According to Plate Tectonics, fracture zones (FZs) are born at Transform Faults (TFs), which leave behind "inactive" FZs traces as scars on the seafloor that reflect their initial use as one side of a strike-slip transform fault. FZs were originally thought to "heal" as the oceanic lithosphere cooled and strengthened with time. However, the occurrence of recent earthquakes reveals that FZs can be associated with significant seismic activity (for example during the recent Mw 8.6 2012 EQ offshore Sumatra and Mw 7.9 2018 EQ offshore SE Kodiak), and also with permanent deformation that occurs well after passage through the TF.

The TF at the spreading center is known to be accompanied by the formation of the transform valley which exposes serpentinized peridotite to the ocean floor. Valley relief itself can drive fluid flow that promotes continued serpentinization, and also cooling- and volume-change-linked stress variations. Off-axis seismicity suggests that FZs remain weaker that neighbouring oceanic lithosphere. The transform valley relief in general persists as a fracture zone valley that itself can continue to be a major drive of fluid flow even in the "healed" oceanic lithosphere. After reviewing evidence for FZ activity on (normal) ocean floor we will focus on the long-lived impact of FZs at continental margins. Offshore/onshore evidence of ongoing deformation at FZs is observed through seismic activity at both the western Brazilian and eastern Ghana-Côte d'Ivoire ends of the Romanche FZ. The western Brazil end is also characterized by recent folding and faulting, both offshore across the FZ, and onshore co-linearly with FZ extensions into the continent. Seismic activity in continental Brazil is focused where the FZ intersects the continental margin. This activity suggests that FZs remain as permanent weak lithospheric heterogeneities that are able to store elastic strain.

The reasons why FZs remain active are still poorly understood. Possible causes include i) effects of serpentinization that occurs both in the TF and in the FZ through hydrothermal fluid/mantle interaction, ii) thermal stress, iii) changing tectonic stresses related to plate driving forces.