**2017 Geodynamics Seminar**

# *Where Did All the Subducted Sediments Go?*


## Al Hofmann

**Emeritus Director of the Geochemistry Division**
**Max Planck Institute for Chemistry, Germany**


**Tuesday, April 25, 2017**
**1:30 - 2:30 p.m.**
**Carriage House, Quissett Campus, WHOI**


**Abstract**

**Several lines of reasoning have revived the idea that subduction has recycled continent-derived sediments into the mantle on a massive scale. For example, well-known peaks in zircon ages have been reinterpreted as reflecting variable rates of crust destruction via erosion and sediment subduction. In addition, assessment of the trace element budgets of subducted sediments and arc volcanics, as well as geological and geophysical studies of accretionary wedges have led to estimates that about one mass of present-day continental crust has been returned to the mantle. If these ideas are correct, then recycled sedimentary components should be present in MORB and OIB sources. As previously established, Nb/U and 87Sr/86Sr are negatively correlated in all EM2-type OIBs, clearly indicating continental/sedimentary input. However, the MORB source reservoir, being depleted in incompatible elements, is particularly susceptible to "pollution" by subducted sediments. Chauvel et al. modeled the Hf-Nd isotopic array of MORBs+OIBs and concluded that it requires the addition of up to 6 % subducted sediment. We revisit this issue and show that global MORBs show no decrease in Nb/U with increasing 87Sr/86Sr, ruling out extensive addition of recycled sediment into global MORB sources. Instead, the Hf-Nd array can be obtained by recycled alkali basalts derived from subducted seamounts and ocean islands, rather than sediments. Moreover, mantle plumes with clearly identifiable sediment input contribute less than 20% of the total plume flux. We conclude that most of the subducted sediment flux is not returned to the convecting mantle. Instead, its most plausible fate is to be underplated beneath existing continental crust via "relamination". These results imply that continental recycling is subordinate and the growth of the continental crust has been largely irreversible.**