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Insights into the crustal structure and magmatic evolution of the High and Western Plateau of the Manihiki Plateau, Central Pacific

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The Manihiki Plateau is a Large Igneous Province (LIP) located in the Central Pacific. It is assumed, that the formation of the Manihiki Plateau took place during the early Cretaceous in multiple volcanic stages as part of the "Super-LIP" Ontong-Java-Nui. The plateau consists of several sub-plateaus of which the Western Plateau und High Plateau are the largest. In addressing the plateau's magmatic evolutionary history, one of the key questions is whether all sub-plateaus experienced the same magmatic history or if distinct phases of igneous or tectonic processes led to its fragmentation. During the RV Sonne cruise SO-224 in 2012; we collected two deep crustal seismic refraction/wide-angle reflection lines, crossing the two main sub-plateaus. Modeling of P- and S-wave phases reveals the different crustal nature of both sub-plateaus. On the High Plateau, the 20 km thick crust is divided into four seismic units, interpreted to range from basaltic composition in the uppermost crust to peridotitic composition in the middle and lower crust. The Western Plateau on the other hand shows multiple rift structures and no indications of basalt flows. With a maximum of 17 km crustal thickness, the Western Plateau is also thinner than the High Plateau. The upper basement layers show relatively low P-wave velocities (3.0 – 5.0 km/s), which infers that on the Western Plateau these layers consist of volcanoclastic and carbonatic rocks rather than basaltic flow units. Later volcanic stages may be restricted to the High Plateau with a possible eastward trend in the center of volcanic activity. Extensive secondary volcanism does not seem to have occurred on the Western Plateau, and its later deformation is mainly caused by tectonic extension and rifting.