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# New climate reconstruction of the Lau Extinction Event (Late Silurian) from boron isotopes in brachiopods

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The Ludfordian (~424 Ma) "Lau Event" was the last of three Silurian mass extinctions. It is characterized by one of the largest carbon isotope excursions of the Phanerozoic with bulk rock $\delta^{13}C$ increasing to ~8‰ in less than 1.5 million years [1]. Possible explanations include enhanced burial of organic matter driven by marine anoxia, changes to weathering rates, and/or increased nutrient flux to the ocean [2]. However, the underlying driving mechanism remains debated. To better inform on the environmental and climatic conditions during the Lau Event, we investigated the boron, strontium, carbon and oxygen isotopic composition of well-preserved brachiopod specimens recovered from four drill cores in the Baltic Basin of central Lithuania: Vidukle-61, Bebirva-111, Bebirva-108 and Bebirva-110, which define a deeper to shallow shelf transect in the palaeo-tropics of the Rheic Ocean. All cores yielded abundant specimens which were screened by optical microscope inspection to identify pristine clean shell parts for sampling. Trace element analyses confirmed excellent preservation and no clay contamination as evident by Mn/Ca and Al/Ca analyses both <300 µmol/mol for most samples (n=65). Preliminary brachiopod carbon isotope data reveal a $\delta^{13}C$ increase by approximately 8‰, corroborating the bulk rock pattern, with brachiopod $\delta^{18}O$ values ranging from approximately –7‰ to –2.5‰. Boron isotope analyses are ongoing and will be used to assess changes in seawater pH and atmospheric $CO_2$ levels. Further constraints on seawater chemistry and the age of the samples will be provided from paired $^{87}Sr/^{86}Sr$ analyses. Our multi-proxy records will provide new knowledge to enhance understanding of this enigmatic event and in assessing the effects of climate changes on past ecosystems.

## References

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