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U-PB ZIRCON GEOCHRONOLOGY OF VOLCANIC TUFFS AND WELL CUTTINGS REVEALS INITIATION OF LATE MIOCENE-PLIOCENE SEDIMENTATION IN THE RUKWA RIFT BASIN, TANZANIA BY ~8.7 MA

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U-Pb zircon geochronology confirms a late Miocene to Pliocene depositional age for newly discovered, fossiliferous deposits of the lower Lake Beds succession in the Rukwa Rift Basin in the western branch of the East African Rift System (EARS). The Lake Beds succession is the capping sedimentary unit preserved in the Rukwa Rift Basin and correlates with the latest phase of deposition in many basins along the EARS. U-Pb geochronology on zircons from newly discovered volcanic tuffs indicate that sedimentation of the lower portion of the Lake Beds succession initiated ~8.7 Ma and that deposition continued beyond 3.5 Ma. In addition, we applied detrital zircon U-Pb geochronology to legacy well cuttings from the Galula-1 well in the Rukwa Rift Basin, indicating a corresponding late Miocene to Pliocene up-well younging trend in the youngest detrital zircon populations through this interval, matching the radioisotopic ages on volcanic tuffs from outcrop. These ages match the timing of onset of the nearby Rungwe Volcanic Province. Together, this suggests coeval Neogene rift reactivation, volcanism, and sedimentation, which has important implications for our understanding of the timing of rift formation, evolution of topography and climate, and other fundamental geologic questions that have an impact on understanding vertebrate evolution along the EARS. Preliminary investigation of the Lake Beds succession has resulted in the discovery of fossiliferous horizons, with faunal remains consisting of abundant fish, some turtle and crocodilian elements, as well as rare mammalian remains.

These results also demonstrate the applicability of detrital zircon U-Pb geochronology via LA-ICP-MS to well cuttings, as a tool for dating strata lacking biostratigraphic age control. In basins with syndepositional volcanic input, the youngest zircons in a stratigraphic unit can serve as a proxy for the age of deposition. This technique is applicable to other basins along the EARS and elsewhere. The detrital and tuff-derived zircons dated here provide important temporal context for the rich vertebrate record described from the East African Rift, and help to illuminate the tectonic backdrop and timing of important large-scale faunal shifts in eastern Africa.

Session No. 111

T194. The Context of Our Origins: Geological Studies of Old World Fossil Primate and Hominin Sites
Monday, 26 September 2016: 8:00 AM-12:00 PM

Room 401 (Colorado Convention Center)

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