



## **The largest delta plain in Earth's history and its implications for life in the Triassic**

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Low-lying delta plains were sites of biotic survival, recovery and evolution following different environmental crises throughout the Phanerozoic. Deltaic environments are also important because their associated prodelta, delta front and interdistributary bays offer wide shallow marine areas suitable for interaction between the marine and terrestrial realms, and widespread paralic areas dominated by brackish water also favour resilient organisms adjusted to stressed environments which thrive following mass-extinctions. We show that the Triassic Boreal Ocean hosted the largest delta system in the history of Earth, and discuss the potential implications of its development on the evolution of Triassic life on the northern coast of Pangea.

Covering more than 1 000 000 km<sup>2</sup>, Triassic delta system of the Boreal Ocean out-scale every modern analogue, and although comparably large river systems existed in Earth's history, none are associated with a delta plain traceable over areas equivalent to the Boreal Ocean. Prerequisites for its widespread nature includes a large drainage basin, greenhouse climate with heavy monsoonal water discharge, and most importantly a sedimentary basin on average one order of magnitude shallower than modern equivalents. This facilitated a low-gradient, vegetated delta plain stretching from the Uralides in the southeast to Svalbard and the Canadian Sverdrup basin to the northwest. Evidence for its distribution is seen both in seismic datasets from the Barents Sea and in outcrops on Svalbard and the northeastern Canadian Arctic islands.

Given its widespread nature, the Triassic Boreal Ocean likely played an important role in the recovery and evolution of early life in northern latitudes. Furthermore, when considering that both the subtropical and tropical areas of Pangea were inhospitably hot during discrete periods in this prevailing greenhouse setting, humid high-latitude areas become even more important for the evolution of life in the Triassic. This is corroborated by palynological data indicating that several Triassic taxa first occurred in the Boreal Ocean and migrated southward, in contrast to other time periods. Given the vast areas of favourable habitats offered by the largest delta in Earth's history, this important sedimentological factor should be considered alongside climatic and biological forcing factors.