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When a slow slip event meets another

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Earthquakes are thought to nucleate as slow aseismic slip progressively accelerating to fast velocities. Slow slip events (SSEs) are candidates to evolve as earthquakes. Observing their dynamics is therefore key to understand the process by which earthquakes initiate. Here, we use continuous measurements of the ground displacement to invert for the daily slip on the fault beneath Vancouver Island during an SSE in 2013. We highlight 3 distinct rupture areas originating independently - associated with 3 independently inferred swarms of micro-seismic activity - progressively merging together. We show that the merging phases are associated with a large increase ($> 500\%$) in daily slip. Our results indicate that the merging of slow slip rupture fronts is a mechanism capable of enhancing slip to the point that it could potentially initiate large earthquakes.