

W5LUU WEEKEND MOONDATA – 2009
For Sundays at 0000 UT

2009	Dec. deg.	RA hrs.	144 MHz Temp. K	Range Factor dB	DGRD, dB		Moon Phase	CONDITIONS
					144 MHz	432 MHz		
Jan 04	7.1	0.4	265	1.35	2.8	1.8		Moderate
11	23.4	7.5	320	0.08	2.2	0.7	FM – 3.5h	Good
18	- 15.4	13.6	324	1.75	3.9	1.3		Moderate
25	- 23.8	19.5	600	2.26	6.7	3.9	NM – 32h	Very Poor
Feb. 01	11.4	1.9	282	1.32	3.0	1.9		Moderate
08	21.0	8.4	225	0.27	1.2	0.5	FM – 39h	Very Good
15	- 18.2	14.1	352	1.70	4.2	2.4		Poor
22	- 21.3	20.1	376	2.17	4.9	2.8	NM – 3 d	Poor
Mar 01	15.4	1.6	302	1.17	3.1	1.7		Moderate
08	18.6	8.7	187	0.54	0.9	0.6	FM – 3 d	EXCELLENT
15	- 20.9	14.6	388	1.70	4.5	2.5		Poor
22	- 19.3	20.6	338	2.09	4.4	2.7	NM – 4 d	Poor
29	18.9	2.3	341	0.91	3.3	1.5		Moderate
Apr 05	14.7	9.3	175	0.78	0.9	0.8		EXCELLENT
12	- 23.1	15.2	427	1.80	5.0	2.7	FM + 2 d	Poor
19	- 15.8	21.1	336	2.06	4.4	2.7		Poor
26	21.3	2.9	364	0.63	3.2	1.3	NM + 21h	Moderate but NM
May 03	9.9	9.9	187	0.91	1.3	1.0		Very Good
10	- 24.5	15.8	482	1.96	5.6	3.1	FM + 1 d	Very Poor
17	- 12.0	21.7	330	2.07	4.3	2.7		Poor
24	23.8	3.5	357	0.43	2.9	1.1	NM – 12h	Moderate but NM
31.	5.7	10.6	202	0.93	1.6	1.1		Good
Jun 07	- 25.8	16.4	645	2.11	6.8	3.7	FM – 18h	Very Poor
14	- 8.5	22.2	268	2.08	3.6	2.4		Moderate
21	24.8	4.1	374	0.36	3.0	1.0	NM + 44h	Moderate
28	0.9	11.2	217	0.86	1.7	1.1		Good
July 05	- 26.9	17.1	944	2.21	8.4	4.1	FM – 2 d	Very Poor
12	- 4.7	22.8	244	2.07	3.3	2.4		Moderate
19	25.8	4.7	437	0.42	3.7	1.3	NM – 3 d	Moderate
26	- 3.3	11.1	245	0.77	2.0	1.1		Good
Aug 02	- 26.5	17.8	2450	2.26	12.3	6.7		Very Poor
09	- 0.9	23.3	244	1.98	3.2	2.3	FM + 3 d	Moderate
16	25.5	5.4	510	0.55	4.4	1.7		Poor
23	- 7.7	12.1	282	0.74	2.4	1.1	NM + 43h	Good
30	- 25.8	18.4	2392	2.25	12.3	6.3		Very Poor
Sept 06	3.3	23.9	250	1.81	3.1	2.1	FM + 32h	Moderate
13	25.5	6.2	470	0.68	4.2	1.7		Poor
20	- 10.2	12.7	314	0.83	2.9	1.3	NM + 30h	Moderate
27	- 24.4	19.0	1028	2.22	8.8	6.0		Very Poor
Oct. 04	7.1	0.4	265	1.60	3.1	1.4	FM – 6 h	Moderate
11	23.4	7.0	371	0.72	3.4	1.4		Moderate
18	- 13.0	13.2	318	1.03	3.1	1.5	NM – 5 h	Moderate but NM
25	- 22.7	19.5	607	2.22	6.7	3.6		Very Poor
Nov 01	10.6	0.9	280	1.40	3.1	1.8	FM – 43h	Moderate
08	21.0	7.7	267	0.63	2.1	1.0		Good
15	- 16.8	13.8	358	1.29	3.6	1.9	NM – 44h	Moderate
22	- 20.0	20.0	381	2.25	4.9	3.0		Poor
29	14.1	1.4	293	1.5	3.1	2.0	FM + 3 d	Moderate
Dec 06	17.9	8.5	196	0.43	0.9	0.7		EXCELLENT
13	- 19.6	14.4	379	1.53	4.3	2.2	NM – 3 d	Poor
20	- 17.5	20.6	339	2.31	4.6	3.0		Poor
27	16.8	1.9	315	1.32	3.4	1.8	FM – 5 d	Moderate

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MOONONDATA UPDATE-2009 AND RELATED COMMENTS

By Derwin King, W5LUU

The earth-moon distance and the cosmic (sky noise) temperatures in the direction of the moon are predictable, cyclical variables that set the basic quality of the earth-moon-earth (EME) communications path for frequencies below 1.0 GHz. Best conditions occur when: 1) the moon is at the absolute minimum perigee distance from the earth and 2) the Sky Temperature behind the moon is the coldest along the moon path. The effect of distance is independent of frequency, but **Sky Temperature** decreases with frequency, up to ~1 GHz and then levels out. The EME signal-to-noise ratio, in dB, is usually degraded from the ideal by a factor (**DGRD**, see below), which varies over hourly, daily, weekly, monthly and yearly time periods. As a guide for the basic weekend conditions for 2009 the **W5LUU WEEKEND MOONDATA -2009** lists the **DGRD**, in dB, for **144** and **432 MHz**, and other pertinent EME information for each **Sunday at 0000 UT**. Station, location and factors such as ionospheric disturbances, local noise, antenna beam width, side lobes, polarization, etc. can increase the “apparent” **DGRD**.

EME conditions during 2009-10 will be the most favorable of the 9 year cycle – now is the ‘best ever’ time to take advantage of this mode. Ten weekends of 2009 are rated as Good to Excellent. Thirteen other days have 2 m. DGRD <1.0 dB. On May 01 it dips to 0.08 dB and on Nov. 09 to 0.07 dB. However, during the traditional ARRL EME Contest period, sky noise at VHF is a problem for high North moon declinations. Weekends around Oct. 11, Nov. 01, 08(Good), and 30 and Dec. 06 (Excellent) are possibilities. For 1296 and up, the weekend around 09/13, high declination near perigee, should also be considered for the contest.

Definitions:

DEC. (deg): Moon declination in degrees north and south (-) of the equator. This is cyclical with an average period of 27.212221 days. The maximum declination during a monthly cycle, plus and minus, ranges from 18.15 up to 28.72 degrees with a period (maximum to minimum and back to maximum) of about 19 years. **Last maximum was on 09/15/2006.**

RA (hrs): Right Ascension, in hours, gives the East-West position of the moon against the sky background. Average period of RA cycle is 27.321662 days but it can vary by a day or so due to effects of the sun on the earth and moon motion.

144 MHz Temp (K): The 144 MHz cosmic (sky) noise in direction of moon expressed as absolute temperature.

Range Factor (dBr): The additional EME path loss, in dB, due to earth-moon separation distance being greater than absolute minimum (348,030 km surface-to-surface). Varies from a low of (0 to 0.7 db) at perigee up to 2.33 ± 0.1 dB at apogee.

DGRD, (dB): The degradation in EME signal-to-noise, in dB, due to: (1) the excess sky noise temperature, in dB, at the stated position of the moon compared to the lowest cold sky temperature and the system noise temperature (all at the frequency of interest); plus (2) the earth-moon range factor, **dBr**, for the listed time and date. The tabulated **DGRD** is referenced to the lowest possible sky noise temperature along the moon path, for a system noise temperature of 80 K at 144 and 60 K at 432, an antenna beam width of $\sim 15^\circ$ and to the absolute minimum earth-moon (surface-to-surface) distance. The **dBr** affects **DGRD** equally at all frequencies, but sky noise decreases rapidly as frequency increases. During a monthly lunar cycle **DGRD** can vary by 13 dB on 144 and 8 dB on 432. **DGRD** varies less with small antennas than with large.

Moon Phase: Shows new moon (**NM**) and full moon (**FM**) along with the number of days (d) or hours (h) before (-) or after (+) these events. At **NM** sun noise is a problem while at **FM** the EME conditions (at night) are usually more stable.

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Conditions: Summary of EME conditions as controlled by **DGRD** at 144 MHz and **NM**. Conditions may be worse, due to ionospheric disturbance, local noise and polarity, but not better than indicated. In general, **144 MHz DGRD <1.0 dB is considered Excellent, 1.0 to 1.5 is Very Good, 1.5 to 2.5 is Good, 2.5 to 4.0 is Moderate, 4.0 to 5.5 is Poor, and over 5.5 is Very Poor. Within a day of New Moon (NM), high sun noise can make conditions Very Poor regardless of the DGRD.**