

Controls on Ocean Carbon Fluxes and Inventory: from Paleochemistry to Future Carbon Sequestration

RICHARD E. ZEEBE¹

¹University of Hawaii, SOEST, Department of Oceanography,
Honolulu, HI 96822, USA. zeebe@hawaii.edu

This presentation will briefly review the fundamental controls on ocean carbon fluxes and inventory across various time scales. It will become evident that the ocean's function in the global carbon cycle is better described as one key control on a dynamic flux balance, rather than a static storage reservoir. I will present new results on the consequences of past changes in the ocean's major ion chemistry on equilibrium constants and the ocean's CO₂ system over the past 100 Myr, including the ocean's carbon inventory, or DIC (Total Dissolved Inorganic Carbon). These changes have important implications for the ocean's buffer capacity and atmospheric CO₂ sensitivity to carbon perturbations throughout the Cenozoic. Specifically, I will compare the present/future sensitivity to that during massive carbon perturbations in the past such as the Paleocene-Eocene Thermal Maximum (PETM, ~56 Myr ago). Finally, I will comment on geoengineering schemes that have been proposed to sequester anthropogenic carbon in the ocean, including ocean liming.