Session 5 solicited abstract

New Madrid and Beyond: what Earthscope can teach us about ancient structures, modern deformation, and the relation between them.

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A major question in central and eastern U.S. tectonics is how ancient structures formed, evolved, and influence modern deformation. The area contains paleorifts, basins, sutures, and other faults, all of which would seem likely to be somewhat weaker than their surroundings, and hence candidates for present seismicity. However, some — notably the Reelfoot Rift, Wabash Valley fault system, and St Lawrence valley — appear more seismically active at present. Similarly, some parts of the rifted continental margin — those off Canada, near Boston, and Charleston — appear more active. It is important to assess whether in the long term these locations will remain more active, or whether seismicity will migrate. Presumably a major factor is whether the active areas are weaker than other similar structures, either because of the way they formed or later modification, or whether their preferential activity primarily reflects the present stress field. Earthscope will address this question in several ways. High resolution seismic images of the crust and mantle will show similarities and differences between structures, for example allowing comparison of the Reelfoot and midcontinent rift structures. These will give insight into the difference in formation and evolution between a major rift that failed prior to continental breakup — but is seismically inactive today — and a smaller one that failed as part of a successful breakup but is more active today. The results will hopefully also give insight into what effects these differences have on the area's evolution. In addition, Earthscope GPS stations will help identify effects of Glacial Isostatic Adjustment and other tectonic deformation and assess their possible role in present day seismicity.