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Refining Plate Reconstruction Models Using OCT Location & Continental Extension Predicted by Gravity Inversion for the North Atlantic Rifted Margins

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Plate reconstruction models require knowledge of ocean-continent transition (OCT) location, the amount of continental lithosphere extension experienced during breakup and the breakup age. Gravity inversion has been used to estimate the location of the OCT and to determine lithosphere extension across the rifted margins. The gravity inversion method is carried out in the 3D spectral domain and predicts Moho depth, crustal basement thickness and continental lithosphere thinning factor (1-1/β). The gravity inversion method incorporates a lithosphere thermal gravity anomaly correction computed using a lithosphere thermal model conditioned by breakup age and continental lithosphere thinning factor derived from the gravity inversion. A correction to the predicted continental lithospheric thinning factor from gravity inversion is made for the addition of volcanic material produced by decompression melting during breakup lithosphere thinning & seafloor spreading. The gravity inversion method, which is independent of plate reconstruction model constraints and magnetic anomaly data, provides an independent prediction of OCT location. Gravity inversion incorporating a lithosphere thermal gravity anomaly correction has been used to determine Moho depth, lithosphere thinning factor, OCT location and breakup lithosphere thinning for $\sim$50 2D regional profiles across North Atlantic rifted margins including Labrador Sea, Baffin Bay & Norwegian-Greenland conjugate margins. Sediment

thickness derived from seismic refraction/reflection data has been included in the gravity inversion: sediment density is assumed to be compaction controlled. Lithosphere extension estimates across the rifted margins have been used in conjunction with the new OCT locations to refine plate reconstruction models by imposing a lower bound to the amount of continental overlap needed for pre-breakup arrangement of the continents. Comparing crustal thickness obtained from the gravity inversion with seismic estimates allows us to test the age of continental breakup. The lithosphere thermal model used to predict the lithosphere thermal gravity anomaly correction may be conditioned using plate reconstruction models to provide the age and location of oceanic lithosphere which can be used in comparison with the isochron independent method to check for consistency.