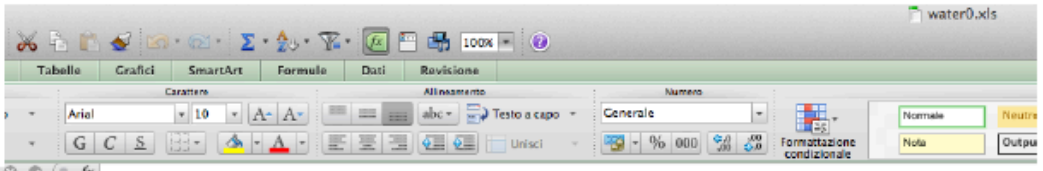
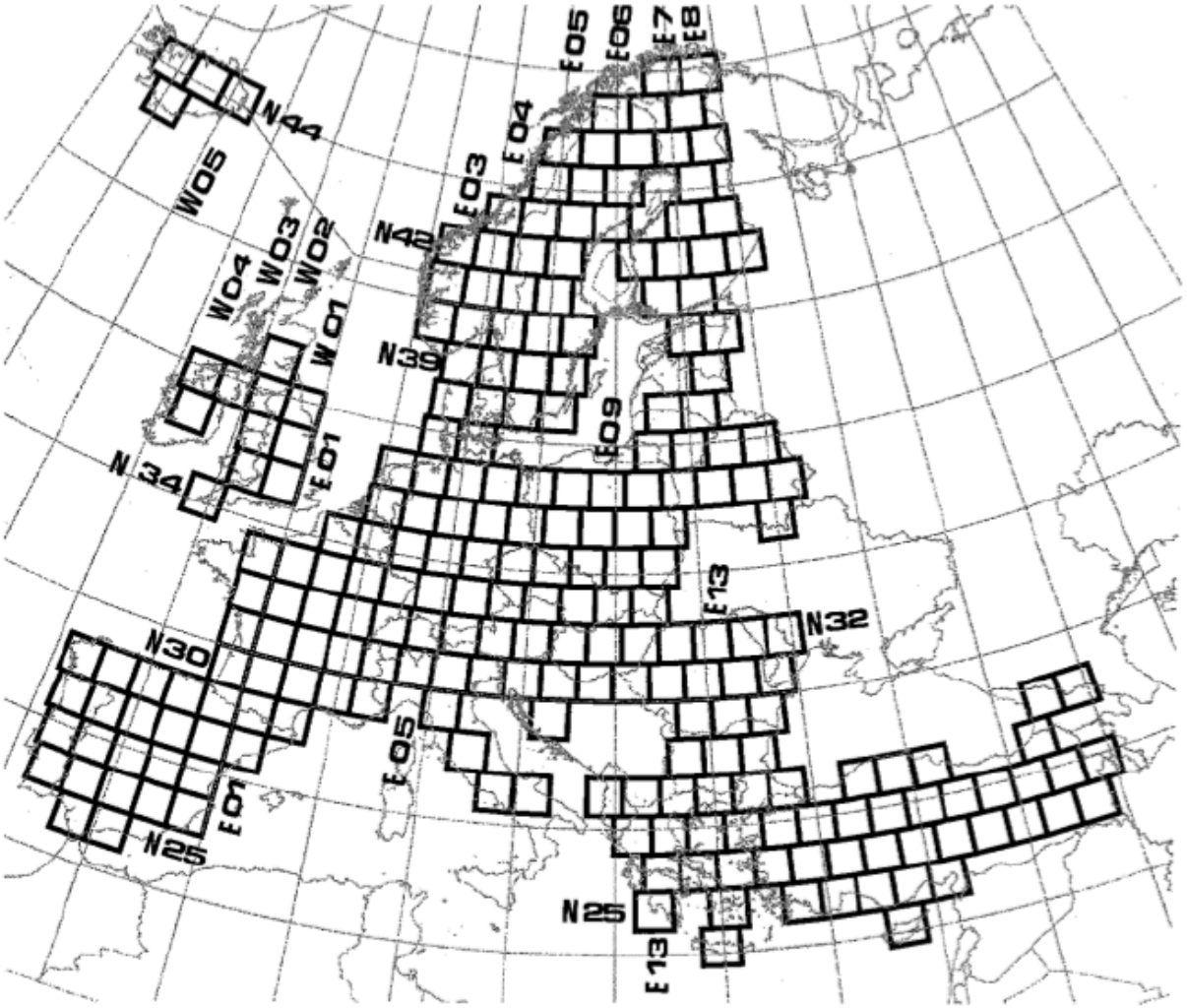


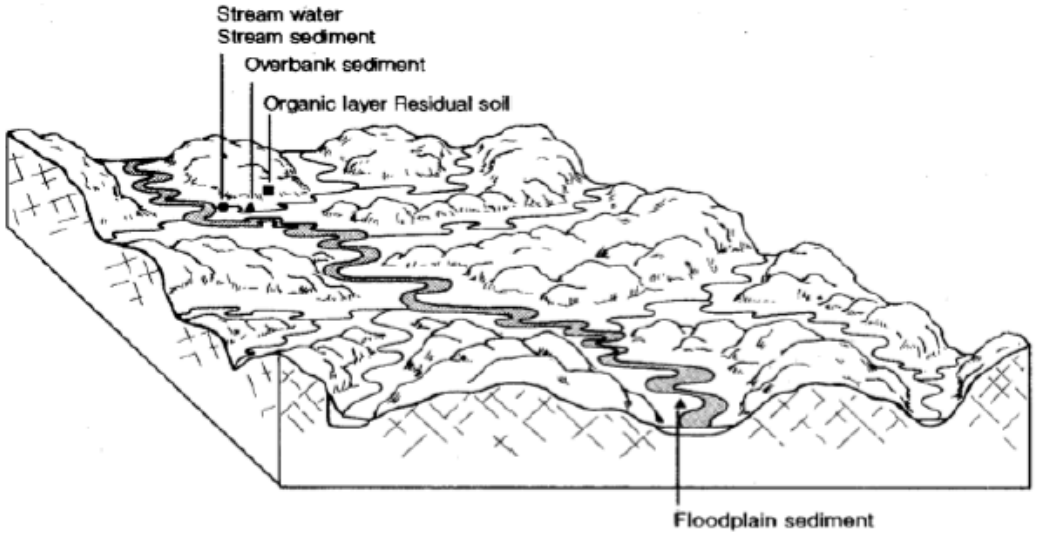
T6

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	GEN	LONG	LAT	Country	pH	HCO3	Cl	SO4	NO3	K	Na	Mg	Ca	SiO2	
2	unit					mg/L	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
3	DL						0.1	0.3	0.04	0.01					
4	N28E11W1	20.07	41.79	AL	7.8	149.0000	1.8000	2.7600	1.2600	0.3400	1.0700	7.6300	37.0000	7.0900	
5	N28E11W4	20.18	40.92	AL	7.9	157.0000	2.5400	9.2900	1.5000	0.5900	3.7500	15.1000	40.0000	13.1000	
6	N28E11W5	19.72	40.78	AL	7.9	227.0000	12.5000	58.2000	4.2800	2.7400	26.3000	26.4000	34.4000	6.8600	
7	N32E06W1	11.56	47.73	AT	7.7	269.4432	1.4900	5.7100	3.7800	0.4800	1.4440	15.8700	64.8000	1.6600	
8	N32E06W2	10.65	47.44	AT	8.5	194.2188	0.2400	5.1700	1.7900	0.2350	0.2310	16.1700	36.6700	1.4100	
9	N32E06W3	11.90	47.23	AT	8.4	152.4000	1.8700	60.6500	1.9400	1.1250	1.9090	13.1300	54.7000	4.7900	
10	N32E06W4	11.73	46.75	AT	8.2	70.7135	0.8800	16.5900	1.7300	0.8870	1.8500	5.4900	20.9200	6.3500	
11	N32E06W5	10.25	47.12	AT	7.3	11.0000	0.2200	5.8200	0.5100	0.4040	0.7640	0.8190	3.6560	3.5700	
12	N32E07W1	13.75	47.78	AT	8.4	180.3248	2.3000	3.3500	2.3400	0.1380	1.5800	9.6800	39.5800	1.0200	
13	N32E07W2	12.66	47.74	AT	8.1	192.8936	5.9700	12.7500	2.6800	0.1920	4.2810	13.1600	43.6100	1.2300	
14	N32E07W3	12.59	46.93	AT	8.2	80.9800	0.2800	25.7600	0.8300	1.3530	0.7040	3.4440	26.3800	3.1000	
15	N32E07W4	13.37	46.59	AT	8.1	182.1536	0.5400	19.3600	2.4200	0.2990	0.5370	11.4200	43.1400	1.6300	
16	N32E07W5	12.82	47.44	AT	8.3	143.0218	0.5500	19.6900	1.1300	0.3410	0.8510	10.8200	32.8500	2.8700	
17	N32E08W1	15.90	47.44	AT	7.1	54.0000	3.9800	11.2900	6.9100	2.1760	4.8410	4.6540	17.7800	13.0100	
18	N32E08W2	14.76	47.67	AT	8.4	174.9552	0.3200	2.5800	2.6300	0.1450	0.2720	14.3100	36.6100	0.6500	
19	N32E08W3	15.32	46.87	AT	7.7	85.2272	8.3500	7.4200	4.5000	2.5880	10.4900	3.1230	14.6800	14.1100	
20	N32E08W4	15.65	47.10	AT	8.1	200.3146	10.9500	18.8000	5.8300	2.3410	6.8900	6.7300	70.7000	12.7900	
21	N32E08W5	14.39	46.98	AT	8.5	186.5376	3.3800	14.7500	4.8800	1.8480	3.3430	5.7400	58.1000	8.5800	
22	N33E08W1	16.18	48.94	AT	8.0	434.6448	44.0100	93.1700	22.1300	9.8800	27.5800	60.9000	79.8000	17.0700	
23	N33E08W2	15.72	48.34	AT	8.1	90.8304	56.1600	52.5700	13.5100	0.3750	43.0600	10.3800	33.6000	3.9200	
24	N33E08W3	15.27	48.89	AT	7.5	46.9392	8.9700	25.9800	12.4200	4.1430	9.1400	4.7300	18.9800	15.0400	
25	N33E08W4	15.94	48.61	AT	8.1	347.0000	86.2300	116.6700	12.6800	15.5800	41.7500	44.7700	113.7000	11.9000	
26	N33E08W5	14.75	48.06	AT	8.2	321.0154	12.9800	21.6100	28.2000	3.0990	7.3900	15.3800	108.3000	7.4900	
27	N34E02W1	4.11	50.37	BE	5.7	335.5238	38.9600	48.0500	13.8900	5.9000	16.2100	9.5000	122.6000	13.6000	
28	N34E03W1	5.77	50.62	BE	6.6	152.1562	36.5300	35.2300	23.8700	7.8000	34.1000	3.6900	42.7000	7.2000	
29	N34E03W2	5.10	50.70	BE	7.6	423.3062	64.9200	122.4000	14.1600	3.0000	19.7000	23.6000	100.0000	30.0000	
30	N34E03W3	4.44	50.12	BE	6.4	154.1068	11.9300	14.0500	1.3000	4.1000	12.6000	8.5300	33.0000	7.0000	
31	N34E03W4	5.31	50.16	BE	6.1	155.1068	13.9200	11.0900	35.4500	3.2300	8.3000	9.2300	12.3000	7.8000	
32	N32E04W1	7.84	47.83	CH	7.7	22.6465	2.8800	2.8200	2.3800	0.6980	3.8980	1.0240	7.4300	10.6400	
33	N32E04W2 CH	8.29	47.42	CH	8.5	283.0000	19.4400	23.7900	18.2000	12.5300	18.6100	6.8200	98.7000	6.9900	
34	N32E04W3	8.19	46.58	CH	8.0	173.7360	15.4400	5.3500	1.0700	1.0950	9.9200	2.7760	57.0000	0.4300	
35	N32E04W4	7.43	47.35	CH	8.3	242.3744	3.4800	8.4100	8.5100	1.3330	2.1220	4.8880	82.8000	4.0300	
36	N32E05W1	9.70	46.57	CH	8.2	219.8466	14.3400	15.7200	14.9200	2.9940	8.7000	11.9600	71.4000	11.4400	
37	N32E05W1	9.79	47.51	CH	6.7	280.0000	13.9500	11.0800	6.8000	2.6640	15.4200	13.9700	68.4000	4.0800	
38	N32E05W2	8.42	47.89	CH	7.4	350.0000	35.8300	883.4500	3.9800	3.3830	20.8800	37.9300	335.1000	7.0200	
39	N32E05W3	8.50	46.60	CH	7.9	16.1544	0.2400	5.8600	0.0200	1.0480	0.5160	0.3600	5.3000	2.1000	
40	N32E05W4	9.91	46.86	CH	7.4	14.8712	0.1800	5.4900	0.2600	0.5180	0.6430	0.5110	4.5790	2.9100	
41	N32E05W5	9.94	46.57	CH	6.4	9.0000	0.1500	117.0500	0.3300	0.4570	1.1200	0.1800	46.9800	4.7000	
42	N34E07W1 CZ	13.59	50.61	CZ	6.8	13.0000	2.5800	32.8300	7.3400	1.5150	4.7740	3.7470	10.5500	14.7100	
43	N34E07W2	14.74	50.74	CZ	7.2	87.3862	11.1200	27.9100	11.5400	3.7380	7.4900	3.2870	28.6700	11.5900	
44	N34E07W3	13.20	50.10	CZ	8.4	159.4104	16.2900	45.4400	4.9800	5.1700	13.1000	16.4600	52.3000	20.2400	
45	N34E07W4	13.10	49.63	CZ	7.8	150.0000	16.8200	29.4800	2.1600	3.8830	18.3000	11.4600	36.6300	29.5400	
46	N34E07W5	14.60	49.81	CZ	7.7	312.0000	2.5600	32.6300	7.3400	14.0700	19.2500	17.1800	66.6000	24.2500	
47	N34E08W1	15.41	50.40	CZ	8.0	229.2096	22.9100	65.7000	15.2300	5.1700	11.9500	16.8800	75.2000	10.8900	
48	N34E08W2	15.82	50.64	CZ	7.5	43.1597	1.1600	11.6400	4.1200	1.0300	1.7000	2.8510	14.1600	7.4400	
49	N34E08W3	16.48	50.10	CZ	7.5	46.0000	3.7800	25.9400	17.7300	2.0150	3.9750	2.5820	25.6200	16.8200	
50	N34E08W4	15.75	49.75	CZ	6.9	47.9450	5.7800	28.0800	5.8000	2.8990	5.6600	3.0630	15.7300	11.6500	
51	N34E08W5	16.75	49.89	CZ	9.2	86.8375	10.9100	48.1600	15.3500	2.8800	18.4300	3.8130	28.4000	19.0800	
52	N33E04W1	8.03	49.27	DE	7.2	50.5000	7.3000	22.7000	2.2000	2.7000	3.7000	7.0000	16.3000	7.0000	
53	N33E05W1	8.27	48.73	DE	6.4	8.6000	2.6000	9.8000	3.1000	1.3000	2.8000	1.0000	4.2000	9.8000	
54	N33E05W2	8.76	48.18	DE	8.1	289.0000	6.8000	29.7000	0.7000	1.3000	7.3000	6.7100	92.9000	6.3000	
55	N33E05W3	10.07	48.11	DE	6.7	21.5000	6.8000	1.3000	6.4000	0.3000	3.5000	2.1900	9.6900	14.4000	
56	N33E05W4	9.77	49.05	DE	7.7	327.0000	5.5000	567.0000	6.1000	3.2000	6.4000	55.7000	248.0000	9.3000	
57	N33E05W5	8.97	49.28	DE	8.2	264.0000	35.2000	38.4000	28.0000	1.2000	11.0000	18.7000	92.5000	11.8000	
58	N33E06W1	10.44	48.96	DE	7.9	212.0000	12.6000	116.0000	26.1000	1.8000	8.1000	14.1000	108.0000	8.0000	
59	N33E06W2	10.60	48.47	DE	7.9	300.0000	7.9000	28.1000	14.9000	0.7000	4.2000	20.7000	82.2000	10.8000	
60	N33E06W3	11.90	48.18	DE	7.5	356.0000	12.1000	21.2000	18.2000	1.8000	6.7000	23.5000	95.3000	9.1000	
61	N33E06W4	12.16	48.73	DE	7.7	330.0000	34.9000	27.9000	54.6000	0.5000	5.4000	27.9000	107.0000	10.5000	

The FOREGS Geochemical Baseline Mapping Programme's main aim is to provide high quality, multi-purpose environmental geochemical baseline data for Europe. The need for this type of data was justified by the first Working Group on Regional Geochemical Mapping immediately after the Chernobyl accident in 1986, when it was realised that a baseline for radioactive and other polluting elements could not be defined (Bølviken *et al*. 1990, 1993, 1996).



Global Terrestrial Network (GTN) cells in the FOREGS countries. (from Salminen, Tarvainen *et al.* 1998, Fig. 1, p.11). After this original plan, more cells were introduced to Greece, Italy and Spain to cover the coastal areas.



Block diagram showing possible sampling sites of GTN sampling media (from Salminen, Tarvainen *et al.* 1998, Fig.4, p.14; modified after Strahler 1969).

The stream bed at the site 32E01W4, France.

Landscape about the water and stream sediment sampling site 32E01W4, France.

The **IUGS/IAGC Global Geochemical Baselines Programme** aims to establish a global geochemical reference baseline for >60 determinants in a range of media for environmental and other applications. The European contribution to the programme has been carried out by government institutions from 26 countries under the auspices of the former **Forum of European Geological Surveys** (**FOREGS**). This activity is now transferred to EuroGeoSurveys, the Association of the European Geological Surveys in which FOREGS is merged. The main objectives of this European survey were:

1) to apply standardised methods of sampling, chemical analysis and data management to prepare a geochemical baseline across Europe;

2) to use this reference network to level national baseline datasets.

Data on **geochemical baselines** are urgently needed in Europe, because environmental authorities in most countries are defining limits for contaminants in soils for different land use purposes. At the same time, the Commission of the European Union (EU) is preparing the Soil Protection Directive. As geochemists know, the natural concentrations of elements are different in the different constituents of overburden, and vary markedly between geologically disparate areas. State authorities, however, are not always aware of these significant natural variations, which should be taken into account in defining action limits. There are already examples of action limits that are lower than natural concentrations.

Figure 12. Figure 12. Filtration of a stream water sample (photo: Jari Väätäinen, GTK, from Salminen, Tarvainen et al., 1998, Fig. 6, p.17)

Figure 13. Figure 13. Wet sieving of a stream sediment sample in the UK (Photo: Fiona Fordyce, BGS from Salminen and Tarvainen et al. 1998, Fig. 7, p.21).

Table 2. The number of different sample types collected in each country.

	Floodplain sediment	Humus	Sub soil	Top soil	Stream sediment	Stream water
Albania	3		2	3	3	
Austria	19	12	15	18	20	20
Belgium	5	4	5	5	5	5
Croatia	12	12	13	14	13	10
Czech Republic	10	7	10	10	10	10
Denmark		1	5	5	5	5
Estonia	11	11	11	11	11	11
Finland	42	65	65	66	65	65
France	113	18	118	119	119	119
Germany	53	41	72	73	74	74
Greece	41		41	41	41	27
Hungary	14	3	14	14	14	10
Ireland	7	7	11	11	11	11
Italy	50	15	47	52	52	48
Latvia	7		8	7	7	7
Lithuania	13	5	15	16	16	14
Norway	47	58	58	58	58	58
Poland	56	29	56	56	56	56
Portugal	19		19	19	19	19
Slovak Republic	15	1	15	15	15	15
Slovenia	3	4	5	5	5	4
Spain	103		58	105	104	87
Sweden	47	51	51	51		51
Switzerland	10	9	9	10	10	10
The Netherlands		4	7	8	9	9
UK	51	28	60	60	60	60
Total	751	385	790	852	802	805

Analisi grafico-numerica con unità di concentrazione differenti

mmol/L =(mg/L) /(gram formula weight)

mmol/L = (ppm) . (density of sample)/(gram formula weight)

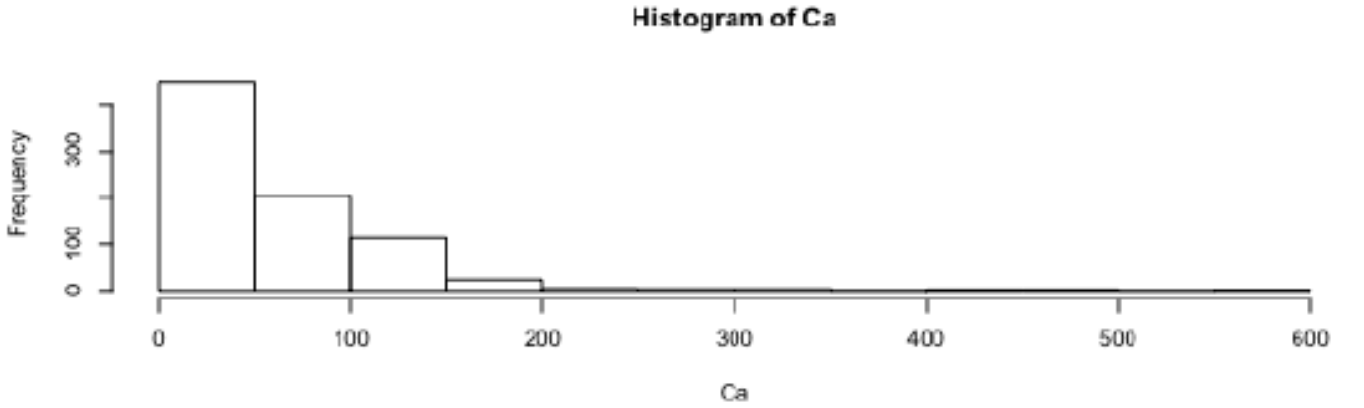
mmol/L = (meq/L) / (charge of ion)

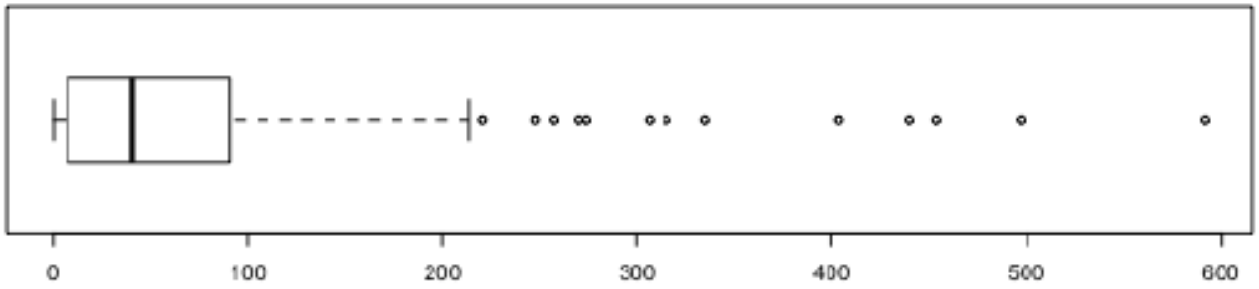
$$mmol/l = molality \times density \times \frac{(weight\ solution - weight\ solutes)}{(weight\ soslution)} \times 100$$

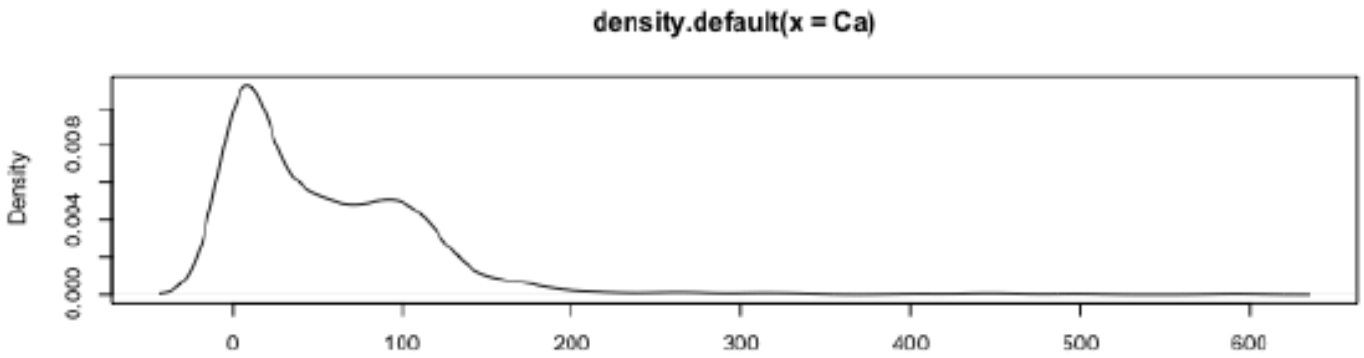
(0.052 mmol/L Na^{+})×1=0.052 meq/L
(1.8 mmol/L Ca^{2+})×2=3.6 meq/L
(0.41 mmol/L SO_4^{2-})×2=-0.82 meq/L

Ions are electrically charged and the sums of positive and negative charges in a given water sample must balance. This condition is termede the **electroneutrality** of the solution. Since mmol/L represents the number of molecules, it should be multiplied by the charge of the ions to yield their total charge in meq/L.

Scatter plots (covariance and correlation) of **Ca^{2+}** and **HCO_3^{-}** have to be investigate also in meq/L.


Histogram of Ca
Frequency
0
100
300
0
100
200
300
400
500
600
Ca


0
100
200
300
400
500
600

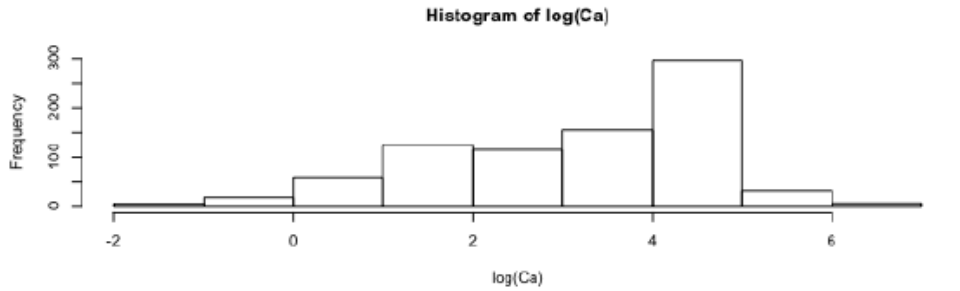

density.default(x = Ca)
Density
0.000
0.004
0.008
0
100
200
300
400
500
600

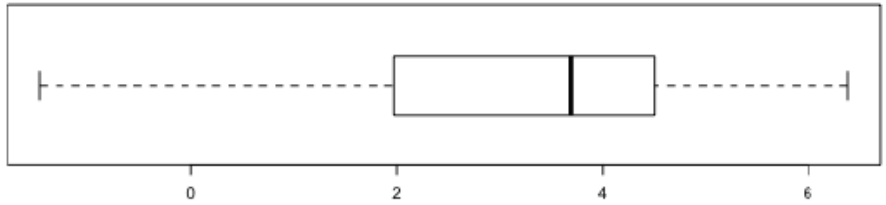
Ca^{2+}

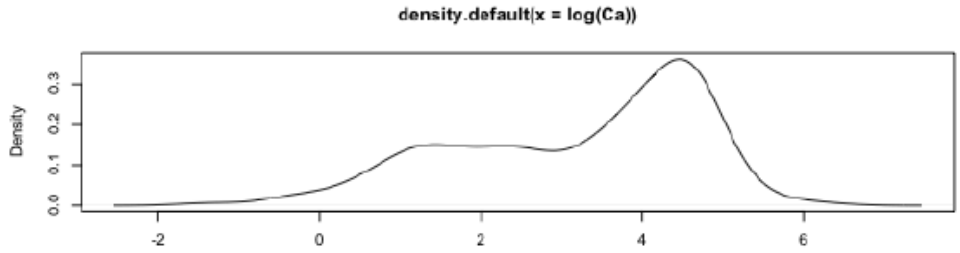
Sali ciclici = 0.1%
Carbonati = 65%
Silicati = 18%
Evaporiti = 8%

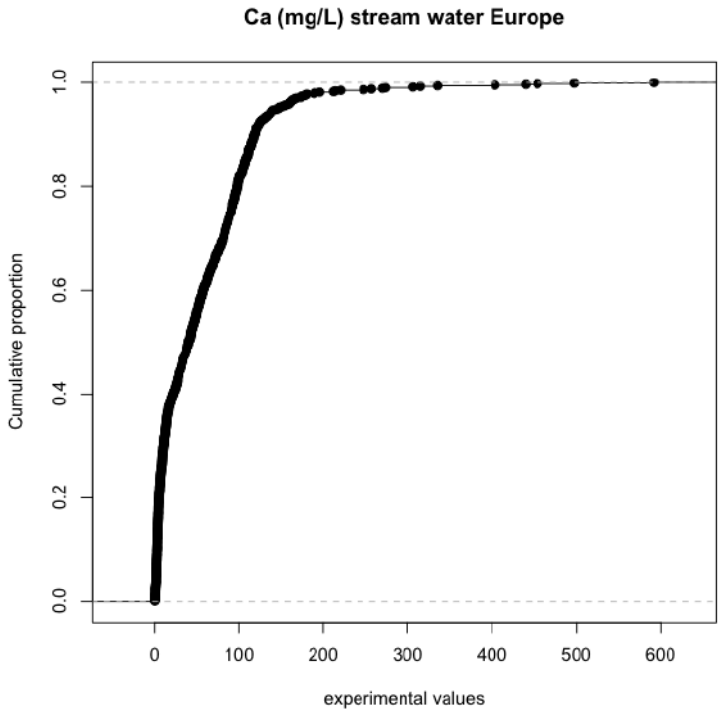
} weathering

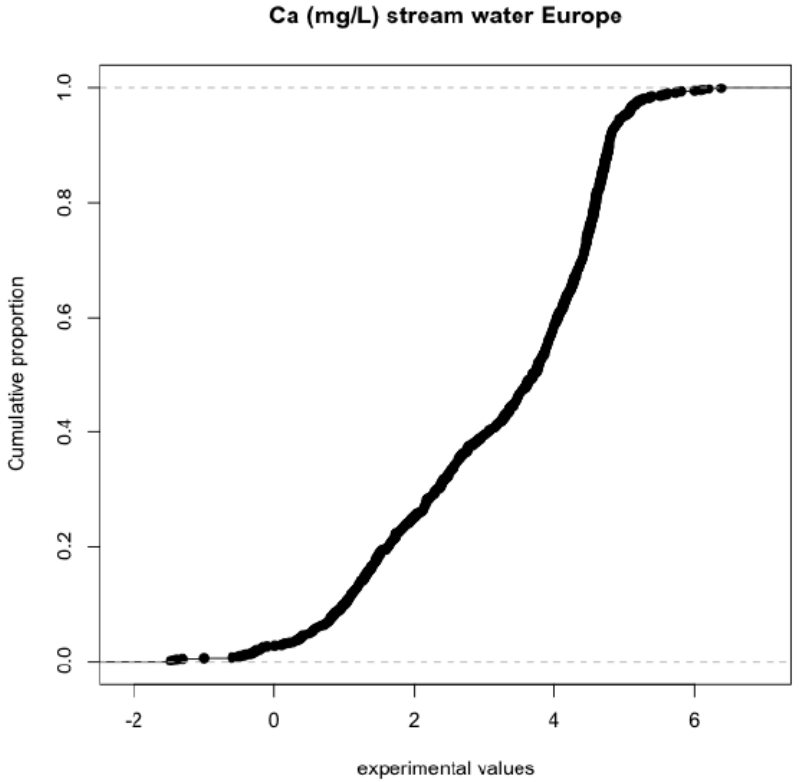
Inquinamento = 9%

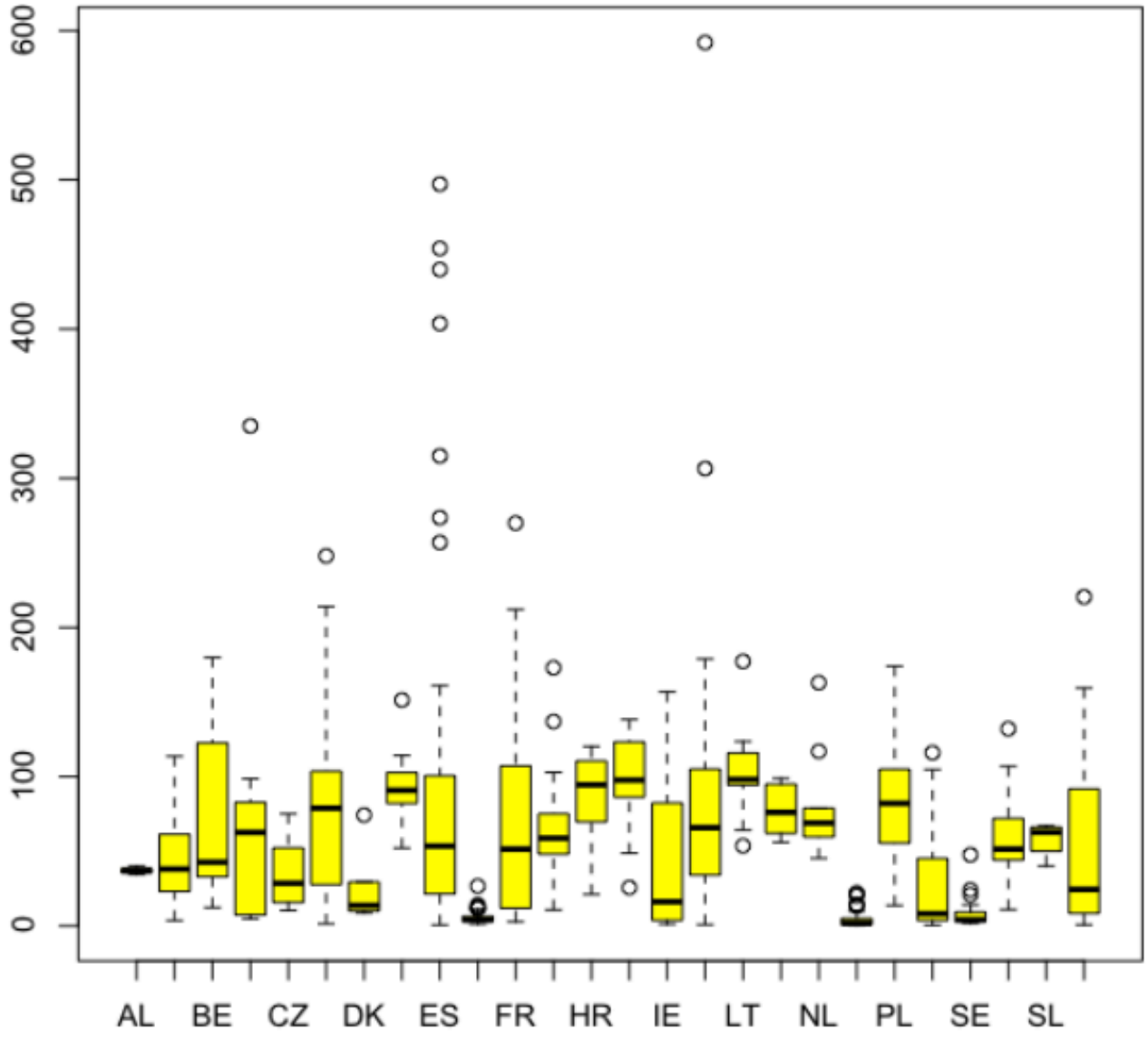







Ca (mg/L) stream water Europe
Cumulative proportion
0.0
0.2
0.4
0.6
0.8
1.0
0
100
200
300
400
500
600
experimental values


Ca (mg/L) stream water Europe
Cumulative proportion
0.0
0.2
0.4
0.6
0.8
1.0
-2
0
2
4
6
experimental values


0
100
200
300
400
500
600
AL
BE
CZ
DK
ES
FR
HR
IE
LT
NL
PL
SE
SL