EGU22-6253, updated on 12 Aug 2022
https://doi.org/10.5194/egusphere-egu22-6253
EGU General Assembly 2022

The Arctic and NE Atlantic Realms: A comparison

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The disintegration of Pangea north of the Charlie Gibbs fracture zone led to the formation of the NE Atlantic and Arctic Oceans. Both these oceans are exceptionally complex in terms of diversity of the structures they contain and the sequence of events leading to their formation. Recent, extensive work by cross-disciplinary international groups has cast a great deal of new light on the structure and evolution of both oceans. Both have experienced fan-shaped oceanic-type spreading and ridge growth by linear propagation. Both contain shallow, linear bathymetric highs which comprise substantially or almost wholly, continental crust. There are also regions of continental crust, some hyper-extended, capped with lavas. Much of the NE Atlantic Ocean is floored by oceanic crust produced by classical, albeit piecemeal, oceanic spreading. The spreading rate is low and dwindles to ultra-low on the Gakkel Ridge in the Eurasia Basin of the Arctic Ocean. The Gakkel Ridge is flanked by linear, oceanic-like magnetic anomalies although it is not entirely clear whether these represent fully oceanic crust formation or whether some residual stretched continental crust remains beneath this region. The same may be true of the extinct Canada Basin spreading axis in the Amerasia Basin. Likewise, the nature and location of the continent-ocean transition in the NE Atlantic is currently under discussion and it has recently been proposed that the oldest linear magnetic anomalies, closest to the continental edges, characterize some form of magma-injected continental crust. A similar structure has been recently proposed for the Greenland-Iceland-Faroe Ridge and the Alpha-Mendeleev Rise. What is currently unclear is the extents, in both oceans, of the three kinds of crust – true continental crust including microcontinents, magma-injected continental crust, and fully oceanic crust. There is furthermore likely a structural and geological continuum between these types. Classical linear magnetic anomalies are discontinuous between sections of the spreading ridge, raising the question of whether continuous fully oceanic crust connects these sections. In our presentation we will summarize what is known geologically and tectonically about both oceans, compare and contrast them, and outline their evolution. We will discuss the extents of the three types of crust and explore the implications for the history and mechanisms of ocean formation and the origins and

extents of flood basalts. Of particular interest also is the control of pre-existing structure on the style of breakup.