

Grand Canyon South Rim Trip Report  
NPS Night Sky Team  
Dan Duriscoe  
October 1, 2007

Accompanied by Cindy Duriscoe, I visited South Rim from September 12-14, 2007. Sky brightness data was collected at Powell Memorial and Lipan Point on September 13 and 14 (Universal Time). Five data sets from 9 PM to 1 AM local time were collected at Powell Memorial. At Lipan Point only two sets (at 9 and 10 PM) were collected before the winds reached a speed that forced discontinuing data collection. All data was processed and of excellent quality. Screen shots of the reports appear below. They verify the visual impression of a very dark sky with almost no natural airglow either night. There was some haze that I think was subduing the distant city light domes somewhat. Also included are compressed versions of photomosaics at each site presented in false color to emphasize the contrast with city light domes labeled.

Grand Canyon is in the unique situation in that these magnificent views of the night sky are available to millions of visitors a year with very little effort. Powell Memorial is only 3 kilometers from the Grand Canyon Village, and Lipan Point is near Desert View, perched on a high plateau with commanding views in all directions. Desert View area already has lots of developments including large parking lots and a campground, which make it ideal for a potential in-park observatory and night sky viewing area.

Grand Canyon Village, though containing lots of developments, has only a small effect on the night sky quality at South Rim. There is certainly room for improvement, but for an area that supports a high concentration of population, it is not bad. With some investment and effort retrofitting lights, the area could be displayed as a model for sensitive and efficient outdoor lighting in destination resorts.

Thank you for your assistance and I look forward to working with you again soon.

Dan Duriscoe  
Physical Scientist  
NPS Night Sky Team

# National Park Service Night Sky Team

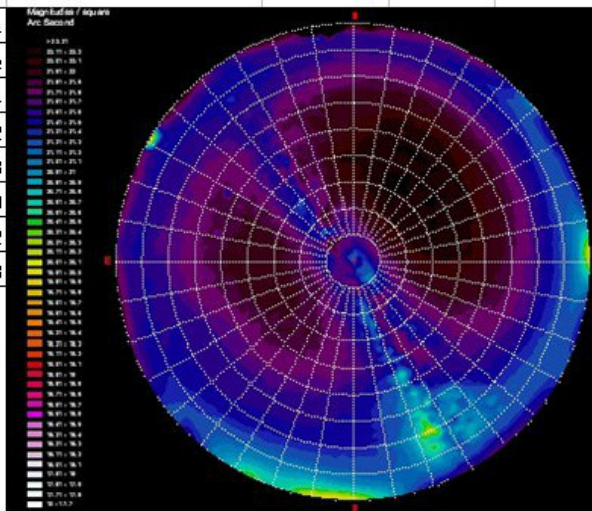
## Night Sky Quality Monitoring Report



Report date:	10/11/2007	by:	D Duriscoe
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<b>PARK:</b>	GRCA	<b>EQUIPMENT:</b>	SBIG, 50mm f/2, 6084
<b>SITE NAME:</b>	Powell Memorial	<b>OBSERVERS:</b>	D Duriscoe, C Duriscoe
<b>LONGITUDE:</b>	-112.15123	<b>AIR TEMP (°F):</b>	74
<b>LATITUDE:</b>	36.07324	<b>REL HUMID (%):</b>	12
<b>ELEVATION (m):</b>	2153	<b>WIND SP (mph):</b>	8
<b>DATE (UT):</b>	September 13, 2007	<b>CCD TEMP (°C):</b>	-20
<b>TIME START (UT):</b>	3:50:05	<b>EXP (seconds):</b>	12
<b>DATA QUALITY:</b>	excellent	<b>BORTLE CLASS:</b>	2
		<b>ZLM:</b>	7.3

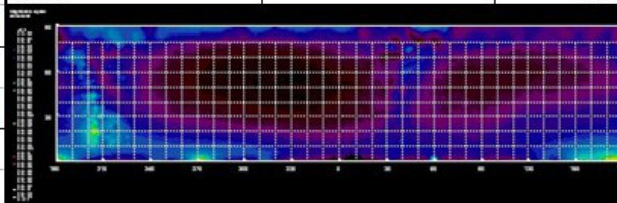
**NARRATIVE:** Very beautiful sky in an incomparable setting. Seeing fair, transparency good, not the most perfect of nights, zlm 7.3 by 11 pm. Phoenix brightest city dome, in the direction of Valle, G.C.Village not bad, Tusayan somewhat worse but of little consequence. Flagstaff barely visible, as is St. George, Las Vegas quite significant, North Rim lights seen but no towns to the north, maybe Tuba City to northeast. bortle class 2-3. sqm 21.75 between 3rd and 4th set, 21.82 at local midnight, among the darkest ever recorded with this instrument. Gegenschein easy at local midnight between Pisces and Aquarius, Zodiacal band seen from Pisces to Taurus.



### SKY BRIGHTNESS DATA

### LIGHT DOME DATA

Data Set Number	Time (UT)	Extinction coefficient (mag/air-mass)	Std Err Y Extinction Stars (mags)	Zenith (mag/sq arc-sec)	Whole Sky (mags)	Sky Above 20° Altitude (mags)	Brightest (mag/sq arc-sec)	Darkest (mag/sq arc-sec)	Link to Sky Maps	Light Dome Data			
										City	Distance (km)	Azimuth	1st Data Set Brightness (mags)
1st Start	3:50:05			21.66					<a href="#">PAN</a>	Grand Canyon, AZ	3	184.1	-2.15
End	4:08:34	0.147	0.033	21.48	-6.93	-6.32	20.17	22.27	<a href="#">HEMI</a>	Tusayan, AZ	11	168.4	
2nd Start	4:50:11			21.66					<a href="#">PAN</a>	Valle, AZ	47	178.5	-1.17
End	5:08:40	0.147	0.036	21.54	-6.91	-6.30	20.22	22.25	<a href="#">HEMI</a>	Phoenix	281	178.5	
3rd Start	5:50:19			21.88					<a href="#">PAN</a>	Las Vegas, NV	277	273.9	-1.17
End	6:08:48	0.148	0.033	21.94	-6.88	-6.28	20.33	22.20	<a href="#">HEMI</a>	Flagstaff	109	153.7	
4th Start	6:50:26			22.03					<a href="#">PAN</a>	Total			-3.83
End	7:08:55	0.153	0.034	22.09	-6.84	-6.26	20.42	22.18	<a href="#">HEMI</a>				
5th Start	7:50:33			22.19					<a href="#">PAN</a>				
End	8:09:02	0.151	0.035	22.20	-6.76	-6.19	20.43	22.26	<a href="#">HEMI</a>				
6th Start													
End													



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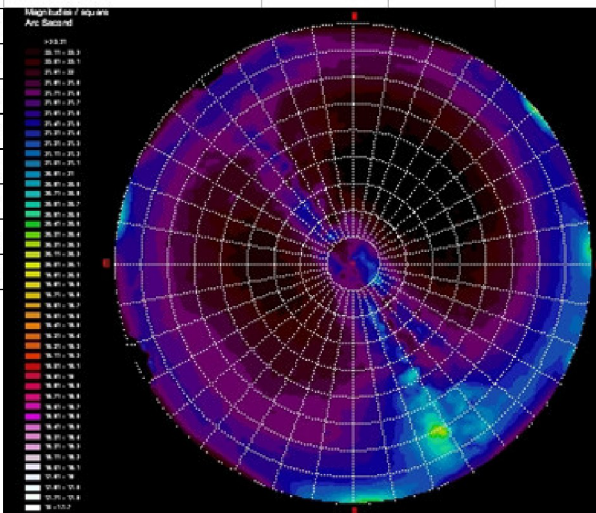
## Night Sky Quality Monitoring Report



Report date:	10/12/2007	by:	D Duriscoe
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<b>PARK:</b>	GRCA	<b>EQUIPMENT:</b>	SBIG, 50mm f/2, 6084		
<b>SITE NAME:</b>	Lipan Point	<b>OBSERVERS:</b>	D Duriscoe, C Duriscoe		
<b>LONGITUDE:</b>	-111.85332	<b>AIR TEMP (°F):</b>	71		
<b>LATITUDE:</b>	36.03262	<b>REL HUMID (%):</b>	19		
<b>ELEVATION (m):</b>	2182	<b>WIND SP (mph):</b>	12		
<b>DATE (UT):</b>	September 14, 2007	<b>CCD TEMP (°C):</b>	-20		
<b>TIME START (UT):</b>	3:57:22	<b>EXP (seconds):</b>	12		
<b>DATA QUALITY:</b>	Excellent	<b>BORTLE CLASS:</b>	2	<b>ZLM:</b>	7.2

**NARRATIVE:** Spectacular sky from a high vantage point. Seeing fair, transparency good. Some fire smoke from Cape Royal, also light from flames shows up in images. VERY DARK, almost no airglow, some haze must be over southern AZ, as Phoenix light dome is very subdued on this night. Few clouds over Las Vegas reflecting city lights, corrupting readings as well. SQM 21.76 at end of 2nd set. Wind a definite factor, gusting to 30 mph by end of second set. Set up on top of camper, shut down after second set because of wind. Gegenschein seen easily near midnight, one of the darkest (relatively) clear nights at moderately high elevation I have ever seen.



### SKY BRIGHTNESS DATA

Data Set Number	Time (UT)	Extinction coefficient (mag/air-mass)	Std Err Y Extinction Stars (mags)	Zenith (mag/sq arc-sec)	Whole Sky (mags)	Sky Above 20° Altitude (mags)	Brightest (mag/sq arc-sec)	Darkest (mag/sq arc-sec)	Link to Sky Maps
1st Start	3:57:22			21.76					<a href="#">PAN</a>
End	4:15:52	0.145	0.033	21.57	-6.79	-6.20	20.26	22.44	<a href="#">HEMI</a>
2nd Start	4:57:30			21.71					<a href="#">PAN</a>
End	5:16:00	0.151	0.036	21.70	-6.81	-6.23	20.22	22.34	<a href="#">HEMI</a>
3rd Start									
End									
4th Start									
End									
5th Start									
End									
6th Start									
End									

### LIGHT DOME DATA

City	Distance (km)	Azimuth	1st Data Set Brightness (mags)
Flagstaff	96	167.2	0.58
Phoenix	277	184.2	-1.00
Las Vegas	304	274.6	-0.33
Tuba City	56	79.3	0.65
Total			-3.22

