# Experimental hybridization of mantle wedge by mélange rocks, and the generation of arc magmas

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Recent field and numerical studies on high-pressure mélange rocks have emphasized their potential roles in subduction zone dynamics such as in plate coupling, material cycling, volatile storage, and arc magma genesis. Mélange rocks are physical mixtures of different lithologies formed from deformation-assisted mixing and fluid-rock reactions along the slab-mantle interface during subduction. As a result, mélange rocks span a wide range of chemical and lithological compositions. Buoyant viscous mélange diapirs have been predicted to form at the slab-mantle interface and migrate to the overlying mantle, and possibly transfer its compositional signatures to the source region of arc magmas. Although geodynamic models have predicted that mélange diapirs can physically mix with sub-solidus mantle wedge peridotites forming peridotite-mélange hybrid materials, the chemistry of melts that would come from subsequent melting of this mélange-hybridized mantle wedge and how they compare with natural arc lavas remain unknown. To examine this, we experimentally investigated melting of natural peridotite-mélange hybrid materials using a piston cylinder device at 1.5 GPa and 1280–1350 ºC relevant to the hot zones of the mantle wedge. We performed those experiments using two end-member compositions of mélange rocks. Here, we show that the major and trace element compositions of experimental melts of peridotite-mélange hybrid materials broadly resemble natural arc lavas and display the characteristic arc trace-element signature (i.e., enriched LILE and depleted HFSE). Thus, we argue that viscous mélange diapirs may play a key role in mass transfer processes in global subduction systems and in the formation of arc magmas. Finally, we discuss implications of this finding on mantle lithologic heterogeneities, slab fluid compositional estimates, material cycling and relamination.