

## 1. Statistics

In hydrochemistry, we do not use averages or means

One high or erroneous value can skew the statistics

Take the following set of 21 uranium analyses in an aquifer in µg/L

1	7	15
1	8	17
2	8	22
3	10	23
5	11	26
6	13	29
7	15	459

The average is

## 1. Statistics

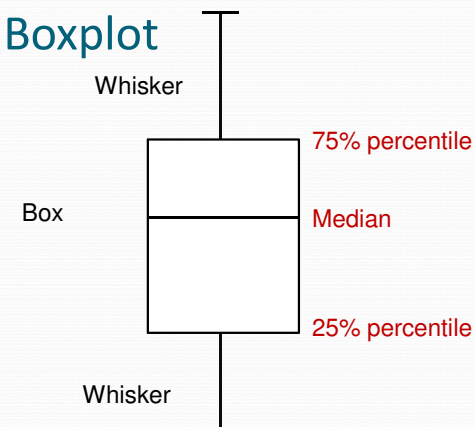
We prefer to use NON-PARAMETRIC STATISTICS

For example, MEDIAN, PERCENTILES

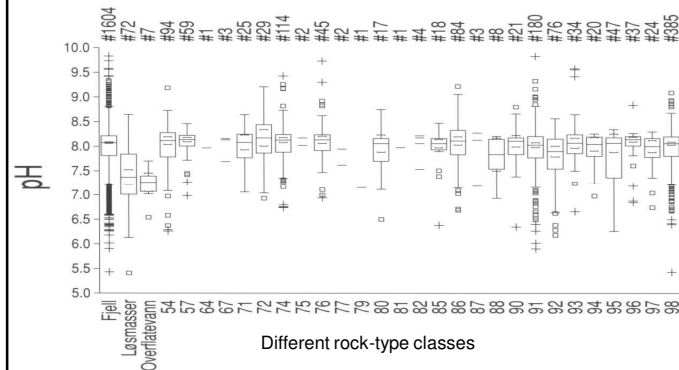
1	7	15
1	8	17
2	8	22
3	10	23
5	11	26
6	13	29
7	15	459

The minimum is  
The 25% percentile is  
The median (50%) is  
The 75% percentile is  
The maximum is

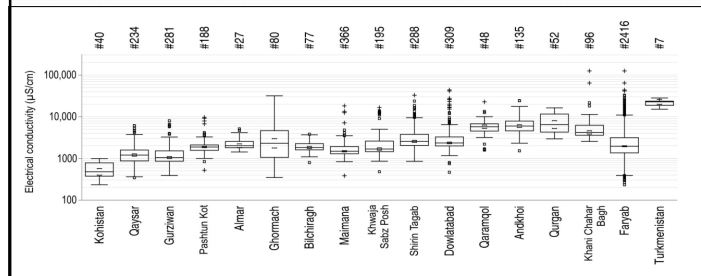
## 2. Boxplot



## 2. Boxplots

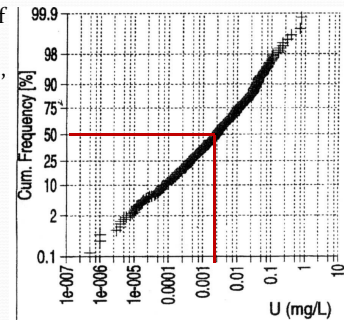


## 2. Boxplots – example from Faryab

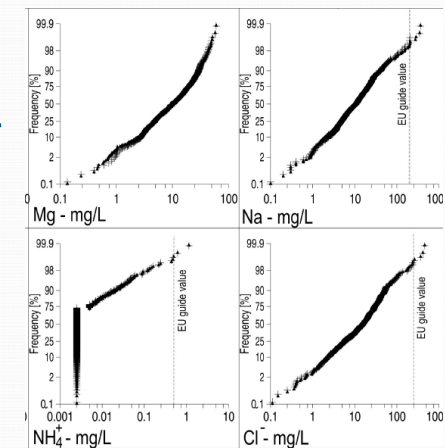


## 3. Cumulative frequency distribution (cfd)

- Uranium varies over 6 orders of magnitude in Norwegian bedrock groundwaters (n = 476), up a maximum of c. 1 mg/l
- Distribution is almost log-normal
- Median value is around 2.5 µg/L

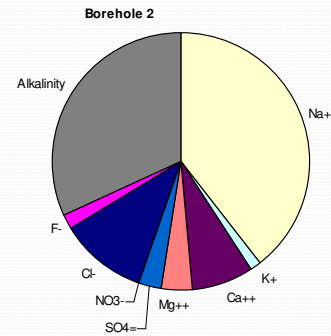


European  
tap water  
N= 579



#### 4. Pie diagrams

- Convert major ions to meq/L.
- Plot each sector in proportion to meq/L content
- If good ion balance, the cations and anions should form 180° of the pie each...



#### 4. Kurlov formula

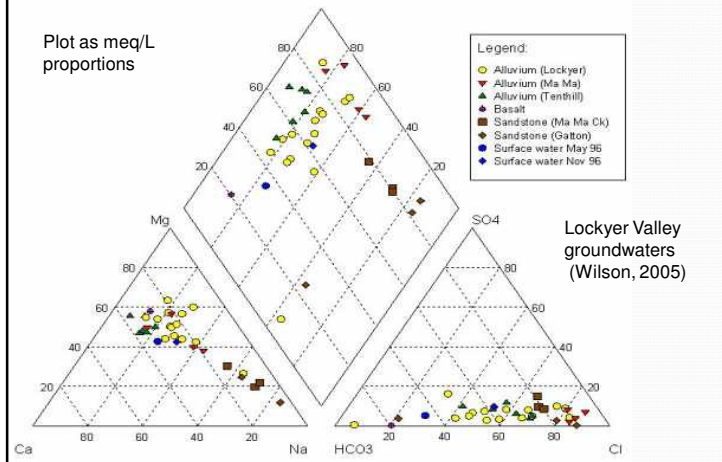
- Mikhail Georgievich Kurlov (1859–1932) was the founder of the Siberian school of hydrotherapeutics and was rector of Tomsk State University in Siberia
- A “written” version of the pie diagram



$$M_{0.15g} \frac{Ca_{15}Mg_7Na_{75}K_2}{HCO3_{67}SO4_6Cl_{23}NO3_0} pH = 7.87$$

#### 5. Piper diagram

Plot as meq/L proportions



#### 6. Durov diagram

