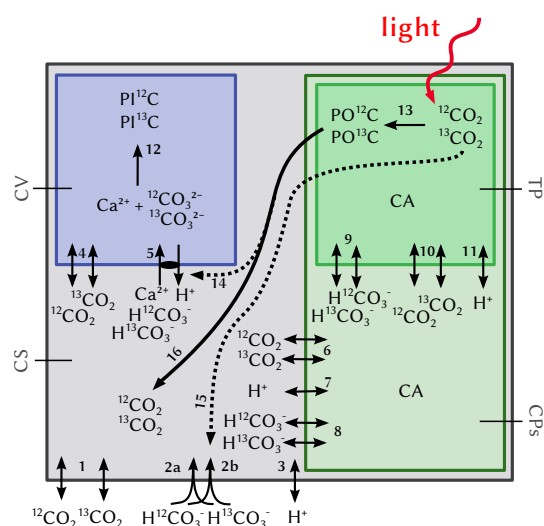


Stable carbon isotope signals in particulate organic and inorganic carbon of coccolithophores - A numerical model study for *Emiliana huxleyi*

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external carbonate system

- 1,4,6 $^{12}\text{CO}_2$ and $^{13}\text{CO}_2$ diffuse independently
- 2a Permanent HCO_3^- uptake, $\text{H}^{12}\text{CO}_3^-:\text{H}^{13}\text{CO}_3^-$ ratio equals ratio in seawater
- 2b Inducible HCO_3^- uptake, $\text{H}^{12}\text{CO}_3^-:\text{H}^{13}\text{CO}_3^-$ ratio equals ratio in seawater
- 3,7,11 pH-regulating H^+ fluxes
- 5 Energy (respiration)-dependent $\text{Ca}^{2+}/\text{HCO}_3^-/\text{H}^+$ antiporter, transported $\text{H}^{12}\text{CO}_3^-:\text{H}^{13}\text{CO}_3^-$ ratio equals ratio in cytosol
- 8, 9 Independent $\text{H}^{12}\text{CO}_3^-$ and $\text{H}^{13}\text{CO}_3^-$ fluxes following concentration gradient
- 10 Slow CO_2 diffusion, $^{12}\text{CO}_2$ and $^{13}\text{CO}_2$ diffuse independently
- 12 Calcite precipitation, $^{12}\text{CO}_3^{2-}$ and $^{13}\text{CO}_3^{2-}$ fixation into PIC with same ratio as in CV
- 13 Photosynthetic CO_2 fixation, [RubisCO] (i.e. $R_{\text{max}}^{\text{Rub}}$) increases with light, RubisCO discriminates against $^{13}\text{CO}_2$
- 14 At high respiration rates, transporter 5 is activated
- 15 When $[\text{CO}_2]$ around RubisCO is low, HCO_3^- uptake (2b) is upregulated
- 16 Respiration releases $^{12}\text{CO}_2$ and $^{13}\text{CO}_2$ into CS in the ratio POC was produced before

