Mesoscale effects on carbon export: a global perspective
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North Pacific: Reduced iron transport limits production

Subantarctic Pacific: Narrower, deeper mixed layers redistribute production and export

South Atlantic: Reduced iron, plankton community shift

Model and Results

Model:
• 5 year CESM1-BEC 0.1 and 1 degree simulations
• Full ocean biogeochemistry

Result Highlights:
• Mesoscale resolution has a small effect on globally integrated carbon export (< 2%), but compensating regional impacts are up to ±50%.
• Improved representation of coastal jets and mesoscale turbulence limit export in regions where shelf-derived nutrients fuel production.
• Deeper mixed layers with mesoscale resolution result in enhanced production in some regions

Export Production

Mixed Layer Depth

Net Primary Productivity

e-ratio = EP/NPP

\[ \text{EP (umol C m}^{-2}\text{ d}^{-1}) \quad \Delta \text{EP (% difference)} \]

\[ \text{NPP (umol C m}^{-2}\text{ d}^{-1}) \quad \Delta \text{NPP (% difference)} \]

\[ \text{Mixed Layer Depth (m)} \quad \Delta \text{MLD (% difference)} \]

\[ \text{E-ratio (-)} \quad \Delta \text{E-ratio (% difference)} \]