

Differential arsenic binding in the sediments of two sites in Chile's lower Loa River basin

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Abstract

Fluvial sediments from two lower Loa River basin sites in northern Chile were compared in order to probe the effects of vegetation and organic matter (OM) on As accumulation in fluvial environments. The two sites were the Sloman dam, which lacks macrophytes and has a low OM content (2.4%) in sediments, and the Quillagua Oasis, which is 23 km downstream from the Sloman site and has a higher OM (6.2%) in sediments and abundant aquatic plant life. The Quillagua site had preferential As enrichment with a co-occurrence pattern that differed from that of the Sloman site, which had a lower As concentration (1528 vs. 262 mg/kg d.w., respectively). At the Quillagua site, As concentration was strongly correlated with Mn and OM ($r = 0.91$ and 0.85 , respectively); while at the Sloman site, As concentration in sediments was significantly correlated with Ca and Sr ($r = 0.63$ and 0.54 , respectively). Sequential extraction analyses showed that the Sloman site had higher percentage of easily exchangeable As within the surface sediment (12%, 45 mg/kg d.w.) compared with the Quillagua site (3%, 40 mg/kg d.w.). These contrasting results suggest that both vegetation and OM control the immobilization and accumulation of As in the arid Loa River basin.