



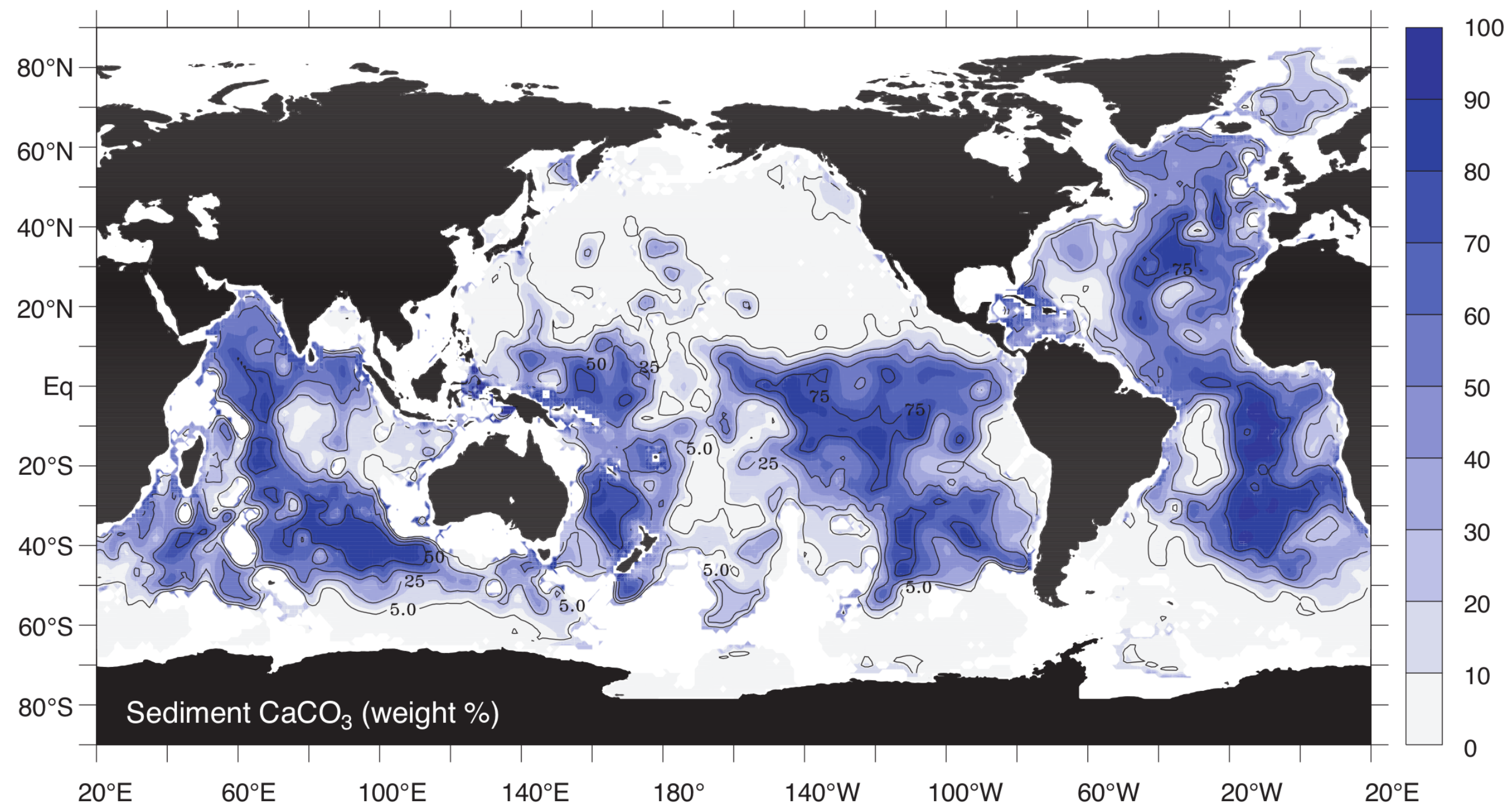
Lecture 20: CaCO₃ saturation

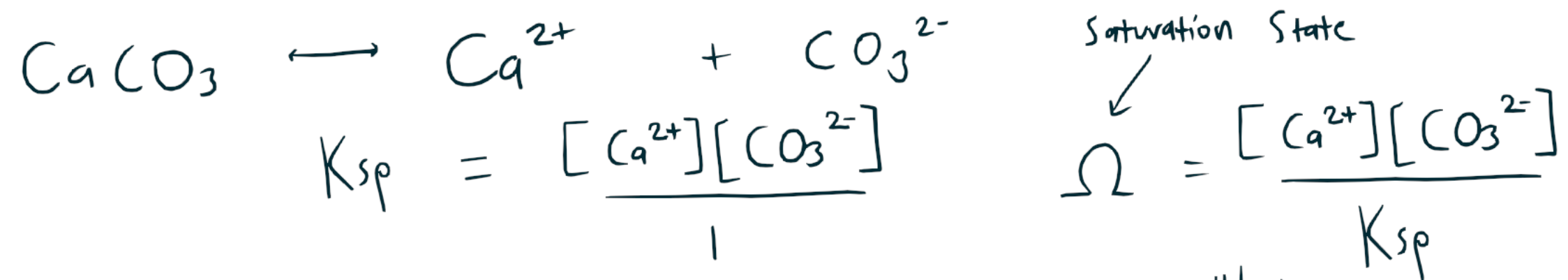
1. CaCO₃ Saturation and compensation

- A. Seafloor CaCO₃
- B. Pressure and Temperature sensitivity of K_{sp}
- C. $[\text{CO}_3^{2-}]$ and reactions that change it
- D. Circulation
- E. Compensation for Alkalinity source changes

We acknowledge and respect the lək'wəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.







$\Omega = 1$ equilibrium

$\Omega > 1$ super saturated (min precipitates)

$\Omega < 1$ under saturated (min dissolves)

Calcite

$$K_{sp} = 10^{-6.37}$$

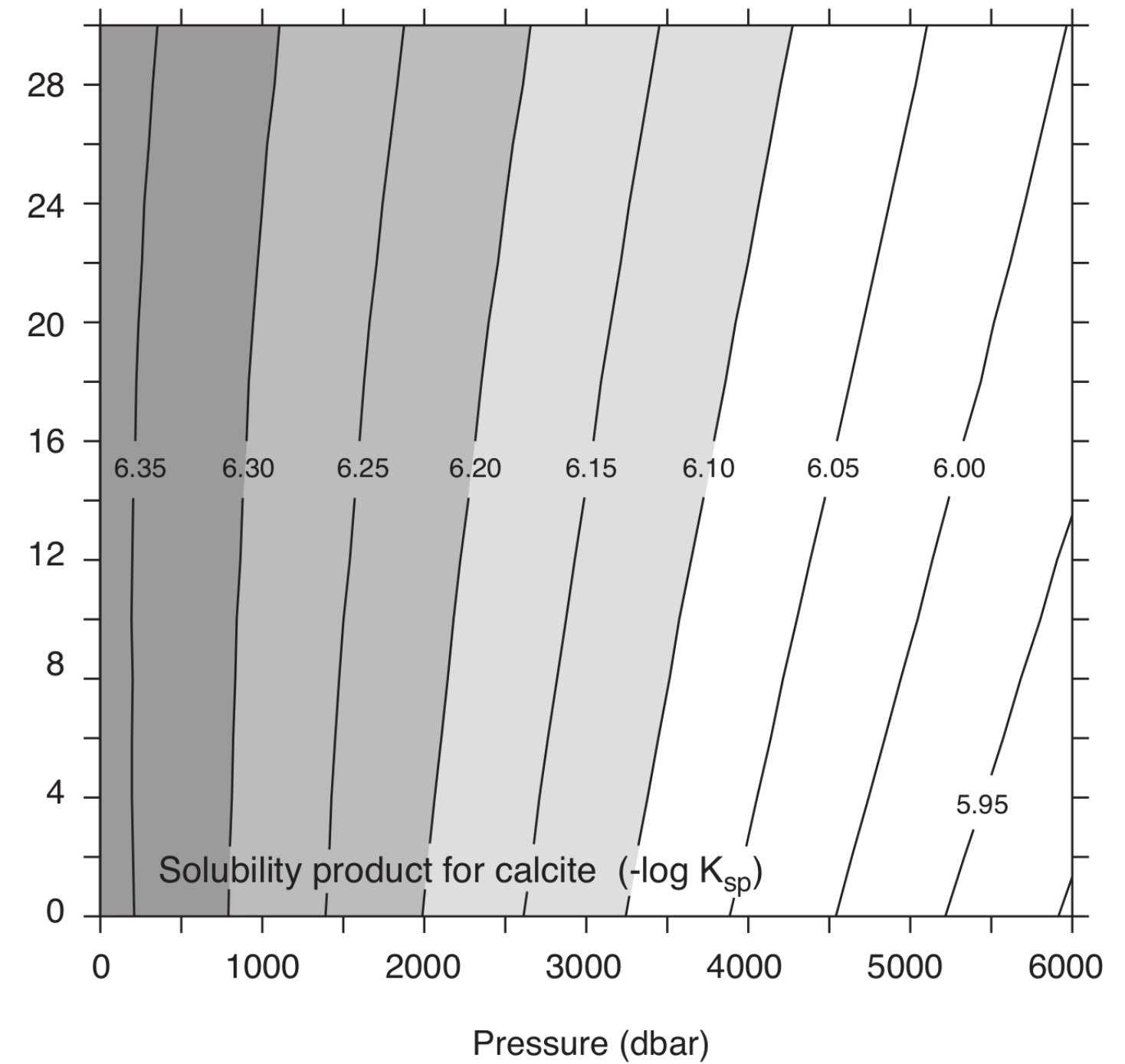
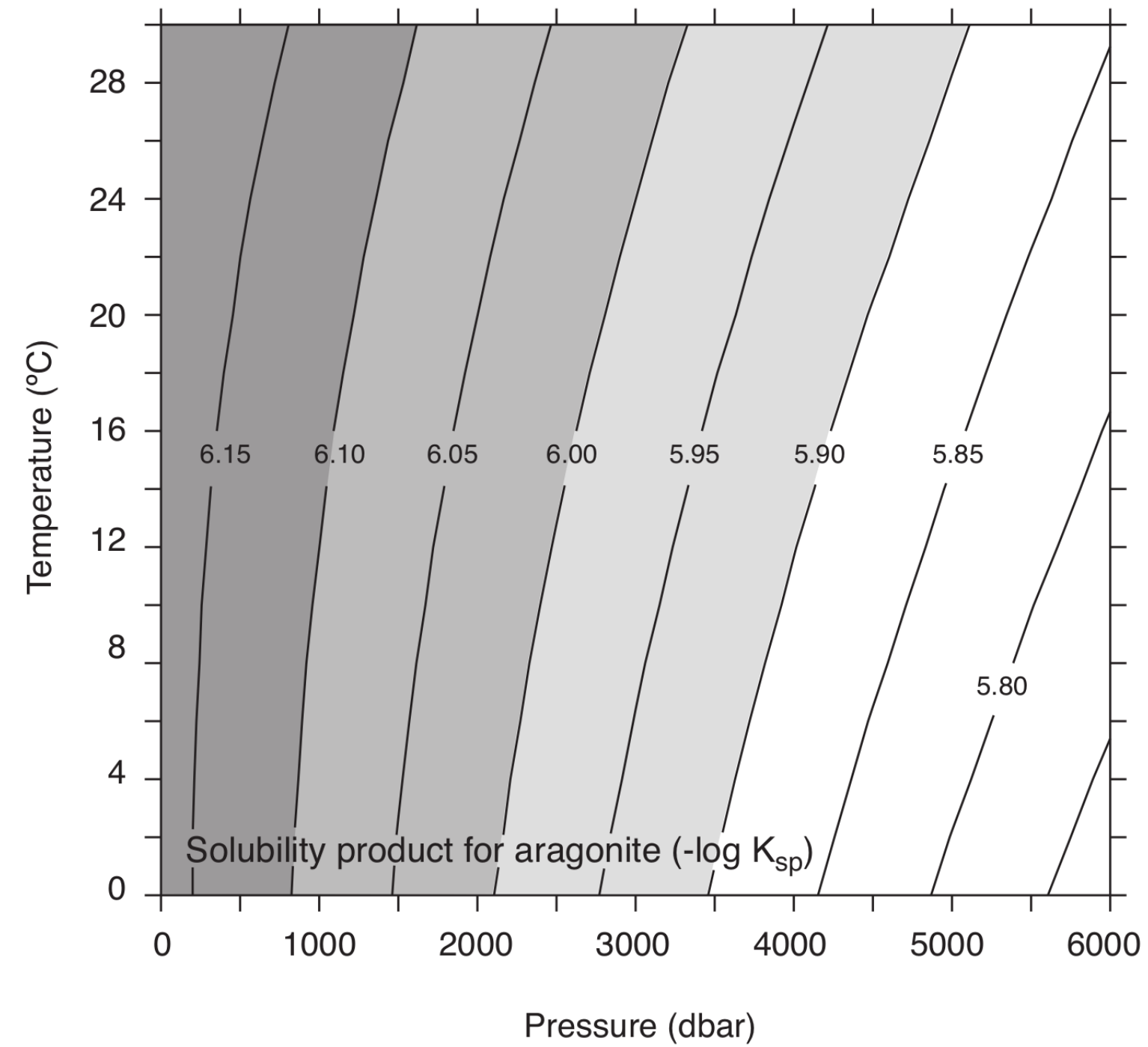
Aragonite

$$K_{sp} = 10^{-6.19}$$

which mineral is more
soluble in seawater?

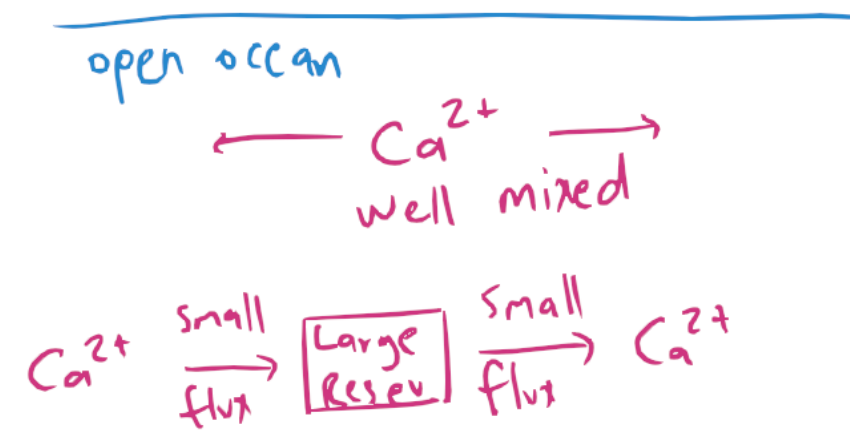
* Aragonite higher
 K_{sp} so "easier"
to dissolve.





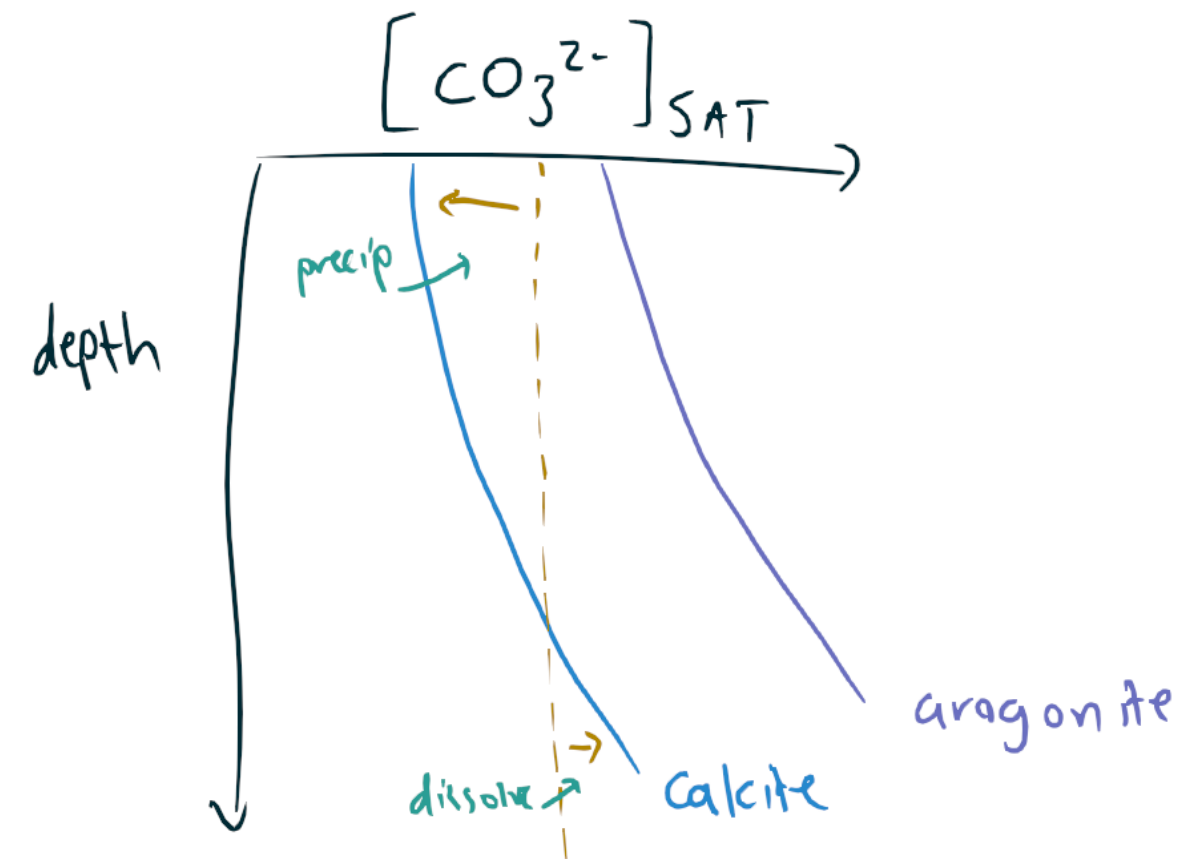
Note: 1 dbar is approximately the hydrostratic pressure for 1 meter of water depth

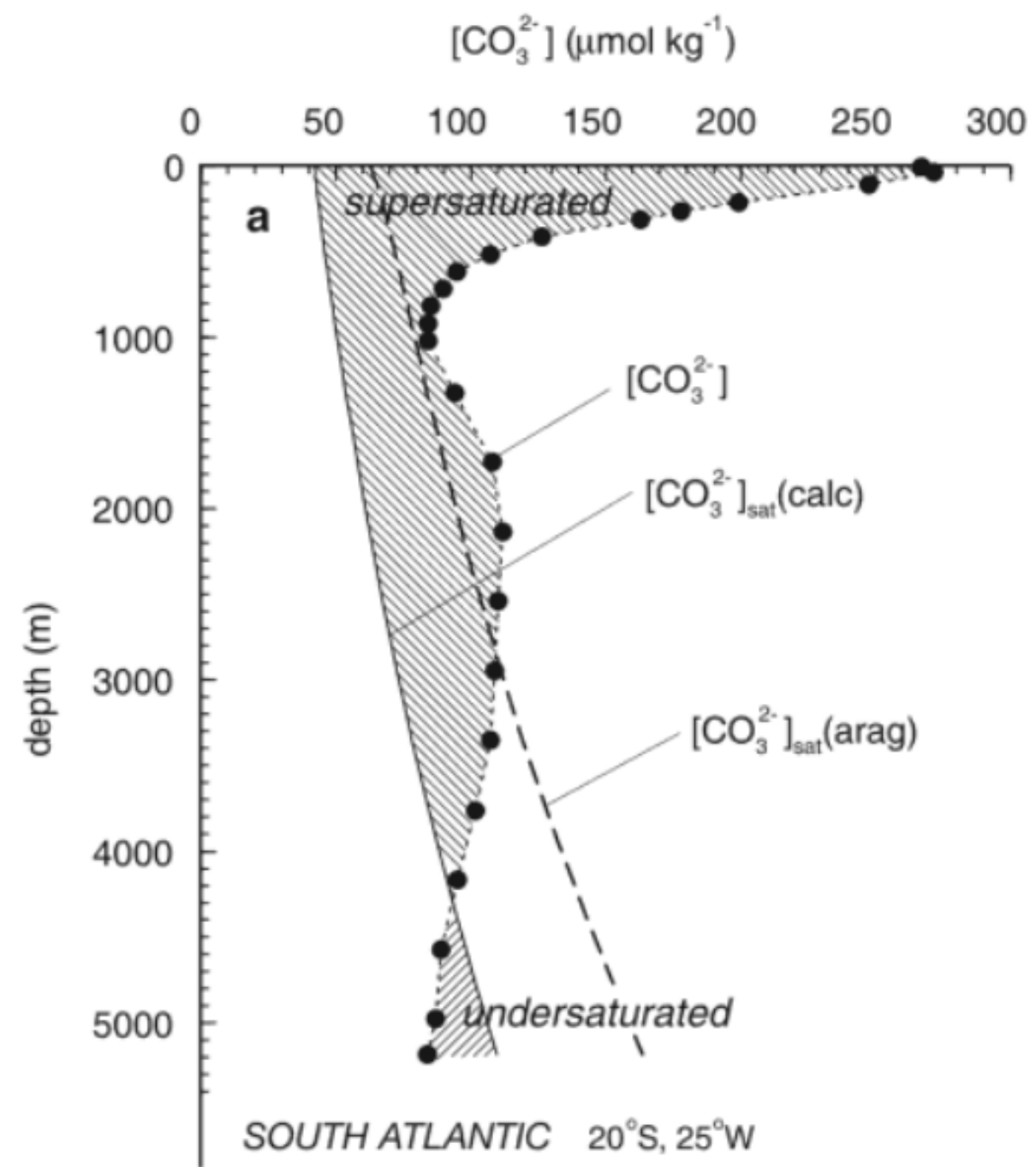


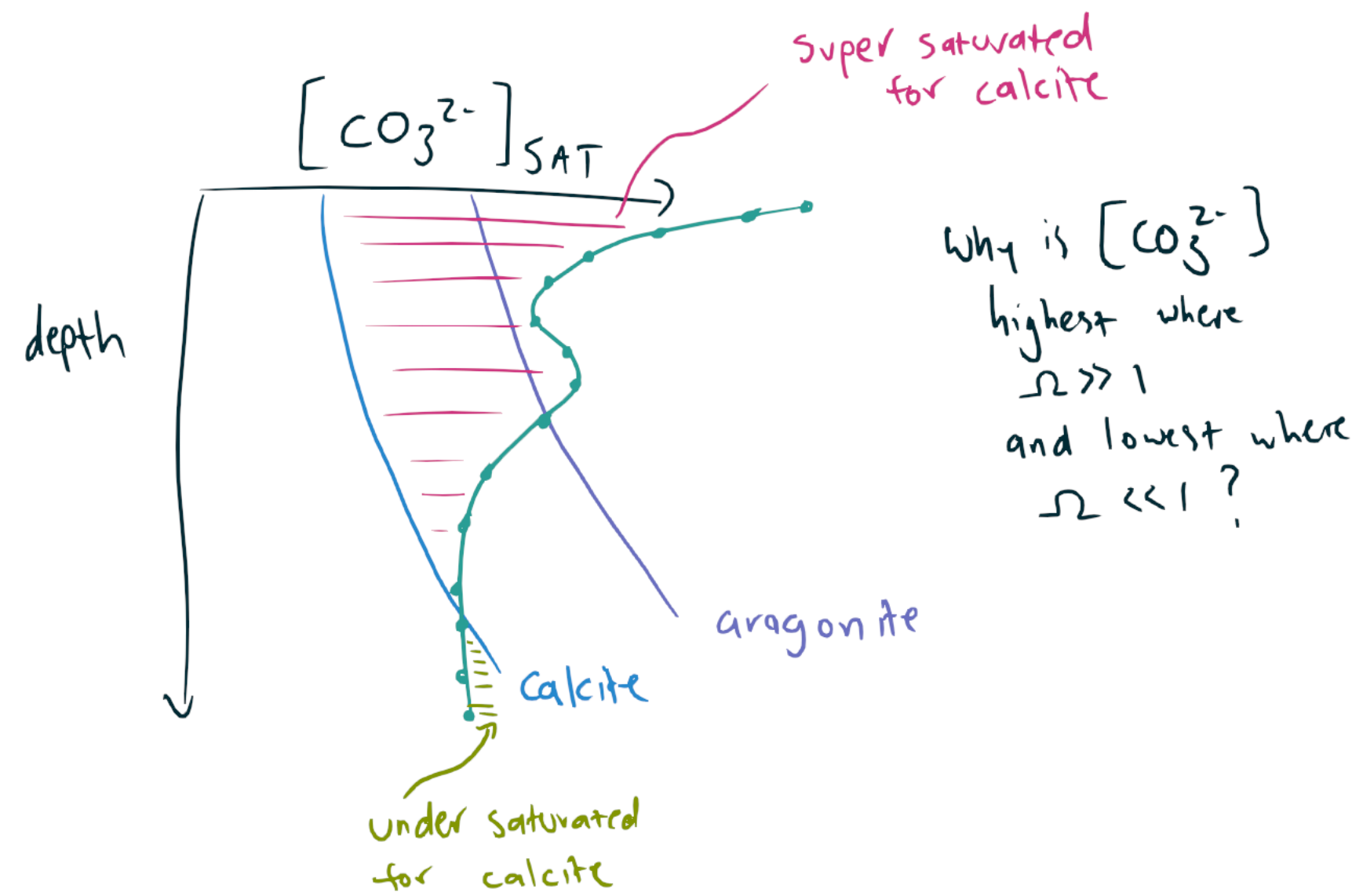


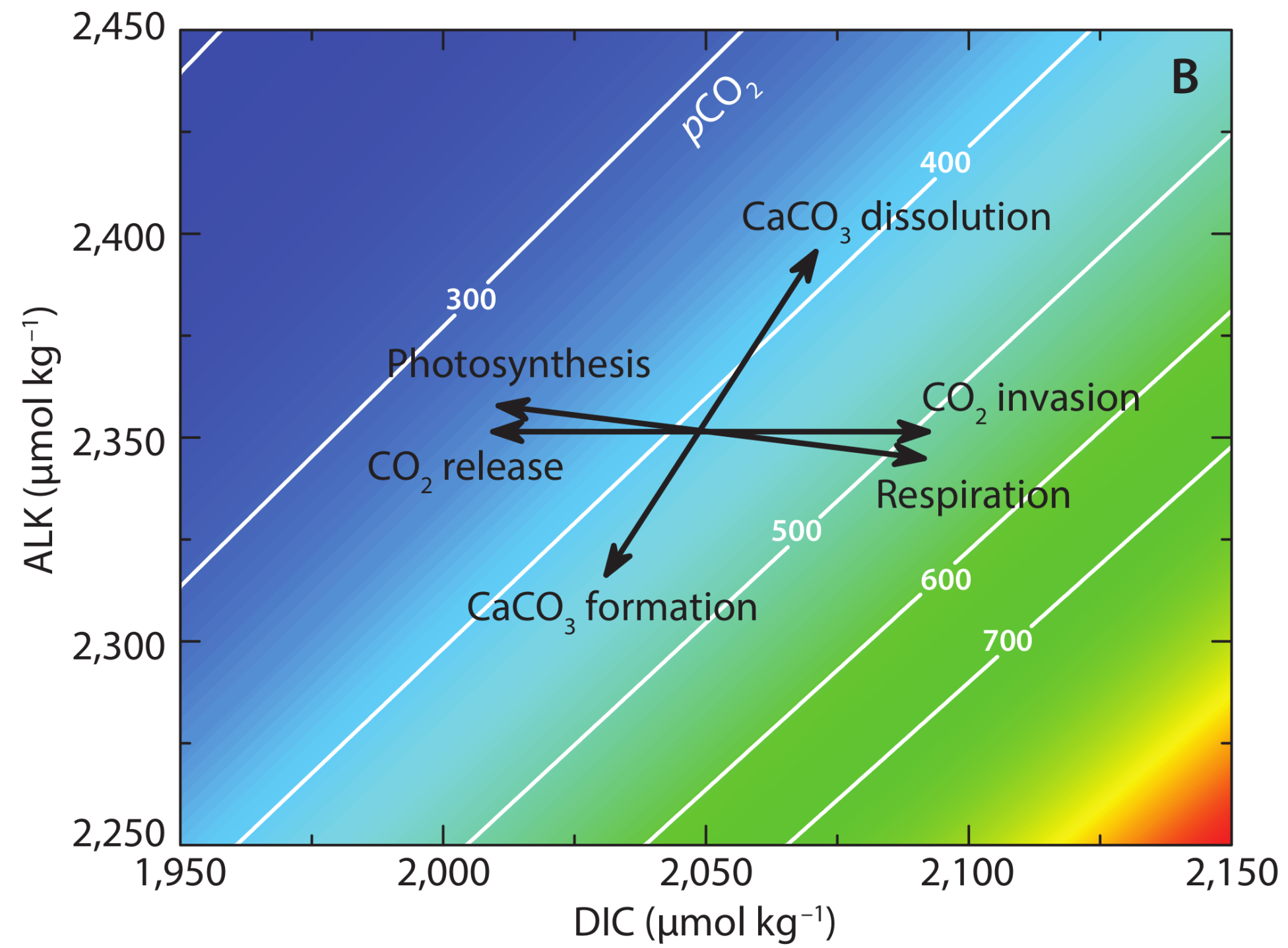
What do you think ocean looks like?

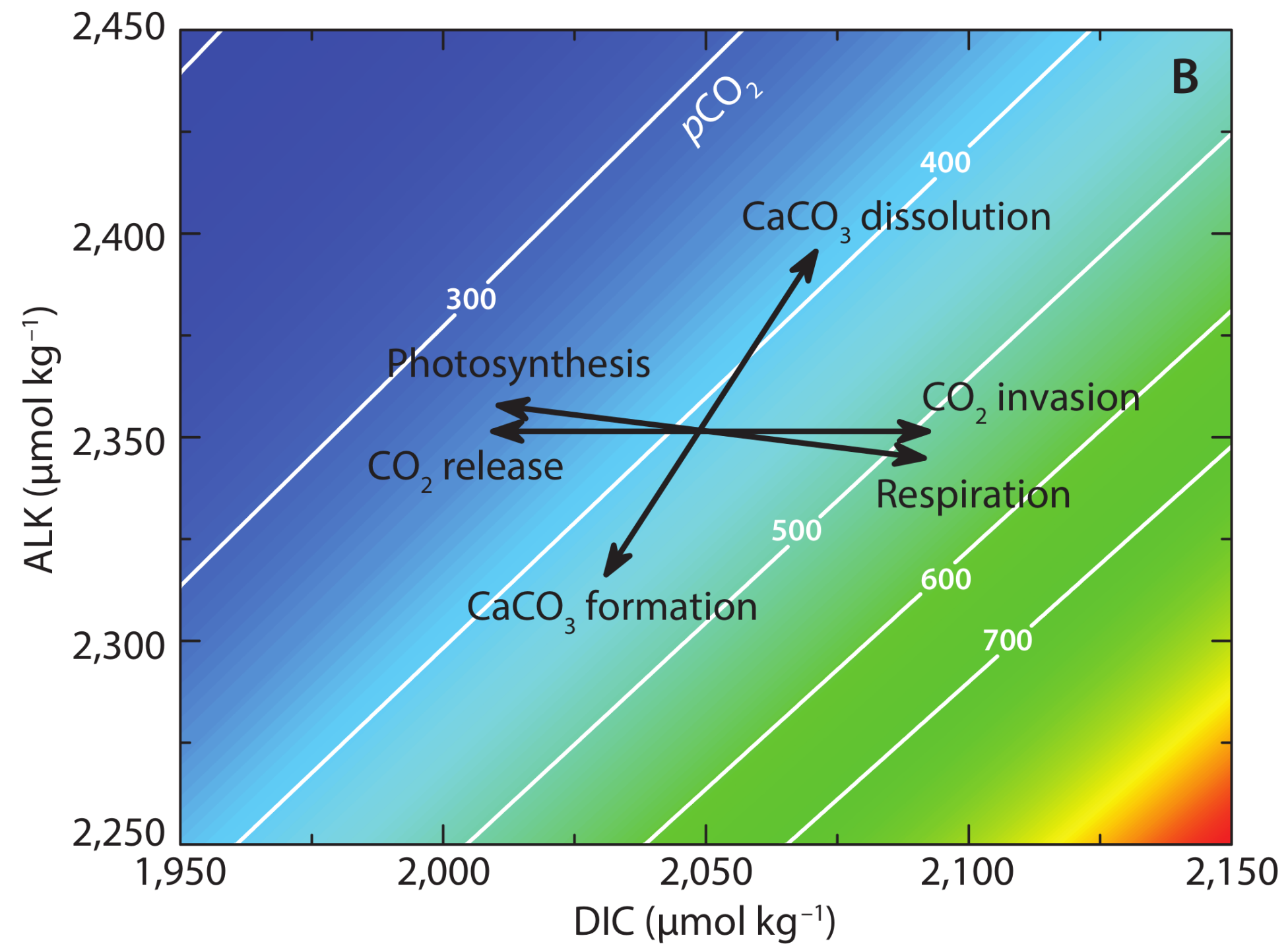
$$K_{sp} = [\text{Ca}^{2+}]_{sw} [\text{CO}_3^{2-}]_{SAT}$$





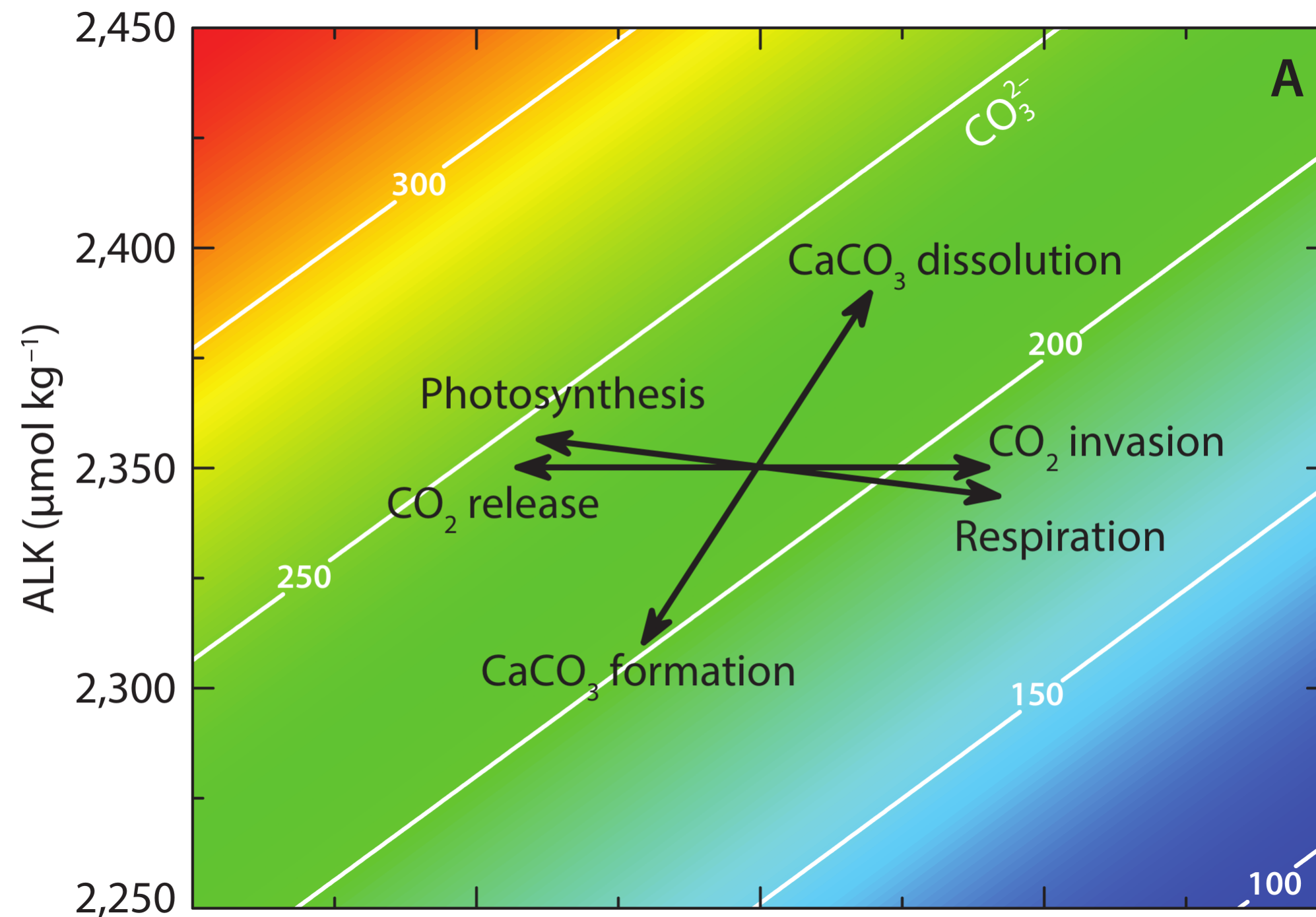






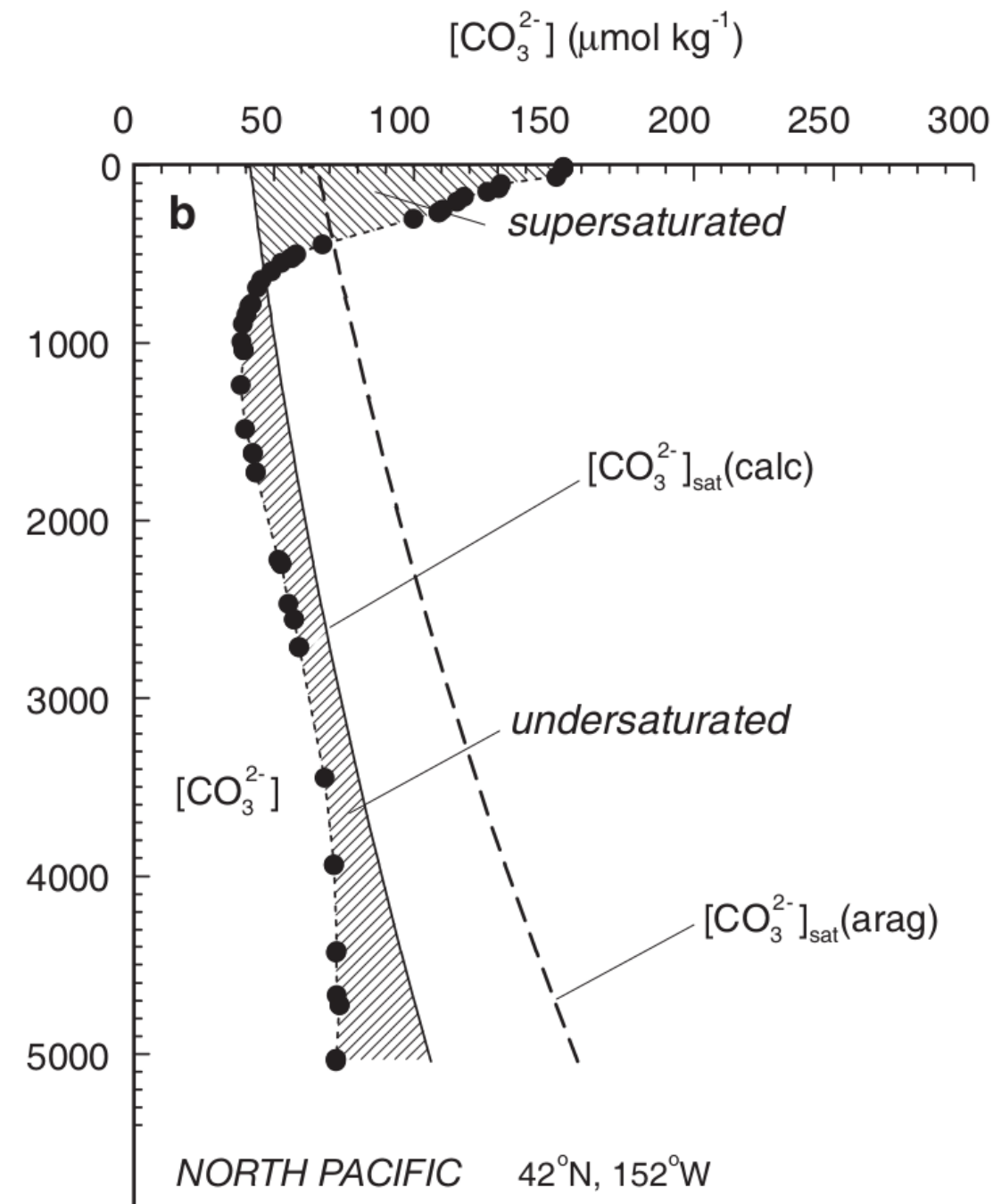
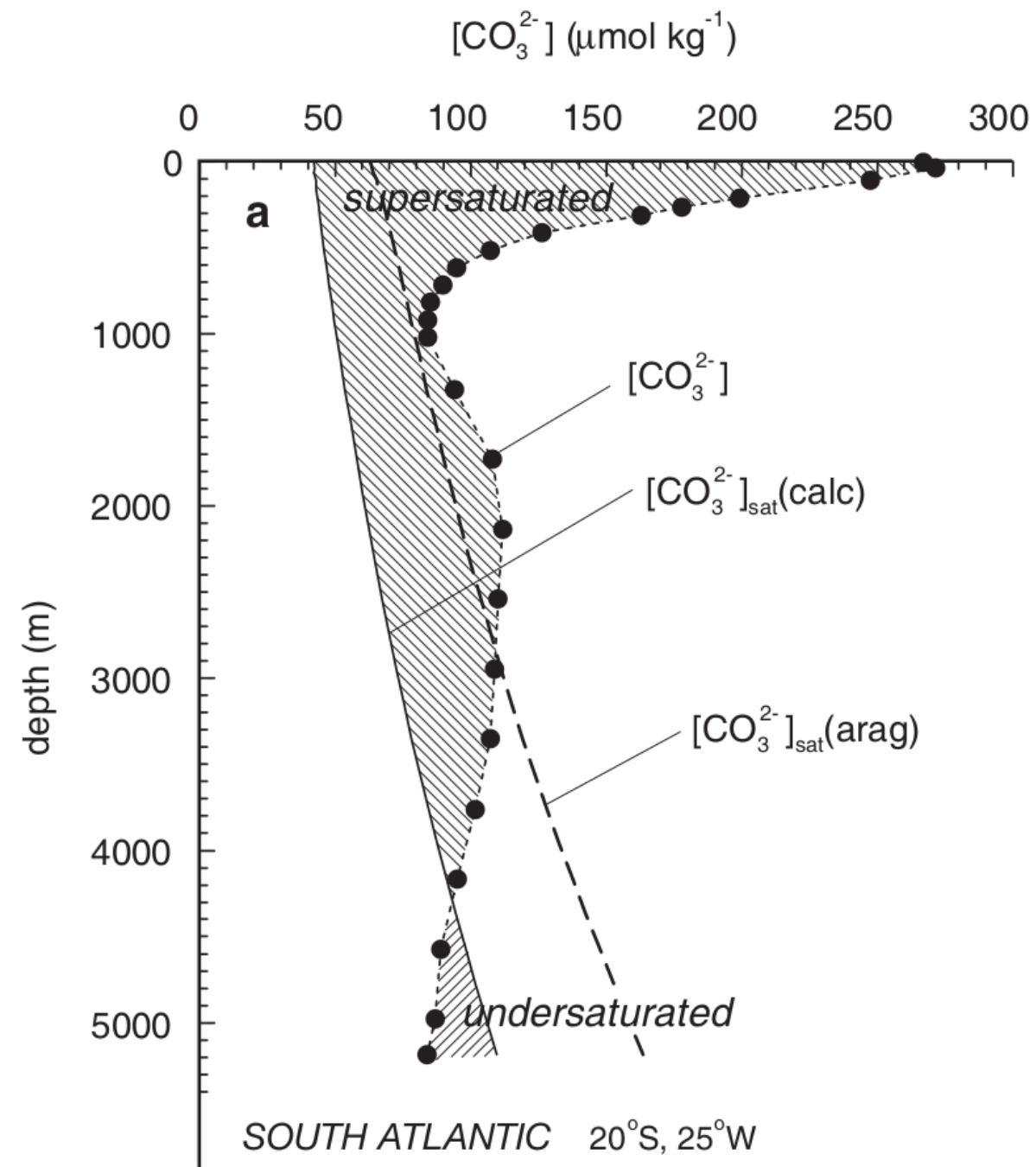
Recall that $[\text{CO}_3^{2-}] \approx \text{ALK} - \text{DIC}$

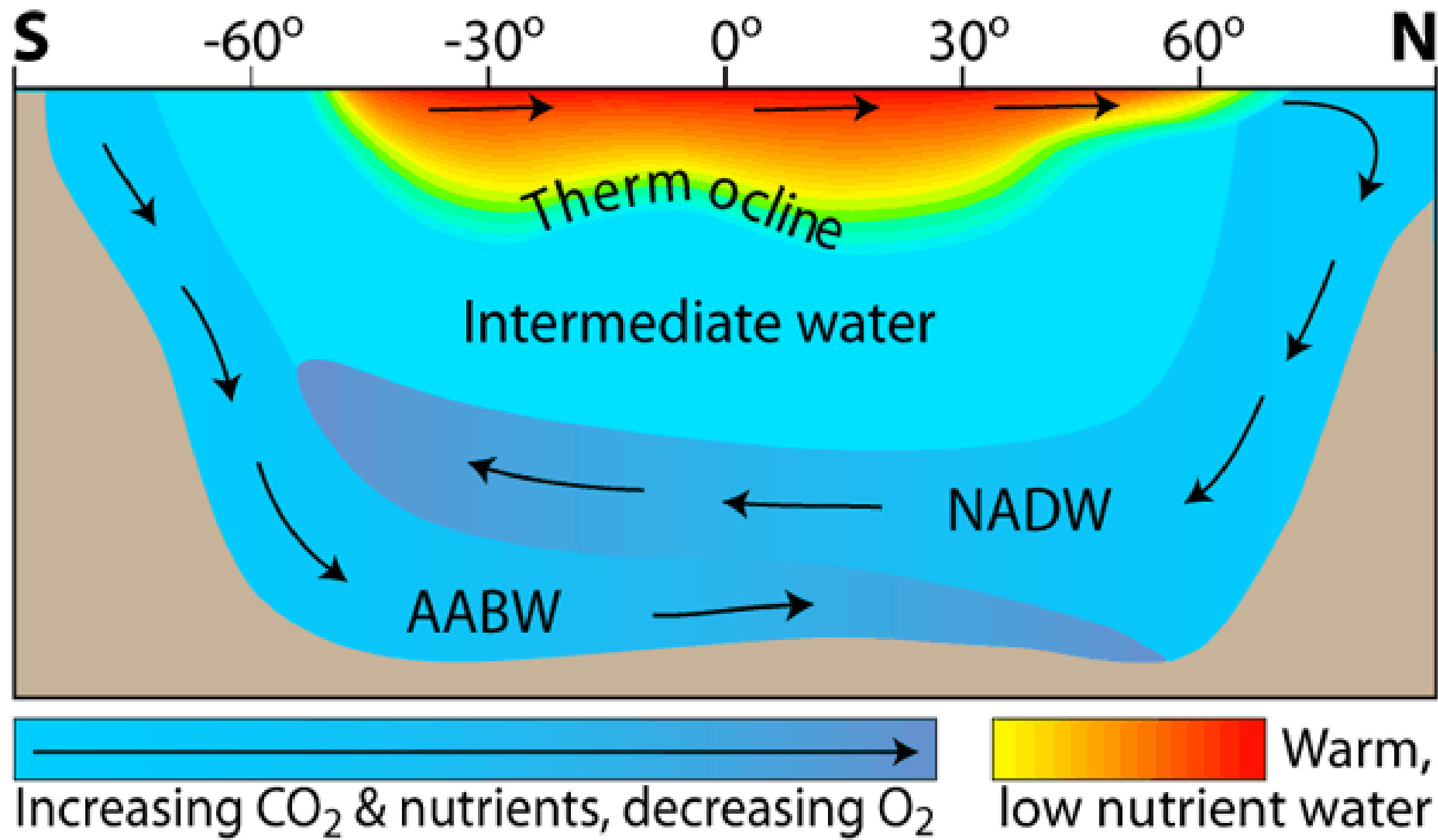


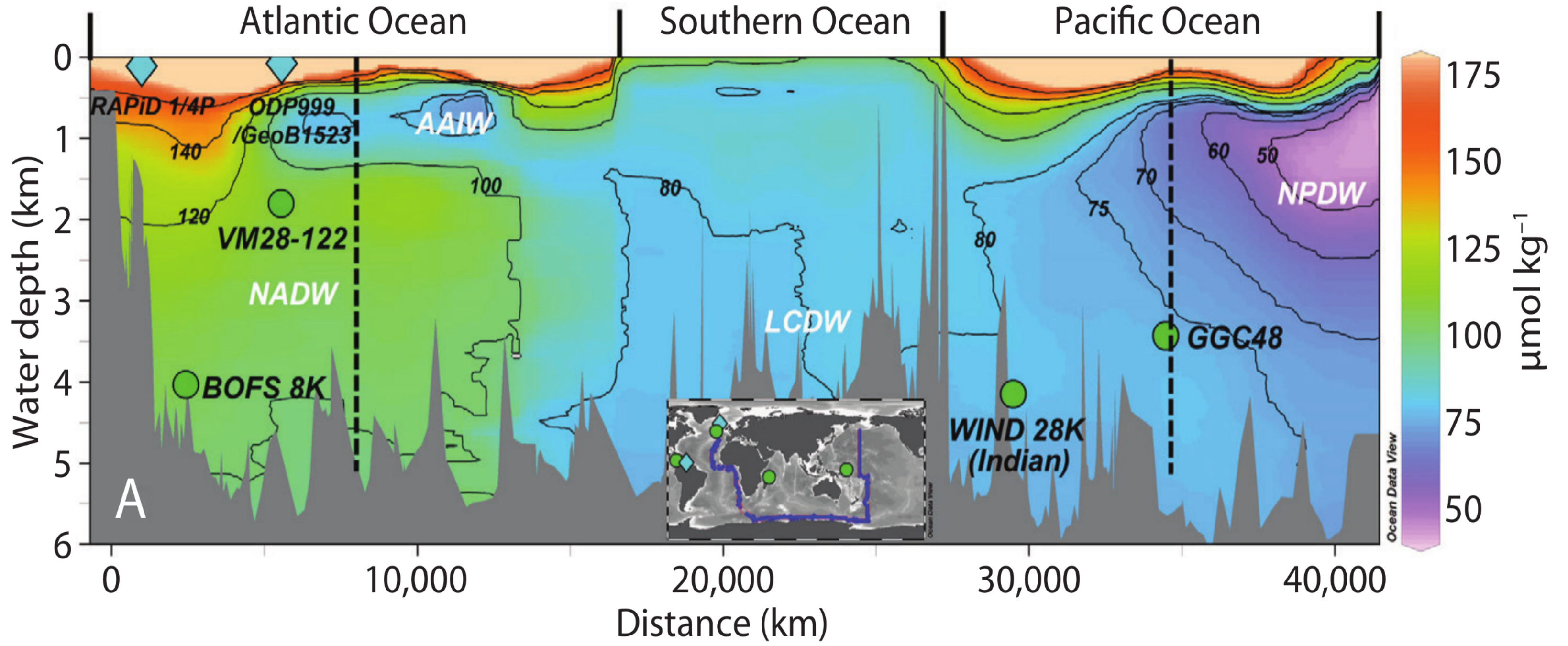


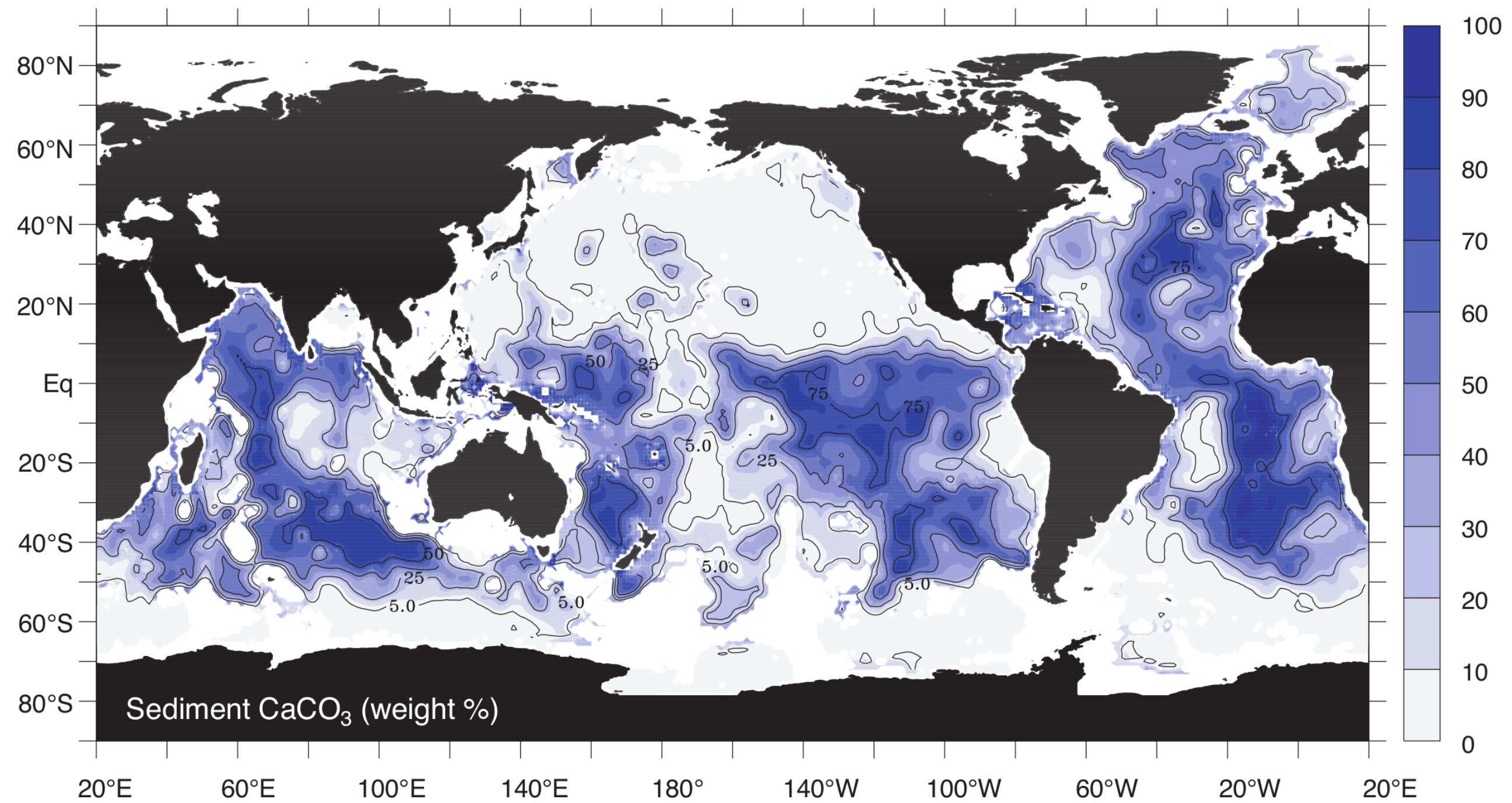
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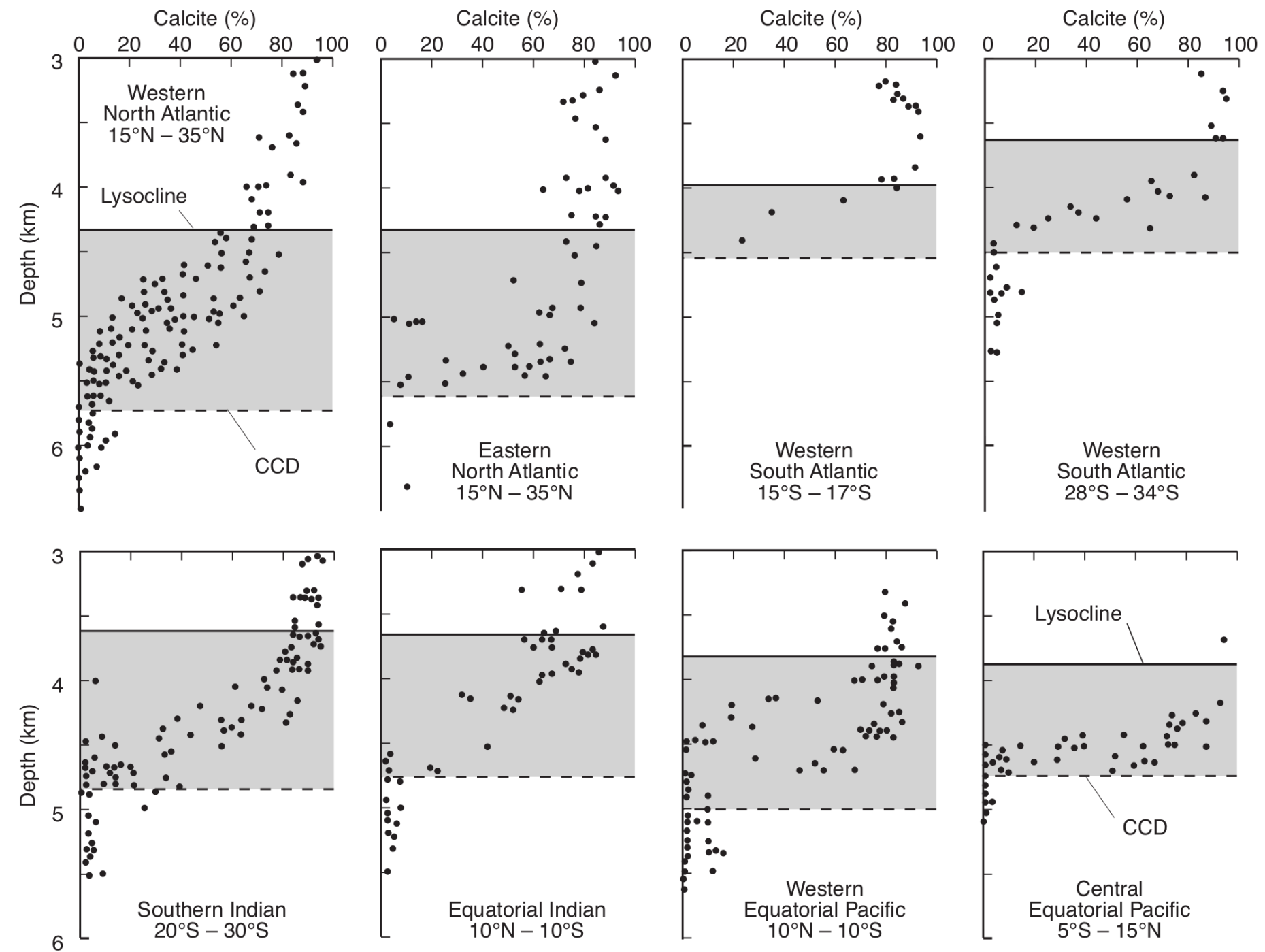












What do you think controls the thickness of the grey region?



