Helwig, J., Ady, B., Kumar, N., Granath, J. W., Dinkelman,, M. G., Bird, D. E., and Emmet, P. A., 2010, **Reconstructing conjugate margins of the Canada-Amerasian basin: new tectonic constraints from deep seismic data and gravity profiles** (abstract): Eos, Transactions, American Geophysical Union, Fall Meeting Supplement, v. 91, T31A-2145.

Over the past 5 years, decreasing sea ice and increasing scientific and economic interest in the Arctic have prompted new geological and geophysical studies that advance knowledge of the northern continental margins of North America. We report here on ArcticSPAN™ 40-km deep, PSDM (Pre-Stack Depth Migrated) marine seismic reflection profiles and gravity data from the Beaufort Sea of Canada and the US Chukchi Sea that constrain the position of the continent-ocean boundary and the relict spreading center of the Canada Basin, displaying significant variations in the orientation, geometry and deep crustal structure of the passive margin facing the Arctic Ocean. In the Canadian Beaufort Sea three distinct segments of the margin correspond to contrasts of pre-rift foundations: 1. the rifted, rotated Arctic Alaska Terrane west of the Mackenzie Delta (Beaufort segment); 2. the transform-faulted Laurentian crust of the Tuktoyaktuk margin (Tuk segment); and, 3. the rifted Laurentian crust of the Banks Island segment. The thick late Mesozoic-Cenozoic clastic prism of the continental margin was centered in the Mackenzie delta area by Mesozoic rifting of the Canada Basin. The northerly Paleocene-Miocene sweep of Cordilleran deformation modified the passive margin, overprinting the offshore Mackenzie Delta. The interpreted tectonic architecture of the three segments of the Beaufort passive margin demonstrates their distinct roles in opening of the Canada Basin. Two conjugate rifted margin segments (Beaufort and Banks Island) and a linking transform fault margin (Tuk) formed during the separation of the Arctic Alaska Terrane from northwestern Laurentia, in accord with a Jurassic-Aptian rotational model of Canada Basin opening. But the orientation of the Tuk transform segment indicates that a single pole of rotation cannot describe the opening of the basin. Additional seismic profiles from investigations of the Chukchi Sea margin display passive margin structures and rift to pre-rift geology compatible with reconstructions that restore Point Barrow to the Canadian margin opposite northern Banks Island. The locus of rifting of the entire Amerasian Basin appears to be controlled by the Paleozoic structures of the Siluro-Devonian age Caledonian-Ellesmerian orogen and its hinterland terranes along the Arctic-Pacific margins of Laurentia. Our model, supported by deep seismic and gravity interpretations, refines the anti-clockwise rotational plate tectonic model for the opening of the Canada Basin synthesized by Embry and supported by many studies. But the refined rotational model cannot fully explain the development of the Amerasian Basin beyond Banks Island to the Lomonosov Ridge where large misfits remain. Surveys planned or now in progress aim to further constrain passive margin segmentation and improve the tectonic framework for reconstruction of the Amerasian Basin.