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Vertical turbulent iron flux sustains the Green Belt along the shelf break in the southeastern Bering Sea

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To evaluate the impact of vertical turbulent iron flux on the summertime biological productivity in the Bering Sea Green Belt (GB), we conducted the concurrent observations of dissolved iron (D-Fe) and turbulence in the Bering Sea for the first time. We show that the GB can be sustained by iron supply from iron-rich, subsurface thick layer distributed along the southeastern shelf break where the GB is located, via strong turbulent vertical mixing. The flux ratio of D-Fe and nitrate was within the range of the N/Fe uptake ratio by GB phytoplankton, suggesting this flux of nutrients can sustain GB productivity. We also analyzed historical hydrographic data and suggest the thick subsurface layer along the GB is formed by the mixing of relatively warm water with some iron from the Aleutian Passes and iron-rich outer-shelf cold water in which the D-Fe derived from seafloor sediment is suspended due to strong vertical mixing.