Electronic Supplementary Information

Speciation of americium in seawater and accumulation in marine sponge *Aplysina cavernicola*.

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Content: 8 pages including cover sheet

- **Table S1**: Equilibrium constants for Am^{3+} at I=0 used for the speciation calculation

Equilibrium	$Log_{10}K°$	Reference
$Am^{3+} + CO_3^{2-} = AmCO_3^+$	7.80	[2]
$Am^{3+} + 2\ CO_3^{2-} = Am(CO_3)_2^-$	12.3	[2]
$Am^{3+} + 3\ CO_3^{2-} = Am(CO_3)_3^{3-}$	15.2	[2]
$Am^{3+} + H_2O = AmOH^{2+} + H^+$	-6.40	[2]
$Am^{3+} + 2\ H_2O = Am(OH)_2^+ + 2H^+$	-14.1	[2]
$Am^{3+} + 3\ H_2O = Am(OH)_3\ (aq) + 3H^+$	-25.7	[2]
$Am^{3+} + NO_3^- = AmNO_3^{2+}$	1.33	[2]
$Am^{3+} + SO_4^{2-} = AmSO_4^+$	3.85	[2]
$Am^{3+} + 2\ SO_4^{2-} = Am(SO_4)_2^-$	5.40	[2]
$Am^{3+} + Cl^- = AmCl^{2+}$	1.05	[2]
$Am^{3+} + F^- = AmF^{2+}$	3.40	[2]
$Am^{3+} + 2F^- = AmF_2^+$	5.80	[2]

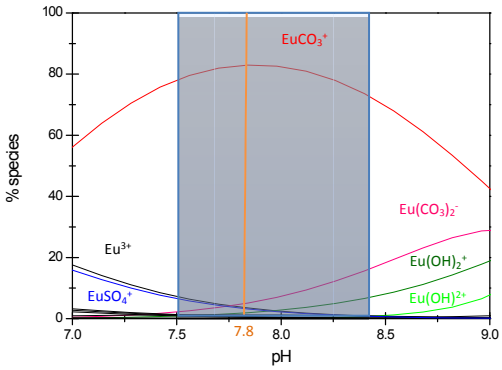
- **Table S2**: Equilibrium constants for Eu^{3+} at I=0 used for the speciation calculation

Equilibrium	$Log_{10}K°$	Reference
$Eu^{3+} + HCO_3^- = EuCO_3^+ + H^+$	-2.41	[40-41]
$Eu^{3+} + 2\ HCO_3^- = Eu(CO_3)_2^- + 2H^+$	-8.40	[40-41]
$Eu^{3+} + 3\ HCO_3^- = Eu(CO_3)_3^{3-} + 3\ H^+$	-16.8	[40-41]
$Eu^{3+} + H_2O = EuOH^{2+} + H^+$	-7.91	[40-41]
$Eu^{3+} + 2\ H_2O = Eu(OH)_2^+ + 2H^+$	-14.9	[40-41]
$Eu^{3+} + 3\ H_2O = Eu(OH)_3\ (aq) + 3H^+$	-24.1	[40-41]
$Eu^{3+} + NO_3^- = EuNO_3^{2+}$	0.875	[40-41]
$Eu^{3+} + SO_4^{2-} = EuSO_4^+$	3.64	[40-41]
$Eu^{3+} + 2\ SO_4^{2-} = Eu(SO_4)_2^-$	5.47	[40-41]
$Eu^{3+} + Cl^- = EuCl^{2+}$	0.309	[40-41]
$Eu^{3+} + F^- = EuF^{2+}$	4.44	[40-41]
$Eu^{3+} + 2F^- = EuF_2^+$	7.71	[40-41]

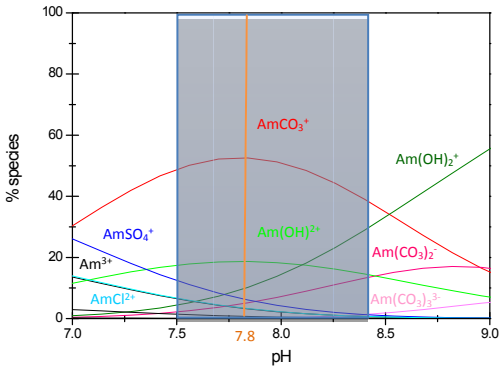
- **Table S3**: Average concentration for co-existing metal and other species in seawater

Metal	Concentration (nM)	Reference
Zn	8.1	[41,43]
Cu	3.3	[41-43]
Fe	2.7	[41]
Co	0.11	[45]
Pb	0.17	[46]
Cd	1.0	[41-42,48]
Ni	11	[42,48]
Hg	$8.5\ 10^{-3}$	[49-50]
Al	38	[51]
I	500	[47]
B	0.4 mM	[44]

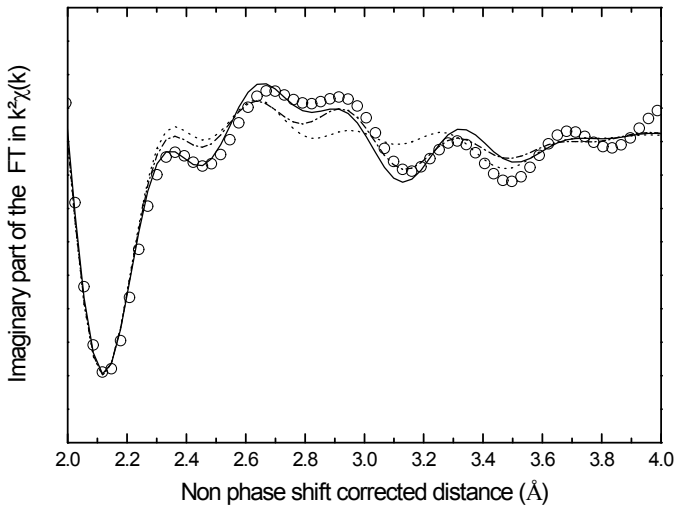
- **Figure S4**: Prediction speciation diagram of europium at 4.10^{-17} M in seawater (JCHESS®)



- **Figure S5**: Prediction speciation diagram of americium at 4.10^{-17} M in seawater (JCHESS®)



- **Figure S6**: Imaginary part of the Fourier transform of the EXAFS spectrum of the doped seawater solution at $[Am^{3+}] = 5x10^{-5}$ M. Experimental spectrum in circles, adjustment with one bidentate carbonate in dots , with one monodentate carbonate in dash dots and final adjustment in black lines.



- **Figure S7**: Imaginary part of the Fourier transform of the EXAFS spectrum of the doped seawater solution at [Eu^{3+}] = $5x10^{-5}$ M. Experimental spectrum in circles, adjustment with sodium in black lines and without sodium in dots.