



Paleoproterozoic HP-LT eclogites from the DR Congo: Implications for the onset of plate tectonics on Earth

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Knowing the plate tectonic regime of the early Earth is a fundamental but ongoing question and its resolution implies to know when and how plate tectonics and subduction began on Earth. Today, the tectonic regime is ruled by mobile-lid tectonics including subduction. However, in the early Earth stagnant-lid tectonics (or sagduction) could also occur. The possible range for the onset of mobile-lid plate tectonic spans from the early Archean to mid-Proterozoic, even though the Neoproterozoic-Paleoproterozoic boundary seems to be a crucial period and a time of major change in tectonic style regime on Earth. The study of High Pressure-Low Temperature (HP-LT) metamorphic rocks is powerful because today, these rocks are only produced in subduction settings. Here, we characterize the oldest HP-LT eclogite worldwide (2089 ± 13 Ma; 20-25 kbar / 550-600°C) discovered in the Kasai Block (DR Congo) attesting subduction process. We also identify the gabbroic protolith of this rock formed at 2216 ± 26 Ma in a rift-type basin, then was buried at high depth (> 65 km) in a subduction zone and exhumed during a Wilson cycle of ca. 130 Ma, testifying a modern-style plate tectonics at 2.2-2.1 Ga.