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## Cenozoic relative movements of Greenland and North America by closure of the North Atlantic – Arctic plate circuit

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Models of Cenozoic plate motions between Greenland and North America often use magnetic anomalies in the Labrador Sea and Baffin Bay regions. The crustal origin of some of the older magnetic signatures, (pre C24, Paleocene) is questioned, and these models often portray Paleogene motions inconsistent with geological data from Nares Strait region. We test for a connection between the (mis)interpretation of anomalies and inconsistencies between model predictions and geological evidence by constructing a regional model that is not based on magnetic data in the Labrador Sea region. We do this by closing the North America – Greenland – Eurasian plate circuit from the Paleocene to Eocene – Oligocene Boundary (C25 – C13). Our findings show seafloor spreading in the Labrador Sea initiated during Eocene, and not Paleocene, times. In turn, we argue that C24 and older isochrons in the Labrador Sea are not suitable as isochron markers for modelling plate motions. We further show that the previously noted counterclockwise rotation of Greenland, marking the beginning of plate convergence in the eastern Canadian Arctic, is not a result of changes in seafloor spreading direction, but instead of the initiation of seafloor spreading in the Labrador Sea. Our model shows ~160km of shortening in the Eastern Canadian Arctic.