#0045

The fate of the Ilmenite-bearing cumulates in the lunar interior

Schwinger, S.*,Yu, S., Maurice, M., Tosi, N., Breuer, D.
* DLR, Institute of Planetary Research
sabrina.schwinger@dlr.de

Ilmenite-bearing cumulates (IBC), i.e. Ti-rich oxides, form during the last stage of crystallization of the lunar magma ocean (LMO) and their location after the overturn of the LMO is strongly debated. Whether they sink to the core-mantle boundary (CMB), are entrained by convection and mixed with the bulk mantle, or remain trapped beneath the plagioclase crust is unclear. We calculated the crystallization sequence of the LMO and performed high-resolution numerical simulations of thermo-chemical mantle convection in order to study the fate of the IBC. Its overturn strongly depends on the mantle rheology and is only possible if the viscosity is sufficiently low as a consequence of water enrichment or melt in suspension. Overturned IBC accumulate above the core-mantle boundary forming a dense layer that survives until present-day. Part of the IBC can be entrained early by convection and mixed with the bulk mantle possibly providing a source for the generation of basalts with various Ti-content. However, if the LMO solidifies slowly, IBC could be entrained by convection as soon as they crystallize thus relaxing the requirement of a very low mantle viscosity.

Cite abstract as:
Schwinger, S., Yu, S., Maurice, M., Tosi, N., et al. (2017) The fate of the Ilmenite-bearing cumulates in the lunar interior. Paneth Kolloquium, Nördlingen (Germany), abstract URL: http://www.paneth.eu/PanethKolloquium/2017/0045.pdf (abstract #0045).