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The Jan Mayen microcontinent and Iceland Plateau volcanic breakup margins.

Anett Blischke (1,2), Bryndís Brandsdóttir (1), Ögmundur Erlendsson (3), Sverre Planke (4,5), and Carmen Gaina (5)

(1) Institute of Earth Science, Science Institute, University of Iceland, Askja, Sturlugata 7, 101 Reykjavík, Iceland (anb@isor.is), (2) Iceland GeoSurvey, Branch at Akureyri, Rangárvöllum, 603 Akureyri, Iceland, (3) Iceland GeoSurvey, Grensásvegi 9, 108 Reykjavík, Iceland, (4) Volcanic Basin Petroleum Research AS, Oslo Science Park, Gaustadalléen 21, N-0349 Oslo, Norway, (5) Dynamics (CEED), University of Oslo, Sem Sælands vei 24, P.O. Box 1048, Blindern, N-0316 Oslo, Norway

We present the results of detailed seismic volcano-sequence stratigraphic and igneous provinces mapping of the Jan Mayen microcontinent (JMMC) and the Iceland Plateau Rift (IPR) regions. The objective of this study was to tie volcano-stratigraphic elements into the Cenozoic stratigraphic sequence, specifically to assess accretion of the various volcanic and transitional margins, to explain the geo-chronologic anomaly within the central NE Atlantic region.

Vintage and new geological and geophysical datasets (1970′s – 2017) were implemented into our revised tectonic-kinematic model, which is based on seismic reflection and refraction data interpretations, gravity and magnetic data, borehole and seafloor samples, and recent multibeam seafloor maps.

We focus on the initial breakup phase during the emplacement of Early Eocene plateau basalts (56 – 55 Ma) and seaward dipping reflectors from early break-up time (55 – 53 Ma) and the establishment of the igneous margin along the eastern Jan Mayen fracture zone. The south-eastern flanks of the JMMC formed during this period as initial segments of the IPR region which presents a potential source for the onshore East Greenland plateau basalt successions. The eastern flank of the JMMC is clearly delineated by anomaly chron C24n2r (53.36 Ma) from seafloor spreading along the Ægir Ridge. Concurrent rift activity can be seen within the IPR area during Eocene to Early Oligocene (C22n, 49.3 Ma – C13, 33.1 Ma) forming a series of en-echelon volcanic ridges, sill and dyke intrusives within crustal and sediment sections that intersect and split the southern Jan Mayen ridge complex and Jan Mayen Trough.

The IPR rift formed an overlapping spreading centre with the southernmost Ægir Ridge, thus compensating for the Ægir Ridge′s asymmetric seafloor spreading during Eocene and Early Oligocene. The separation of the JMMC from the central East Greenland margin during Oligocene to early Miocene (C13, 33.1 Ma – C6b, 22.2-21.7 Ma) formed a distinct volcanic margin along the western extend of the JMMC. Volcanic activity continued throughout the Neogene along the JMMC′s north-western and northern margins tied to the western Jan Mayen fracture zone, the Eggvin bank, and Jan Mayen Island igneous systems. In summary the JMMC - IPR transition portraits the complexity of long-lived, active volcanic margins within an unstable rift-transfer tectonic setting, exhibiting both lateral and vertical crustal accretion throughout its formation in Eocene to Oligocene times.