
Detrital Zircon U-Pb Age Constraints on the Provenance of the Upper Jurassic Norphlet Formation, Eastern Gulf of Mexico: Implications for Paleogeography

Thomas Lovell and Amy Weislogel

Department of Geological Sciences, University of Alabama, Box 870338, Tuscaloosa, Alabama 35487

ABSTRACT

U-Pb detrital zircon geochronology and thin section petrology of core samples taken from onshore Alabama and offshore federal lease blocks, including Destin Dome, Pensacola, and Mobile, constrain sediment provenance for the Upper Jurassic Norphlet Formation in the eastern Gulf of Mexico. Previous research of the Norphlet Formation in onshore Alabama suggests that northern sediments originated from metamorphic rocks of the Talladega slate belt and Piedmont, while southern sediments were of primarily igneous origin. The Pan-African Suwannee terrane, which contains igneous and sedimentary rocks of Gondwanan affinity and comprises the majority of the northern Florida basement, is another potential source considering its proximity to offshore eastern Gulf of Mexico; however, input from this source has not previously been identified. Detrital zircons from 12 Norphlet core and cutting samples yield major U-Pb age populations between 300-500, 500-650, 950-1,900, and 2,500-3,000 Ma. These ages correspond with known U-Pb ages of source terranes in the Appalachian Mountains and foreland basin, including plutonic, metasedimentary, and metavolcanic rocks. Populations of 540-580, 600-625, and 2,000-2,200 Ma zircons indicate Gondwanan (Suwannee terrane) sources for southern wells. Norphlet Formation petrologic data plot in continental block, magmatic arc, and recycled orogen fields on provenance discrimination ternary diagrams. Dominant grain types include feldspars, polycrystalline quartz, and metamorphic and volcanic lithic fragments. The integration of geochronologic and petrologic data suggests a sedimentary and volcanic Suwannee terrane source for the southern extent of the study area compared to a provenance of predominantly recycled igneous and metamorphic rocks in the north.