

## Off-arc volcanism in rollback subduction settings

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Seismological imaging has shown ubiquitous small-scale convection in the uppermost mantle in regions such as the Mediterranean and the western Pacific, and volcanism may be connected to subduction dynamics outside regular arc formation. We review how the three-dimensional flow around slabs and slab fragmentation can generate focused upwellings, and argue that these may play a significant role in regional tectonics. This process may be reflected in off-arc volcanism, a topographic swell, and slow seismic anomalies associated with partial melt. Using numerical subduction models, we show that upwellings can be generated both ahead of the slab in the back-arc region (~600 km away from the trench) and around the lateral edges of the slab (~100 km away from slab edges). Vertical mass transport, and by inference the associated decompression melting, in these regions appears strongly correlated with the interplay between relative trench motion and subduction velocities. The upward flux of material from the depths is expected to be most pronounced during the first phase of slab descent into the upper mantle or during slab fragmentation.

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