Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37984

Increases in Gadolinium Anomalies in Los Angeles, California Waterways

MIA BRADSHAW, SHUN-CHUNG YANG AND JAMES MOFFETT

University of Southern California

Rare Earth Elements (REEs) are increasing in prevalence in the aquatic environment due to their use in industrial and medical technology. Gadolinium (Gd) possesses a growing risk for release to industrial wastewaters, rivers, and harbors, due to its employment in the medical field as a contrast agent in magnetic resonance imaging (MRI) screening. Gd is injected into the human bloodstream in heavily complexed forms, then renally excreted within days, entering waste water treatment systems. Gd is an emerging contaminant, with potential to serve as a tracer of municipal waste, distinguishing sewage-derived sources of excess nutrients from agricultural sources and coastal upwelling. Recent evidence has shown heightened Gd anomalies in waterways with correlations to anthropogenic sources. However, no information is known about the fate of Gd in the industrial and medical megacity, Los Angeles, California. We determine the distribution and concentration of Gd in surface water of the LA, California, waterway system. The waterway is composed of two rivers that drain to an enclosed harbor. During dry periods, river flow is heavily dominated by wastewater treatment plant effluent. Surface water samples were collected throughout the Los Angeles River at different time points encompassing high rain and low rainfall periods, as well as surface samples in the San Pedro Harbor. Further, subsurface samples were collected in off-coast waters. Samples were filtered for particulate REE analysis and acidified for dissolved REE analysis. Dissolved samples were concentrated on NOBIAS PA-1 resin and measured on an Element 2 Inductively Coupled Plasma Mass Spectrophotometer. Results showed elevated concentrations of Gd and high Gd anomaly values in the San Pedro Harbor ranging from 4.4-47 ng Gd / L and 1.5-9.8 respectively. Concentrations in the LA River exceeded concentration levels in the harbor, with values averaging greater than 400 ng Gd / L. Preliminary results are consistent with other previously reported outfall values. In addition to quantifying the distribution of Gd in the LA waterway, this study aims to develop a Gd budget, allowing us to apply our understanding to the broader environment.