

Article Title: Evidence for Low-pressure Crustal Anatexis During the Northeast Atlantic Break-up

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Dear Editor,

Please find enclosed the manuscript entitled “Evidence for low-pressure crustal anatexis during the northeast Atlantic break-up.” On behalf of my co-authors, I would like you to consider it for publication in *Geochemistry*, *Geophysics*, *Geosystems*. This manuscript is an original piece of work that has not been published in another journal and is not under consideration for publication elsewhere.

In this paper we present results obtained on a dacitic unit collected during the IODP Expedition 396 (summer 2021), offshore Norway. This unit was emplaced in post-PETM (Paleocene-Eocene Thermal Maximum) sediments. We used a combination of bulk rock analyses, carbon isotopes and mercury concentrations in the associated sediments, thermodynamic modeling, thermobarometric calculations, in situ major and trace element analyses, and in situ U-Pb zircon geochronology, to investigate the origin and emplacement of this unit. Our results show that this igneous unit was produced in the crust at low pressure and was likely emplaced as a high-density pyroclastic current into a shallow water environment. Our study presents the first petrological evidence for the nature of the continental crust beneath this segment of the mid-Norwegian rifted margin. We propose that low pressure crustal melting was facilitated by a long period (> 7Myr) of intense stretching of the continental lithosphere, preceding the main phase of basaltic volcanism in the area.

This research is of interest to petrologists working on the formation of the North Atlantic Igneous Province, geodynamicists interested in the tectonic reconstruction of the North Atlantic continental breakup, and volcanologists interested in volcanic-sedimentary interactions. We hope that our article will be of wide interest to the *Geochemistry*, *Geophysics*, *Geosystems* readership and should meet the high research impact requirements of the journal. The manuscript has been formatted according to the online directions.

As potential reviewers for this manuscript, we suggest:

- **Bernardo Cesare**, Padova University, Italy, bernardo@dmp.unipd.it
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Thank you in advance for your time and consideration.

Sincerely yours,
Ashley M Morris



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