**Appendix S1**

Plant fossil record revealed that plants adaptation to changing conditions during the Phanerozoic involved significant changes in stomatal density, *d*, and size, *s* [14, 15, 29, 30].

In this study, the *s* and *d* values were averaged for time intervals ranging from 5 to 85 Myr. Plant gas exchange rates being determined by stomatal configuration expressed in terms of the product between *s* and *d*, *(s·d)*, the following regression equations were fitted to the data:

(*s.d*)=-6.5 10-8 [*CO2*]2 + 2.55 10-4 [*CO2*] ; *r*2=0.70 (S1)

*s* = 1.77[CO2] – 14.93 ; *r*2=0.83 (S2)

where CO2 is given in [ppm]; *(s·d)* in Eq. (S1)is dimensionless*,* and *s* in Eq. (S2) is given in [μm2] with. The coefficients in Eq. S1 were significant at the level of *p<0.05*. The (*s.d*)- *CO2* relationship (Eq. S1) is depicted by the solid line in Fig. 1a.

In their analysis of the fossil record, Franks and Beerling [14] considered time intervals of 50 or 100 Myr. They have fitted regression equations to the mean values of *s* and *d* for each time interval:

log10 *d* = -6.57 10-4 [CO2] + 2.58 ; *r*2=0.98 (S3)

*s* = 3.02[CO2] – 528 ; *r*2=0.92 (S4)

where *d* ins given in [mm-2], *s* in [μm2] and CO2 in [ppm]. Based on Eqs. S3 and S4, the resulting evolution of (*s.d*) with *CO2* was computed and depicted by the dashed line in Fig. 1a.

Franks and Beerling [15] considered time intervals of 10 Myr. They have fitted regression curves to the mean values of *s* and *d* for each time interval:

log10 *d* = -5.08 10-4 [CO2] +2.39 ; *r*2=0.57 (S5)

log10 *s* = -0.65 log10 *d* +4.4 ; *r*2=0.45 (S6)

where *d* is given in [mm-2], *s* in [μm2] and CO2 in [ppm]. Based on Eqs. S5 and S6, the resulting evolution of (*s.d*) with *CO2* was computed and depicted by the dotted line in Fig. 1a.