What happens during the transition from subduction to collision? Insights from the Greater Caucasus Mountains.

Dr. Nathan Niemi

Continental collisions globally are preceded by the subduction of oceanic lithosphere. As such, the transition from subduction to collision must be a developmental phase in continental collision zones, but the transitory nature of this process, lasting perhaps a few millions years, means that opportunities to study this transition are fleeting, geologically. The impact of this transition, however, are expected to be significant, as the introduction of buoyant continental crust into a subduction zone fundamentally changes the balance of forces at the plate margin, with implications for the magnitude and frequency of seismicity, the growth of topography, the rate of plate motions, and the initiation and orientation of major fault systems. The Caucasus region, which lies between the Black Sea and the Caspian Sea in southwestern Asia, may provide a unique opportunity to study this transition. Geophysical, geodetic, and geological data, when considered together, indicate that the Greater Caucasus Mountains are forming along a plate boundary zone that is transitioning from active oceanic subduction, in the east, to ongoing continental collision, in the west. I will present the lines of evidence that support this interpretation and make the case that the Caucasus region presents a unique and unprecedented natural laboratory for understanding plate boundary processes.