# Continental lithosphere removal by drip and delamination processes

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We present evidence for convective removal of continental lithosphere beneath the western U.S., the western Mediterranean, and the southeastern Caribbean. All three locales are associated with subduction, the first through hydration weakening of overlying lithosphere during Laramide-age flat slab subduction, the latter two by recent or ongoing subduction that includes involvement of the adjacent continental margins. In the western U.S., the Precambrian continental lithosphere beneath the western Colorado Plateau, the Rio Grande Rift, and likely the northern Wasatch Front are experiencing thermo-chemical edge convection that removes most or all of the lithospheric mantle and can reach depths as shallow as the lower crust. Extensive basaltic volcanism accompanies this process, as vertical asthenospheric flow gradients and melt generation help destabilize the lithosphere. In the western Mediterranean, slab rollback and delamination of continental mantle beneath the Alboran crust have also removed the mantle lithosphere beneath the adjacent Iberian and Moroccan margins. Southern Spain and northern Morocco are sites of extensive mid-Cenozoic to modern basaltic volcanism. In the western Mediterranean, however, melt generation may be a consequence of rather than the cause of lithosphere removal. In the southeastern Caribbean, at the southernmost corner of the Antilles subduction zone, Atlantic subduction beneath the Caribbean plate results in a tearing lithosphere that produces a large-scale ocean-continent transform fault system. Deeper levels of the South American continental lithosphere (≥ 75-100 km depth) south of the surface expression of the plate boundary are dragged along by the subducting Atlantic plate and descend into the mantle. Removal of lithosphere beneath the South American continental margin appears to trigger additional lithospheric instabilities within the continental interior. In contrast to both the western U.S. and the western Mediterranean, this process is almost amagmatic resulting from the relatively thick lithosphere that remains, precluding significant decompression melting. The range of subduction styles in which part or all nearby continental lithosphere is removed suggests a widespread process for recycling continental mantle.

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# The Effect of Chloride on the Dissolution Rate of Silver Nanoparticles and Toxicity to *E. coli*

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Pristine silver nanoparticles (AgNPs) are not chemically stable in the environment and react strongly with inorganic ligands such as sulfide and chloride. Understanding the environmental transformations of AgNPs in the presence of specific inorganic ligands is crucial to determining their fate and toxicity in the environment. Chloride ($Cl^-$) is a ubiquitous ligand with a strong affinity for Ag(I) and is often present in natural waters and in bacterial growth media. Though chloride can strongly affect toxicity results for AgNPs, their interaction is rarely considered and is challenging to study because of the numerous soluble and solid Ag-Cl species that can form depending on the Cl/Ag ratio. Consequently, little is known about the stability and dissolution kinetics of AgNPs in the presence of chloride ions. Our study focuses on the dissolution behavior of AgNPs in chloride-containing systems and also investigates the effect of chloride on the growth inhibition of *E.coli* (ATCC strain 33876) caused by Ag toxicity. Our results suggest that the kinetics of dissolution are strongly dependent on the Cl/Ag ratio and can be interpreted using the thermodynamically expected speciation of Ag in the presence of chloride. We also show that the toxicity of AgNPs to *E.coli* at various $Cl^-$ concentrations is governed by the amount of dissolved $AgCl_x^{(x-1)-}$ species suggesting an ion effect rather than a nanoparticle effect.

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