PBS-SEPM Technical Luncheon

3/22/2022 11:30 AM

Ranchland Hills Golf Club - Vista Room

$25 Early Bird Rate, $30 at the Door or $10 BYOL/Student or $5 Virtual

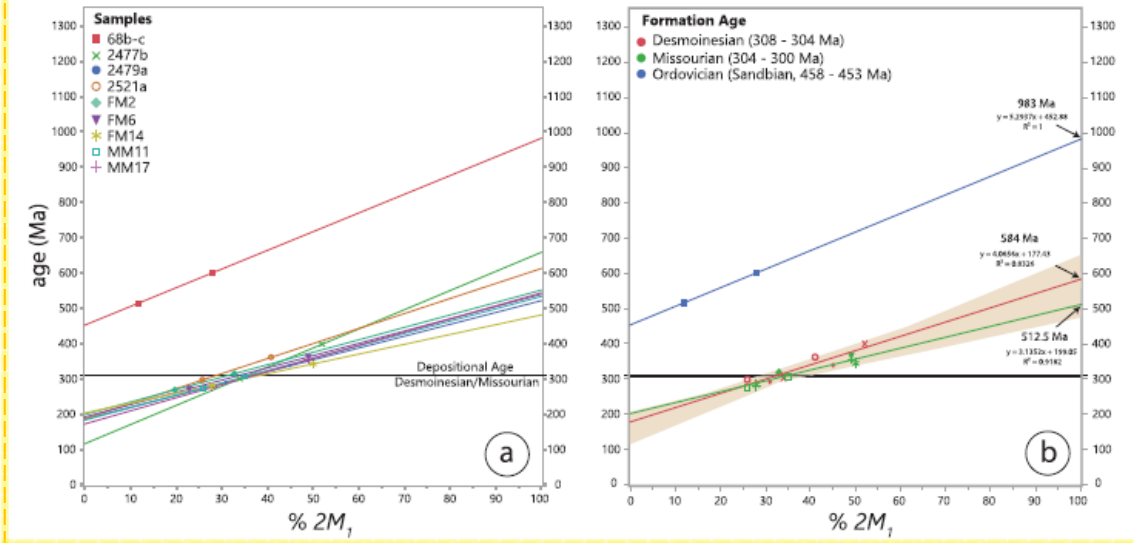
RSVP by 3/18/2022 to info@pbs-sepm.org or online at www.pbs-sepm.org

K-Ar geochronology and trace-element geochemistry of illite from upper Paleozoic shale of SW Laurentia – Insights into sediment origin and drainage pathways in the Anadarko Basin, OK

Dr. Branimir Segvic –Assistant Professor at Texas Tech University

ABSTRACT:

The Anadarko Basin of Oklahoma represents a major Paleozoic depocenter that existed along the rifted margins of southwestern Laurentia. In its infancy it accumulated a thick series of Cambrian through Mississippian detritus while further subsidence caused by inversion of the Cambrian Southern Oklahoma Aulacogen resulted in voluminous Pennsylvanian to Permian sediment. In this talk I will present new data on K-Ar ages and trace-element geochemistry of detrital illite from middle and upper Pennsylvanian shale used to reconstruct sediment origins at the peak period of subsidence of the Anadarko Basin. X-ray diffraction was used to unveil mineral compositions and abundances of illite polytypes in two size fractions of separated illite. K-Ar isotopic analyses were completed for both fine fractions, while the laser ablation inductively coupled plasma mass spectrometry was done for the latter.



All illite separates consisted of mixtures of authigenic (1Md) and detrital (2M1) illite. The Illite Age Analyses showed that the detrital age of Desmoinesian shale is the late Ediacaran (584 Ma), while the age of Missourian shale is the middle Cambrian (512.5 Ma). Trace-element abundances of all analyzed illite, irrespectively of stratigraphic age, are consistent with those of mica from metamorphic rocks. Based on illite detrital age and geochemistry it was inferred that Desmoinesian shale represents a mixture of Neoproterozoic and Cambrian detritus sourced locally, whereas Missourian shale records a provenance shift toward more distal easterly sources from the Ouachita-(Marathon) foreland.

This study has proposed a sediment source transition between the middle and upper Pennsylvanian that likely reflected major changes in the basin paleogeography and progressive development of the east-west (transcontinental) fluvial systems.

BIOGRAPHY: *Branimir Segvic holds a diploma degree in Geology from the University of Zagreb, Croatia, a PhD in Mineralogy from the University of Heidelberg, Germany, and is currently an assistant professor of Geosciences at Texas Tech University in Lubbock, TX. His areas of interest are focused on a range of topics centered around the application of mineral science and low-temperature geochemistry to the solution of diagenetic, paleoclimatic, and sedimentary problems. He is currently working on Late Paleozoic fine-grained clastic rocks from various Mid-Continent basins using integrating geochemical-analysis techniques to determine their provenance in the frame of the amalgamation of Gondwana and Laurentia. He is also interested in diagenesis of clay minerals looking to find mineralogical and geochemical clues as to how the clay mineral composition is related to the nature and history of diagenesis in the context of thermal evolution of sedimentary basins.*