

Author:  [ADVANCED](#)

Volume Page

Keyword:    [TOP](#) > [Available Volumes](#) > [Table of Contents](#) > [Abstract](#)

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[\[PDF \(1590K\)\]](#) [\[References\]](#) [\[Supplementary Materials\]](#)**Evaluating the effects of stomata development and senescence on the seasonal variation in stomatal conductance**[Tamaki Ito](#)<sup>1)</sup>, [Kazuho Matsumoto](#)<sup>2)</sup>, [Chisato Takenaka](#)<sup>1)</sup> and [Takeshi Ohta](#)<sup>1)</sup>

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**Abstract:**

We examined the influence of phenological changes in stomata on the seasonal variation of stomatal conductance using a Jarvis-type conductance model that included functions representing the active stomatal density and chlorophyll concentration of leaves. We studied the leaves of three 12-year-old oak trees (*Quercus serrata*). Stomatal conductance was measured under controlled ambient conditions (i.e., photosynthetic photon flux density, leaf temperature, and specific humidity deficit) in a chamber. Our analyses showed that low stomatal conductance could not be explained by environmental variables alone. Stomatal conductance decreased with increasing stomatal density, where the number of stomata included guard mother cells (GMC), in spring. On the other hand, time series of stomatal conductance showed a correlation with the increases in active stomatal density. Chlorophyll concentration was a good index of the low conductance in autumn, and the active stomata density was a good index of the leaf-unfolding period. These results implied that phenological progress of stomata must be included in land surface models for the accurate prediction of seasonal variations in water, energy, and CO<sub>2</sub> cycles.

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