**LITHIUM AND ITS ISOTOPES IN RIVER WATER AND SUSPENDED MATERIAL.** Y. Huh¹, L. -H. Chan² and J. M. Edmond¹, ¹Earth, Atmospheric and Planetary Sciences, E34-166, Massachusetts Institute of Technology, Cambridge, MA 02139, U.S.A. (yhuh@mit.edu; jedmond@mit.edu), ²Geology and Geophysics, Louisiana State University, Baton Rouge, LA 70803, U.S.A. (lchan@geol.lsu.edu).

**Introduction:** Lithium isotopes have the potential to be an effective tracer of weathering processes due to their large relative mass difference and therefore fractionation. Previous reconnaissance study of the dissolved load of major world rivers showed a large range from -6 to -32 ‰ [1]. However, there was no clear relationship to any other chemical parameter. One of the gaps in knowledge was the amount and isotopic ratio of lithium carried as suspended material and its interaction with the dissolved load. We have analyzed additional samples of both the dissolved and suspended load to address this issue.

**Mafic Terrains:** Two river water samples were analyzed to determine the value for basaltic terrains. The Mayn, a tributary of the Anadyr, drains arc basalts of the Mesozoic collision zone between the Kolyma and Siberian cratons. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratio shows a characteristic basaltic value of 0.70488, Mg/Ca = 0.8 mole ratio, and a high Si value of 193 µM. The Li/Mg ratio is $6.6 \times 10^{-3}$ and $\delta^6\text{Li}$ is -28.7‰. The Baghicha, a tributary of the Indus, drains the ophiolitic belt. It has unradiogenic $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.70451, Mg/Ca is 0.4, and Si is 98 µM. The Li/Mg ratio is 0.49 $\times 10^{-3}$ and $\delta^6\text{Li}$ is -22.2‰.

**Lithium Mass Balance Within the Orinoco Watershed:** A crude mass balance study was carried out to determine if within-channel storage and adsorption/desorption or ion exchange reactions played a significant part. The Orinoco basin was chosen because it flows along the boundary between two markedly different terrains, the Precambrian Guayana Shield on the right and the Andes on the left, and has well known hydrology and water chemistry.

**Dissolved Load.** We have accounted for 60% of the discharge, and the lithium concentrations and isotope ratios balance within this uncertainty. Conspicuous in this is the clear divide in the isotopic ratios between the Andean tributaries and those draining the Shield. The Upper Orinoco, Ventuari, Caura, and Caroni, all draining the Shield, have Li concentrations 27 to 77 nM with $\delta^6\text{Li} -13$ to -22‰. The Guaviare, Meta and Apure draining the Andes and its foreland basin have 39 to 127 nM and -30 to -36‰. The Meta (-36.1‰) provides the bulk of the dissolved Li and so the Orinoco at its mouth has ratios close to that (-32.2‰).

**Suspended Load.** The suspended load of the Orinoco River is predominantly derived from the Andes. In addition, the suspended Li concentration is about 7 times higher in the Andean rivers (38.3 to 71.3 ppm) than those from the Shield (5.2 to 19.1 ppm). Thus, the overwhelming proportion of suspended Li is from the combined areas of the Andes and its wide alluvial plain, the Llanos. However, the isotopic composition is indistinguishable between the two regions: -5.4 to +0.9 in the Shield rivers versus -6.4 to -0.8 in Andean rivers.

**$\delta^6\text{Li}$ of SPM versus Dissolved:** The differences in $\delta^6\text{Li}$ between suspended and dissolved lithium are much larger in the Andean rivers (~30‰) than in the Shield rivers (~15‰).

**Conclusion:** The lithium isotope ratios are much lighter in the suspended material. Apparently $^6\text{Li}$ is preferentially partitioned into clays during weathering. This is in contrast with other reactive isotopes, e.g. C and O, where the heavier isotopes prefer solid phases. To a first approximation, during superficial weathering in high-relief, tectonically active terrains $^6\text{Li}$ is preferentially leached and in large amounts, whereas in stable shield regions the weathering is intensive so that the concentrations are low and the ratios in the water becomes lighter with increasing degree of weathering. The heavier isotopic composition of the Andean Rivers may also reflect dominant weathering of carbonate and evaporites, as well as adsorption as water percolates through clay-rich weathering profiles. The latter process is not significant in tropical shields where silicates are completely transformed to gibbsite.