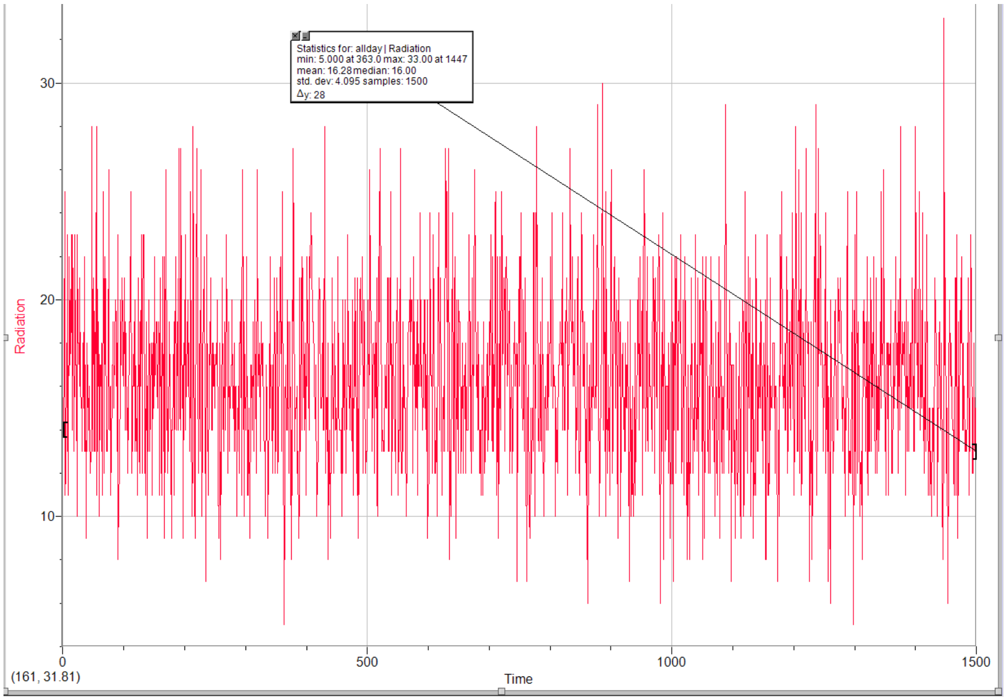
Variation in radiation counts

What to make of the variation in radiation counts?



Statistics:

- Min 5 at 363; Max 33 at 1447
- Mean 16.28; Median 16
- Std. dev. 4.095 $\approx$ 4.1

Standard deviation

Here are the first 20 1-minute counts for the "all day" GC counting:

Time (min)	Counts / 1 min	Counts-Ave = dev	dev^2	within 1 std?	within 2 std?
1	14	-3.65	13.3	1	1
2	17	-0.65	0.4	1	1
3	25	7.35	54.0	0	1
4	11	-6.65	44.2	0	1
5	12	-5.65	31.9	0	1
6	18	0.35	0.1	1	1
7	13	-4.65	21.6	0	1
8	23	5.35	28.6	0	1
9	11	-6.65	44.2	0	1
10	22	4.35	18.9	1	1
11	18	0.35	0.1	1	1
12	17	-0.65	0.4	1	1
13	18	0.35	0.1	1	1
14	23	5.35	28.6	0	1
15	14	-3.65	13.3	1	1
16	23	5.35	28.6	0	1
17	20	2.35	5.5	1	1
18	13	-4.65	21.6	0	1
19	18	0.35	0.1	1	1
20	23	5.35	28.6	0	1
Averages->	17.65	1.42109E-15	19.2275		
		Sqrt(dev^2)->	4.4		
		Range: average+- 1 "std"	13.2 to 22.1		

- "Mean" = average
- "Median": Half the measurements are above this value, half are below.
- The "deviation" for one particular measurement is

  dev= Counts - average(Counts).
- Why is the average of the deviations not useful for talking about how much variation there is in the data?
- The "Standard deviation", σ, for our purposes is:

$$\sigma = \sqrt{\text{Average}(\text{dev}^2)}. \tag{1}$$

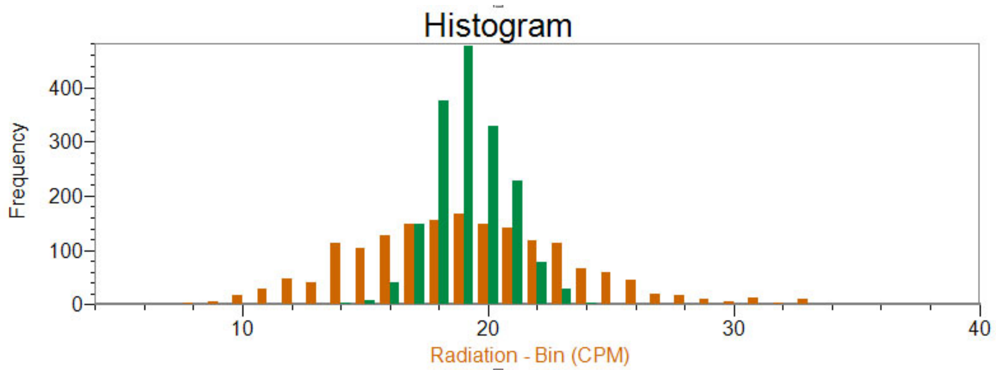
In a course on probability and statistics, you would find that for many kinds of random processes:

- 68% of measurements are between $\text{ave} - \sigma$ and $\text{ave} + \sigma$.
- 95% of measurements are between $\text{ave} - 2\sigma$ and $\text{ave} + 2\sigma$.
- 99.7% of measurements are between $\text{ave} - 3\sigma$ and $\text{ave} + 3\sigma$.

- ...

GC data

Here are the histograms from the 1 minute counts and the 10-minute averages for the GC data:



There is a trick we can use to connect the standard deviation of the 1-minute counts with the width of the 10-min average histogram....