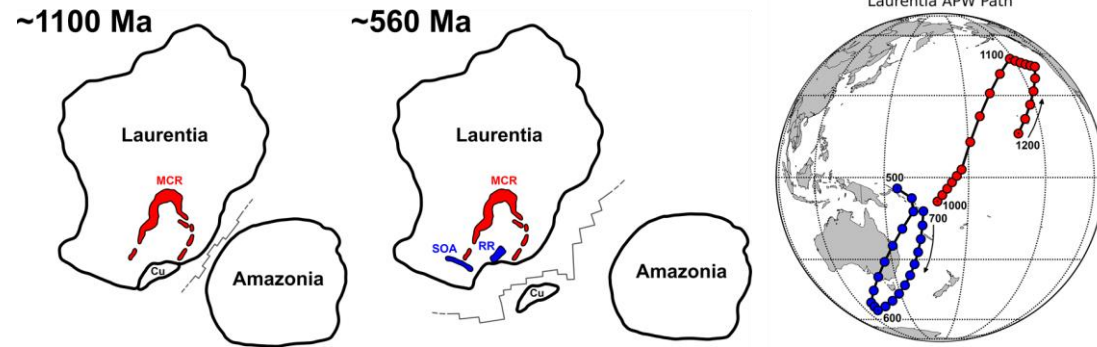


Exploring rift magmatism and evolution through gravity analysis of North America's failed rifts

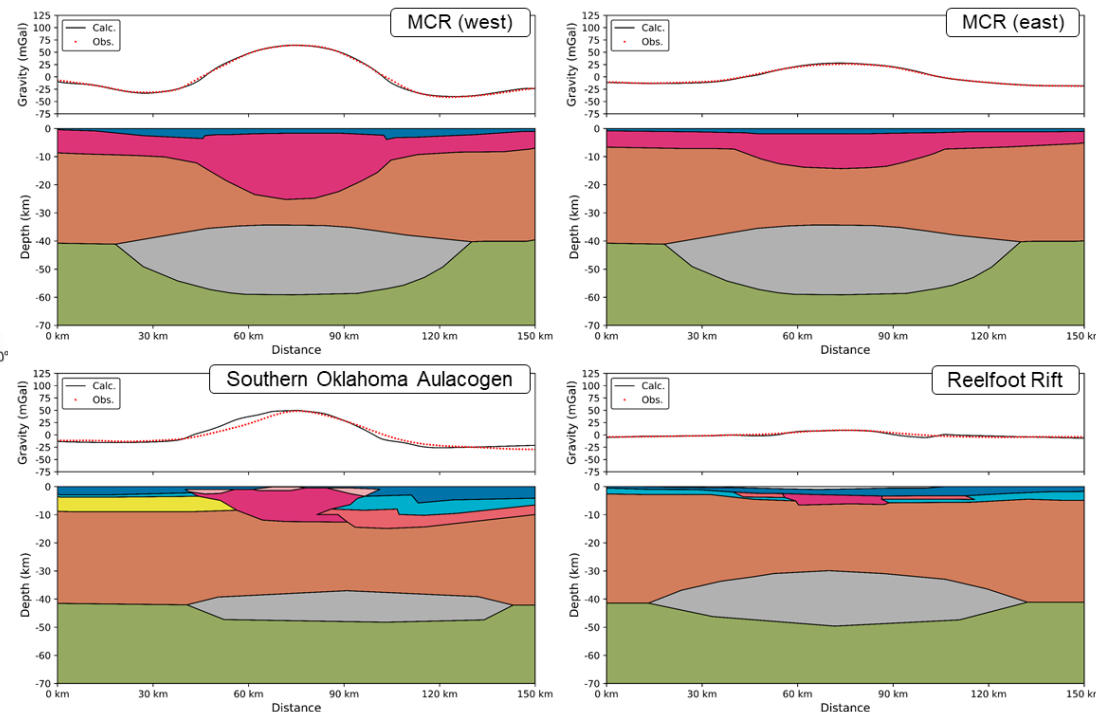
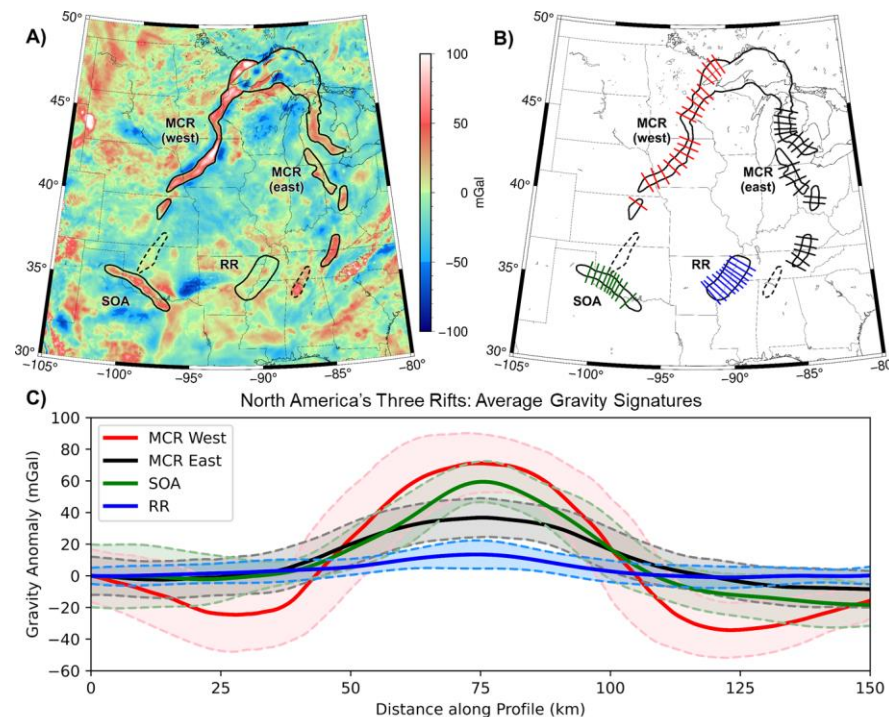
Video Placeholder

Reece Eling, Seth Stein, Carol Stein, and G. Randy Keller – EGU21-3187

The North American craton preserves over a billion years of geologic and tectonic history, among which exists a story of three failed rifts. Two of these, the Midcontinent Rift (MCR) and Southern Oklahoma Aulacogen (SOA) are the most prominent positive gravity anomalies in maps of the region. A third, the Reelfoot Rift (RR), remains hidden in the gravity data. Thus, gravity modeling can provide insight into the similarities and differences between these three features.



The ~1.1 Ga MCR records aspects of the complex assembly of Rodinia, during which Amazonia and Laurentia collided multiple times, with periods of quiescence or rifting between. Both the SOA and RR formed ~560 Ma during the later breakup of Rodinia and subsequent assembly of Pangea. Both events are recorded as cusps in APW paths of Laurentia.



Insight into the complicated history of extension, volcanism, and inversion can be gained from modeling the average gravity anomalies of these rift structures. Both arms of the MCR and the SOA have strong gravity highs along much of their lengths, reflecting greater amounts of rift-filling volcanics and subsequent inversion. The RR has no associated positive gravity anomaly due to few volcanics and a lack of inversion, leaving the high-density rocks buried in the subsurface. All 3 rifts likely contain large underplates at the Moho, which has been supported by recent receiver function data.