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Cascade structure of the 2025 Kamchatka megaearthquake

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The Kamchatka mega-earthquake, Mw 8.8, of July 30, 2025, was among the top ten strongest earthquakes on the planet.

By that time, a network of accelerometers was operational on the peninsula, which, for the first time in the history of instrumental observations in Kamchatka, allowed for a detailed study of the earthquake's source process [1].

The Kamchatka mega-earthquake's source consists of four subsources of varying sizes, localized along the Kuril-Kamchatka subduction zone mega-thrust from Onekotan Island to Cape Shipunsky.

Accelerograms clearly show the sequential initiation of subsources ruptures from northeast to southwest, which occurred due to the propagation of waves from the previous subsource. In the zones between the subsource, the rupture velocity and displacement amplitude decrease significantly.

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References

1. Chebrov et al. 2013. Volcanology and Seismology