**Understanding the dynamics of tectonic plate movements and their impact on Earth's geological features: a comprehensive study of earthquakes, volcanism, and mountain formation**

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**Abstract**

Geology is the study of the Earth's structure, composition, and the processes that shape its surface over time. Central to this scientific discipline is understanding the dynamic interplay between the Earth's internal forces and the external factors that influence the planet's geological features (e.g., Wilson 1989), also in Fennoscandia (e.g., Eklund et al. 1998). This abstract aims to provide a comprehensive overview of key geological processes, with a particular focus on tectonic plate movements, the formation of geological features such as mountains, earthquakes, and volcanoes, and the Pudasjärvi granulite belt (Lalli 2002).

The Earth's lithosphere is divided into tectonic plates that float atop the semi-fluid asthenosphere. The movement of these plates is driven by mantle convection, slab pull, and ridge push, resulting in various geological phenomena like, for example, layered mafic intrusions (Iljina & Hanski 2005). When plates collide, they may form mountain ranges or cause subduction zones, where one plate is forced beneath another. This process is responsible for the formation of deep ocean trenches and volcanic arcs. Conversely, when plates diverge, new crust is created along mid-ocean ridges, contributing to the expansion of ocean basins.

The interaction of tectonic plates is also a primary cause of seismic activity. Earthquakes occur when stress accumulated along faults is suddenly released, sending shockwaves through the Earth’s crust. These seismic events are commonly associated with plate boundaries, particularly transform and convergent boundaries. Understanding the frequency, magnitude, and distribution of earthquakes helps in assessing seismic hazards and improving the safety and preparedness of regions prone to such events.

**References (layout as in Bull. of the Geol. Soc. of Finland:** [**https://www.geologinenseura.fi/fi/bulletin**](https://www.geologinenseura.fi/fi/bulletin)**)**

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