

A 30 second summary of the Rafter et al. (2012) paper in *Global Biogeochemical Cycles*: Subsurface tropical Pacific nitrogen isotopic composition of nitrate: biogeochemical signals and their transport

Bottom Line: Surface ocean nutrients must be resupplied from the deep sea via the Southern Ocean. I identify the pathway and the influence of organic matter remineralization and mixing.

New and published nitrate $\delta^{15}\text{N}$ measurements (symbols in A) allow me to track nutrients from their source in the Southern Ocean through intermediate depth waters (B) to the tropics. Mixing and organic matter remineralization dramatically alter the nutrients along the way.

In other words, upwelling in the Southern Ocean is a critical step for lower latitude nutrients, but it is just one of several processes affecting lower latitude nutrients.

