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Water mass denitrification during the latest Permian extinction in the Panthalassic Ocean

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The latest Permian extinction (LPE) event, about 252 Myr ago, resulted in the disappearance of >90 % of marine and terrestrial species. Possible explanations invoke, Siberian Trap volcanism, anoxia, H2S poisoning draw down of bioessential elements or a combination of these. Recent observation of coal ash dispersion into global oceans prior to LPE suggest global ash fall could have created toxic marine (terrestrial) conditions. Recent work also suggests volcanic mercury emissions may have added to toxic marine conditions. While development of marine euxinic conditions in the Tethyan region across the LPE is widely accepted, inferences on the redox and environmental conditions of the Panthalassic Ocean more equivocal. Indications of (photic zone) euxinia occur in marginal areas of Panthalassa. In central pelagic areas, however, expansion of low oxygen conditions across the LPE may be restricted to the oxygen minimum zone rather than towards the photic zone or the seafloor. Here, we report the [U+F064]15N isotopic signature in Late Permian – Early Triassic sediments from the Buchanan Lake section in the Sverdrup Basin, Canadian Arctic. Deep water marine sedimentation in the Sverdrup Basin, connected to Panthalassa via a western seaway, allows inferences on the nitrogen cycling across the LPE. We confirm that expansion of low oxygen conditions in the Panthalassic Ocean began prior to the paleo-Tethys Ocean. Further, the detailed correspondence of changes in denitrification, nitrate utilization/fixation across the LPE in both oceans indicate rapid reorganization of the marine ecosystem in response to changes in nutrient inventories, probably mediated through the eruption of the Siberian Traps.