MOONDATA UPDATE-2008 AND RELATED COMMENTS

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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 earth-moon-earth (EME) communications for frequencies below 1.0 GHz. Best conditions occur when the: 1) earth-moon distance (Range Factor) is at the absolute minimum and 2) Sky Temperature toward the moon, as seen from earth, is the coldest along the moon path. While the **Range Factor** is independent of frequency, **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 with time over hourly, daily, weekly, monthly and yearly periods. The **DGRD**, in **dB**, for **144** and **432 MHz**, and other pertinent **EME data**, are listed in **W5LUU WEEKEND MOON DATA** for each **Sunday** at **0000 UT** to provide a guide for the basic EME weekend conditions. Random variables such as ionospheric disturbances, local noise, and polarization mismatch will increase the "apparent" **DGRD.**

EME conditions will generally improve in 2008 with all moon perigees at north declinations, but on many weekends the moon is at Right Ascensions where Sky Noise is 1 to 4 dB above minimum and five Good weekends are negated by new moon. Many weekdays will be Good or better. Over the next 1-2 years as perigees occur near the best cold sky region, conditions will improve. During the traditional ARRL EME Contest period there are no ideal, high declination weekends for VHF due to the high sky temperatures. Dates will have to be a compromise. For 1296 up, several high declination dates are near perigee and near ideal.

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) in 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 $\pm$ 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 ~15^0 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.

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.**

W5LUU WEEKEND MOONDATA – 2008

For Sundays at 0000 UT

Date 2008	Dec. deg.	RA hrs.	144 MHz Temp. K	Range Factor dB	DGRD, dB 144 MHz	DGRD, dB 432 MHz	Moon Phase	CONDITIONS
Jan 06	- 27.7	17.0	905	2.14	8.2	3.8	NM – 2.5d	Very Poor
13	- 2.9	23.1	244	1.15	2.3	1.5		Good
20	28.0	5.7	512	0.53	4.3	1.8	FM – 2.7d	Poor
27	- 2.9	12.0	259	1.77	3.2	2.1		Moderate
Feb. 03	- 28.0	17.6	2227	2.04	11.8	5.6		Very Poor
10	0.9	23.7	247	0.90	2.1	1.3	NM + 2.9d	Good
17	27.6	6.4	407	0.81	4.0	1.8		Moderate
24	- 1.5	12.4	306	1.84	3.8	2.4	FM + 2.9d	Moderate
Mar 02	- 27.7	18.2	2732	2.01	12.6	6.5		Very Poor
09	5.3	0.3	262	0.61	2.0	1.0	NM + 1.3d	Good but NM on 03/08
16	26.0	7.1	344	0.97	3.3	1.6		Moderate
23	- 10.2	12.9	313	1.99	4.0	2.5	FM + 2.6d	Moderate
30	- 26.8	18.8	1351	2.02	9.7	5.3		Very Poor
Apr 06	9.2	0.8	277	0.38	2.0	0.8	NM - 3.9h	Good but NM
13	23.4	7.9	229	1.00	2.0	1.2		Good
20	- 13.9	13.5	321	2.14	4.3	2.6	FM - 9.9h	Poor
27	- 25.1	19.4	654	2.05	6.8	3.7		Very Poor
May 04	12.8	1.3	290	0.29	2.1	0.8	NM - 1.5d	Good
11	20.1	8.6	186	0.92	1.3	1.0		VERY GOOD
18	- 17.5	14.0	350	2.25	4.7	2.8	FM – 2.1d	Poor
25	- 22.6	20.0	380	2.04	4.8	2.8		Poor
Jun. 01	16.3	1.8	313	0.34	2.4	0.8	NM – 2.8d	Good
08	16.7	9.2	172	0.83	0.9	0.8		EXCELLENT
15	- 20.7	14.6	392	2.29	5.1	3.0	FM - 3.7d	Poor
22	- 19.5	20.7	337	1.95	4.3	2.5		Poor
29	19.7	2.4	351	0.48	2.9	1.1		Moderate
July 06	13.3	9.7	185	0.81	1.1	0.8	NM + 2.9d	VERY GOOD
13	- 23.3	15.2	433	2.28	5.5	3.1		Poor
20	- 16.0	21.3	341	1.78	4.1	2.3	FM + 1.7d	Poor
27	22.9	3.1	364	0.62	3.2	1.3		Moderate
Aug 03	9.8	10.2	193	0.89	1.3	1.0	NM + 1.4d	V. G. but NM 08/02
10	- 25.3	15.8	493	2.25	5.9	3.2		Very Poor
17	- 12.3	21.9	299	1.56	3.4	2.0	FM + 2.7h	Moderate
24	25.4	3.9	363	0.69	3.2	1.3		Moderate
31	6.1	10.7	204	1.09	1.7	1.2	NM + 4.0h	Good but NM
Sept 07	- 26.6	16.4	657	2.24	7.0	3.5		Poor
14	8.6	22.3	252	1.34	2.6	1.7	FM - 1.4d	Moderate
21	26.9	4.7	430	0.64	3.8	1.5		Moderate
28	2.0	11.3	222	1.35	2.2	1.5	NM - 1.3d	Good but NM 09/29
Oct. 05	- 27.2	17.0	867	2.26	8.1	3.9		Very Poor
12	- 4.9	22.9	244	1.19	2.4	1.9	FM - 2.8d	Good
19	27.3	5.5	514	0.47	4.3	1.7		Poor
26	- 2.6	11.8	251	1.59	2.9	1.9	NM – 2.9d	Moderate
Nov 02	- 27.2	17.6	2175	2.31	11.9	5.8		Very Poor
09	- 1.2	23.3	244	1.18	2.4	1.5		Good
16	26.7	6.1	468	0.25	3.7	1.4	FM + 2.7d	Moderate
23	- 7.2	12.4	303	1.75	3.7	2.3		Moderate
30	-26.6	18.2	2659	2.35	12.0	6.8	NM + 2.3d	Very Poor
Dec 07	2.9	23.8	249	1.26	2.5	1.6		Good
14	25.5	6.8	385	0.08	2.9	0.9	FM + 1.3d	Moderate
21	- 11.4	13.0	313	1.79	3.8	2.3		Moderate
28	- 25.3	18.9	1152	2.33	9.3	5.3	NM + 0.5d	Very Poor and NM