# Relationship between surface dissolved iron inventories and net community production during a marine heatwave in the subarctic northeast Pacific

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At Ocean Station PAPA (OSP) (50°N, 145°W) in the subarctic northeast Pacific, sea surface temperature anomalies (SSTa) up to 3°C above the 1981-2010 mean occurred between 2013 and 2015, a phenomenon colloquially known as the 'Blob'[1]. Diminished winter convection in 2013-14 resulted in increased stratification, shoaling of the mixed layer, lowered surface macronutrients (Si, N, P) inventories, and coincident shifts in phytoplankton community composition [2]. These physical and chemical changes combined with a phytoplankton community dominated by pico/nanoplankton resulted in little change in net community production (NCP) during the spring and summer of 2014 followed by a virtual collapse of NCP in spring-summer 2015 [3].

Iron (Fe) availability is known to limit NCP at OSP and diminished vertical mixing in the winters of 2013-14 and 2014-15 would likely make Fe-limitation more acute. Bif *et al*. 2019 hypothesized that the resilience of the OSP ecosystem NCP in 2014 was related to retention and efficient recycling of Fe in the mixed layer. Further they proposed that export of Fe in spring-summer 2014 followed by failure to resupply with weak winter convection in 2014-15 led to more severe Fe-limitation which collapsed NCP in spring-summer 2015.

Here we report dissolved Fe concentrations (DFe) measured in the upper 400m at OSP in winter 2013-2015. The winter of 2014 had an average mixed layer DFe of 0.43+/-0.02 nmol/kg. The winters of 2013 and 2015 had DFe inventories that were ~4 to 8-fold lower than winter 2014, respectively. The elevated Fe inventory at the beginning of the 2014 growing season suggests that higher DFe combined with efficient Fe-recycling played a role in maintaining NCP in 2014 despite diminished vertical mixing during the Blob.

[1] Bond *et al.* (2015) *Geophys. Res. Lett.* **42**, 3414-3420. [2] Peña *et al.* (2019) *Limnol. Oceanogr.* **64**, 515-525.[3] Bif *et al.* (2019). *Global Biogeochem. Cycles.* **33**, 1174-1186.