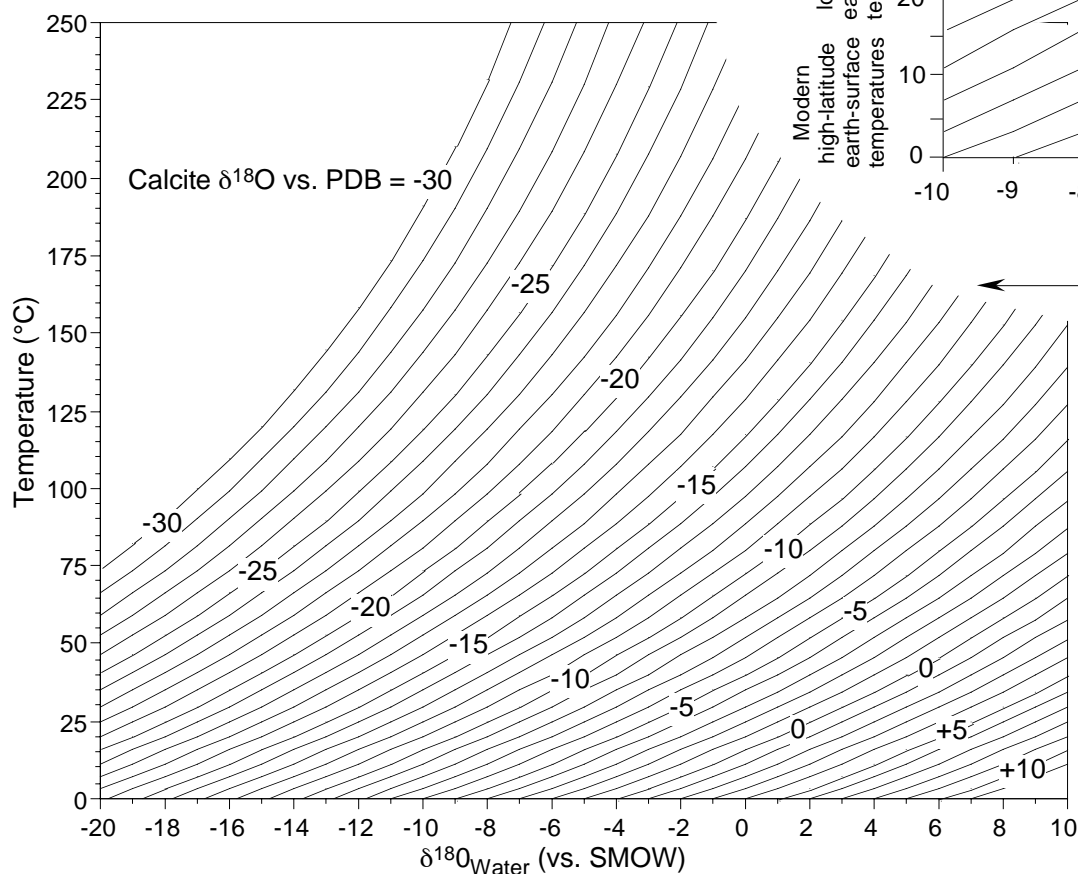


Oxygen isotope composition of calcite as a function of temperature and water composition

These plots show the oxygen isotope composition of calcite precipitated at isotopic equilibrium from water of the O isotope composition shown on the X axis and at the temperature shown on the Y axis. $\delta^{18}\text{O}$ of calcite was calculated using the equation of Friedman and O'Neil (1977) whereby

$$10^3 \ln \alpha = \frac{2.78 \times 10^6}{T^2} - 2.89 \text{ with } T \text{ in Kelvins.}$$

The lower plot is merely an enlargement of part of the upper plot, with ranges of typical temperatures and water compositions.



A key thought illustrated by these plots is that any one mineral composition can be the result of many possible combinations of water composition and temperature. For example, a calcite with $\delta^{18}\text{O}_{\text{C}} = -10$ relative to the PDB standard may have been precipitated from a water with $\delta^{18}\text{O}_{\text{W}} = +1.0$ relative to SMOW at $T = 80^\circ\text{C}$, or from a water with $\delta^{18}\text{O}_{\text{W}} = -8.0$ relative to SMOW at $T = 25^\circ\text{C}$.