## Sediments and Water Interactions

Proceedings of the Third International Symposium on Interactions Between Sediments and Water, held in Geneva, Switzerland, August 27–31, 1984

Edited by Peter G. Sly

With 276 Illustrations





Springer-Verlag New York Berlin Heidelberg London Paris Tokyo

## Contents

Pre	eface	V
Co	ntributors	xvii
Pa	rt I Sediment Dynamics, Solid and Aqueous Phase	
_	Transport, and Material Distribution	
	in Aquatic Environments	
1	Particulate and Dissolved Materials in the Rio Negro-Amazon Basin	
	W.L.F. Brinkmann	3
2	Sediments as a Record of the Input Dispersal and Settling Processes in a Coastal Marine Environment	
	V. Damiani, E. Ambrosano, S. De Rosa, R. De Simone, O. Ferretti,	
	G. Izzo, and G. Zurlini	13
3	High Natural Content of Uranium in the Upper Rhône and	
	Lake Geneva (Switzerland)	
	J. Dominik and A. Mangini	27
4		
	and Morphometry	
	L. Håkanson	35
5		
	DeGray Lake, Arkansas	50
	R.H. Kennedy, W.F. James, R.H. Montgomery, and J. Nix	53
6	Hydromechanic Aspects of Contaminated Sediment Transport	
	in Fluvial Systems	
	B. Westrich	63
Pa	rt II Land Use and Loadings Regulation Effects on	
	Material Yields and Water Quality	
7	Momence Wetland: Influence on Sediment and Water	
	N.G. Bhowmik and M. Demissie	71
	proming and the rest of the subsect	

Basin Response to Detergent-Phosphorus Control	
	700745
E.D. Ongley	79
Mass-Balance and Transfer Mechanisms of Phosphorus in	
a Rural Watershed of Lac Leman, France	
E. Pilleboue and J.M. Dorioz	91
rt III Contaminant Accumulation, Mineralogy, and	
Materials Speciation in Sediments	
A Comparative Study of the Partitioning of Certain Metals	
in Sediments From Four Near-Shore Environments of the	
Aquitaine Coast (Southwest France)	
H. El Ghobary and C. Latouche	105
The Use of Sediments as Indicators of Point and Diffuse	
	105
R.D. Evans, R.J. Cornett, and V.A. McCulloch	125
Interstitial Ion Concentrations as an Indicator of Phosphorus	
Release and Mineral Formation in Lake Sediments	
G.C. Holdren and D.E. Armstrong	133
The Fractional Composition of Phosphorus in	
T A A	
K. Pettersson	149
Geochemical Trends in Sediments From	
13 Italian Subalpine Lakes	
G. Premazzi, A. Provini, G.F. Gaggino, and G. Parise	157
Depth Profiles of Cu, Cr, and Zn in Lake Orta Sediments	
(Northern Italy)	
A. Provini and G.F. Gaggino	167
A Speciation Study of Phosphorus in the Interstitial Water	
# CONTROL	
ZJ. Wang, F. Giovanoli, H. El Ghobary, and JP. Vernet	175
TALLE TO SERVICE THE PARTY OF T	
Models, Mass Balance, and Loadings	
Radionuclide Cycling in Natural Waters: Relevance of	
P.H. Santschi, U.P. Nyffeler, YH. Li, and P. O'Hara	183
Modelling Water Quality of Lake Heenvliet in Relation	
to Planned Disposal of Harbor Sludge	
J.G.C. Smits, N.M. de Rooij, and J. Bril	193
	in Southern Ontario  E.D. Ongley  Mass-Balance and Transfer Mechanisms of Phosphorus in a Rural Watershed of Lac Leman, France  E. Pilleboue and J.M. Dorioz  It III Contaminant Accumulation, Mineralogy, and Materials Speciation in Sediments  A Comparative Study of the Partitioning of Certain Metals in Sediments From Four Near-Shore Environments of the Aquitaine Coast (Southwest France)  H. El Ghobary and C. Latouche  The Use of Sediments as Indicators of Point and Diffuse Source Pollution  R.D. Evans, R.J. Cornett, and V.A. McCulloch  Interstitial Ion Concentrations as an Indicator of Phosphorus Release and Mineral Formation in Lake Sediments  G.C. Holdren and D.E. Armstrong  The Fractional Composition of Phosphorus in Lake Sediments of Different Characteristics  K. Pettersson  Geochemical Trends in Sediments From  13 Italian Subalpine Lakes  G. Premazzi, A. Provini, G.F. Gaggino, and G. Parise  Depth Profiles of Cu, Cr, and Zn in Lake Orta Sediments (Northern Italy)  A. Provini and G.F. Gaggino  A Speciation Study of Phosphorus in the Interstitial Water of Lake Geneva (Switzerland)  ZJ. Wang, F. Giovanoli, H. El Ghobary, and JP. Vernet  It IV Sediments and Associated Parameters in Models, Mass Balance, and Loadings  Radionuclide Cycling in Natural Waters: Relevance of Scavenging Kinetics  P.H. Santschi, U.P. Nyffeler, YH. Li, and P. O'Hara  Modelling Water Quality of Lake Heenvliet in Relation to Planned Disposal of Harbor Sludge

	19	Modelling Radionuclide Transport Between Lake Water and Sediments W.J. Snodgrass	209
		m.s. Silvagrass	207
	20	Particle-Based Lake Model for Calculating Dose Commitment W.J. Snodgrass, D.L. Lush, R.R. Walker, and W. Bell	229
$\prec$	21	Lake Oxygen Model 1: Modelling Sediment Water Transport	
1	21	of Ammonia, Nitrate, and Oxygen	
		W.J. Snodgrass and A. Klapwijk	243
	22	Lake Oxygen Model 2: Simulation of Nitrification and	
	-	Denitrification in Hamilton Harbor Using Laboratory Data	
		A. Klapwijk and W.J. Snodgrass	251
1	23	Lake Oxygen Model 3: Simulation of Ammonia, Nitrate,	
1	<i></i>	and Oxygen in Hamilton Harbor (1977-1978)	
		A. Klapwijk and W.J. Snodgrass	265
	24	Calculation of Nutrient Fluxes Across the Sediment-Water	
1	24	Interface in Shallow Lakes	
		G.Th.M. van Eck and J.G.C. Smits	289
	25	Transfer to Biosystem From Bed and Suspended Sediment Early Diagenesis of Organic Matter in the Recent Sediments of Lake Erie and Hamilton Harbor I. Carbon Gas Geochemistry D.D. Adams and N.J. Fendinger	305
	26	The Effects of Sediment-Bound Heavy Metals on Algae	
	20	and Importance of Salinity	
		W. Ahlf, W. Calmano, and U. Förstner	319
	27	Cycling of Organic Carbon in a Coastal Marine System W. Balzer, F. Pollehne, and H. Erlenkeuser	325
	28	Abiological Controls on Silica in Chalk Streams	
		and Groundwaters	
		H. Casey and C. Neal	331
(	29	Early Sediment Changes and Element Mobilization in a	
		Man-made Estuarine Marsh	527704
		D.A. Darby, D.D. Adams, and W.T. Nivens	343
	30	Behavior of Some Metals in Surficial Sediments of the	
		Northwest Mediterranean Continental Shelf	
		F.E. Fernex, D. Span, G.N. Flatau, and D. Renard	353

31	Mobility of Heavy Metals in Dredged Harbor Sediments U. Förstner, W. Ahlf, W. Calmano, M. Kersten, and W. Salomons	371
32	Effect of Oxyhydrate Coatings on the Binding Energy of Metals by Clay Minerals  E. Helios-Rybicka and U. Förstner	381
		501
33	Nitrate as a Catalyst for Phosphorus Mobilization in Sediments M. Jansson	387
34	Available Phosphorus in the Sediments of Eight Lakes in the Netherlands	
	S.P. Klapwijk and C. Bruning	391
35	The Transport Mechanisms and Phase Interactions of Bioavailable Heavy Metals in Snowmelt Runoff G.M.P. Morrison, D.M. Revitt, J.B. Ellis, G. Svensson, and P. Balmér	399
36	Sediment Toxicity and Production-Biomass Relationships of Size-Fractionated Phytoplankton During On-Site Simulated Dredging Experiments in a Contaminated Pond	
	M. Munawar, R.L. Thomas, W.P. Norwood, and S.A. Daniels	407
37	Phosphorus Exchange Between Sediment and Water in Lake Balaton	
	K. Pettersson and B. Boström	427
38	Radionuclides as Tracers for Sedimentation and Remobilization Processes in the Ocean and in Lakes	
	P.H. Santschi	437
39	The Role of Lake Water in Enhancing Sorption of Phosphorus by Stream Particulates	
	M. Stafford-Glase and J.P. Barlow	451
40	Direct Effects and Interactions Involving Iron and Humic Acid During Formation of Colloidal Phosphorus	
	T.C. Young and W.G. Comstock	461
Dos	t VI Manipulation and Diapasel Techniques	
41	t VI Manipulation and Disposal Techniques The Field Verification Program: A Five Year Effort to	
41	Evaluate Disposal of Dredged Material in the Ocean and Alternative Locations	
	T.M. Dillon	473

Par	t VII	Sedimentation Rates and Fluxes, Dating,	
		Spatial and Temporal Variations	
42	and Pa	g Flux and Sinking Velocities of Particulate Phosphorus (PP) articulate Organic Carbon (POC) in Lake Zug, Switzerland esch and M. Sturm	481
43	210Pb ]	Fluxes in Acidified Lakes	
	P.J. D	illon, P.J. Scholer, and H.E. Evans	491
44	<sup>210</sup> Pb i	n Lake Kinneret Waters and Sediments:	
	Reside	nce Times and Fluxes	
	M. Sti	ller and D.M. Imboden	501
Sub	ject Ind	ex	513
		ikes. Rivers, and Other Locations	519