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Physical modeling of the formation of the microcontinent Jan Mayen

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The split between the North American and Eurasian plates began in the Late Pleistocene - Early Eocene (58-60 million years). As the stretching took place, overlapping rift cracks formed. With further evolution, the crack that came from the north fully formed, while the south at that time died out, forming the axis of paleospreading (early Ypresian Age, 49.7 Ma). A hot spot was already functioning near Greenland at that time. In the Priabonian Age (33.1 million years), the hot spot ended under the axis of paleospreading. As a result, the spreading axis jumped (Peron-Pinvidic et al., 2012) creating the Jan Mine main microcontinent and the Kolbeinsain spreading ridge. In addition, the northern branch of the spreading ridge died out and the Aegir paleospreading ridge formed. These raises a number of questions arise:

-What is the mechanism for the separation of the Jan Mine continental block?

-Why did the spreading axis jumped and the Aegir Ridge wither away?

-What is the effect of the Icelandic hot spot on microblock formation?

-Are there similar structures in the world formed through a similar mechanism?

To answer these questions, a physical simulation was performed. Some of these issues were considered in (Muller et al., 2001, Gaina et al., 2003, Mjelde et al., 2008, Mjelde, Faleide, 2009).

Modelling was based on the initial geometry of rift cracks, known oldest magnetic anomalies and existing reconstructions. It showed two possibilities for the formation of the Jan Mayen microcontinent.

The first model is associated with parallel or oblique strike of rift cracks, the oncoming movement of which leads to their overlap, isolation of the microcontinental block, which experienced deformation and rotation.

The second model is associated with the presence of a local heat source (hot spot), the influence of which led to a jump of one branch of the rift towards the hot spot, and to the generation of a significant amount of magmatic material, which could significantly change the initial continental

structure of the microblock. The second method, which combines the influence of the overlap zone and the hot spot, showed the best correlation with natural structures.