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Phenology studies need to account for tissue temperature, not air

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Plant phenology is mainly driven by temperature in extratropical ecosystems. Contrasting responses of foliar phenology to climatic warming, however, have been reported in recent decades, raising important questions about the role of other environmental constraints, especially light. A striking and common aspect to past phenological studies is that all analyses have been solely based on air temperature. In fact, temperatures differ substantially between plant tissues and the air, because plants absorb and radiate energy. Using a simple model of bud energy balance, we explore how using bud instead of air temperature could change our interpretation of the phenological response to warming and explain several observed responses of phenology to temperature and light. Not accounting for the real temperature of plant tissues represents a real gap in phenology studies. Field observations of plant tissues temperature as well as experiments are needed for accurately assessing the response of vegetation to climate change.