

Interactive comment on “Changes in mobility and solubility of the redox sensitive metals Fe, Mn and Co at the seawater-sediment interface following CO₂ seepage” by M. V. Ardelan and E. Steinnes

Anonymous Referee #2

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General Comments

This paper provides a needed link between the extensive literature on early diagenetic remobilization of metals and the “real-world” potential problem of CO₂ seepage during subterranean storage. The physicochemical processes involved are intricate and difficult to resolve (e.g. simultaneously occurring reductive dissolution/precipitation of metal oxides, acid-enhanced dissolution, resuspension/adsorption. . .).

The authors have devised a sound experimental design to examine the changes resulting from CO₂ seepage upward through a sediment layer and into the overlying water column. The data presented are excellent and the conclusions are clear. Even mini-

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mal seepage of CO₂ alters the pH and pE of overlying sediments, transferring Fe, Mn, Co (and presumably associated metals) to the overlying water column via increases in the acidity and reducing power of sediment porewater and physical resuspension of surface sediments by rising CO₂ bubbles.

Specific Comments

The comments of Anonymous Reviewer 1 are valid and should be addressed.

With regard to resuspension, the paragraph at the bottom of pg. 5628 of the methods section appears to say that “resuspension” samples were taken during the time that CO₂ or N₂ were being bubbled through the sediment. “No-resuspension” samples were taken 6 hours after the bubbling ceased. This detail is lost in the subsequent discussion, creating some confusion. Also, the authors state that an increase in turbidity was seen during bubbling. Was turbidity measured?

The figures are indeed much too small to be clearly seen on the screen without enlargement and the printed figures are nearly illegible.

The conclusions section adequately summarizes the main findings of the experiment. I do, however, agree with Reviewer 1 that the authors should elaborate on the potential environmental impact of CO₂ seepage. Given a realistic estimate of the amount of CO₂ released and the area of sediment affected, what might be the geochemical and biological consequences?

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