Supplementary Material

Iron "Ore" Nothing: Benthic iron fluxes from the oxygen-deficient Santa Barbara Basin enhance phytoplankton productivity in surface waters

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Figure S1. Development of dissolved Fe(II) concentration in the supernatant water of benthic flux chambers (BFC) deployed at the studied stations in the Santa Barbara Basin during the AT42-19 expedition (see also data in **Table 1**). The increase (slope) in Fe(II) over time was used for the calculation of benthic Fe(II) fluxes.



Figure S1. Continued.



Figure S1. Continued.



Figure S2. Scatter plot for the dissolved iron concentrations in the upper 100 m of the ocean from field measurements along the US West Coast (y-axis) and from the ROMS-BEC model, where we have field measurements (x-axis). Model data are sampled seasonally according to field measurements. R = 0.5



Figure S3. Modeled oxygen concentration throughout the domain where 80 percent of the oxygen concentration is between 20 to 100μ M.



Figure S4. Dissolved iron (dFe) concentrations averaged between 100-200 m: (a) measured data (see manuscript section 2.4), (b) model results.



Figure S5. Atmospheric dFe deposition into the surface ocean of the CCS (32-48N). Higher atmospheric dFe deposition is observed north of 42°N.



Figure S6. (a) Surface dFe anomalies, (b) surface NO₃⁻ anomalies, and (c) vertically integrated net primary production (NPP) throughout the domain from the *Low Oxygen Threshold-100* model run relative to the *Control* model run. Graphs focus on areas around the SBB.



Figure S7. Benthic dFe flux anomalies with relative to the Control run throughout the domain from (a) Low Oxygen Threshold-100, (b) Low Oxygen Threshold-65, and (c) High-flux model experiments.



Figure S8. (a) Surface dFe anomalies, (b) Surface $NO_3^{=}$ anomalies, and (c) vertically integrated net primary production (NPP) in the full domain from the *High Flux* model run relative to the *Control* model run.



Figure S9. (a) Surface dissolved Fe, (b) surface NO_3^- anomalies, and (c) vertically integrated net primary production (NPP) for the full domain from the *Dust-off* model run relative to the *Control* model run.

model simulations.			
Model simulations	Benthic Fe flux [mol d ⁻¹]	Mean surface dFe [nM]	NPP [mmol C d ⁻¹]
Control	3.22e+13	0.245	37.85
Hypoxia100	1.13e+13	0.228	37.88
Hypoxia65	2.05e+13	0.239	37.86
High-flux	7.56e+13	0.275	37.85

0.203

37.36

3.22e+13

Dust

Table S1. Full model domain of benthic Fe flux (mmol d⁻¹), mean surface dFe concentration (nM), and total integrated NPP (mmol C d⁻¹) from different model simulations.