Tomography of crustal magma bodies

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Because of the simplicity of the blob model for magma accumulation in the crust, geophysicists have long been intrigued by the potential signature a large magma body in the subsurface seismic imaging of volcano magma chambers is now relatively common and has been explored at numerous sites. Distinct and clear seismic evidence of large accumulations of molten material has proven elusive, perhaps as a result of poor resolution and lack of critical data, or because the magma plexus does not conform to pre-conceived notions. Furthermore, technical difficulties in the inversion schemes associated with noise suppression may be masking larger anomalies expected for high percent melt anomalies. Inherent blurring of seismic images, though, prevents detailed structural features from being isolated and associated with specific eruptive events. Examples illustrating inversion results at large volcanoes like Kliuchevskoi and the recently erupted Sheveluch appear to be feeding from deep within the mantle, well below crustal reservoirs where magma chambers are commonly imaged at eruption centers like Mt. St. Helens, Mt. Fuji, and Unzen. Typical crustal magma anomalies reside in the 7-15 km depth range and extend over from one to tens of km in radius. Attenuation analysis holds some promise for advances in estimation of partial melt percentages, although Q (quality factor) is elusive and difficult to constrain.