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*Supplement of*

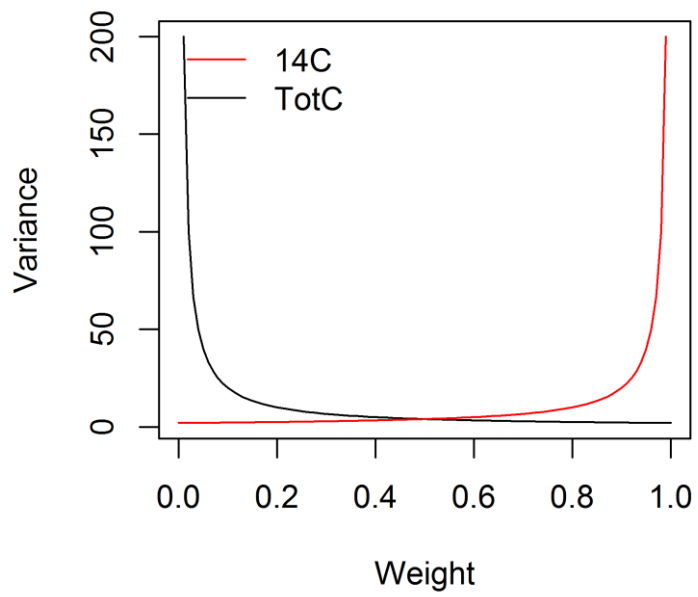
## **Parametrization consequences of constraining soil organic matter models by total carbon and radiocarbon using long-term field data**

**Lorenzo Menichetti et al.**

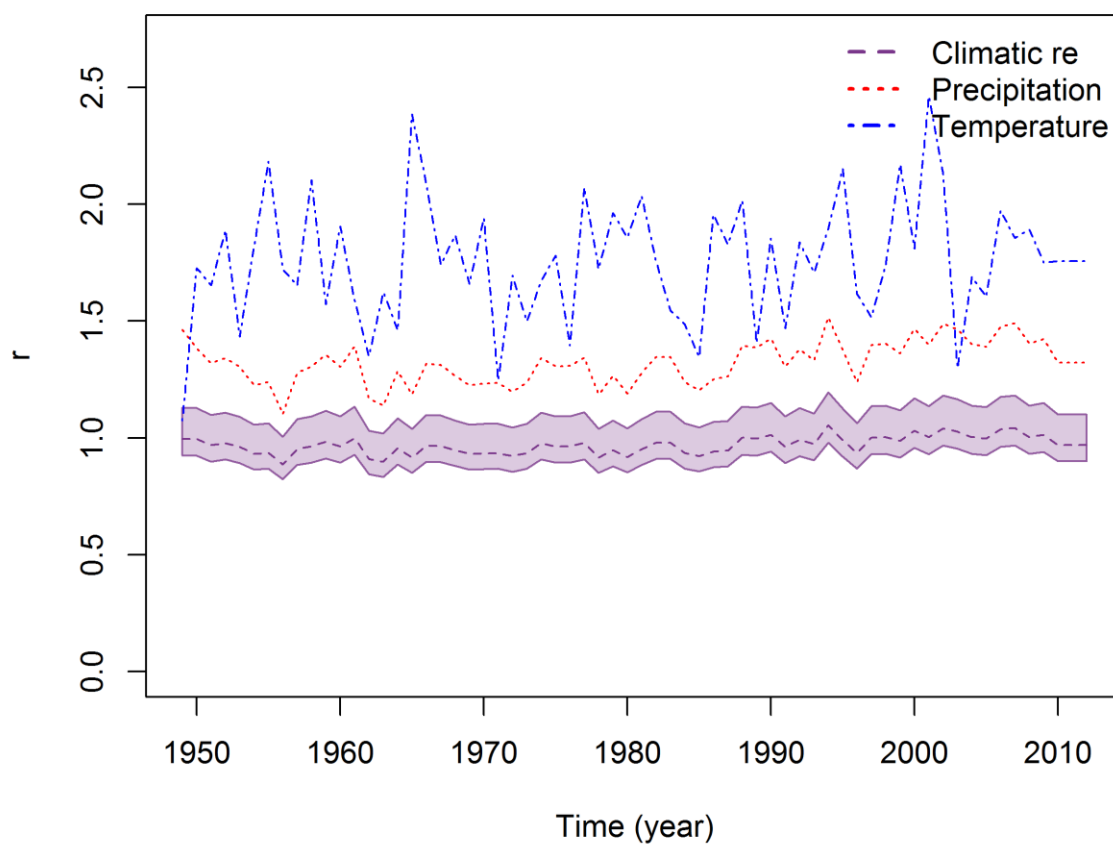
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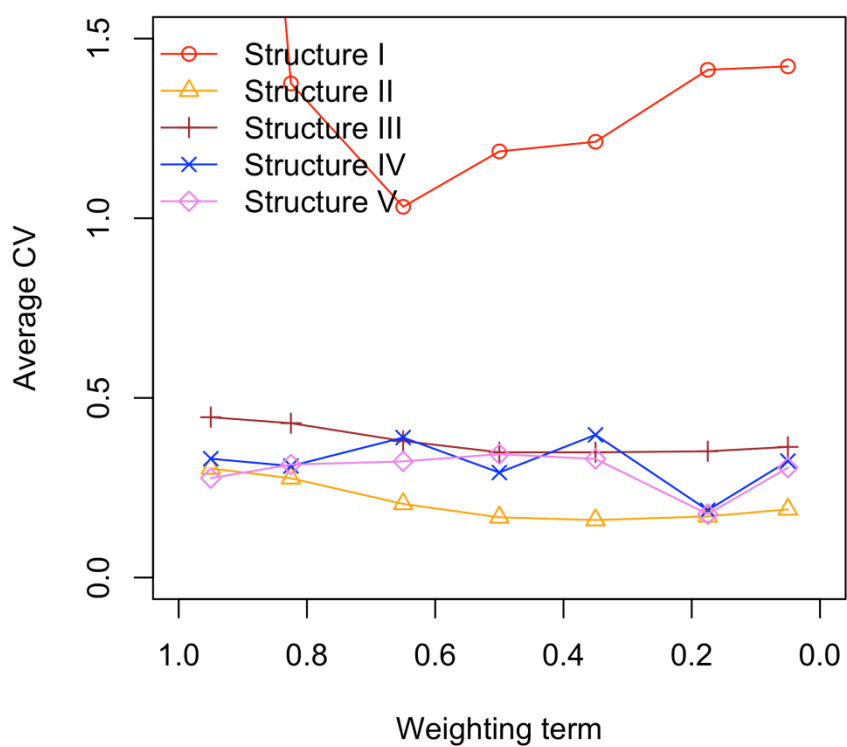
**S1: Effect of the weighting parameter on the variance defining the probability distribution of the two data streams.**



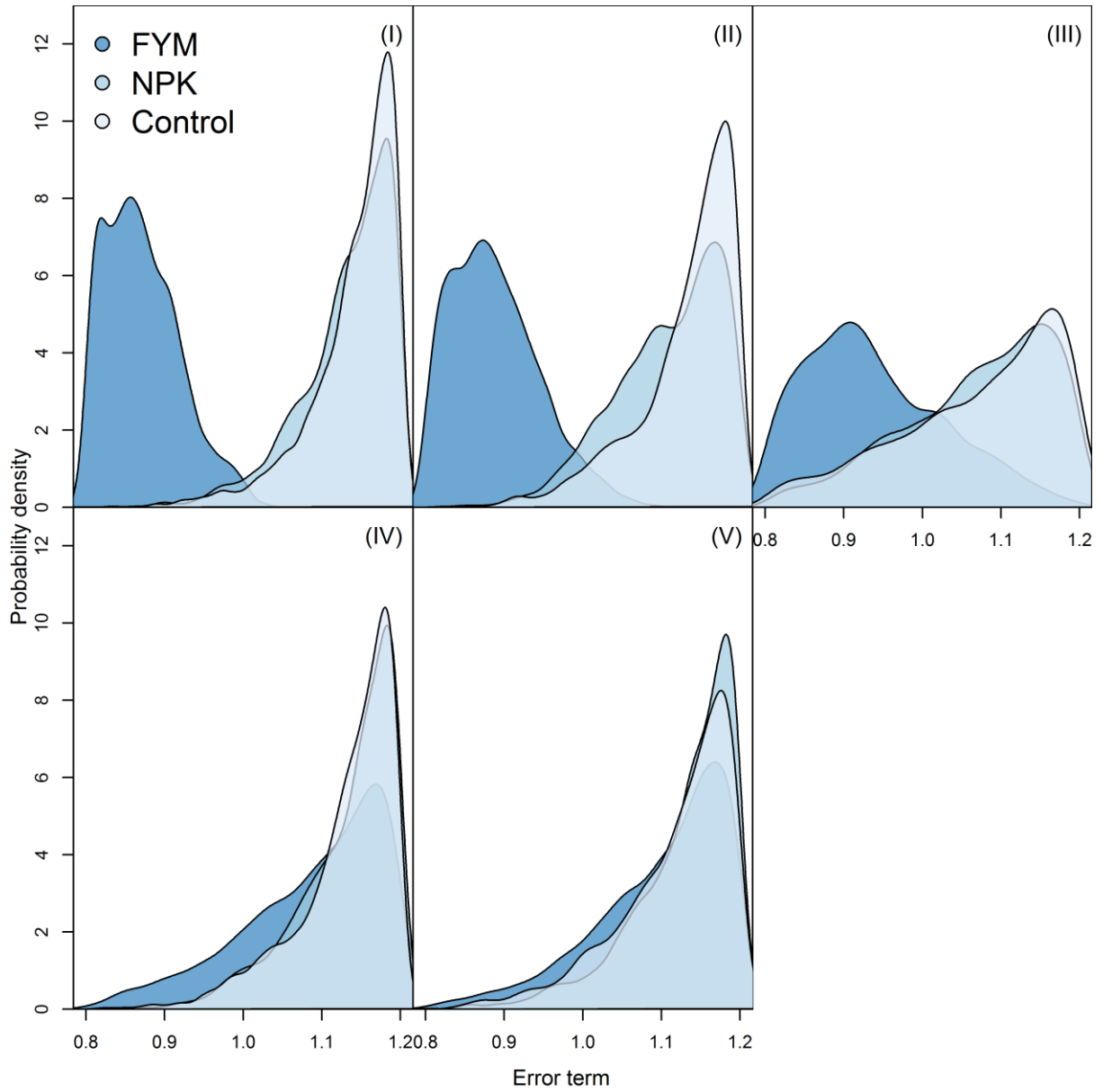
**S2: Value (dimensionless) took by the climatic parameter  $r$  (Eq. 9) over the simulation. The shaded area represents the parameter uncertainty.**



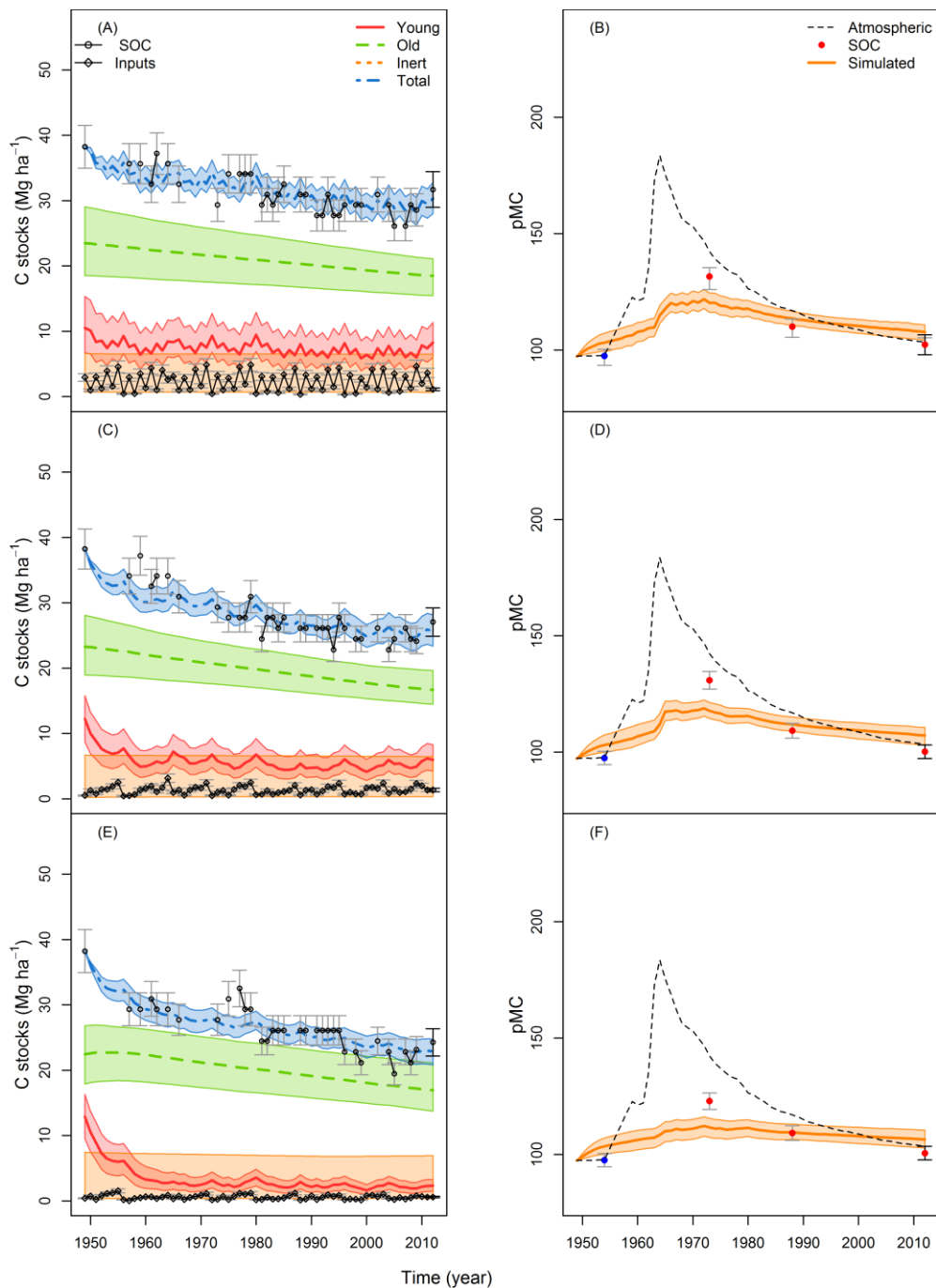
**S3: Coefficient of variation of all the parameters (average) among all the three treatments for the five model structures with the variation of the relative weight of  $SO^{14}C$  over total C. In this scale 1 means only total C, 0 means only  $SO^{14}C$ .**



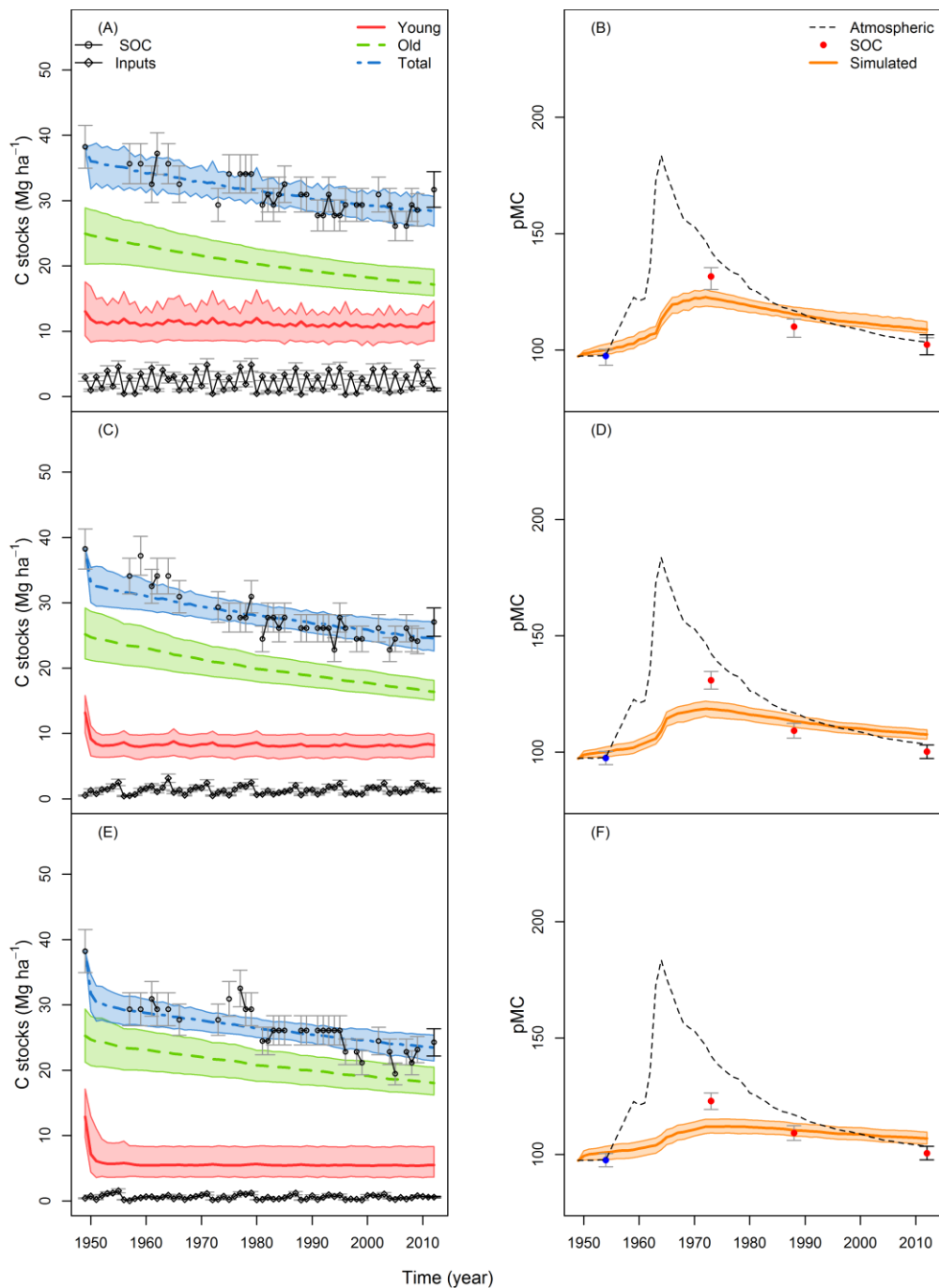
**S4: The posterior probability density (vertical axis) for the input error term (dimensionless, horizontal axis) for model structure I, II, II, IV and V.**



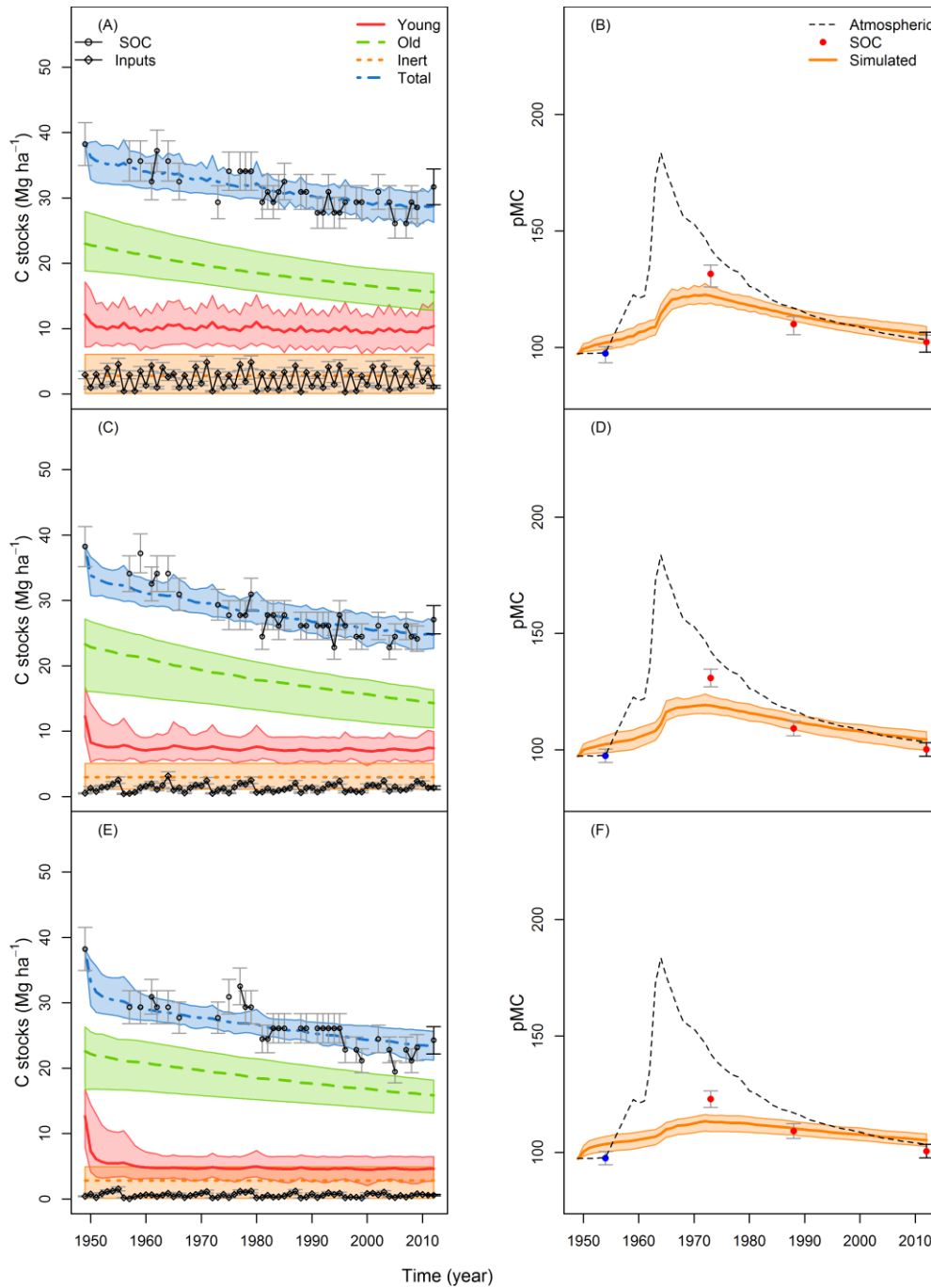
**S5: Simulation of SOC pools in the ZOFÉ trial as described by model structure III, with weighting factor = 0.35. Error bars represent the measured (black) and estimated (dark grey) standard error of the measurements. SOC (A,C,E) is in  $\text{Mg ha}^{-1}$ , while  $\text{SO}^{14}\text{C}$  (B, D, F) is in pMC.**



**S6: Simulation of SOC pools in the ZOFÉ trial as described by model structure IV, with weighting factor = 0.35. Error bars represent the measured (black) and estimated (dark grey) standard error of the measurements. SOC (A,C,E) is in  $\text{Mg ha}^{-1}$ , while  $\text{SO}^{14}\text{C}$  (B, D, F) is in pMC.**



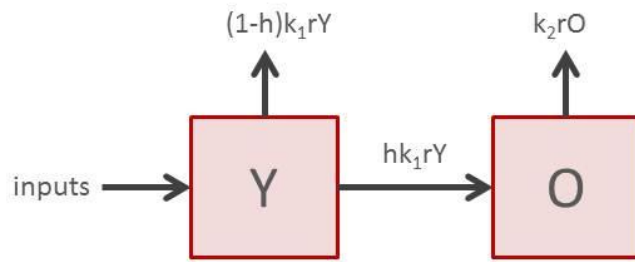
**S7: Simulation of SOC pools in the ZOFE trial as described by model structure V, with weighting factor = 0.35. Error bars represent the measured (black) and estimated (dark grey) standard error of the measurements. SOC (A,C,E) is in  $\text{Mg ha}^{-1}$ , while  $\text{SO}^{14}\text{C}$  (B, D, F) is in pMC.**





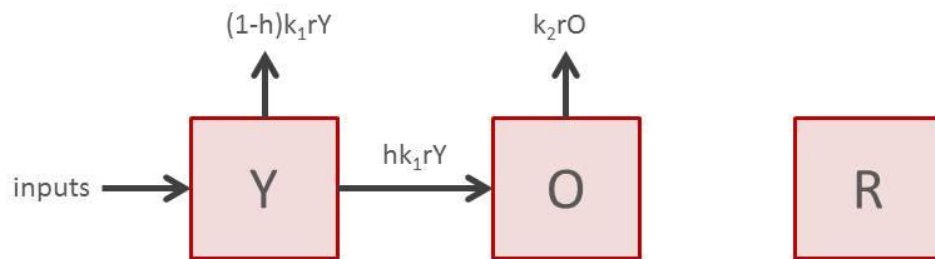
**S8: Graphical abstract of model structure I**

Model  
Structure I



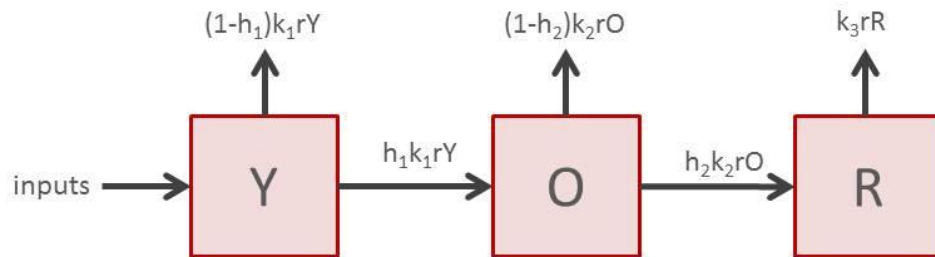
S9: Graphical abstract of model structure II

Model  
Structure II



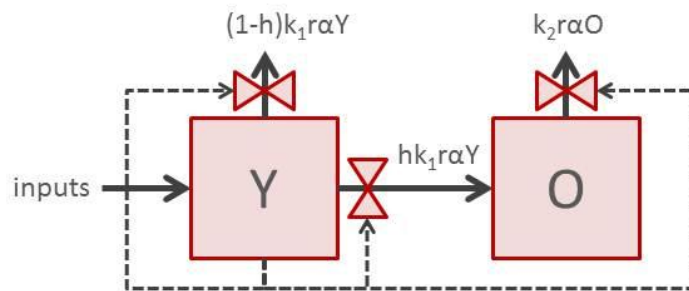
**S10: Graphical abstract of model structure III**

**Model  
Structure III**



S11: Graphical abstract of model structure IV

# Model Structure IV



S12: Graphical abstract of model structure V

Model  
Structure IV

