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Timing of Continental breakup at the mid-Norwegian margin, Euromargins 2003 OBS Experiment

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The continental margin off mid-Norway is a volcanic passive margin created during the earliest Eocene, and large volumes of magmatic rocks were emplaced during and a few M.y. after continental breakup. In 2003, an ocean bottom seismometer/hydrophone survey was acquired on the Vøring and Lofoten-Vesterålen Margins. The main targets are continental breakup processes, early seafloor spreading, and along-margin variation of magma productivity. The P-wave data were modeled by a combined forward ray-tracing and inversion into 2D velocity-depth models. The continent-ocean transition (COT) is usually well defined as a rapid increase of P-wave velocities at mid- to lower-crustal levels. This transition may occur over a distance of only 15-20 km. Maximum igneous crustal thickness was found to be about 18 km on both of the Euromargins profiles across the outer Vøring Plateau, which is 5-7 km less than reported from older surveys in the area. Lower-crustal P-wave velocities of up to 7.3 km s^{-1} were found at the bottom of the igneous crust here, similar to earlier studies. Magmatic underplating of continental crust was clearly identified at the Lofoten-Vesterålen margin: At 2 km thickness this is a third of what is typical for the Vøring Plateau, and oceanic crustal thickness adjacent to the continent is 7.5-8 km, which is only slightly above normal, both showing the distal location of this part of the margin to the Iceland hotspot influence. We use new magnetic data collected with the OBS data to identify seafloor spreading anomalies adjacent to the COT. The question is whether these anomalies represent true time-lines in an area with large lateral flow distances of lava, which differ from the confined axial magmatism occurring during normal seafloor spreading. The interpretations are tested against a recently published plate spreading model from the Møre margin, where magmatism is lower than on the

Vøring margin. This shows that continental breakup at the Lofoten-Vesterålen occurs within or just after magnetic anomaly 24B, while on the Møre and Vøring margins breakup occurs within 24R: Møre and Vøring breakup takes place at approximately 54.3 Ma, while Lofoten-Vesterålen breakup at 53.1 Ma is about 1 M.y. later. Thus, lower breakup magmatism correlates with delayed continental breakup.