

MIS010-07

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## Subduction and plume factories: their roles in mantle evolution and material recycle

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The subduction factory (SubFac) processes raw materials such as oceanic sediments, oceanic crust, and mantle wedge peridotites and manufactures arc magmas, which solidify and ultimately create the continental crust. SubFac, as do other factories, emits waste materials, such as oceanic sediments/crusts, which are chemically modified through complex dehydration and/or melting processes during subduction. The major product from SubFac, the continental crust, is distinct in compositions from mantle-derived arc magmas; i.e., intermediate vs. mafic, respectively. Therefore, SubFac should also have emitted 'anti-continental' materials as a waste material of continental crust formation. These waste materials founder into the Earth's deeper interior, reside probably at the deep mantle, and may contribute greatly to the evolution of mantle because of their significant mass and characteristics compositions; existing volume of the continental crust and magma production rate at ridges, together with high-P experimental results, may lead to speculate that the mafic waste materials from SubFac form a 200km-thick layer at the base of the mantle and are the major component of the D" layer. Geochemical modeling suggests that waste materials from SubFac, i.e., chemical modified sediments/oceanic crust and anti-continent may have been matured for billions of years, are reused as raw materials in plume factories, known as the enriched mantle components such as EM2, HIMU, and EM1, respectively, and are recycled as mantle plumes. Behavior of carbon in both the SubFac waste materials and the mantle plume is thus a key to decode the deep carbon cycle.

Keywords: subduction factory, waste materials, D" layer, enriched mantle components, recycle, mantle plume factory