

Nitrate Concentration exercise

Overview

A water supplier is abstracting groundwater from boreholes and wants to know the quality of the water before using it for supply. The WHO threshold for nitrate concentrations allowed in drinking water is 11.3 mg/l.

The data in the spread sheet represent observations of Nitrate concentrations (mg/l) in the boreholes. The column headings are the borehole identifiers and the dates are the first column.

Tasks

1. What are the highest, the lowest and the average concentrations measured over the entire time period in each of the boreholes (min, max, mean)?
2. Calculate which boreholes show concentrations above the threshold. At which dates are threshold concentrations exceeded?
3. Assuming it is only economically feasible to treat the abstracted water if at 75 % of the sampled water has concentrations below 6 mg/l – which boreholes shall be used for supply? (75% is the 3rd quartile)
4. On average does the data vary more in between different sample dates or more for different locations? (You can assess this by calculating the average of the variances for borehole station/dates!) What is the average variance for i) dates, ii) locations
5. What are the temporal trends in the groundwater concentrations? Are the concentrations generally rising or falling over the observation period in borehole:
 - a. B2, D3, G1 and H3

Assessment:

Submit to me:

1. A technical report (as a word document) that provides the answers to the tasks/questions above. This should include any graphs that you create but should not contain code.
2. A fully commented script (.R file) that I can use to recreate your results

You will be marked on:

1. The presentation of your report, including the graphs. Imagine that I am going to hand it to someone that has no prior understanding of this practical. It should stand alone and address the relevant tasks.
2. The presentation of your R script. Again this should be readable, well commented and understandable to someone who has not seen it before.
3. Whether or not the R script repeats the results from the report.

Some tips for good code presentation:

- Your script should begin with a brief description of what it does containing your name, the date and any other relevant information (e.g. submitted as part of the assessment for ... etc.)
- Use consistent formatting and indentation to break the code in to coherent sections
- Use meaningful variable names
- Do not use overly long lines. Long thin code sections are easier to read.