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Continent-Ocean-Transition on the Vøring Plateau, NE Atlantic; a tectono-magmatic model derived from densely sampled OBS-data

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A 180.4 km long profile across the Vøring Plateau, NE Atlantic, acquired by use of a tuned airgun array and 35 three-component Ocean Bottom Seismographs (OBS), has been modelled with regards to both P- and S-waves, constrained by gravity modelling. The last rifting phase, breakup and first phase of ocean spreading were associated with extensive magmatic activity, manifested as thick extrusives and intrusives at all crustal levels. The continent-ocean-transition (COB) is modelled over a c. 25 km wide zone from the southeastern end of Inner Seaward Dipping Reflectors (SDR) to the COB. The formation of Inner SDRs are mainly explained by intensive extrusive activity, a system of feeder dykes connecting the SDRs to a high in the intrusive lower crust at c. 12 km depth, and syn-magmatic extension along continentward-dipping normal faults. The up to 6 km thick Inner SDRs are entirely underlain by crust of continental origin. We interpret Outer SDRs as being formed by similar processes as Inner SDRs, that is by syn-magmatic extension. The inferred continentward-dipping normal faults are in the model assumed to sole out in a ductile, transient (magma chamber) layer beneath layer 2B. The average Vp/Vs-ratio of 1.71 for oceanic layer 3 could be conformable with gabbroic rocks with Mg content increased due to influence from the Icelandic hot-spot. We interpret the last phase of rifting to be closely related to the development of crustal scale detachment faults. The initiation of the episode may be referred to as passive rifting, whereas the breakup was actively related to the crustal detachment fault that was closest to the local injection centre. This detachment fault is defined as the Continent-Ocean-Boundary (COB), since it delimits intruded continen-

tal crust to the southeast from anomalous oceanic crust to the northwest. This location of the COB is situated c. 20 km oceanward of earlier interpretations from MCS data. The modelled crustal thickness and P-wave velocity indicates breakup time mantle potential temperatures significantly higher than normal mantle temperature. Normal potential temperature is inferred after c. 5 Ma spreading, but it must be underlined that our model does not extend far enough seawards to accurately sample the transition to normal seafloor spreading. Our model indicates active upwelling of mantle from breakup to c. 5 Ma spreading. A phase from 2.5 to 4 Ma after breakup with relatively constant crustal thickness could indicate an additional input of heat.