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Covariance resampling for particle filter – state and parameter estimation for soil hydrology

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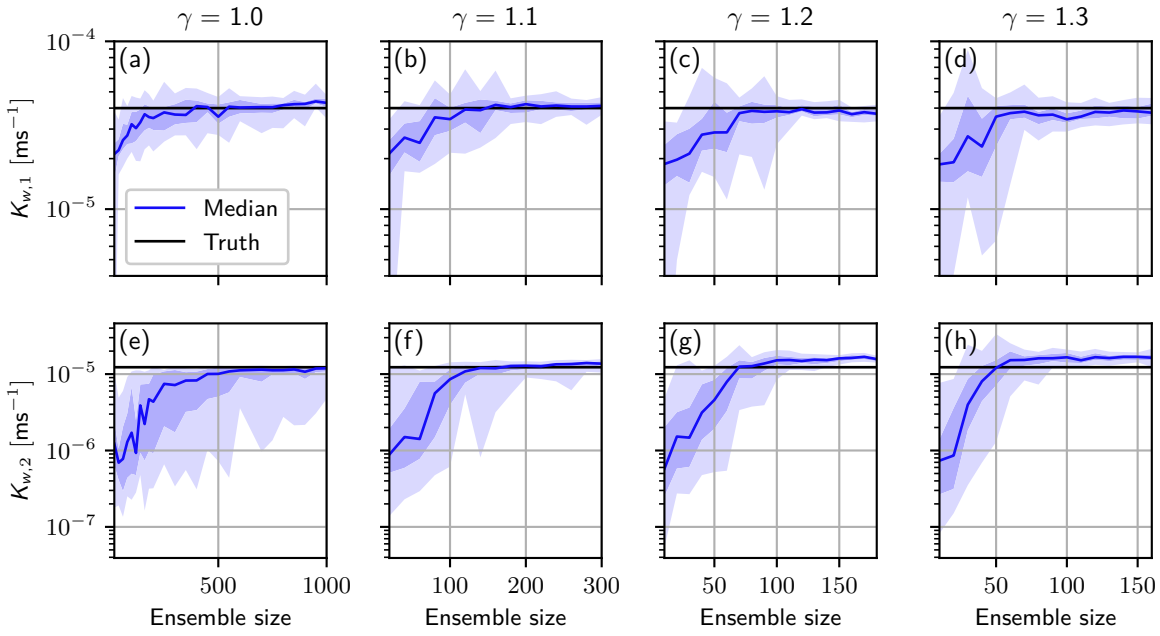

Figure S.1: The mean saturated conductivity in the first layer (first row) and second layer (second row) after the data assimilation run for 40 different seeds and for varying factors of $\boldsymbol{\gamma}_p$ (a,e): $\boldsymbol{\gamma}_p = 1.0$, (b,f): $\boldsymbol{\gamma}_p = 1.1$, (c,g): $\boldsymbol{\gamma}_p = 1.2$ and (d,h): $\boldsymbol{\gamma}_p = 1.3$. The blue areas represent the 70 %-quantile (darker blue) and the 90 %-quantile (light blue), respectively. Note the different scaling of the x-axes.

Convergence of parameters

As in Appendix C, the convergence of the mean of all estimated parameters is analyzed for 40 different seeds, varying ensemble sizes and for four different tuning parameters $\boldsymbol{\gamma}_p = (1.0, 1.1, 1.2, 1.3)$. The convergence for K_w (see Fig. S.1) and n (see Fig. S.2) in both layers is similar to the case of $K_{w,2}$ presented in Appendix C. Only the case α_1 for $\boldsymbol{\gamma}_p = 1.3$ (see Fig. S.3d) differs. The parameter α_1 is insensitive and the inflation with $\boldsymbol{\gamma}_p = 1.3$ leads to a diverging parameter.

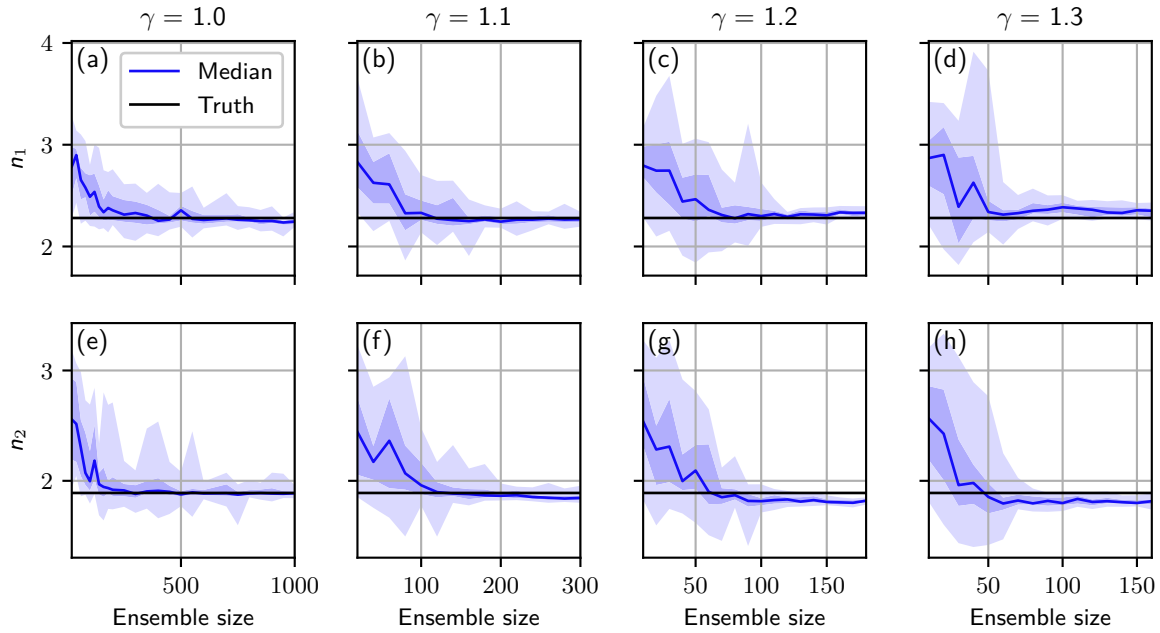

Figure S.2: The mean of parameter n in the first layer (first row) and second layer (second row) after the data assimilation run for 40 different seeds and for varying factors of $\boldsymbol{\gamma}_p$ (a,e): $\boldsymbol{\gamma}_p = 1.0$, (b,f): $\boldsymbol{\gamma}_p = 1.1$, (c,g): $\boldsymbol{\gamma}_p = 1.2$ and (d,h): $\boldsymbol{\gamma}_p = 1.3$. The blue areas represent the 70 %-quantile (darker blue) and the 90 %-quantile (light blue), respectively. Note the different scaling of the x-axes.

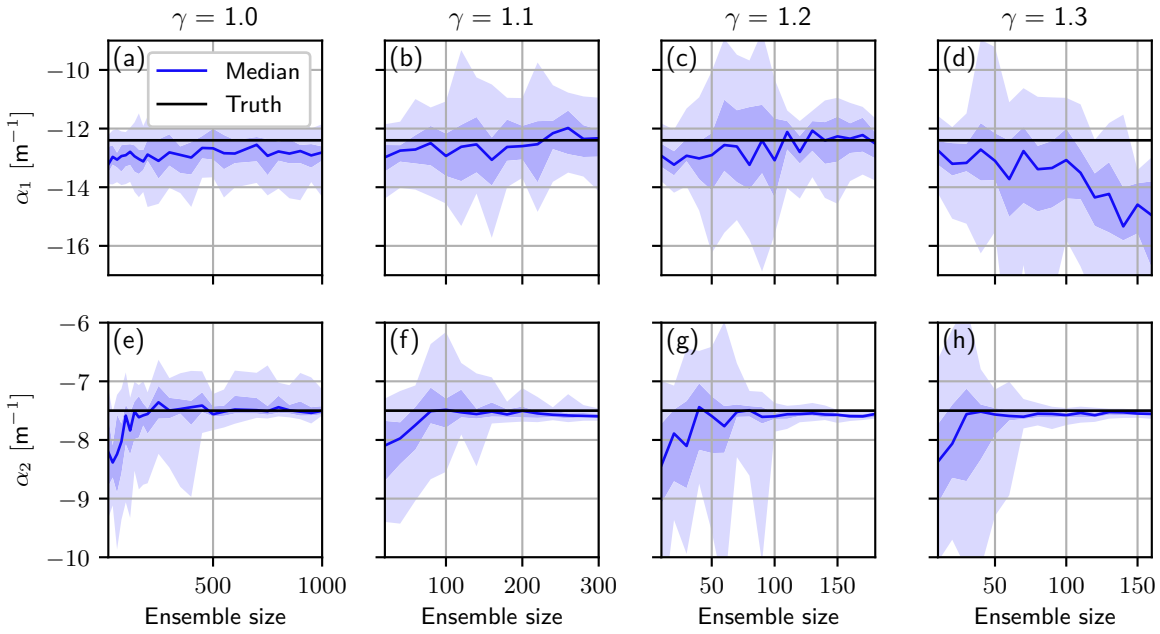

Figure S.3: The mean of parameter α in the first layer (first row) and second layer (second row) after the data assimilation run for 40 different seeds and for varying factors of $\boldsymbol{\gamma}_p$ (a,e): $\boldsymbol{\gamma}_p = 1.0$, (b,f): $\boldsymbol{\gamma}_p = 1.1$, (c,g): $\boldsymbol{\gamma}_p = 1.2$ and (d,h): $\boldsymbol{\gamma}_p = 1.3$. The blue areas represent the 70 %-quantile (darker blue) and the 90 %-quantile (light blue), respectively. Note the different scaling of the x-axes.