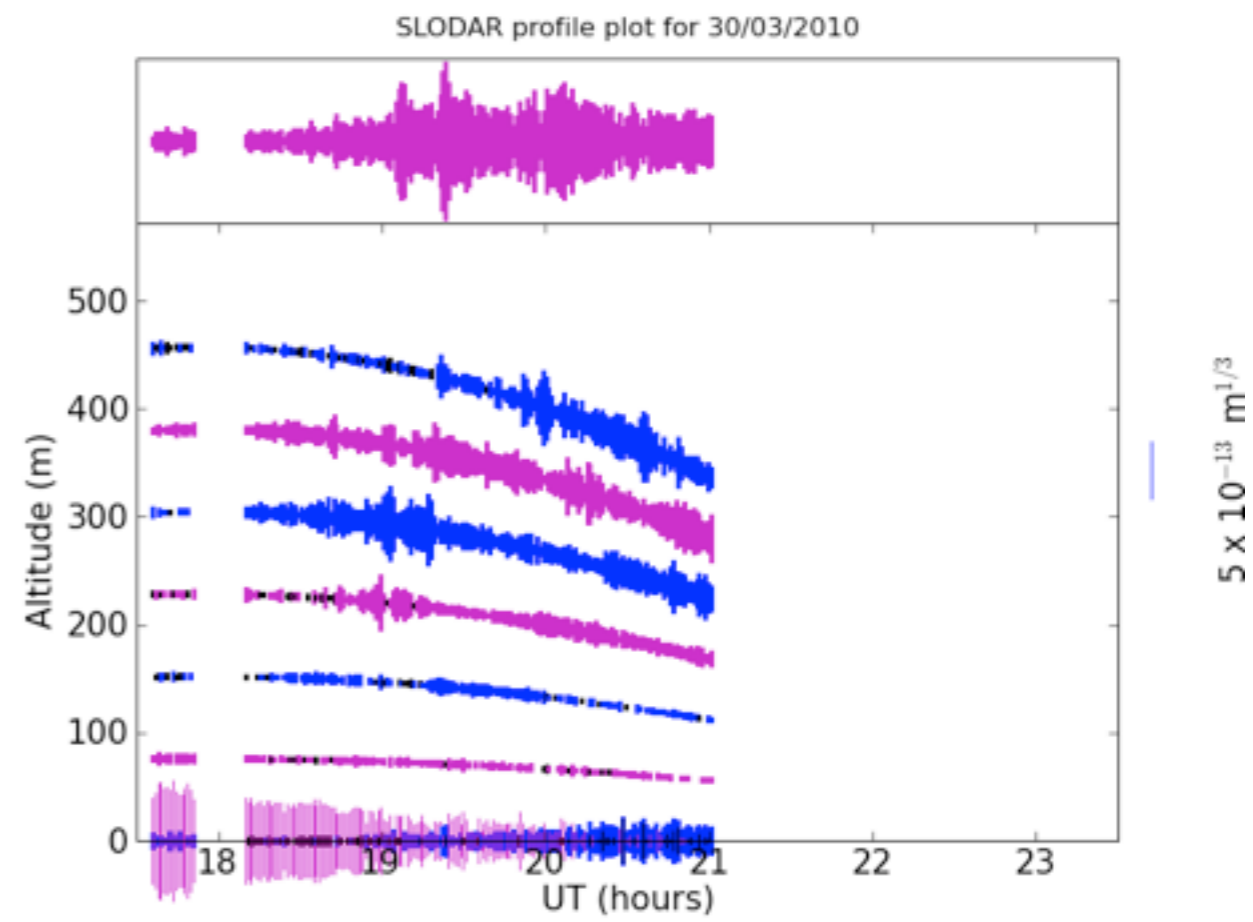
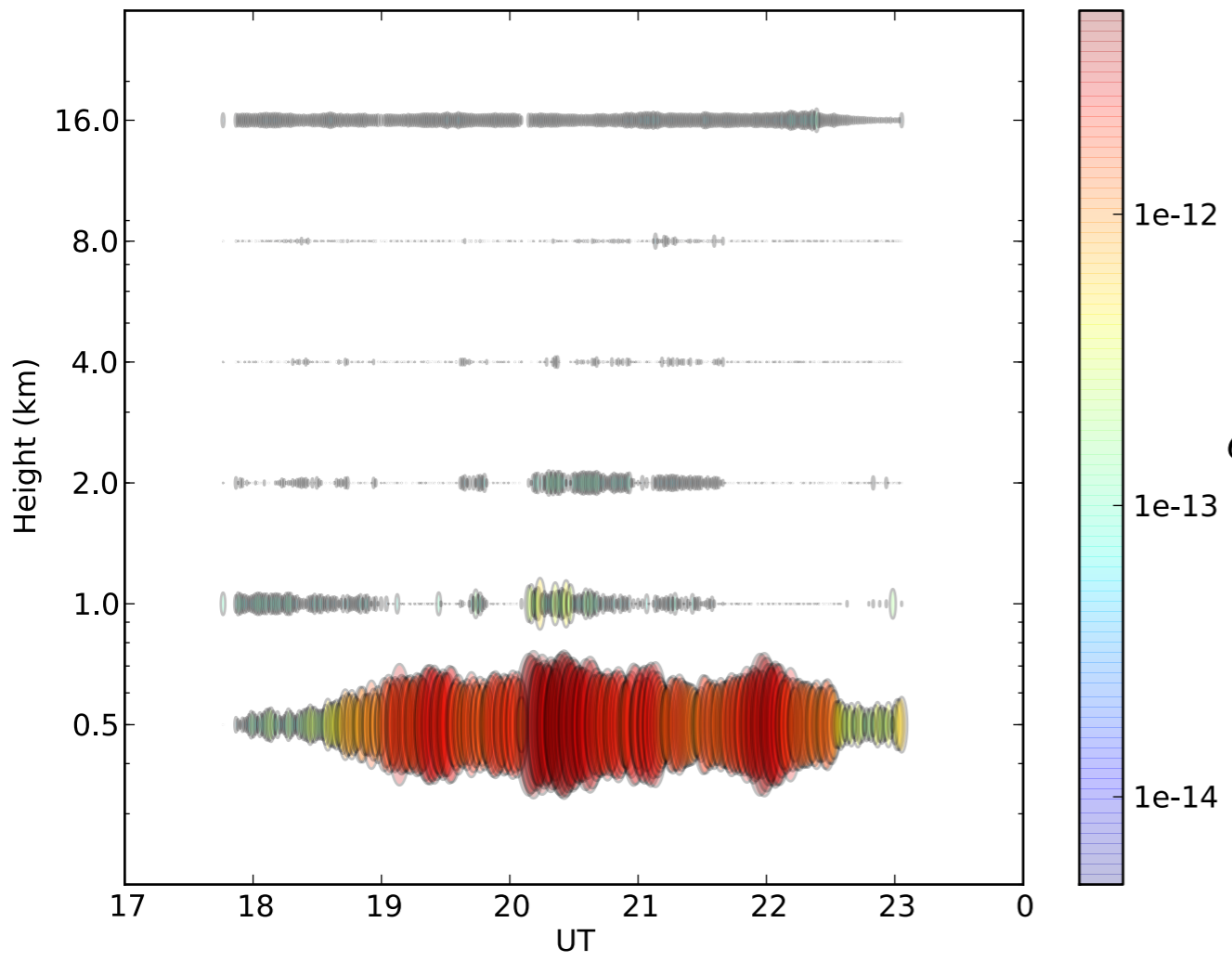


MASS-DIMM Results

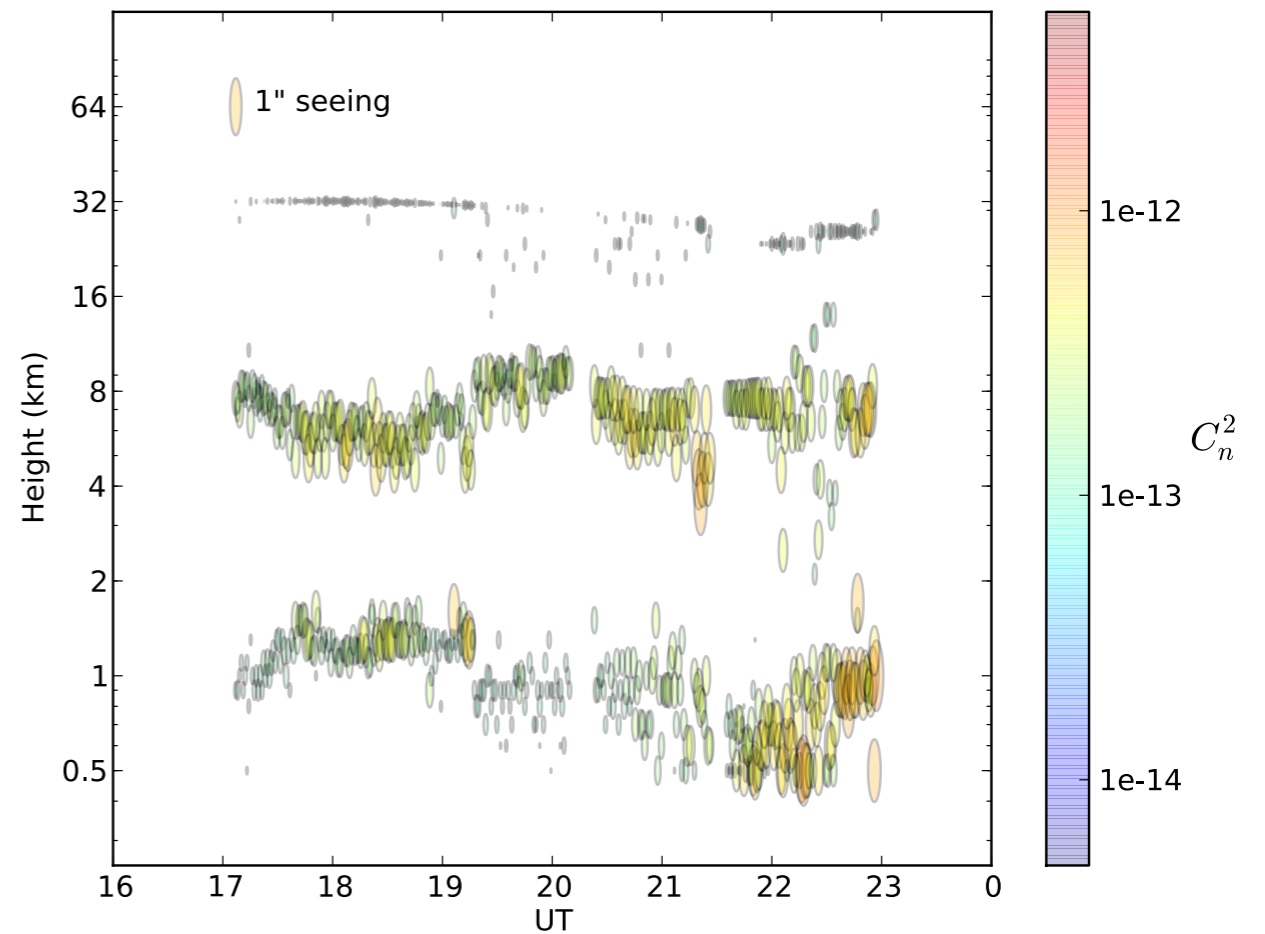
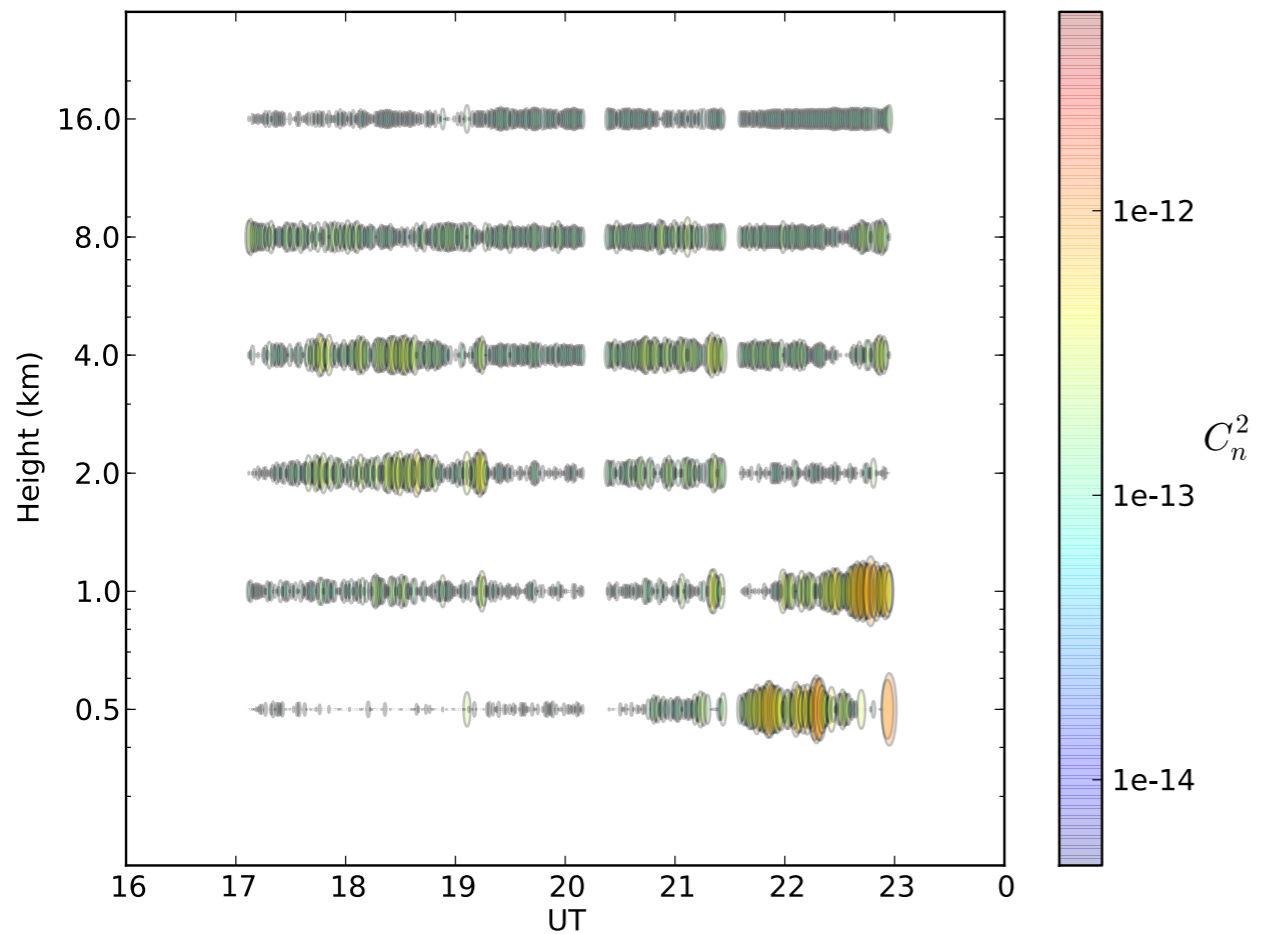


- Deployed 24 March, 2010
- Overlapped with SLODAR for first three weeks

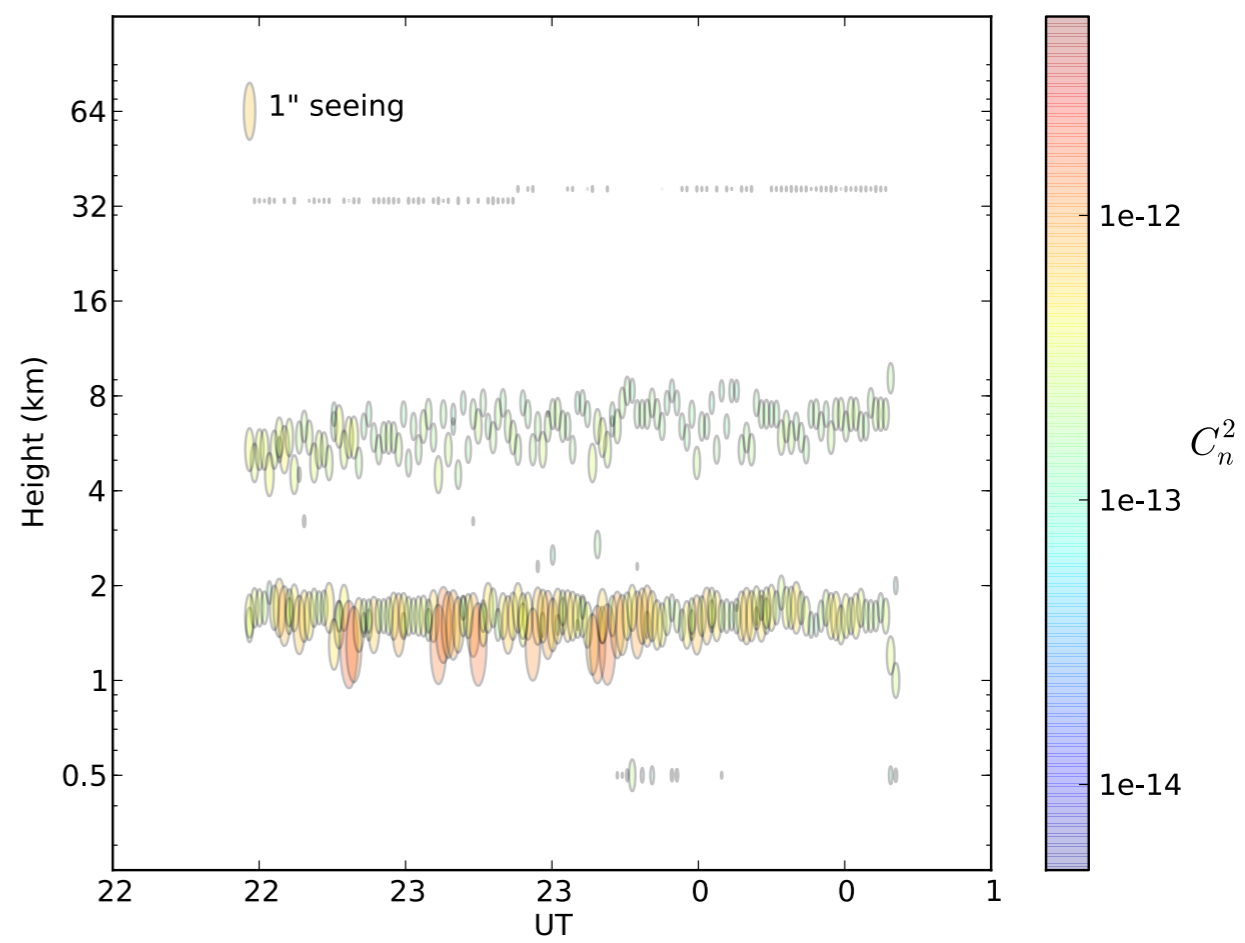
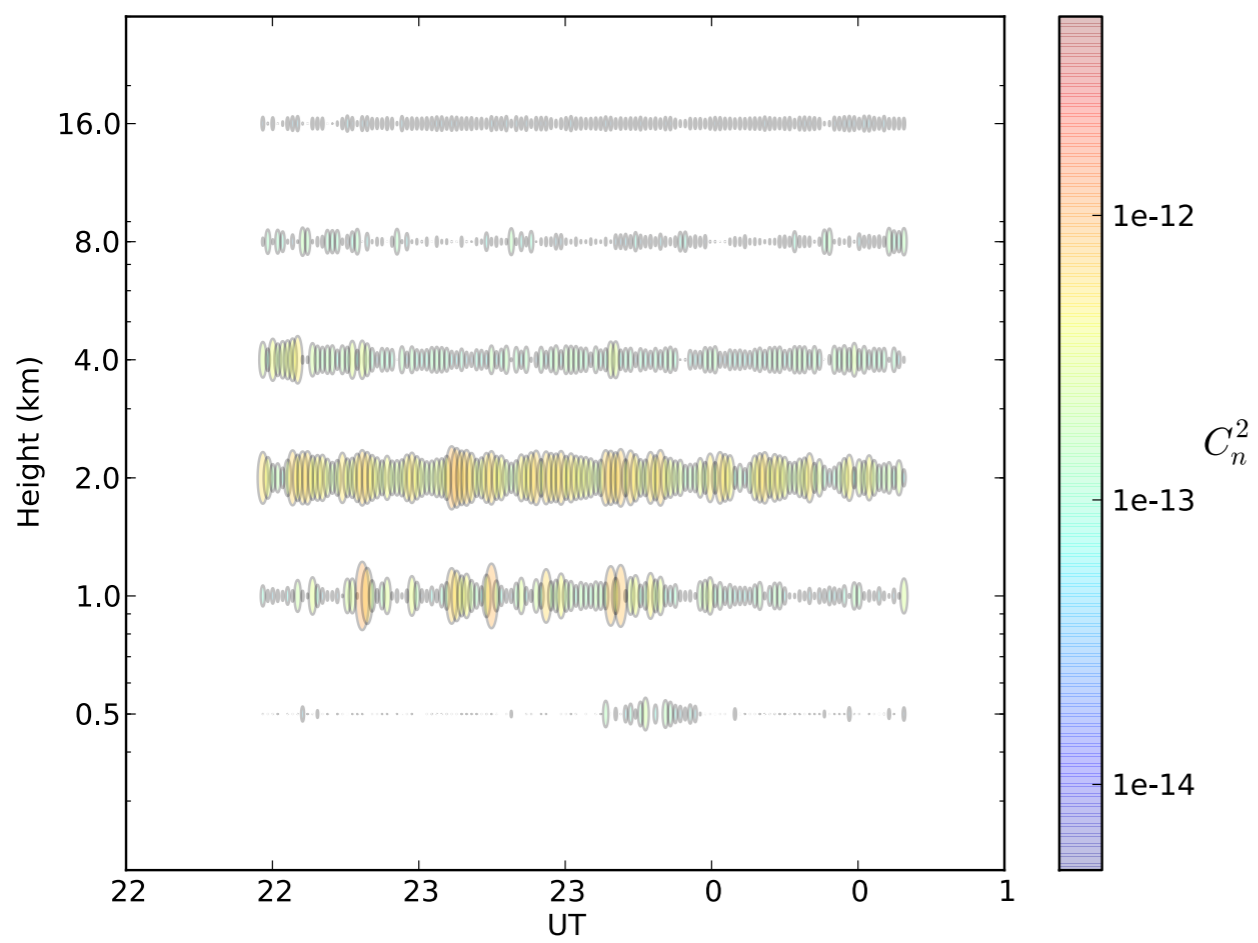


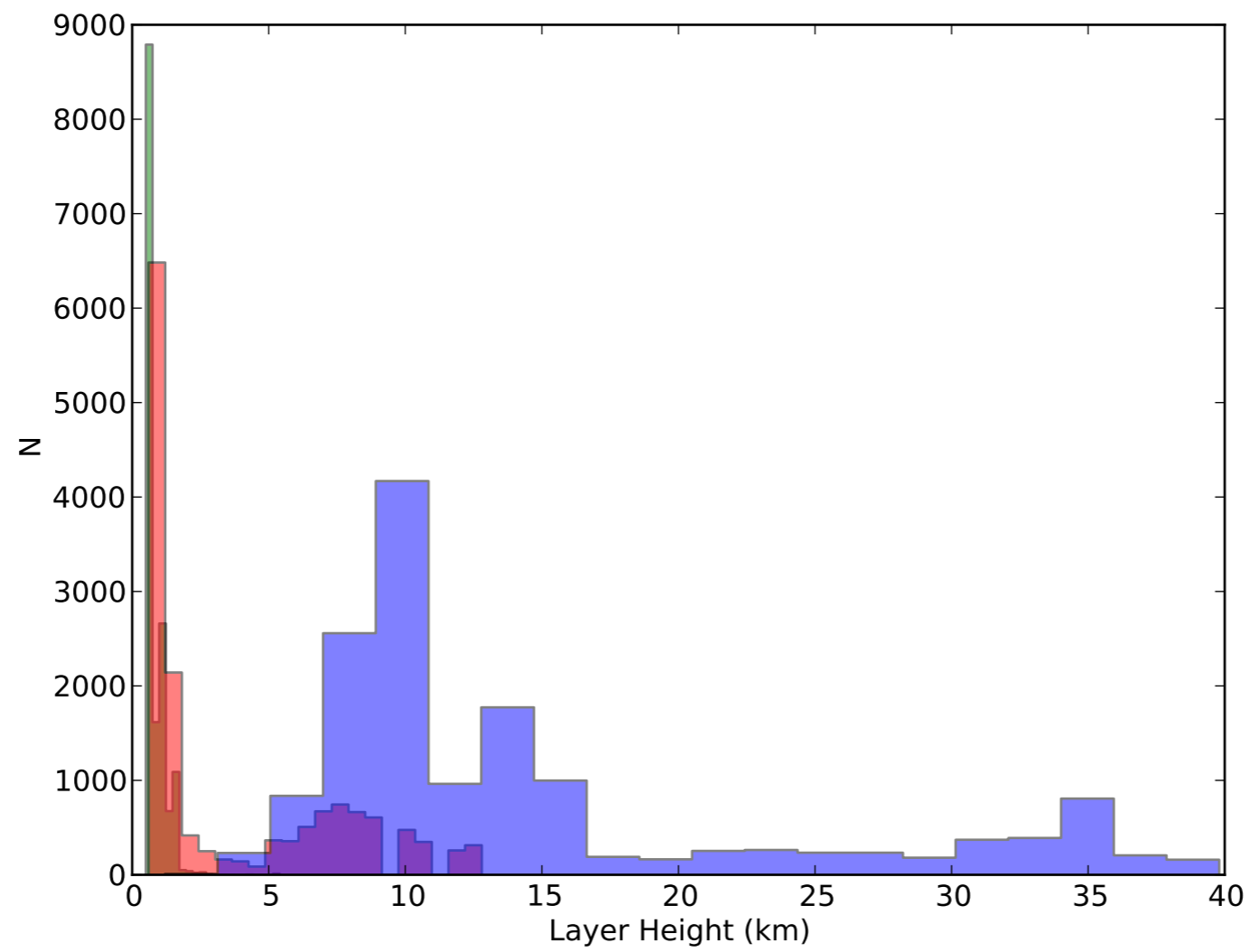


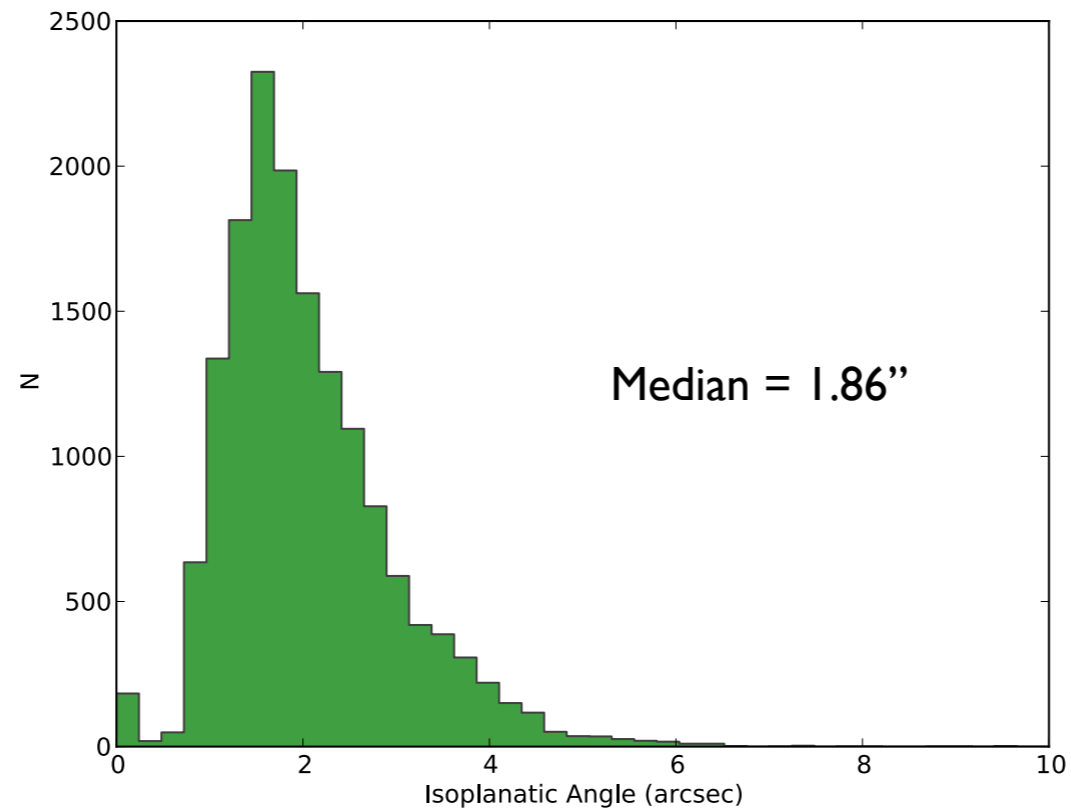
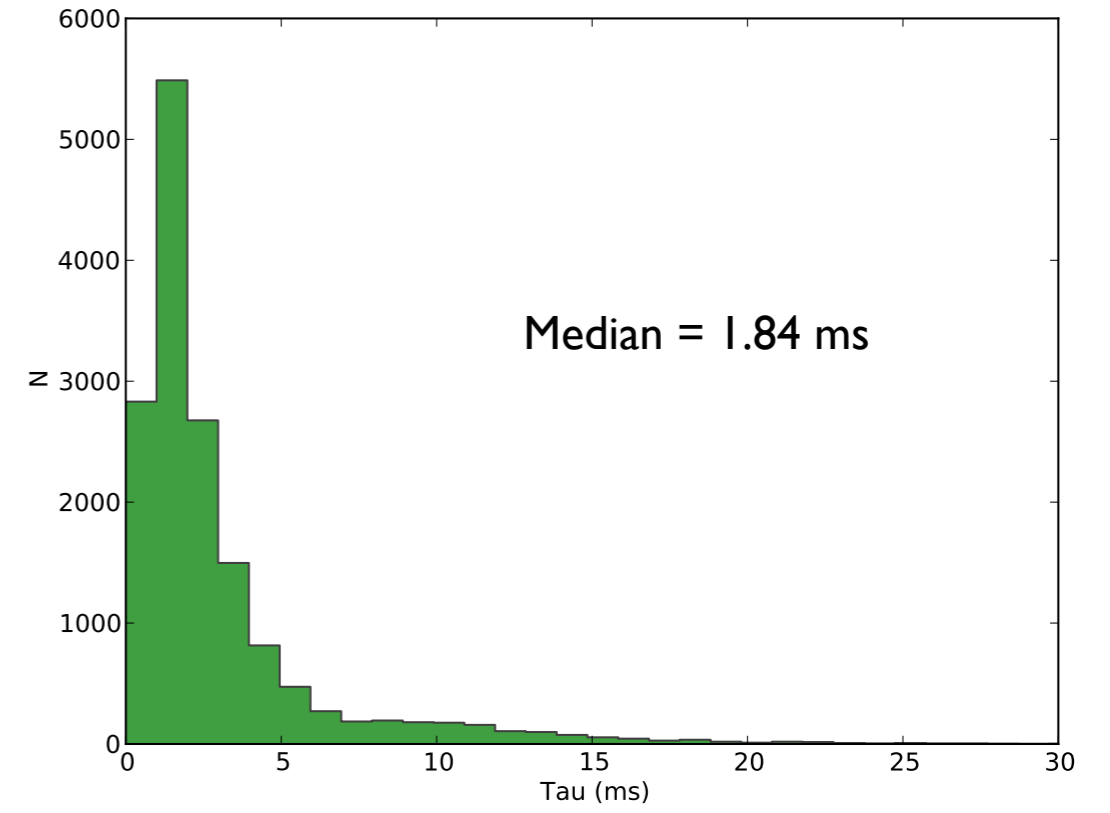
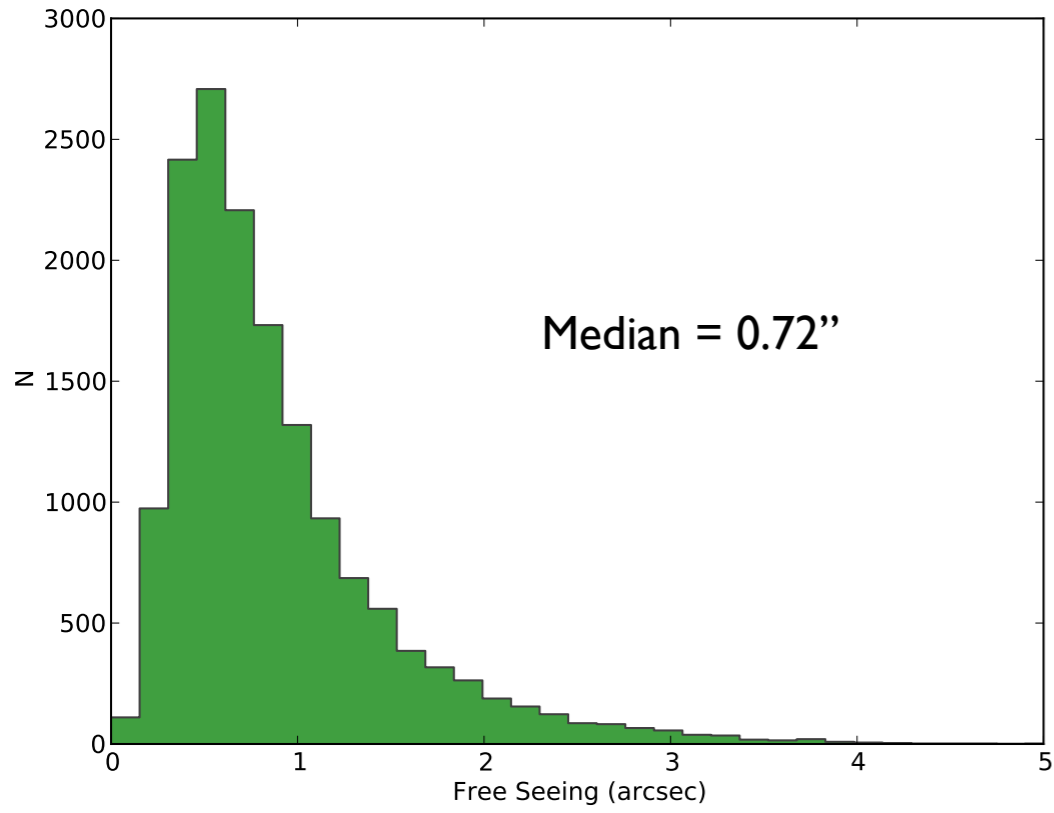
Fixed vs. Floating Layers



==> Only need two layers!







DIMM Camera Upgrade

Grasshopper®

HIGH RESOLUTION + HIGH FPS + COMPACT

- 0.3M, 1.4M, 2.0M, or 5.0M pixels
- Progressive scan Sony® CCDs
- High speed 14-bit A/D converter
- Dual IEEE-1394b ports for daisy chaining
- Industry standard design, compact case

The Grasshopper digital camera line from Point Grey Research is a complete, cost effective and reliable imaging solution. A variety of large format, high resolution image sensors, combined with an IEEE-1394b 800Mb/s interface, makes the Grasshopper an ideal choice for demanding imaging applications such as semiconductor inspection and high-speed assembly.

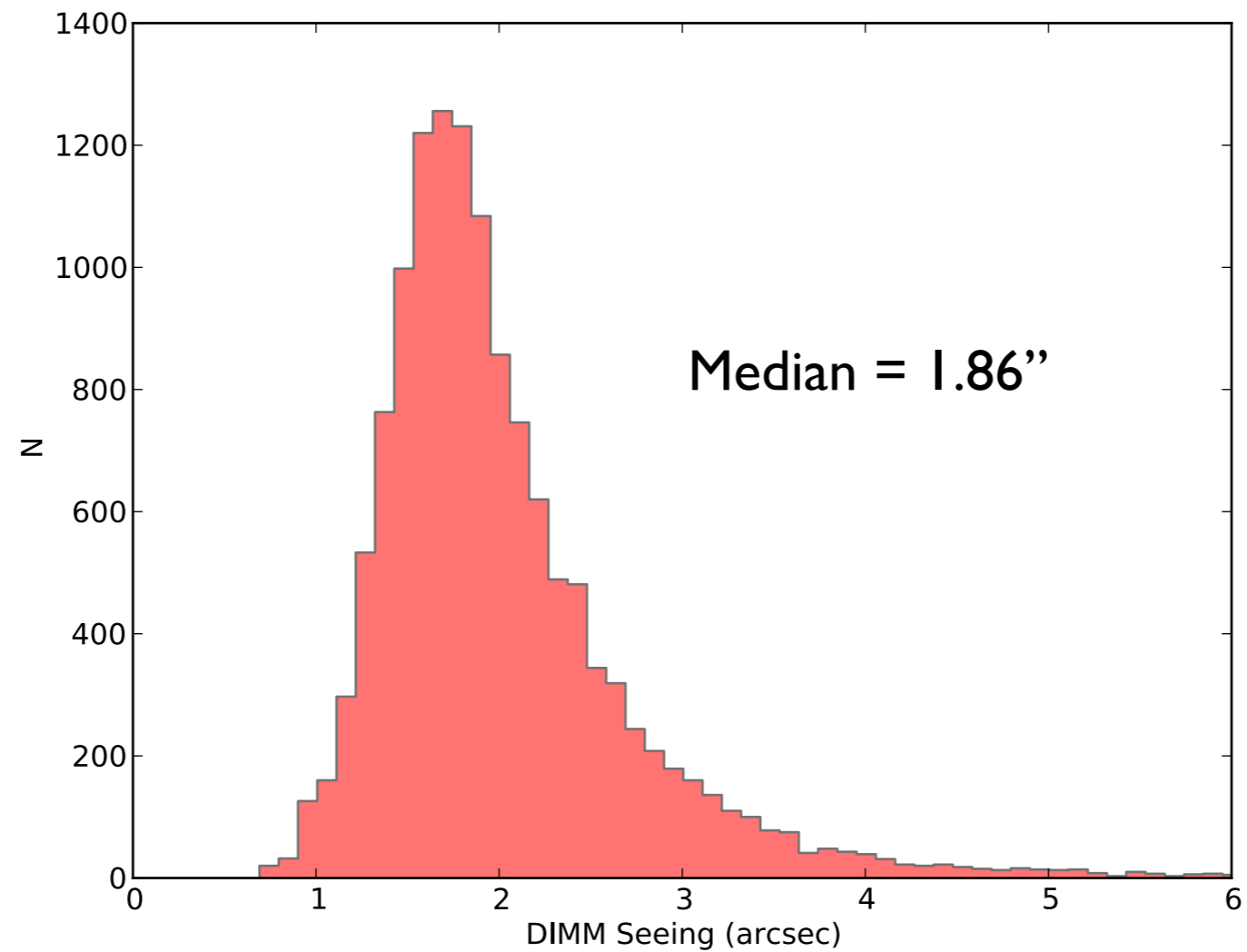
POINT GREY



Specification	GRAS-03K2M/C
Image Sensor Type	
Image Sensor Model	KAI-0340D 1/3"
Maximum Resolution	640(H) x 480(V)
Pixel Size	7.4µm x 7.4µm

The KAI-0340D sensor has dual readout amplifiers. This helps the speed, but makes ROI configuration less flexible. However, we are able to run ours at 330 frames/sec using a 2x2 binning mode and 8 bpp readout. Software utilizes libdc1394 and is fully portable between OS X and linux.

DIMM Statistics Since July



Conclusions

- Three main turbulence components above SAAO: ground layer, wind shear layer @ 0.2-2 km, and jet stream at 5-15 km.
- SLODAR reports better seeing for $h > 500$ meters ==> MASS has some sensitivity below 500 meters; possible dome/telescope effects? Seasonal?
- Overall seeing comparable to previous measurements during site testing. Bad run of weather this winter, though.