**Supplementary Data**

**Determination of the sediment:solution ratio and equilibration time**

The sediment:solution ratio refers to the grams of sediment relative to the milliliters of microsphere solution and the equilibration time refers to the time the solutions are allowed to mix on the rotating shaker. For NFMS and CMS experiments were carried out for sediment:solution ratios at 1:4, 1:10, 1:20, 1:40, 1:60; 1:100: 1:200: and 1:500. For NFMS the, the percent of adhered microspheres across these ratios ranged from 80.2 – 96.15 % with an average percent adhered value of 89.0% 5.4. For CMS, the percent of adhered microspheres across these ratios ranged from 73.9 – 99.9% with an average percent of adhered value of 89.2% 9.77. Due to the percent adhered range across these ratios being consistent with the percent of unrecovered microspheres reported in microsphere tracer studies (Flynn and Sinreich, 2010; Goeppert and Goldscheider, 2011; Goeppert and Hoetzl, 2009; Harvey et al., 1989; Harvey et al., 1993; Harvey et al., 2008; Sinreich et al., 2009), ratios of 1:4 and 1:100 were selected for equilibration time experiments. For NFMS and CMS in a 1:4 sediment:solution ratio, equilibration times of 1, 24, 48, and 72 hours were evaluated. Percent adhered for both types of microspheres across these equilibration times averaged 99.9% 0.01. For NFMS and CMS in a 1:100 sediment:solution ratios, equilibration times of 0.5, 6, 16, 18, and 20 were evaluated. For NFMS, percent adhered microspheres averaged 28.6% 35.6 and for CMS, percent adhered microspheres averaged 87.3% 5.9. Initial adherence experiments for NFMS in 1:100 and 1:4 ratios at four hours equilibration time resulted in average percent removal of microspheres from the initial solutions of 18.1% 7.70 and 49.1% 8.07, respectively. In the same conditions for CMS, average percent removal was 18.5% 7.1 and 58.4% 16. Based on these preliminary data, a ratio of 1:20 and equilibration time of 4 hours was chosen for the following experiments to reflect the potential ratio that would be observed in a natural setting. These parameters resulted in adhered microspheres that is consistent with previously reported field experiments and allows for comparison of different microsphere behavior under the same conditions.