SW Pacific export production since the Last Glacial Maximum: No evidence for iron fertilisation

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The stimulating effect of dust on export production (EP) has been clearly demonstrated for the Atlantic Subantarctic, on both orbital [1] and millennial [2,3] timescales. Here we infer EP since the LGM at four sites around New Zealand using 230-Thorium-normalised fluxes of biogenic opal, carbonate, excess barium, and organic carbon. In Subtropical Waters and the SAZ, biogenic fluxes have not changed markedly since the LGM. The only exception is a site currently north of the subtropical front. Here we suggest the subtropical front shifted south over the core site between 18 and 12 ka, driving increased EP. At all sites, lithogenic fluxes were greater during the LGM compared to the Holocene due to a combination of increased aeolian and glaciogenic inputs. From these observations, we propose that even though increased glacial dust deposition may have relieved iron limitation within the SAZ around New Zealand, the availability of silicic acid limited diatom growth and thus any resultant increase in carbon export during the LGM. Therefore, silicic acid concentrations have remained low since the LGM. This result suggests no change in the co-limitation of EP by silicic acid and iron in the SAZ around New Zealand since the LGM.

[1] Martinez-Garcia *et al*. (2011), *Nature* **476**, 312-315. [2] Anderson *et al*. (2014), *PNAS* **372***(2019)* [3] Martinez-Garcia *et al*. *et al*. (2014), *Science* **343**, 1347-1350.