Short-term episodicity of Archaean plate tectonics

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Plate tectonics, the dominant process shaping Earth as we know it today, may not have existed throughout Earth's history.

Indeed, the interior of our planet (the mantle) cools progressively, by perhaps 300 degrees Celsius over the past 3.0 billion years.

Numerical calculations reveal that in Archaean times (4.0-2.5 billion years ago), the mantle was too hot to support stable, long-lived plate tectonics.

Rather, Jean-François Moyen and Jeroen van Hunen suggest that subduction -- a key component of plate tectonics, with cold, rigid plates sinking from the surface down into the mantle -- was an episodic process, stopping and starting frequently.

Evidence for this episodicity is found in rocks from old geological units such as the Abitibi province of the Canadian Shield, where Moyen and van Hunen describe short, repeated, episodic bursts of subduction related lavas interlayered in non-subduction rocks.

They propose that plate tectonics started progressively on Earth by more and more frequent, long-lived, and large-sized subduction events progressively evolving into the stable, large structures observed today.

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