# Subduction factory and its impact on global mantle heterogeneity

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"Subduction factory" produces arc magmas as a main output, which has been extensively studied to probe the sub-arc structure and processes. Another equally important product is the residual material that subducts deeper into the mantle; e.g., dehydrated or melted slab and mantle materials. Importance of such processed materials has been repeatedly argued for geochemical heterogeneity and global material cycling in the mantle [e.g., 1-3]. In spite of its importance, compared to the arc magmas, the residual materials have been less constrained partly due to its inaccessibility. Of several approaches for quantitatively identifying such processes and materials, based on the fluid dynamical model for trace element transport in subduction zones [4], as well as 3-D mantle convection model that incorporates water transport [5,6], we discuss what comes out and what goes down to the deep mantle, and how the subducted materials may contribute to global geochemical structures, including east-west mantle geochemical hemispheres [7].

Within the subduction factory, melting and melt extraction create compositionally zoned mantle, which is dragged down by corner flow to encounter the fluid from the slab [4]. It has been found that this combined process creates highly complicated 2-D distribution of elements, as well as large variability in parent/daughter ratio of radionuclides, which are comparable to the global variability. Outside the subduction factory, the heterogeneous materials are transported and redistributed by both solid convective flow and percolating fluid that is released upon dehydration of hydrous minerals (including nominally anhydrous minerals) at various depths over the whole mantle, resulting in effective delivery of water (and associated elements) to a broad but a certain region of the mantle.

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