

# Uncertainty associated with the measurement of mineral micropollutants in natural waters and in waste waters: differences observed between analytical methods during proficiency testing schemes

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## Goals:

- highlight and quantify the differences between analytical methods (trueness and precision)
- assess the impact of these differences on the decision making for regulations

## Data

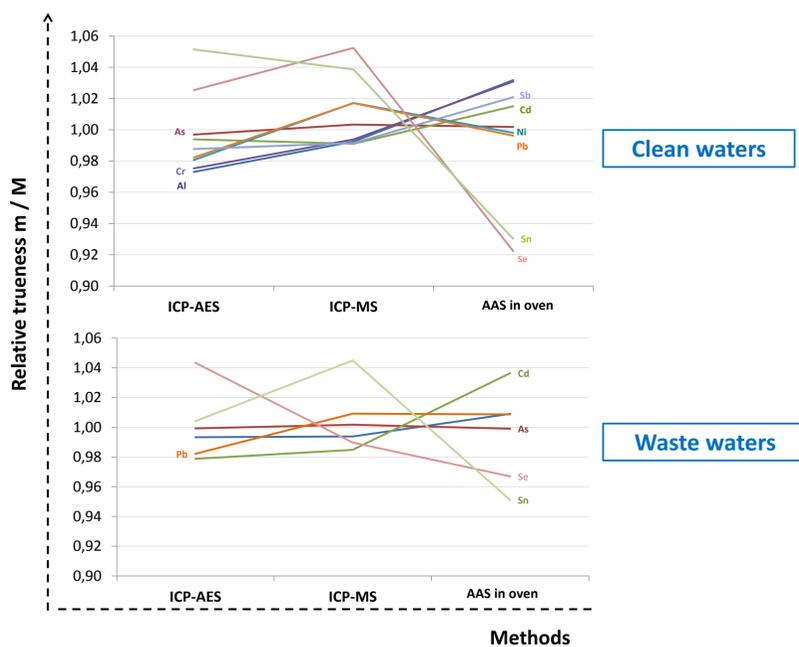
- Results from proficiency tests organised by AGLAE between 2005 and 2010
- Analysis of about 20 metals (Al, As, B, Ba, Be, Cd, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr and Zn)
- Repeated tests at different concentration levels (around 12)
- High number of laboratories who participated in the tests (about 120)

## Way of data processing

- For the differences between results (trueness): ANOVA with normally distributed random variables
- For the deviations between precision values: for each analytical method, a model of reproducibility variations ( $CV_R\%$ ) is calculated according to the concentration level

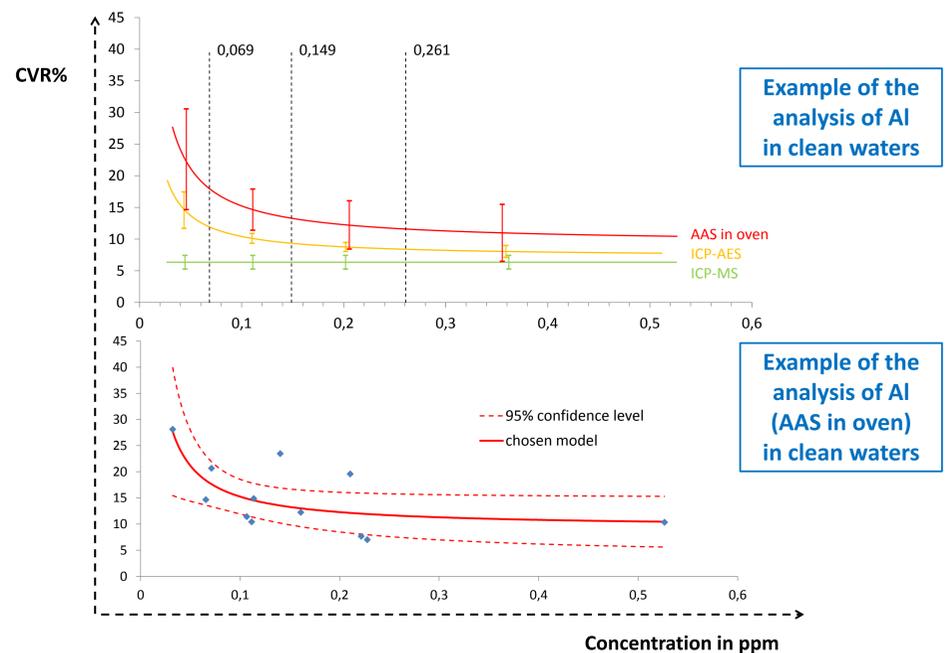
## Results

### Deviations between results (trueness)



- No significant differences between clean waters and waste waters
- Major tendency: ICP-AES < ICP-MS < AAS in oven
- 2 exceptions: Sn and Se, for which AAS in oven << ICP

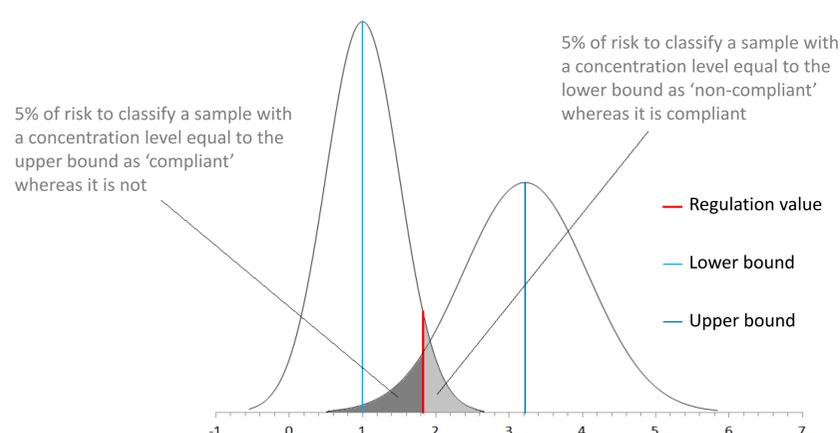
### Deviations between precision values



- Major tendency: AAS (in oven and in flame) reproducibility is less satisfactory than ICP (AES and MS) reproducibility
- ICP-MS is more reproducible than ICP-AES for low concentration levels
- No significant difference between clean waters and waste waters

## Impact on the regulation values

**Doubt zone:** zone in which the risk to misclassify a sample as 'compliant' or 'non-compliant' is higher than 5%



- The more reproducible the results for an analytical method are, the less expanded the doubt zone around the regulation value will be
- The analytical methods which give higher results reduce the risk to classify as 'compliant' a 'non-compliant' sample
- The analytical methods which give lower results reduce the risk to classify as 'non-compliant' a 'compliant' sample