



Figure S1: Seasonal changes in (a) $\Delta^{17}\text{O}(\text{SO}_4^{2-})_{\text{bulk}}$ and $\Delta^{17}\text{O}(\text{SO}_4^{2-})_{\text{SAS}}$ calculated using a k value (mass ratio of SO_4^{2-} to Ca^{2+}) of 0.59 and 0.18. The lines indicate the seasonally average values of $\Delta^{17}\text{O}$ with 1 σ -uncertainty.