

### **How does Magnetometer noise vary with sample rate?**

- 1. Sensitivity is given as a frequency bandwidth product or nT/rt Hz RMS. This value is valid for ALL sample frequencies or sample rates. Sensitivity for the 858 and 859 is 0.008nT/rt Hz RMS Sensitivity for the 823 and 882 is 0.004nT/rt Hz RMS Noise levels can also be given as Peak-to-Peak numbers at certain sample rates. For instance at 10 Hz.
  - a. RMS value at 1 Hz for either instrument is approximately equal to the sensitivity
  - b. P-P value at 1 Hz is roughly equal to 3x or 4 x the RMS value. Remember that the Root Mean Square is not operating on a sine wave but on some random noise components as well and thus the actual Root Mean Square would be about 0.024nT for the 858 and 0.012 for the 882 at 1 Hz.
  - c. For higher frequencies, we basically take the square root of the sample rate and multiply that times the P-P at 1 Hz. So for 10 Hz we have 0.075nT for the 858 and 0.036 for the 882. This is approximately what we see in the field and I can verify that (looking at the noise on an 882 in very quiet area, deepish water, we see less than 0.050nT P-P.)
  - d. So for 20 Hz the multiplier is 4.5 and for 40 Hz the multiplier is 6.3. So 882 noise at 40 Hz would be  $6.3 \times 0.012 = .075$  nT P-P.

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