



The physical responses depicted on the diagram are:

- (1) increased CO_2 solubility in response to more open water and lower salinity ($\text{CO}_2 \downarrow$),
- (2) decreases CO_2 solubility with increasing temperature ($\text{CO}_2 \uparrow$),
- (3) the burial of organic C in deep ocean sediments ($\text{CO}_2 \downarrow$),
- and
- (4) the release of inorganic carbon from sediments, ocean floor, and submerged permafrost ($\text{CO}_2 \uparrow, \text{CH}_4 \uparrow$).

The biotic feedbacks include:

- (5) biotic productivity response to increased light and nutrients ($\text{CO}_2 \downarrow$),
- (6) stable photic zone ($\text{CO}_2 \uparrow$),
- and
- (7) warming induced increases in decomposition and methanogenesis ($\text{CO}_2 \uparrow, \text{CH}_4 \uparrow$).

Figure 14: Marine carbon responses and pathways to warming in the Arctic that influence the climate system. Responses of sea ice, glaciers, and seabed permafrost (on the left) are coupled with biotic responses (on the right) through several mechanisms affecting carbon dynamics. Modified from McGuire et al. (2006).

Roberts, A. et al. 2010. A Science Plan for Regional Arctic System Modeling, International Arctic Research Center, University of Alaska Fairbanks.

Graphic design by Russ Mitchell