Using R to address significantly lower measurements of Chl-A concentrations using Method Detection Level (MDL)

This R script that I created addresses issues with measuring Chl-A concentrations using a fluorometer, sometimes the analytical device could record data even if there is no sample in the analyzer. This could be an issue because the data could be inaccurate due to a lot of noise from the analyzer. (Dittmar et al.) In our personal data we recognized that a lot of our values were considerably lower than the standard curve, to address this we had to statistically correct noise from the analytical device’s reading. Reading such as this could potentially give you false positives or negatives signals. There are many ways to correct for this, but the method that this script will employ is the Method Detection Limit, MDL, which is a standard statistical correction analysis even used in federal government.(Hyslop et al.). We can assume the MDL will measure the standard deviation of seven samples with the lowest values by the degrees of freedom using the Student’s t-test at 99% confidence level. With that value, we can assume that our sample's true value is plus or minus the MDL’s value, because it will act as a reliable threshold for the analytical device’s readings.

This code will use Method Detection Limit to statistically assess the smallest absolute amount of a substance’s concentration. This will allow for researchers to plug in their data and understand the minimum amount of a concentration based on their standard curve. Using my personal data, I will develop a code that could identify the values in all my columns and the values that are in my standard curve. Once I can develop a code to do that, I can filter the values that are significantly lower than the standard curve and apply those values to the MDL’s formula. Afterwards, I will test the R script by using another line to compare the output from R to the sample data in Excel to see if the values are equal. If they are equal that means that the code does work and it has the potential of being used with other instruments that have residual effects in general and needs some form of statistical method detection.

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