

## **MAGMATIC UNDERPLATING IN CONTINENTAL LITHOSPHERE**

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### **ABSTRACT**

*Underplating was originally proposed as the process of magma ponding at the base of the crust and was inferred from petrological consideration, mainly associated with extensional regions. The process may have main importance for the formation of continental crust with its characteristic low average density, and may have been mainly active during the early evolution of the Earth. However, despite the assumed importance of underplating processes and associated fractionation, the available geophysical images of underplated material remain relatively sparse and confined to specific tectonic environments. Direct ponding of magma at the Moho is only observed in very few locations, probably because the magma interacts with the surrounding crustal rocks. There is no direct discriminator between traditionally underplated material and lower crustal magmatic intrusions in the form of batholiths and sill-like features, and here we include both phenomena. Such underplating is observed in island arcs, wide extensional continental areas, rift zones, and continental margins. Recent new data show that magmatic processes around Moho level may take the form of sill intrusions in the lower crust (at continental rift zones and slopes), and that underplating may create giant magma chambers in the crust. In magma-rich rift zones mafic-ultramafic magma addition to the lower crust/uppermost mantle may even totally mask the crustal thinning from the extension by the process of "Magma-Compensated Crustal Thinning". Probably, Large Igneous Provinces are the only locations where extensive underplating over large areas may have happened, but there is a total lack of data for testing this hypothesis and, therefore, new controlled source seismic data is needed at these locations. We review the structural styles observed by geophysical imaging and discuss these first order observations in relation to the Moho.*

**Keywords:** Magmatism, underplating, Moho, Rifts