Integration Times

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Let the sky noise coupled into the balun (after mismatch losses) be Ts and the active balun noise level be Tb. Define sky noise dominance to be:

$$D = Ts/Tb$$

The ratio of the total system noise, Ts + Tb, to the noise in an ideal system with a noiseless balun is:

$$R = (Ts + Tb)/Ts$$

To obtain the same output fluctuation level in a real system compared with an ideal system one must increase the integration time by a factor of R^2.

The results are:

D	R	R^2
0 dB	2.0	4.0
1 dB	1.79	3.22
2 dB	1.63	2.66
3 dB	1.5	2.25
6 dB	1.25	1.57
10 dB	1.1	1.21
13 dB	1.05	1.10
16 dB	1.03	1.05
20 dB	1.01	1.02

One sees that for D = 6 dB, integration times must be increased by 57%; this seems to me to be practical goal. D = 10 dB with a 21% increase is obviously better. Observations are possible with D = 0 dB or even D = -3dB for strong sources (like the active Sun) where sensitivity is no problem. Even sensitive observations would be possible in these cases, just very slow.