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## The Water Mass Transformation Framework for Ocean Physics and Biogeochemistry

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To understand the role of the ocean in the climate system, it is no longer sufficient to study either physics or biogeochemistry. Future efforts need to combine these disciplines to truly understand our future climate. The water mass transformation (WMT) weaves together circulation, thermodynamics, and biogeochemistry into a description of the ocean that complements traditional Eulerian and Lagrangian methods. Here we present a derivation of a WMT framework that offers an analysis that renders novel insights and predictive capabilities for studies of ocean physics and biogeochemistry that determine ocean tracer uptake, circulation and storage. We will discuss application for this framework for biogeochemical studies and its potential for inferring unmeasurable biogeochemical processes from estimates of the measurable physical processes.