Lacustrine evaporites have potential to document ancient terrestrial climates, including temperatures and their seasonal variations, and atmospheric pCO_2. The sodium carbonate mineral nahcolite ($NaHCO_3$) in the early Eocene Parachute Creek Member, Green River Formation, Piceance subbasin, indicates elevated pCO_2 concentrations (> 680 ppm) in the water column and in the atmosphere if in contact with brine. These data support a causal connection between elevated atmospheric pCO_2 and global warmth during the early Eocene Climatic Optimum. Trona ($Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$), not nahcolite, is the dominant sodium carbonate mineral in the coeval Wilkins Peak Member in the Bridger subbasin, which may be explained by interbasin variations in (1) brine chemistry, (2) temperature, and (3) pCO_2. These interpretations are based on equilibrium thermodynamics and simulations that evaporate lake water, but they ignore seasonal changes in water column temperature and pCO_2. Winter cooling, rather than evaporative concentration, best explains the fine-scale alternations of nahcolite, halite (NaCl), and nahcolite + halite in the Parachute Creek Member. Simulated evaporation of alkaline source waters from the paleo Aspen River at temperatures between 15^o and 27^o C and pCO_2 at or below 1200 ppm produces the observed mineral sequence in the Wilkins Peak Member: gaylussite ($Na_2CO_3 \cdot CaCO_3 \cdot 5H_2O$) at temperatures < 27^o C and pirssonite ($Na_2CO_3 \cdot CaCO_3 \cdot 2H_2O$) > 27^o C (both now replaced by shortite $Na_2CO_3 \cdot 2CaCO_3$), then northupite ($Na_3Mg(CO_3)_2Cl$), trona, and halite. The challenge of determining paleo-lake temperatures in the Bridger and Piceance subbasins using microthermometry has now been solved using femtosecond lasers that promote nucleation of vapor bubbles in brine inclusions without deforming the halite host crystal. This method shows general agreement with thermodynamic-based calculations and will be used to document mean annual temperatures in the Greater Green River Basin.