New Constraints on Along-strike Variations in Synrift Magmatism on the Rifted Margin Offshore North Carolina and Virginia from 2D Inversion Results

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Although the Eastern North American Margin (ENAM) is one of the type-locales of a magma-rich passive rifted margin, our current knowledge about the distribution of magma along the rifted margin is limited. Our study presents 2D tomography results from the Eastern North American Margin Community Seismic Experiment (ENAM CSE) offshore North Carolina and Virginia. Twenty-three short-period ocean-bottom seismometers (OBS) deployed along the East Coast Magnetic Anomaly (ECMA) with 2 main transects recorded shots from a 3300- to 6600- cu. in. air gun array of the R/V *Marcus G. Langseth* at shot intervals of 37.5 to 225 m. We examine data from short-period OBS around the ECMA, which is thought to arise from synrift magmatic addition. Refractions from the sediments, crust and mantle (Ps, Pg and Pn, respectively) are observed on data from the majority of instruments examined. Arrivals from OBS lines shot with the larger volume array and larger shot spacing can be observed to offsets > 200 km. Reciprocity checks ensure consistent phase identifications between instruments. To obtain 2D models of P wave velocity structure based on first arrival travel time picks, we used the FAST (First Arrival Seismic Tomography) method (Zelt & Barton, 1998). We tested different initial models and parameterizations to examine their impact on the results. Preliminary velocity models show along-strike variations in the thickness of an interval with velocities of > 7 km/s, which we interpret to represent mafic magmatic intrusion. We compared them with Earth Magnetic Anomaly Grid data and found a good correspondence between the interpreted magmatic intrusions based on high crustal velocities and peaks in the ECMA. Our results thus confirm that there appears to be along strike variations in synrift magmatism along the margin, as implied by magnetic and gravity data (Behn & Lin, 2000). And they also provide a foundation for the establishment of a 3D P-wave velocity model for future.