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SMAP passive retrieval algorithm ($\tau - \omega$ model):

$$T_B = T_{soil}\,(1 - R_{soil})\,e^{-\tau/\cos\theta} + (1-\omega)(1 - e^{-\tau/\cos\theta})\,T_{veg} + (1-\omega)(1 - e^{-\tau/\cos\theta})\,T_{veg}\,R_{soil}\,e^{-\tau/\cos\theta}$$

θ is the incidence angle.

τ = optical thickness of land surface ~ VWC = vegetation water content

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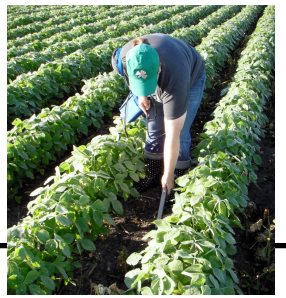
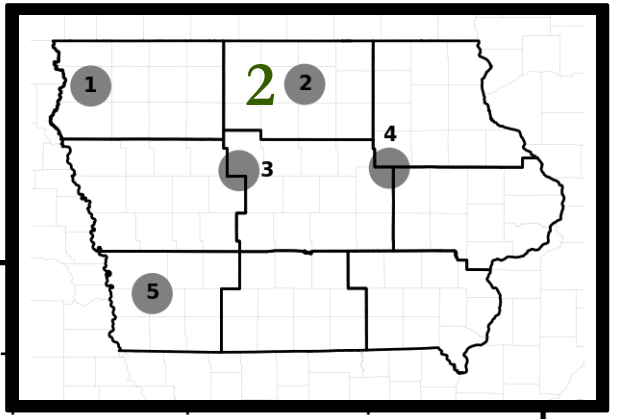
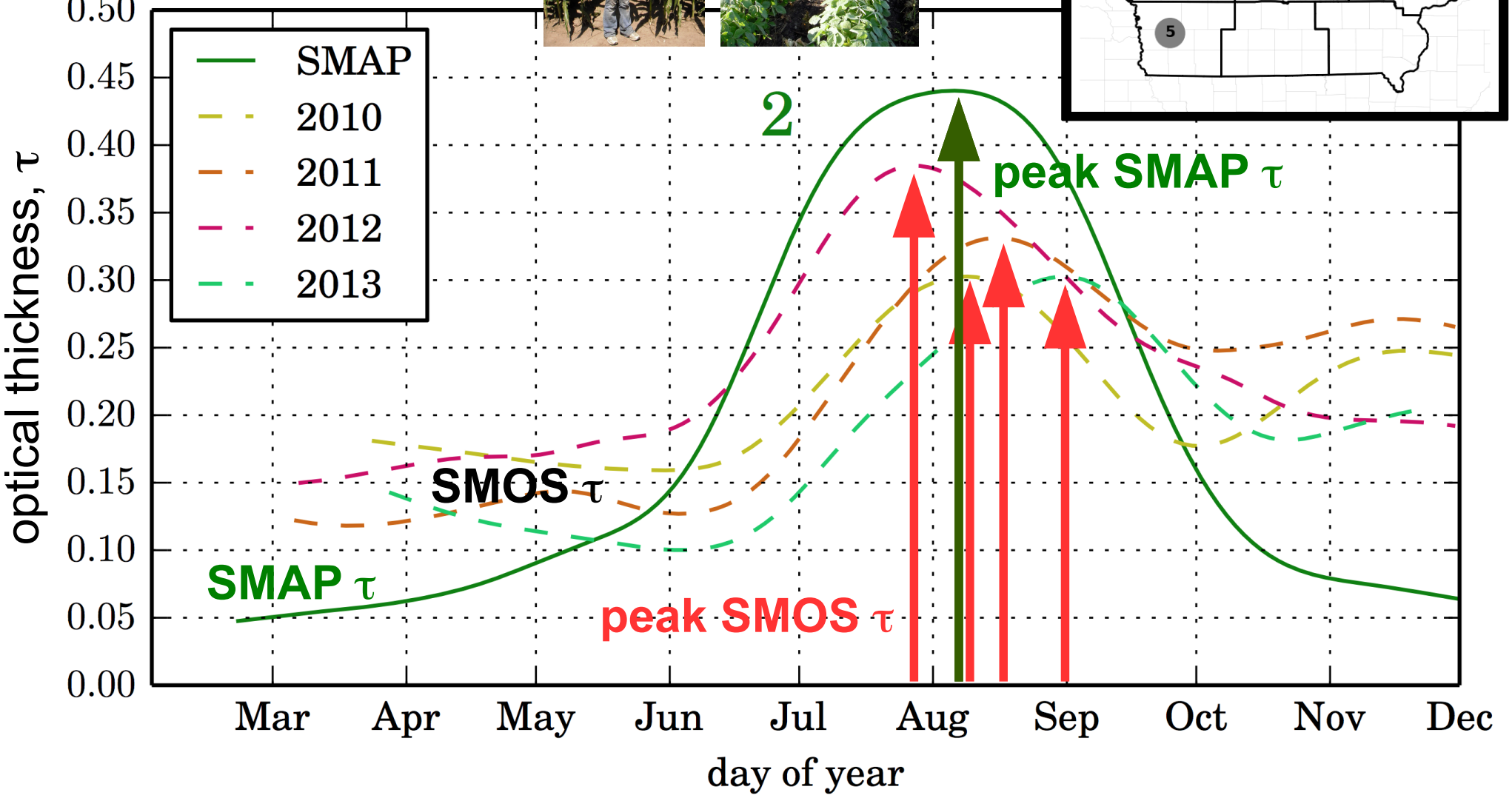
Year-to-year variation in SMOS τ.







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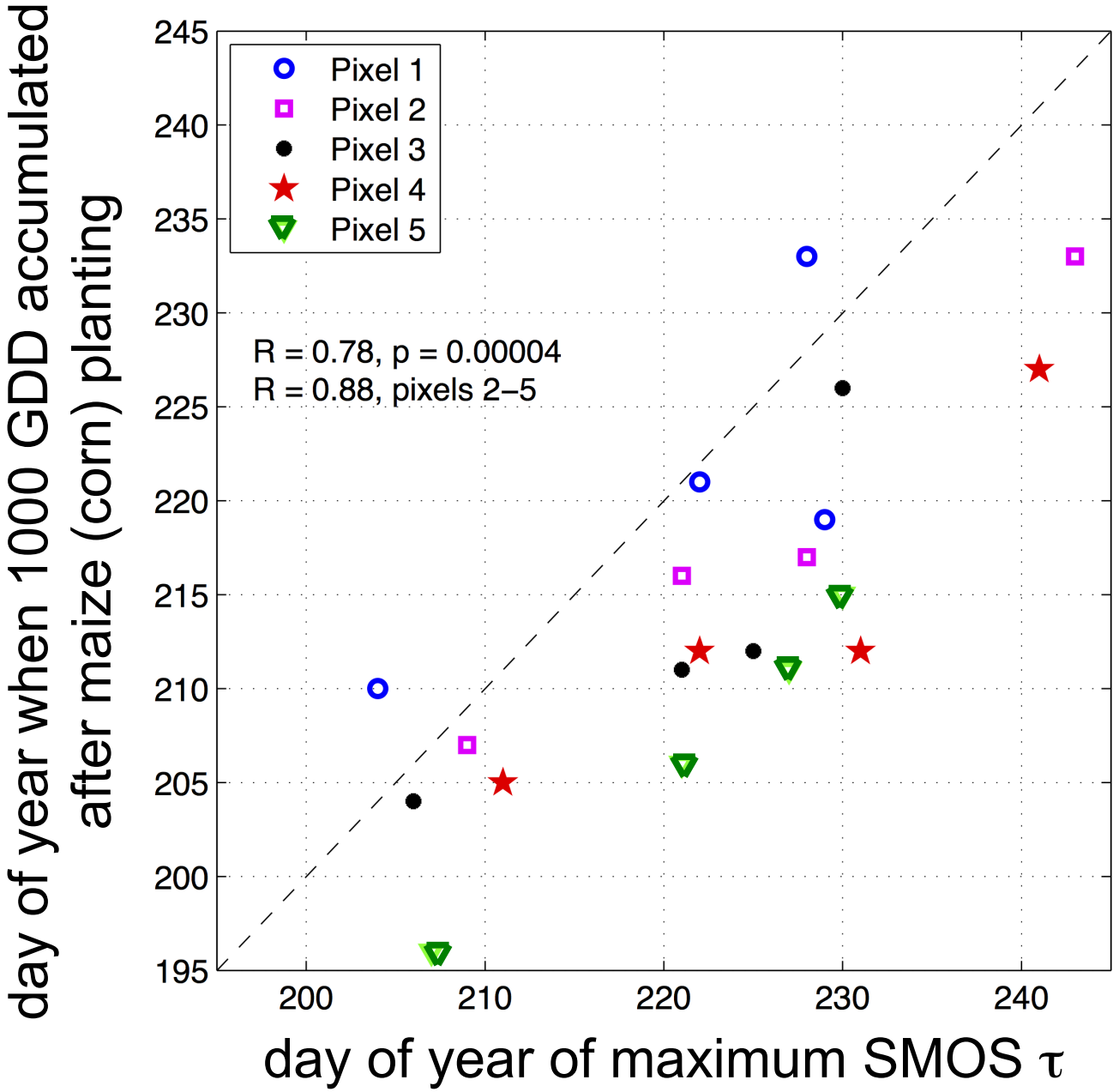
Year-to-year variation in SMOS τ.



Year-to-year variations in SMOS τ are real.

A climatology of SMAP τ may not be appropriate in agricultural areas.

Simultaneous retrieval of both soil moisture and τ should be more carefully considered.