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Deep crustal expressions of exhumed strike-slip fault systems: Shear zone initiation on rheological boundaries

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The formation of major exhumed strike-slip faults represents one of the most important dynamic processes affecting the evolution of the Earth's lithosphere and surface. In this study, we deal with key properties controlling the development of major exhumed strike-slip fault systems, which are equivalent to the deep crustal sections of active across fault zones. We also propose two dominant processes for the initiation of orogen-scale exhumed strike-slip faults: (1) pluton-controlled and (2) metamorphic core complex-controlled strike-slip faults. In these tectonic settings, the initiation of faults occurs by rheological weakening along hot-to-cool contacts and guides the overall displacement and ultimate exhumation. These processes result in a specific thermal and structural architecture of such faults. These types of strike-slip dominated fault zones are often subparallel to mountain ranges and expose a wide variety of mylonitic, cataclastic and non-cohesive fault rocks, which were formed at different structural levels of the crust during various stages of faulting. The high variety of distinctive fault rocks is a potential evidence for recognition of these types of strike-slip faults. Exhumation of mylonitic rocks is, therefore, a common feature of such reverse oblique-slip strike-slip faults, implying major transtensive and/or transpressive processes accompanying pure strike-slip motion during exhumation.