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Carbonate System Changes Within an Evaporating Sea Spray Droplet

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Modeling the air-sea flux of CO_2 is a key factor in understanding climate change and predicting its effects. The contribution of sea spray to this flux is highly uncertain yet important for reducing error margins in global estimates. In this work, a modified CO2SYS routine is used to quantify the effect of evaporation on aqueous carbonate reactions in sea spray in order to assess this flux. Factors that affect these reactions are the increasing salinity and temperature changes of the droplet as it evaporates. The size of the droplet is also a determining factor as it affects the time aloft and thus the amount of evaporation and gas exchange that can occur. Using these factors and a number of simplifying assumptions, we model the change in DIC, TA, pCO_2 and pH in an evaporating sea spray droplet.