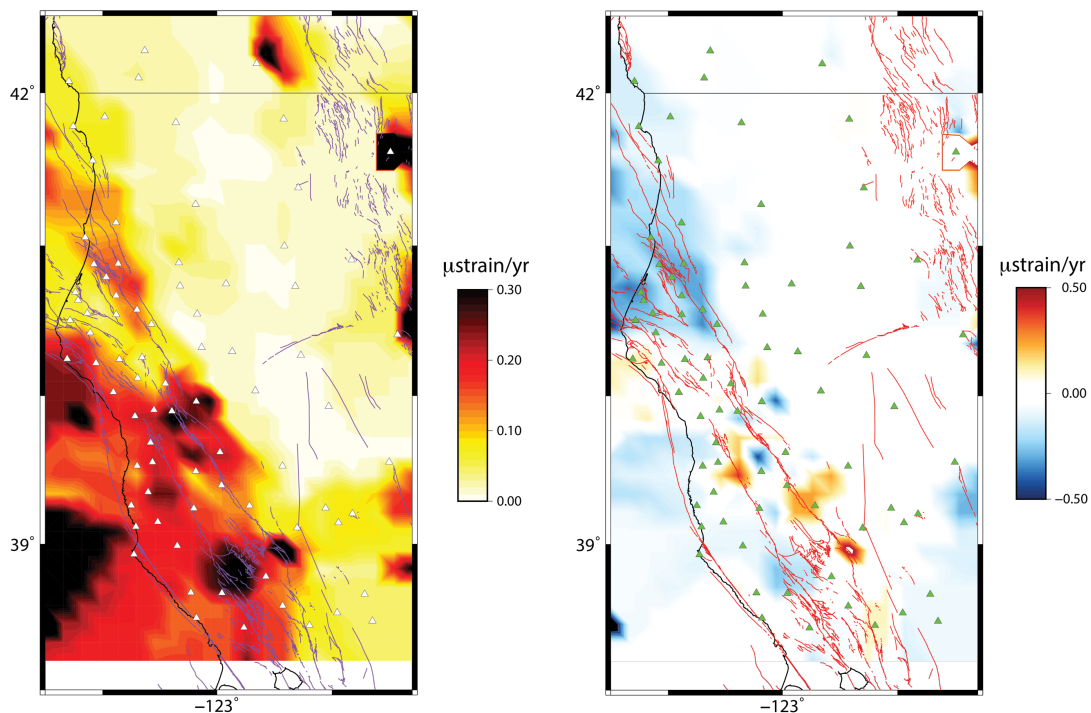


Crustal deformation in southernmost Cascadia represents the confluence of transpressive and convergent tectonics around the Mendocino Triple Junction (MTJ). The transition between these major systems is achieved in part by faulting and deformation along the North American plate boundary, as well as large-scale rotation of the crust in southern Cascadia. However, the spatiotemporal history of deformation around the MTJ is poorly resolved due to previously sparse instrument coverage. Fortunately, GPS instrumentation in this area has increased significantly over the past decade, providing improved resolution on long enough time scales to discern and refine steady strain rates. This work uses GPS data to investigate patterns of horizontal strain rates in southern Cascadia and explore their correlation with quaternary fault zones around the MTJ. To achieve this, we generated regional strain rate maps using gridded and triangulated methods with horizontal GPS data from 2007-2017. Our results indicate that strain rates change across the MTJ from north to south, with compressional signals to the north and extensional signals to the south. We observe high maximum shear strain rates broadly across the San Andreas fault system, indicating that strain is distributed across multiple major fault strands. Lastly, we see regions with high strain rates north of the MTJ that coincide with the locations of three major quaternary fault systems: the Mad River Fault Zone (MRFZ), the Little Salmon fault, and the Grogan fault. Geologic work has already suggested that the MRFZ and Little Salmon fault are two major thrust systems in this region, while the strike-slip Grogan fault facilitates translation of the forearc. Thus, our results verify that these fault systems are actively participating in crustal deformation near the MTJ. However, these maps also suggest that strain may be accommodated by oblique slip on multiple faults, rather than by full partitioning between thrust and strike-slip systems.



Gridded strain rate maps for southern Cascadia. **Left** Maximum shear strain rate map with GPS stations (white triangles) and quaternary faults (purple lines). **Right** Second invariant of strain rate map where warm colors indicate extension and cold colors indicate compression. GPS stations and quaternary faults are shown as green triangles and red lines, respectively.