

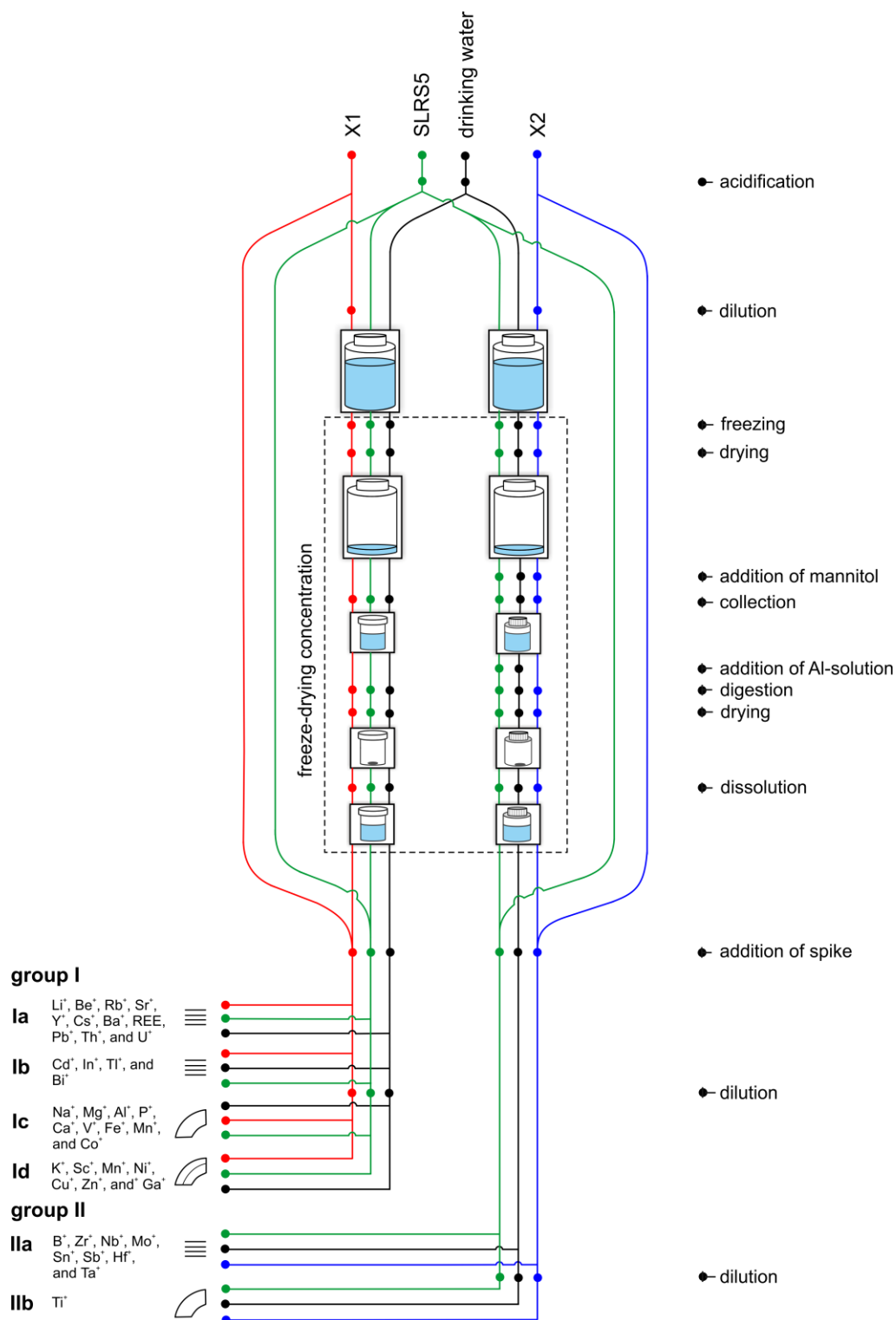


Figure 1: Chain of operations under FDC-ID-IS method. Two batches of sample solution (river water SLRS5 and drinking waters) were acidified to $0.05 \text{ mol L}^{-1} \text{ HNO}_3$ and freeze dried. Following freeze drying, the sample was collected, digested, dried, and redissolved. Then solutions was mixed with spike solutions and 6 acquisitions were conducted by ICP-MS.

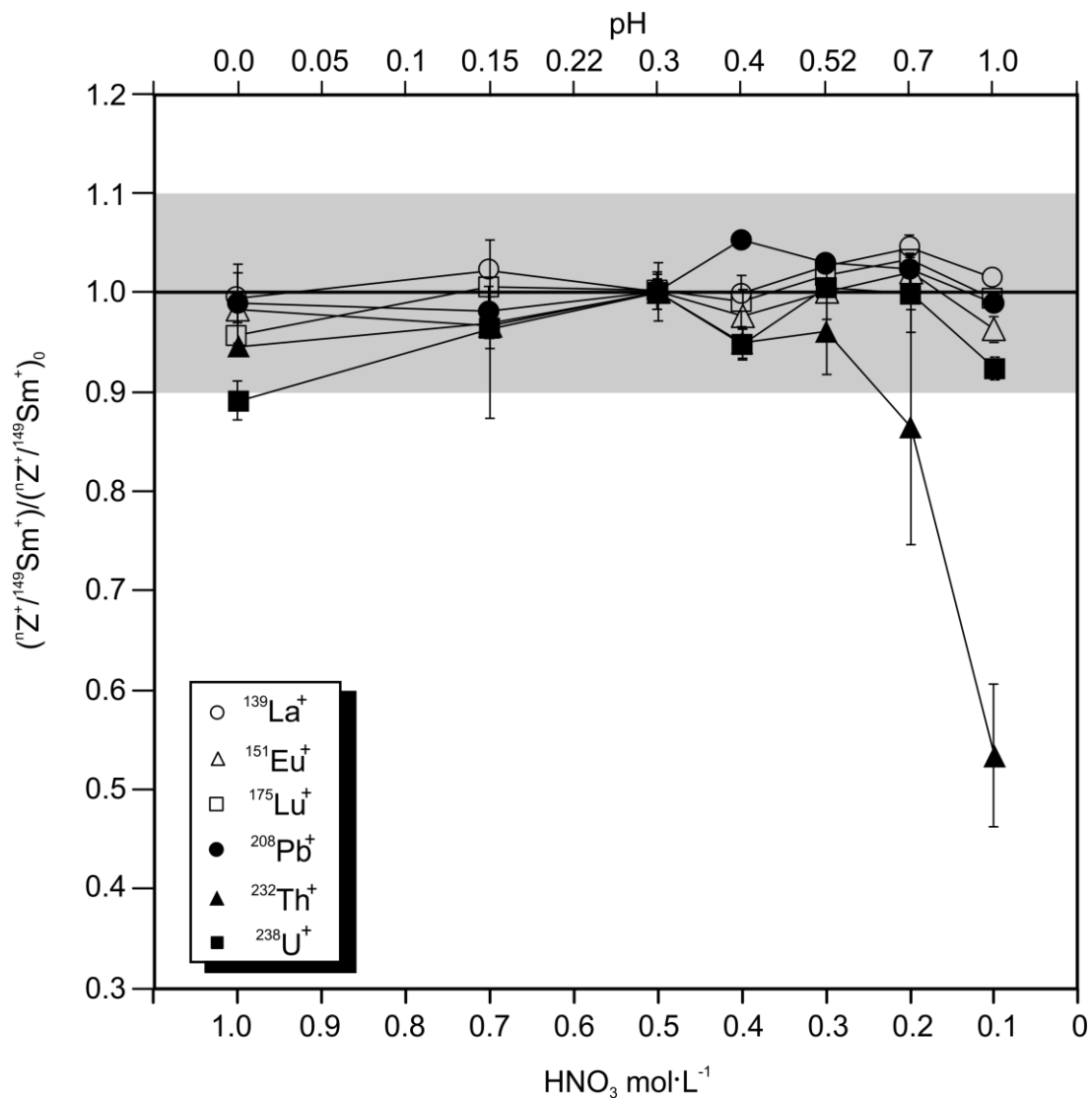


Figure 2: Ion signal as a function of concentration HNO_3 from 0.1 to 1.0 mol L^{-1} . Ion signal is normalized to that obtained at HNO_3 0.5 mol L^{-1} . No hydrolysis of cation was observed with concentration of $\text{HNO}_3 \geq 0.3 \text{ mol L}^{-1}$. Gray area corresponds to deviation $\pm 10\%$.

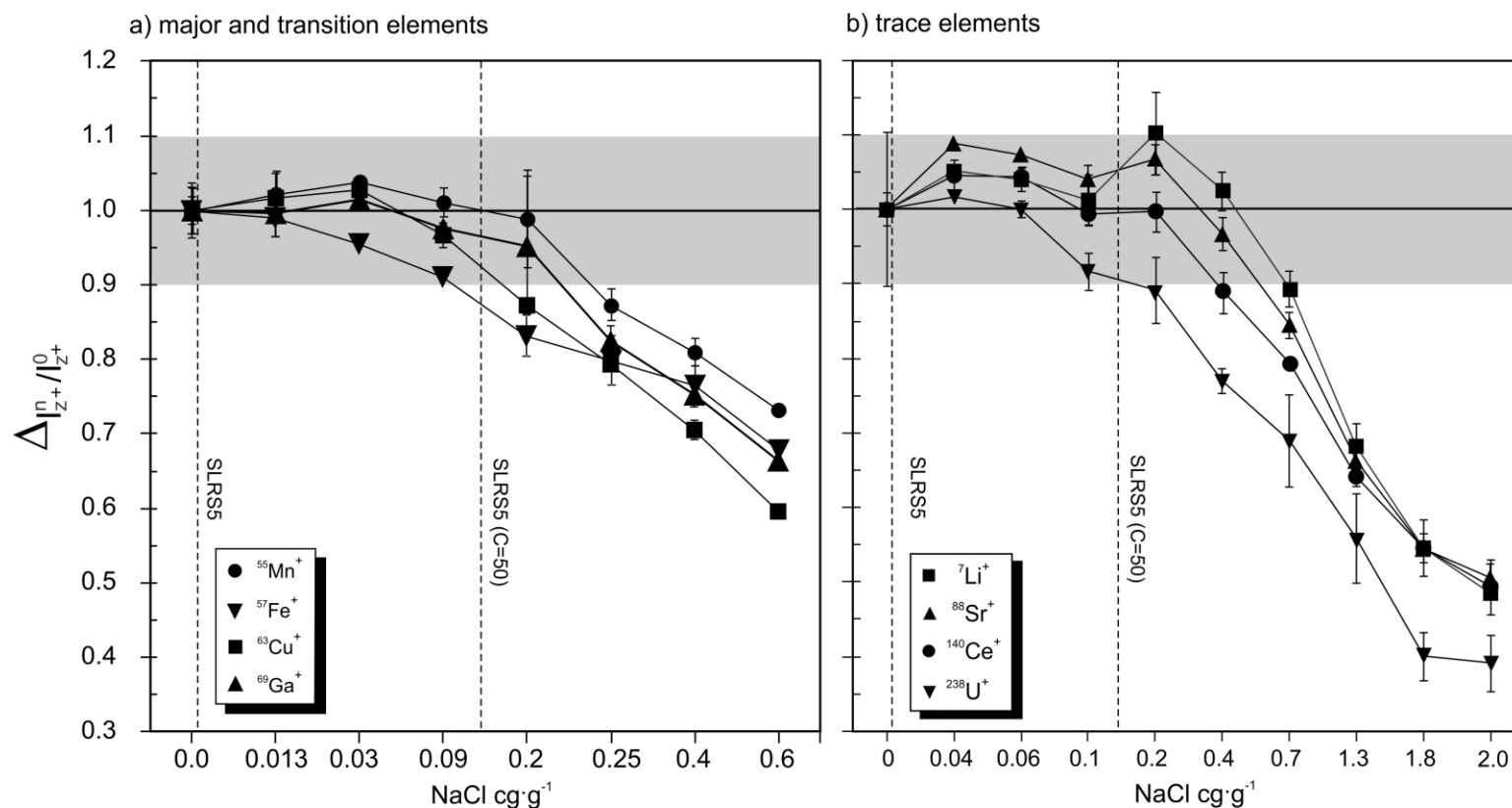


Figure 3: Matrix-effected signal suppression as a function of concentration of NaCl. Ion signal is normalized to that obtained at NaCl $0 \text{ cg} \cdot \text{g}^{-1}$. A standard deviation of duplicates is shown by error bar. The dot lines corresponds to NaCl concentration of river water SLRS5 with or without concentration. Gray area corresponds to deviation $\pm 10\%$. (a) Major- and transition-elements determined by ICP-SFMS. (b) Trace elements determined by ICP-QMS.

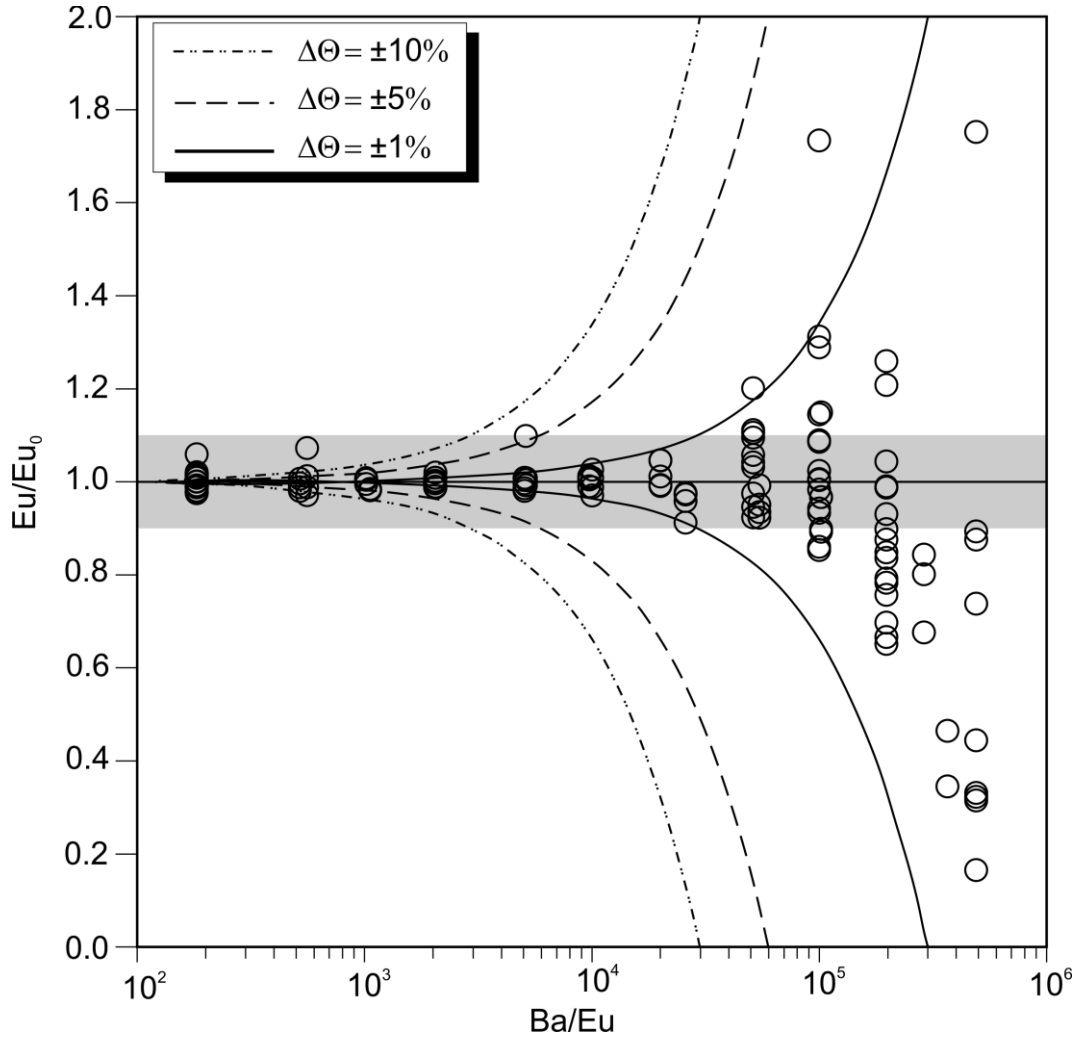


Figure 4: Determination of Eu on a series of solutions that varied in Ba/Eu ratio from 182 to 5×10^5 . The abundance is normalized to that obtained at Ba/Eu ratio of 182. Gray area corresponds to deviation $\pm 10\%$. Uncertainty of Eu abundance resulted from that of oxide-to-atomic-yield $\Delta\Theta_{\text{BaO/Ba}}$ of $\pm 1\%$, $\pm 5\%$, and $\pm 10\%$ are shown by curves. Eu abundance is determined with accuracy $< 10\%$ when Ba/Eu ratio is $< 5 \times 10^4$.

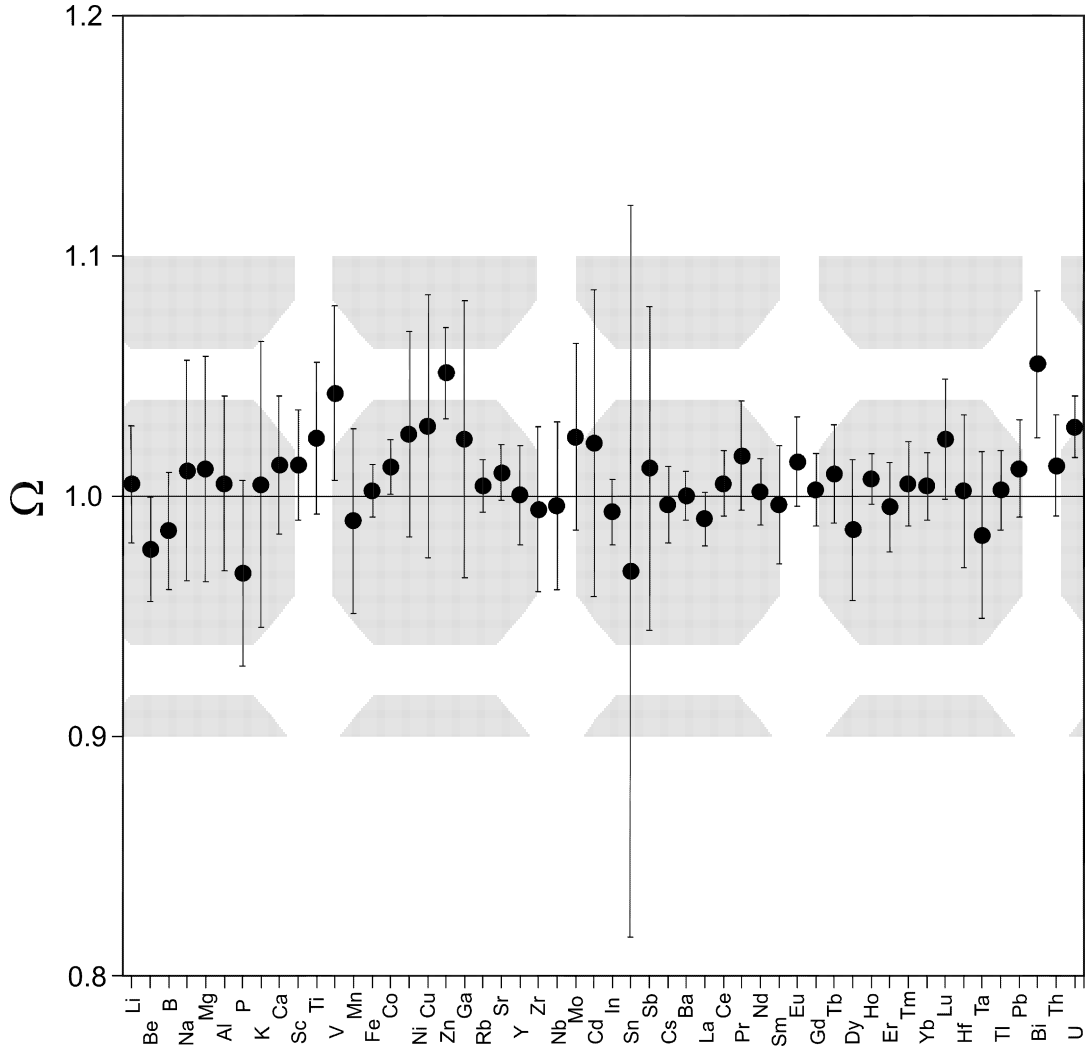


Figure 5: Recovery yield Ω of elements on freeze-drying pre-concentration. Gray area corresponds to deviation $\pm 10\%$.

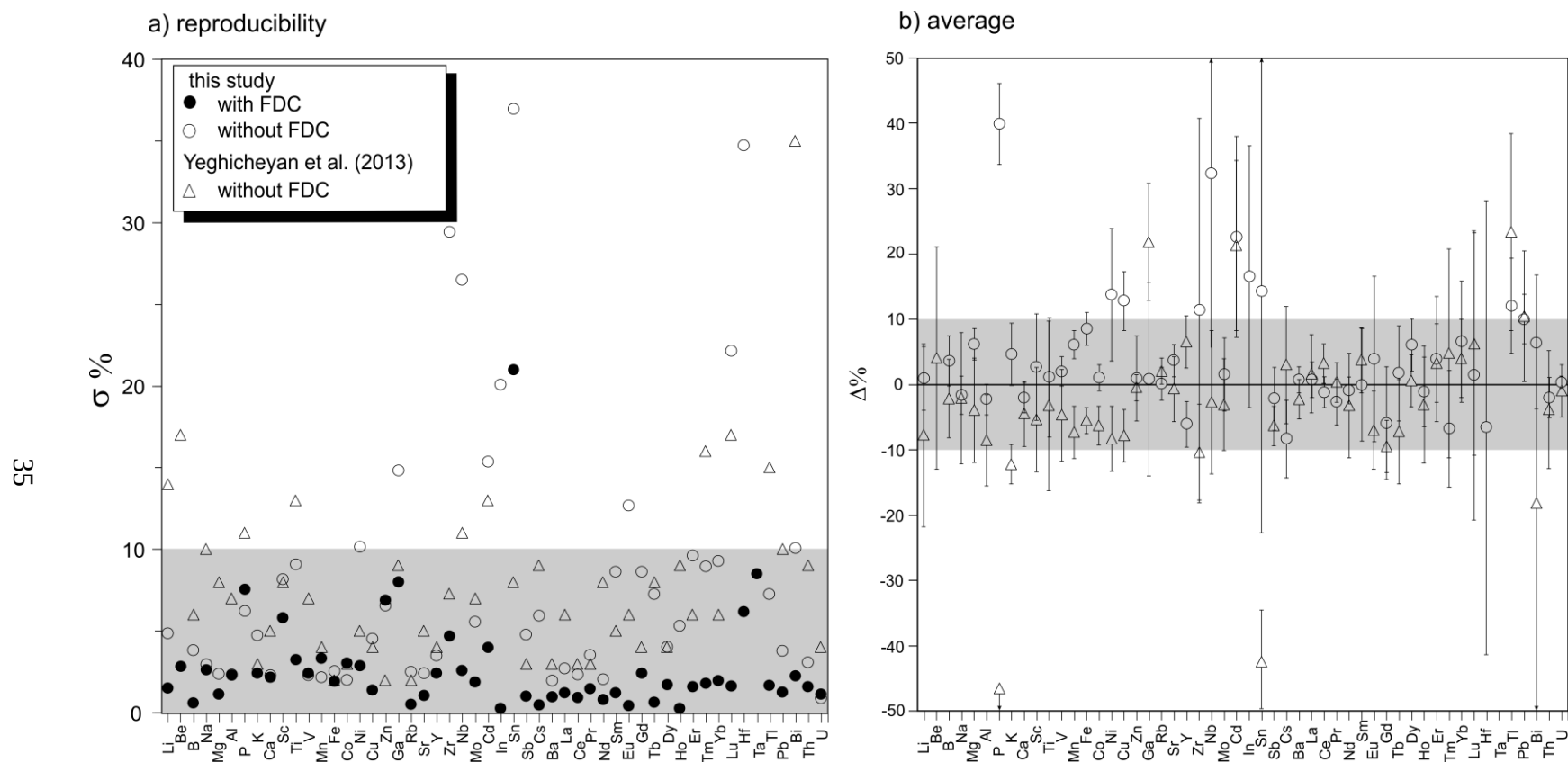


Figure 6: Comparison of reproducibility and average on analyses of river water SLRS5 with and without FDC (this study) and without FDC (Yeghicheyan et al., 2013). (a) Reproducibility. Gray area corresponds to precision from 0 to +10%. (b) Average. The difference in average is defined as deviation of element abundances relative to that determined by analysis with FDC (this study). Data for P ($\Delta = -68\%$; Yeghicheyan et al., 2013) is located out of the plot. Gray area corresponds to deviation $\pm 10\%$.

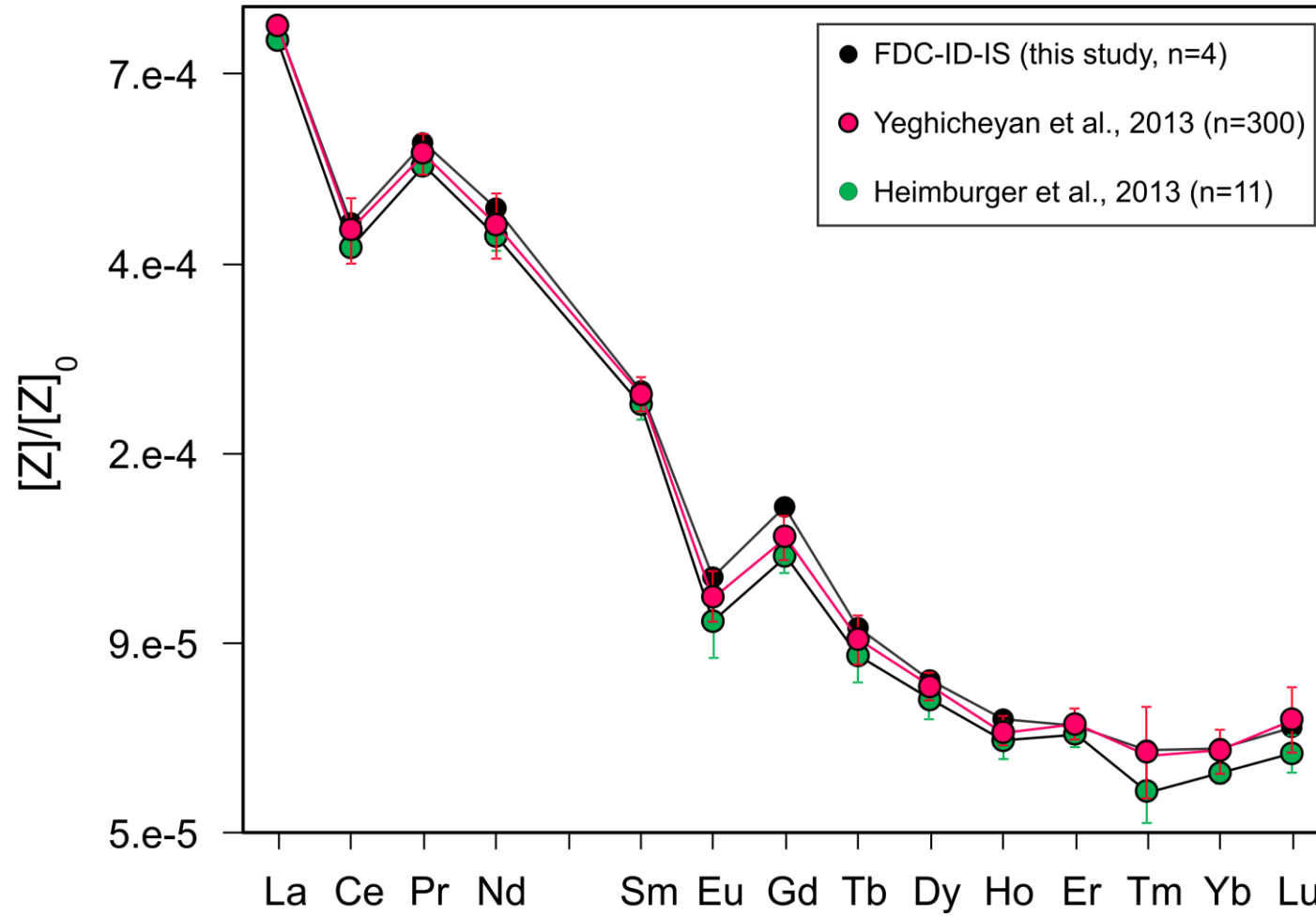


Figure 7: Abundances and reproducibilities of REE determined and by FDC-ID-IS compared with those by Heimburger et al. (2013) and Yeghicheyan et al. (2013). Element abundances are normalized by those of CI chondrite (Anders and Grevesse, 1989). Standard deviation (1σ) and expanded uncertainty ($U = k\sigma_R$ with $k = 1$) are shown for FDC-ID-IS and Heimburger et al. (2013), and Yeghicheyan et al. (2013), respectively.

Figure 8: Relative differences of duplicated analyses applied on five geological sourced waters as a function of element abundances. Gray area and dote line correspond to relative difference of 0–10% and 20%, respectively.

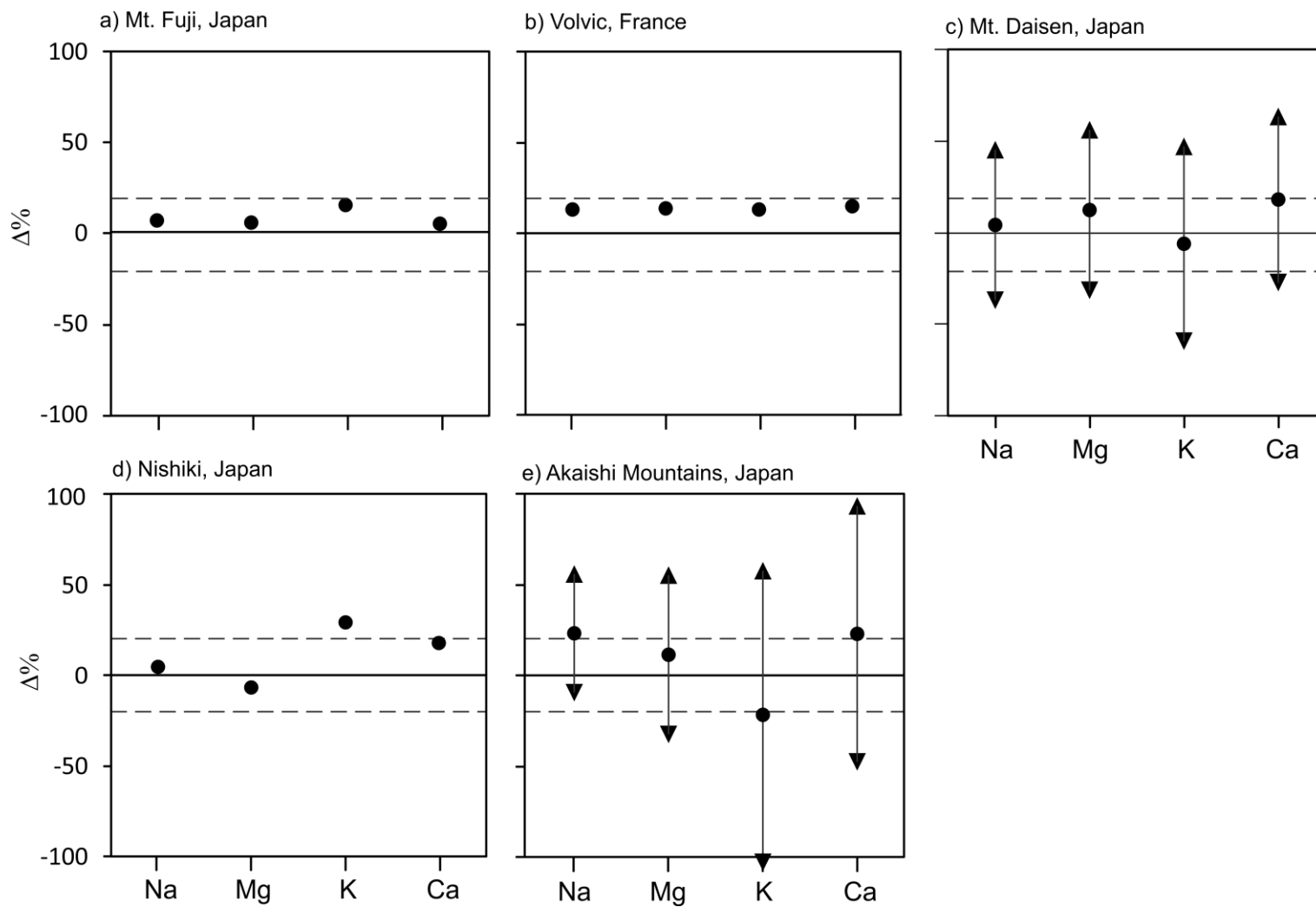


Figure 9: Deviation of major-element abundances inferred on labels of PET bottles relative to those determined by this study. The dot line denotes for deviation of $\pm 20\%$. Range of element abundances inferred on labels are shown by error bars.

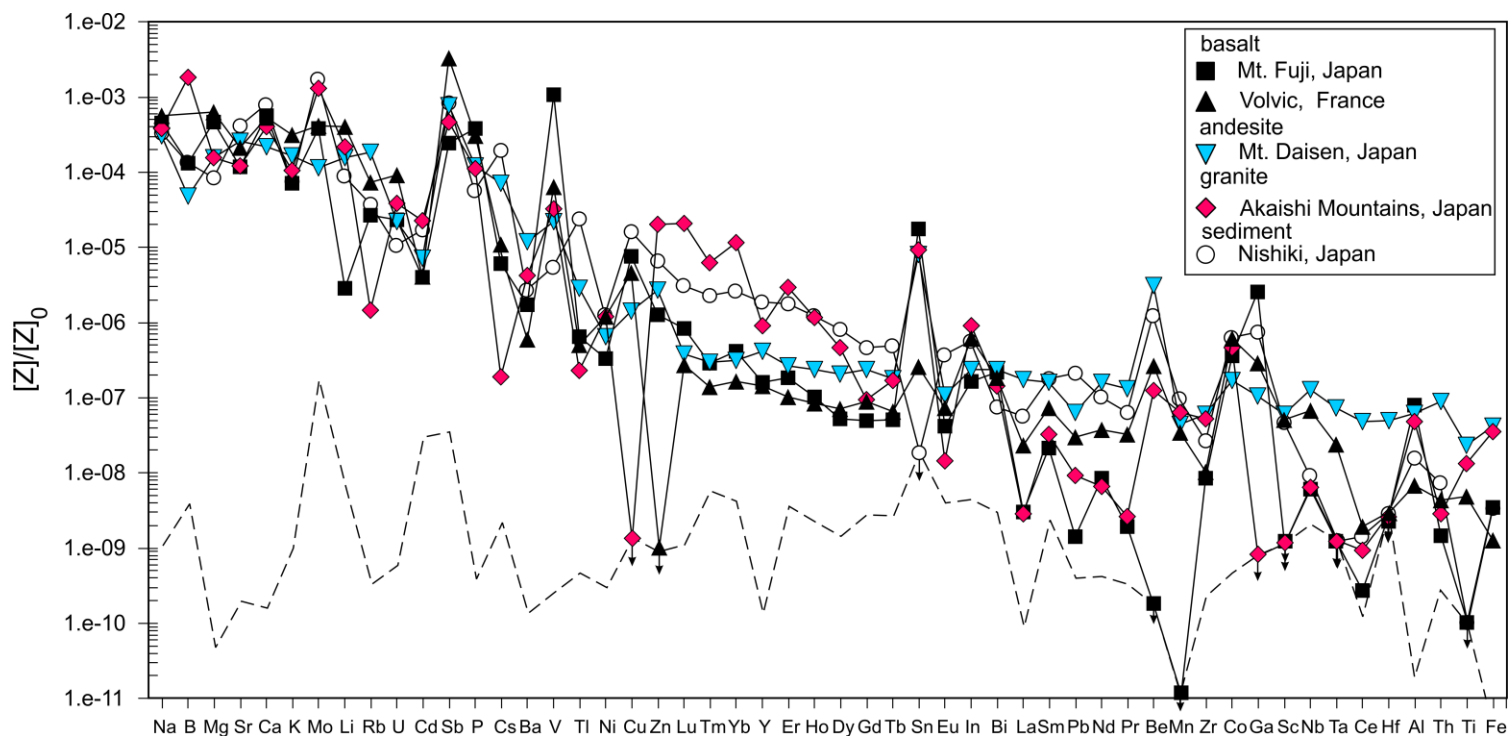


Figure 10: Abundances of 52 elements of drinking waters from five geological sources determined by FDC-ID-IS method. Element abundances were normalized by those of upper crustal continents (Rudnick and Gao, 2003) aligned as a function of solubility of elements estimated from partition coefficient between seawater and upper crust (Rudnick and Gao, 2003; Le et al 2011). The dot line indicates sample detection limit for ($C \sim 180$) and arrows indicate that an acquisition cannot determine the element abundance.

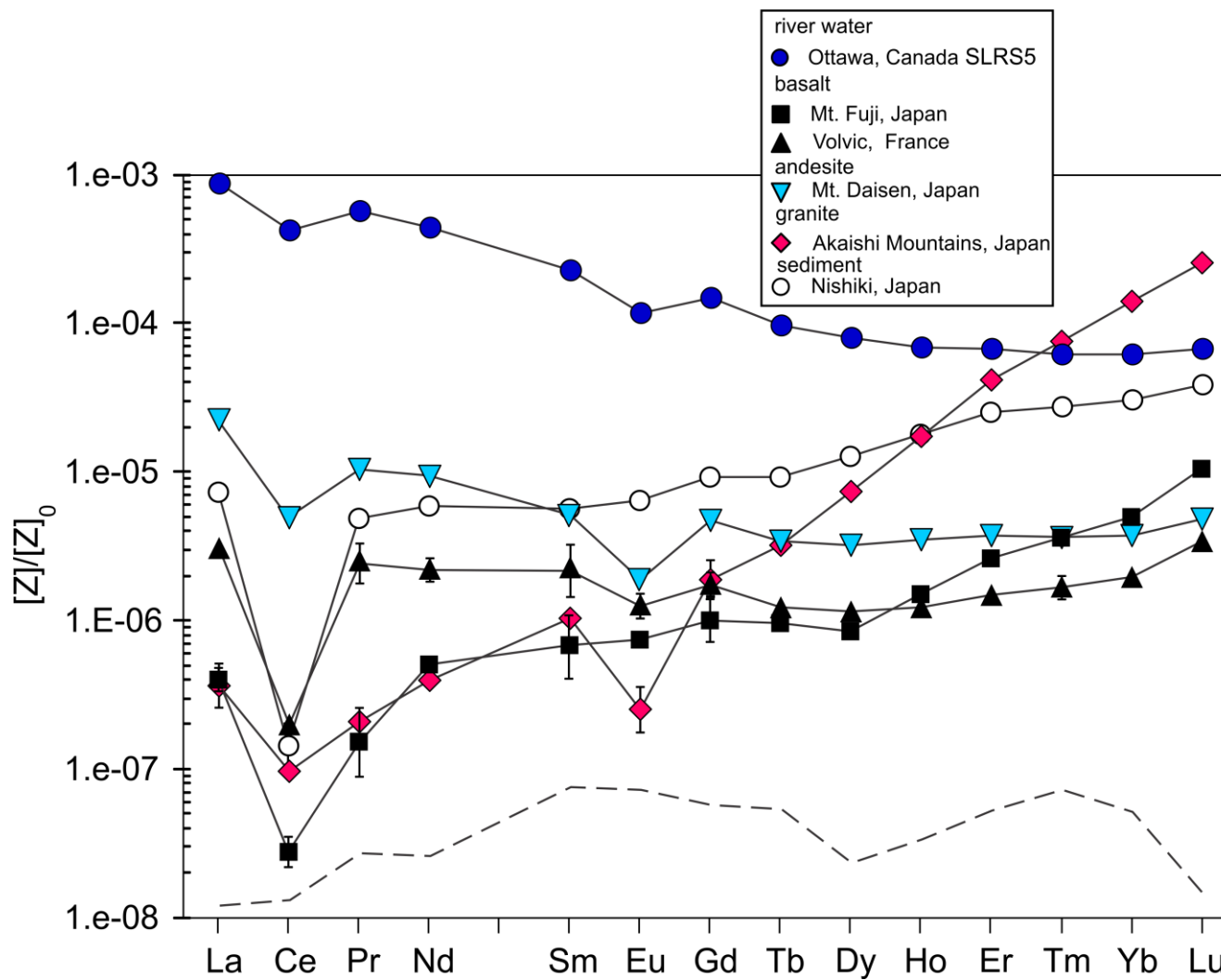


Figure 11: Abundances rare-earth elements of drinking waters from five geological sources and Ottawa river SLRS5 determined by FDC-ID-IS. Relative difference of duplicates is shown by error bar. The dot line indicates sample detection limit (C=180). Element abundances were normalized by those of CI chondrite (Anders and Grevesse, 1989).