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Supplementary material

Ionic strength- and pH-dependence of calcium binding by terrestrial humic acids

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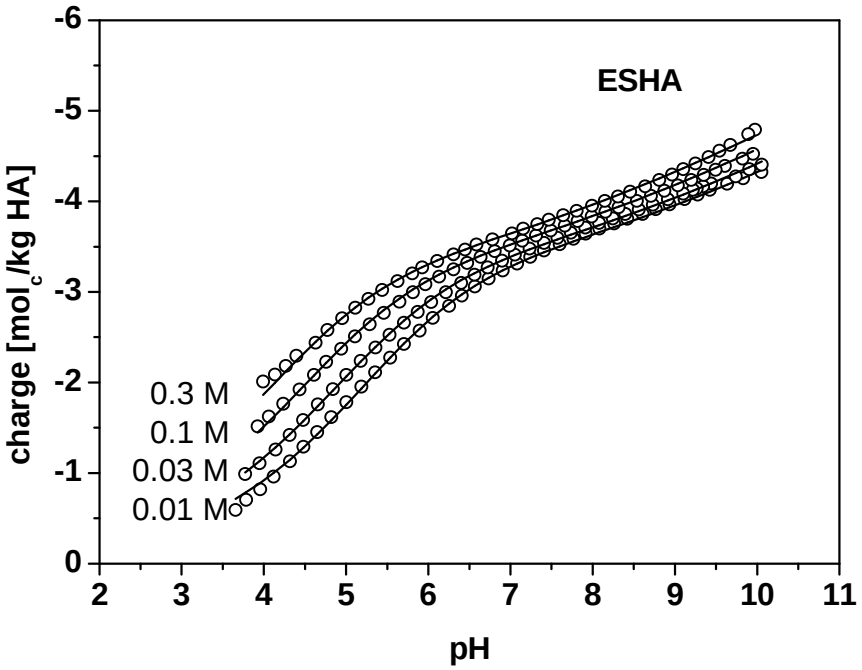

Fig. S1. Ionic strength- and pH-dependent charging behavior of Elliot soil humic acid (ESHA). Symbols represent experimental data as derived from acid–base titrations performed at 25 ±1 ºC in a NaCl background electrolyte solution. Lines represent NICA–Donnan model fits obtained from a simultaneous fit (R^2 = 0.9993; n = 211) of acid–base titration data shown this figure and calcium binding data of ESHA shown in Fig. 4.

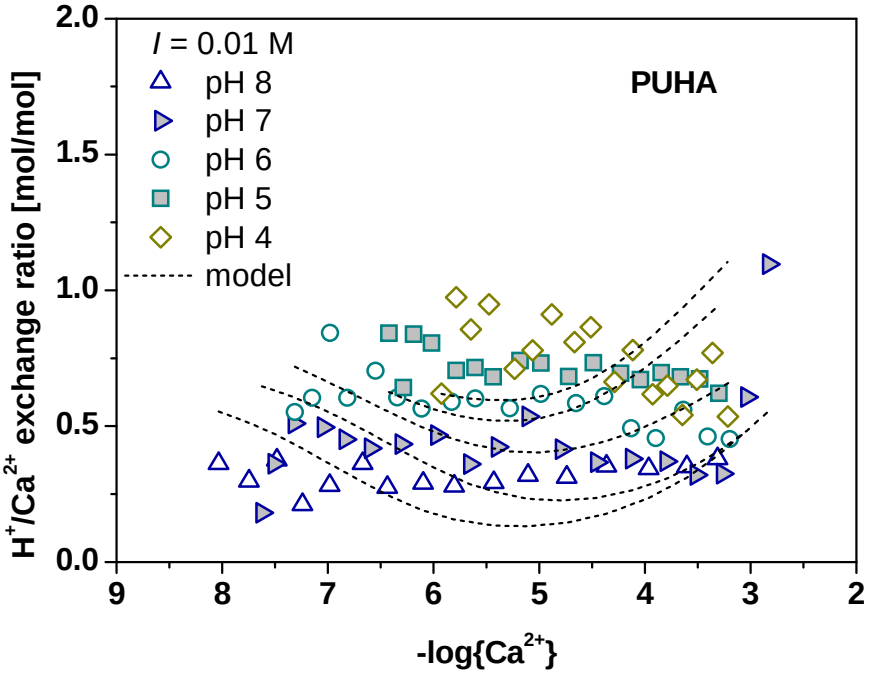

Fig. S2. Molar H^+/Ca^{2+} exchange ratios for calcium binding by PUHA in 0.01 M $NaNO_3$ at pH 4, 5, 6, 7 and 8 as a function of Ca^{2+} activity in solution. Symbols represent data calculated from calcium titrations. Lines correspond to predictions based on the NICA–Donnan model (see Table 1 for model parameters).

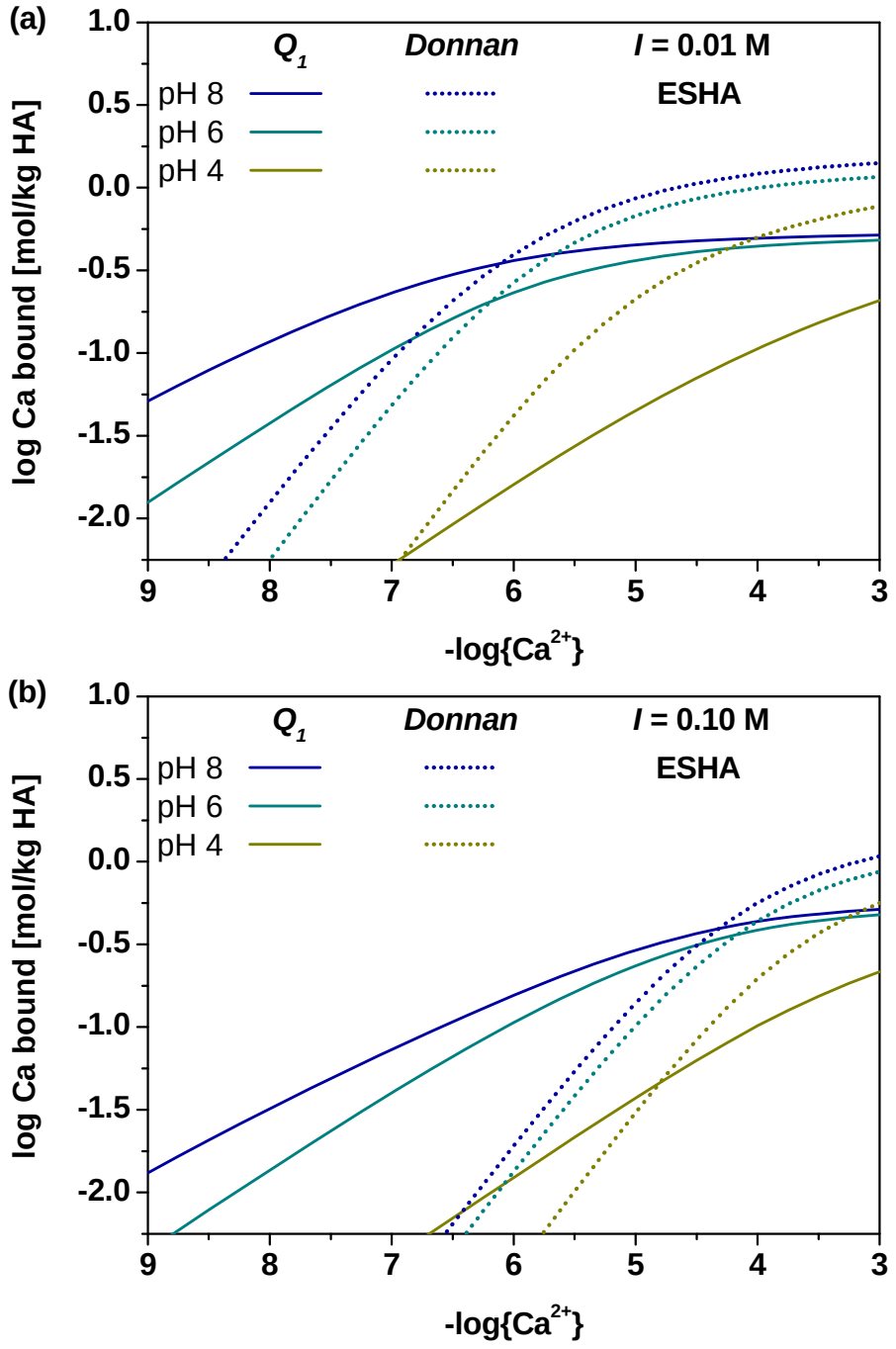

Fig. S3. Speciation of calcium binding by ESHA at pH 4, 6 and 8 as a function of Ca^{2+} activity as calculated with the NICA–Donnan model for 1 g L^{-1} ESHA at an ionic strength of (a) 0.01 M and (b) 0.1 M. Dotted lines represent Ca^{2+} accumulated in the Donnan volume due to the negative charge of the humic acid and solid lines represent Ca^{2+} bound to sites exhibiting a low affinity for protons (Q_1 sites). The respective sums of Ca^{2+} accumulated in the Donnan volume and Ca^{2+} bound to Q_1 sites correspond to the calculated total binding of calcium by ESHA.