

T12A-08 Extensional Collapse of the Nevadaplano and Arizona-Plano in the Oligo-Miocene: Lower Crustal Flow and the Generation of Multiple Metamorphic Core Complexes



Monday, 11 December 2023



14:30 - 14:40



155 - South (Upper Mezzanine, South, MC)

Abstract

Multiple lines of evidence suggest the existence of highlands in the SW Cordillera of North America that existed before major Oligocene-Miocene extension (Nevadaplano and Mogollon Highlands in Arizona). These highlands have been linked to Sevier-Laramide crustal thickening. Evidence for a high Nevadaplano include isotopic and paleobotanical proxy methods used to infer a large area of high (3-4 km) elevation. Paleocene-Eocene sedimentary deposits found along the southern portion of the Colorado Plateau, sometimes referred to as Rim Gravels, support the existence of highlands in Arizona. These 'Rim Gravels' contain channel deposits of cobbles and boulders derived from the southwest. Clast size distributions are in accord with rivers draining source-catchment areas that rivaled the present-day Rocky Mountains. The highlands in Arizona experienced rapid extensional collapse beginning around 30 Ma when the East Pacific Rise made first contact with the Farallon Trench. This extensional collapse has been linked to the formation of metamorphic core complexes. These metamorphic core complexes are located along a belt of paleo-thickened crust with a geographic distribution inferred from the restoration of the extensional history back to 30-40 Ma. Recently generated thermomechanical models across such an inferred thickened crust show that its extensional collapse leads to the formation of a major low-angle normal fault that exhumes middle crust to the surface (metamorphic core complexes). These models generate only one metamorphic core complex

along profiles that cut perpendicular to the trend of the mountain belt. Yet in many places in Nevada and Arizona there are two or more core complexes along such profiles across the inferred trend of the paleo-highland. In this study we investigate thermo-mechanical models involving the possibility of a Nevadaplano and Mogollon Highlands that were wider than has been previously inferred from reconstruction efforts. Models involve time-dependent thermal, traction, and velocity boundary conditions and are coupled to erosion and sediment loading. We show that a collapse of a highland greater than 150 km in width typically leads to more than one core complex along extension profiles perpendicular to the mountain belt.

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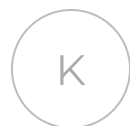
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