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Can **Fuzzy LOGIC** *Bring* *Complex* **Environmental Problems** *into* Focus?

Organic Contaminants in Mountains: A Critical Review

Source and Health Implications of High Toxic Metal Concentrations in Illicit Tobacco Products

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Research

Critical Review

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Organic Contaminants in Mountains
Gillian L. Daly and Frank Wania

Numerous studies reporting on the occurrence of organic contaminants in mountain regions help identify priority research needs.

Policy Analysis

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Uncertainty of Air Pollution Cost Estimates: To What Extent Does It Matter?
Ari Rabl, Joseph V. Spadaro, and Bob van der Zwaan

The price to society of uncertainties in cost and benefit estimates is remarkably low, even for errors of a factor of 3.

Characterization of Natural and Affected Environments

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Atmospheric Distribution and Long-Range Transport Behavior of Organochlorine Pesticides in North America
Li Shen, Frank Wania, Ying D. Lei, Camilla Teixeira, Derek C. G. Muir, and Terry F. Bidleman

Concentrations and enantiomeric fractions measured with a continental network of passive air samplers reveal regional sources that release organochlorine pesticides to the atmosphere.

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▶ **Herbicide Sorption to Fine Particulate Matter Suspended Downwind of Agricultural Operations: Field and Laboratory Investigations**
Amelia S. Clymo, Jin Young Shin, and Britt A. Holmén

Laboratory experiments and field measurements during soil incorporation of two pre-emergence herbicides are used to quantify the mass of herbicide released as particle-bound fugitive $PM_{2.5}$.

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The 7-Decade Degradation of a Large Freshwater Lake in Central Yangtze River, China
Shuqing Zhao, Jingyun Fang, Shili Miao, Ben Gu, Shu Tao, Changhui Peng, and Zhiyao Tang

Historical land cover information and remotely sensed data are used to explore the seven-decade degradation of a large freshwater lake.

■ **437**
Monitoring Mercury in the Loggerhead Sea Turtle, *Caretta caretta*
Rusty D. Day, Steven J. Christopher, Paul R. Becker, and David W. Whitaker

Isotope dilution cold vapor ICPMS is used to evaluate methods that nonlethally monitor for mercury in the blood and shells of loggerhead sea turtles.

■ **447**
Dissolution of an Emplaced Source of DNAPL in a Natural Aquifer Setting
Michael O. Rivett and Stanley Feenstra

Dissolution of a known dense, nonaqueous-phase-liquid source is a slow, heterogeneous process significantly influenced by groundwater bypass flow and intrasource "dissolution fingering".

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Contribution of Municipal Effluents to Metal Fluxes in the St. Lawrence River
Charles Gobeil, Bernard Rondeau, and Luc Beaudin

Municipal effluents do not weigh heavily on the St. Lawrence River metal budget, but other poorly constrained sources of metal contamination do exist.

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Atmospheric Concentrations and Air–Water Flux of Organochlorine Pesticides along the Western Antarctic Peninsula
Rebecca M. Dickhut, Alessandra Cincinelli, Michele Cochran, and Hugh W. Ducklow

Hexachlorocyclohexanes are declining in Antarctic air, but deposition to coastal Antarctic seas continues; heptachlor in Antarctic air is correlated with air masses from lower latitudes.

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Determination of 14 Polycyclic Aromatic Hydrocarbons in Mainstream Smoke from Domestic Cigarettes
Yan S. Ding, Jenna S. Trommel, Xizheng J. Yan, David Ashley, and Clifford H. Watson

Differences in smoke PAHs among cigarettes from selected tobacco blends illustrate how blend composition contributes to the overall mainstream-smoke PAH profile.

Environmental Processes

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▶ **Source and Health Implications of High Toxic Metal Concentrations in Illicit Tobacco Products**
W. Edryd Stephens, Angus Calder, and Jason Newton

Tobacco in counterfeit cigarettes sold in the United Kingdom is shown to have high concentrations of heavy metals with potentially harmful implications for health.

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Assessment of the Geochemical Role of Colloids and Their Impact on Contaminant Toxicity in Freshwaters: An Example from the Lambro–Po System (Italy)
Davide A. L. Vignati, Tamara Dworak, Benoît Ferrari, Brahim Koukal, Jean-Luc Loizeau, Marion Minouflet, Marina I. Camusso, Stefano Polesello, and Janusz Dominik

Field-based studies help improve the current understanding of the role of colloids in regulating element behavior and bioavailability in natural aquatic systems.

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Differences in Dissolved Cadmium and Zinc Uptake among Stream Insects: Mechanistic Explanations
David B. Buchwalter and Samuel N. Luoma

Aquatic insects differ in their uptake of dissolved cadmium and zinc.

■ **Supporting information is available free at http://pubs.acs.org/est.**

▶ **This issue contains a news story about this research.**

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Chemical Transformation of 3-Bromo-2,2-bis-(bromomethyl)propanol under Basic Conditions
Shai Ezra, Shimon Feinstein, Itzhak Bilkis, Eilon Adar, and Jiwchar Ganor

The mechanism and kinetics of spontaneous decomposition of 3-bromo-2,2-bis(bromomethyl)propanol and its sequence of daughter products are determined in aqueous solution at alkaline conditions.

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Aqueous Photochemical Reaction Kinetics and Transformations of Fluoxetine
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The photodegradation kinetics and phototransformation products of fluoxetine are determined; reaction mechanisms leading to the formation of observed products are postulated and tested.

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Ian J. Allan, William A. House, Andrew Parker, and Joy E. Carter

Algal biofilm growth at the sediment surface significantly influences the pyrethroid permethrin's movement, partition, and losses in freshwater sedimentary environments.

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► **Aerobic Biotransformation of ^{14}C-Labeled 8-2 Telomer B Alcohol by Activated Sludge from a Domestic Sewage Treatment Plant**
Ning Wang, Bogdan Szostek, Patrick W. Folsom, Lisa M. Sulecki, Vladimir Capka, Robert C. Buck, William R. Berti, and John T. Gannon

Microbial biodegradation of fluorotelomer 8-2 TBA ($CF_3(CF_2)_6$ $^{14}CF_2CH_2CH_2OH$) occurs via multiple transformation pathways; the metabolite 2H,2H,3H,3H-perfluorodecanoic acid ($CF_3(CF_2)_6$ $^{14}CH_2CH_2COOH$) links the β-oxidation pathway.

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Tracking the Sources of Nitrate in Groundwater Using Coupled Nitrogen and Boron Isotopes: A Synthesis
David Widory, Emmanuelle Petelet-Giraud, Philippe Négrel, and Bernard Ladouche

A combination of nitrogen and boron isotopes is an efficient and precise tool to determine nitrate sources in groundwater.

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Field Observation and Modeling of Dissolved Fraction Sediment–Water Exchange Coefficients for PCBs in the Hudson River
Michael J. Erickson, Carrie L. Turner, and Louis J. Thibodeaux

High-quality field data allow the "direct" observation of the coefficients that control the release rate of PCBs and other halogenated organic compounds from aquatic bed sediments. The coefficients correlate with a two-layer transport model based on the bioturbation process.

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Modern and Historic Atmospheric Mercury Fluxes in Northern Alaska: Global Sources and Arctic Depletion
William F. Fitzgerald, Daniel R. Engstrom, Carl H. Lamborg, Chun-Mao Tseng, Prentiss H. Balcom, and Chad R. Hammerschmidt

Atmospheric mercury deposition to Arctic Alaska shows a threefold modern/historic increase; springtime depletion and generalized deposition of reactive gaseous mercury likely occurred in pre-industrial times.

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Mechanisms of Pb(II) Sorption on a Biogenic Manganese Oxide
Mario Villalobos, John Bargar, and Garrison Sposito

Aqueous Pb(II) reacts with a poorly crystalline layer of biogenic manganese oxide and synthetic analogues to form inner-sphere complexes both at external surfaces and at interlayers.

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David C. Mays and James R. Hunt

A model with a single parameter that represents deposit morphology describes experimental data over a range of flow velocities.

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Aminomethylphosphonic Acid and Glyphosate Adsorption onto Goethite: A Comparative Study
B. C. Barja and M. dos Santos Afonso

The adsorption of aminomethylphosphonic acid and glyphosate onto goethite suspensions is studied, and the structures of the interfacial complexes are elucidated.

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Reactivity and Transformation of Antibacterial *N*-Oxides in the Presence of Manganese Oxide
Huichun Zhang and Ching-Hua Huang

A new reaction pathway involving oxidation of organic *N*-oxide antibacterials with manganese oxide under environmental conditions is discovered and described.

Environmental Modeling

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Semianalytical Solution for CO_2 Leakage through an Abandoned Well
Jan Martin Nordbotten, Michael A. Celia, Stefan Bachu, and Helge K. Dahle

New semianalytical solutions provide fast estimates of potential leakage associated with sequestration of CO_2 in deep saline aquifers.

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Ab Initio Study of Carbon–Chlorine Bond Cleavage in Carbon Tetrachloride
Nianliu Zhang, Paul Blowers, and James Farrell

Ab initio methods show that reduction of carbon tetrachloride by high-energy electrons leads to outer-sphere electron transfer, whereas low-energy electrons react via an inner-sphere mechanism.

Environmental Measurements Methods

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Determination of Levoglucosan from Smoke Samples Using Microchip Capillary Electrophoresis with Pulsed Amperometric Detection
Carlos D. García, Guenter Engling, Pierre Herckes, Jeffrey L. Collett, Jr., and Charles S. Henry

Microchip capillary electrophoresis offers simpler, cheaper, faster, semicontinuous, on-site analysis of levoglucosan, which is the largest single component of water-extractable organics in smoke particles.

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Use of Diffusive Gradients in Thin Films To Measure Cadmium Speciation in Solutions with Synthetic and Natural Ligands: Comparison with Model Predictions
Emily R. Unsworth, Hao Zhang, and William Davison

Total concentrations of inorganic cadmium species measured by diffusive gradients in thin films in fulvic acid solutions agree well with predictions from the NICA–Donnan model.