39-2 - Booth No. 2: COMPARISON OF THE LITHOSPHERIC STRUCTURES ACROSS LAURENTIA AND PERI-GONDWANAN TERRANES BETWEEN NORTH AMERICA, IRELAND, AND GREAT BRITAIN

Tuesday, 19 March 2024

9:00 AM - 1:00 PM

Armory Ballroom (Doubletree by Hilton)

Booth No. 2

Abstract

Tectonic events such as accretion, subduction and ocean closures during the Paleozoic, impacted paleocontinents Laurentia and Gondwana. Current geographical zones of NE United Stated and NW Europe (Ireland and Great Britain) were affected by these processes, shaping the lithospheric geometry that is preserved nowadays. This study focuses on these geometries on opposite sides of the Atlantic: in central New England (Massachusetts) on the west side of the Atlantic and Ireland and Great Britain on the east side of the Atlantic. We applied two seismological tools for the identification of these geometries: the receiver function analysis technique, involving P to S converted seismic waves in records of P and PKP phases, to examine the variation of thickness of the crust across accreted terranes; and the harmonic decomposition method to identify anisotropic or dipping features. We processed data from a dense seismic array in northwestern Massachusetts (NEST), where we identified a sharp ~15 km offset in Moho depths, where the deeper Moho belongs to Laurentia and is located at ~48 km depth and the one below peri-Gondwanan terranes at ~32 km depth (Masis Arce et al., in review). For comparison, we applied the same methodologies across Laurentia and the peri-Gondwanan terranes Gander and Avalon in Great Britain and Ireland. These results show that the Moho depth across tectonic units varies smoothly, with the Laurentian Moho located at ~35 km depth in England and ~30 km in Ireland, the Gander terrane Moho at ~32 km in both England and Ireland; and the Avalon terrane Moho at ~30 km in England. Comparing the two regions, we find that the thickness of Laurentia is double in NW Europe than in NE United Stated and that the Moho depth variation is more dramatic in northeastern US than northwestern Europe. These differences imply that tectonic events had to impact one side of the Atlantic more than the other one or they might attributed to rheological differences during the accretion events, and/or post accretion events such as uplift and erosion.

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