ABSTRACT: The coupled 100,000 year variations in ice volume, temperature, and atmospheric CO2 during the late Pleistocene are generally considered to arise from a combination of orbital forcing, ice dynamics, and ocean circulation. Also previously argued is that changes in glaciation influence atmospheric CO2 concentrations through modifying subaerial volcanic eruptions and CO2 emissions. Building on evidence that ocean ridge volcanism responds to changes in sea level, it is suggested that ocean ridges play an important role in generating late-Pleistocene 100 ky glacial cycles.

If all volcanic CO2 emissions responded immediately to changes in pressure, subaerial and ocean-ridge volcanic emissions anomalies would oppose one another. At ocean ridges, however, the egress of CO2 from the mantle is delayed by tens-of-thousands of years, or longer, owing to ascent time. A simple model involving temperature, ice, and CO2 is presented that oscillates at ~100 ky time scales when incorporating a delayed CO2 contribution from ocean ridge volcanism, even if the feedback accounts for only a small fraction of total changes in CO2.