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Supplement of

Optimal model complexity for terrestrial carbon cycle prediction

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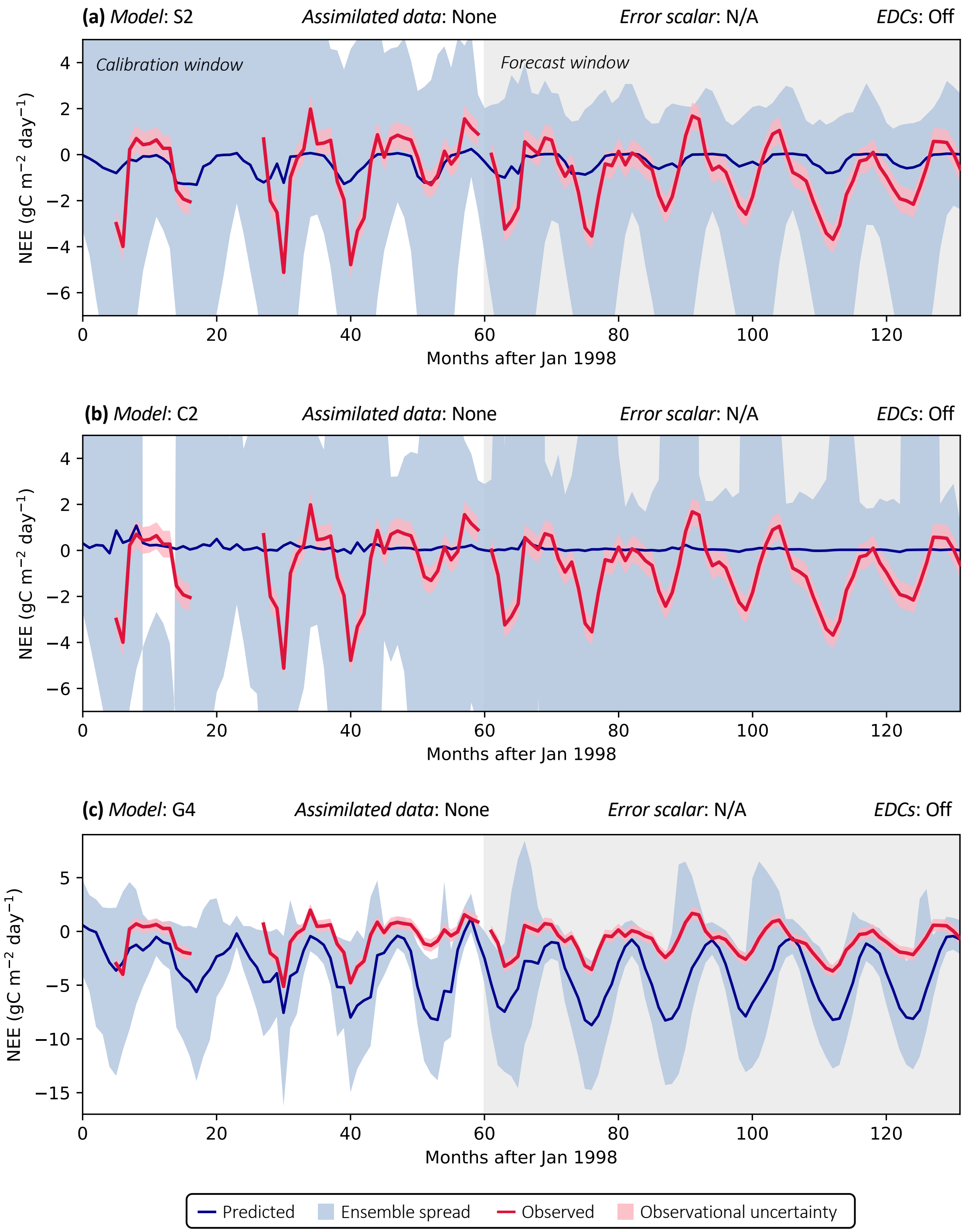

Fig. S1: Example model runs parameterized strictly using prior distributions at the FR-LBr site. For comparison, panels correspond directly to the models shown in Fig. 3. The calibration window—the first 5 years of the record—is shown in white and the forecast window is shaded gray. The ensemble spread (blue shading) encapsulates the 5th-95th percentile of runs.

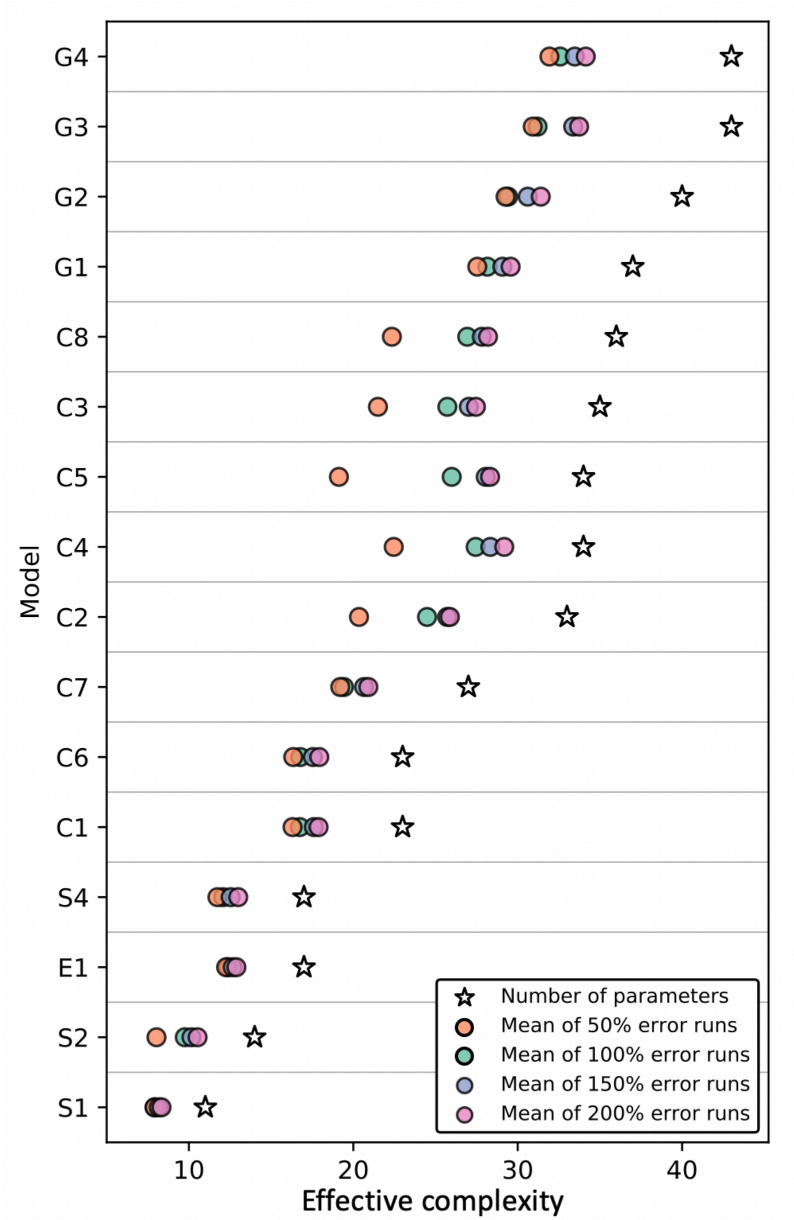

Fig. S2: Effect of observational error scalar on effective complexity. Models are ordered from fewest (S1) to greatest (G4) number of parameters.

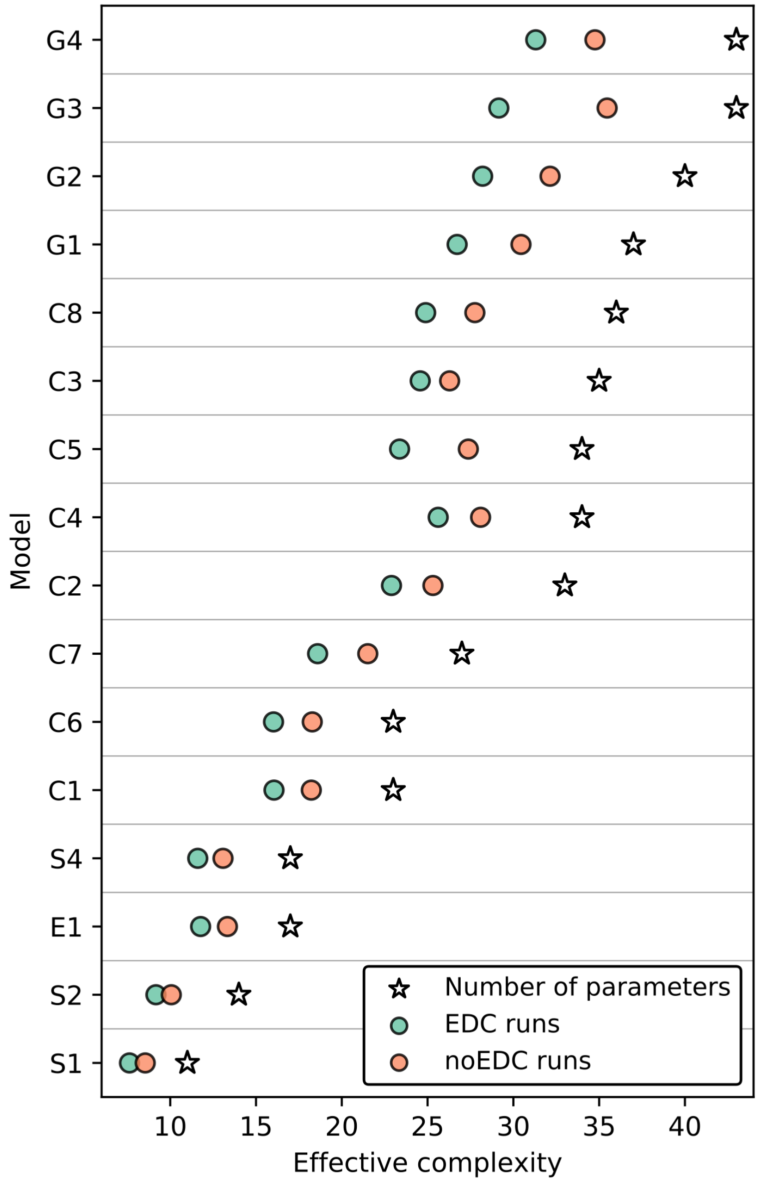

Fig. S3: Effects of EDCs on effective complexity. Models are ordered from fewest (S1) to greatest (G4) number of parameters.

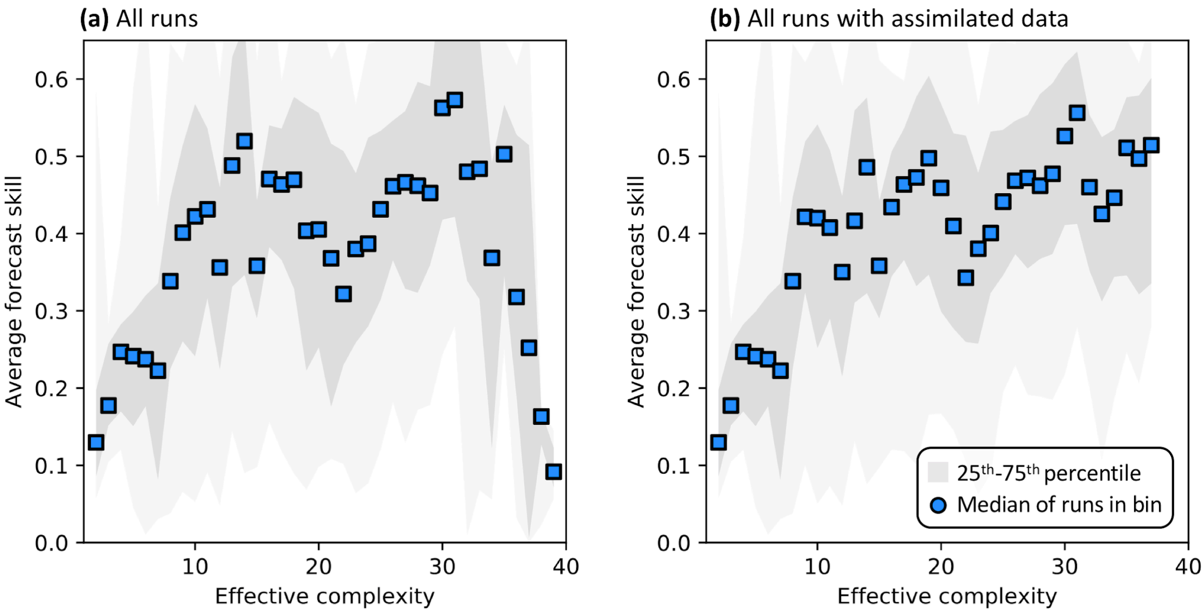

Fig. S4: Complexity–skill relationship for LAI predictions. (a) All model runs included in the experiment; (b) all model runs for which data was assimilated. Dark gray shading spans the 25th to 75th percentile of runs; light gray shading spans 5th to 95th percentile; blue points are medians of complexity bins. Average forecast skill is computed using the histogram intersection metric.

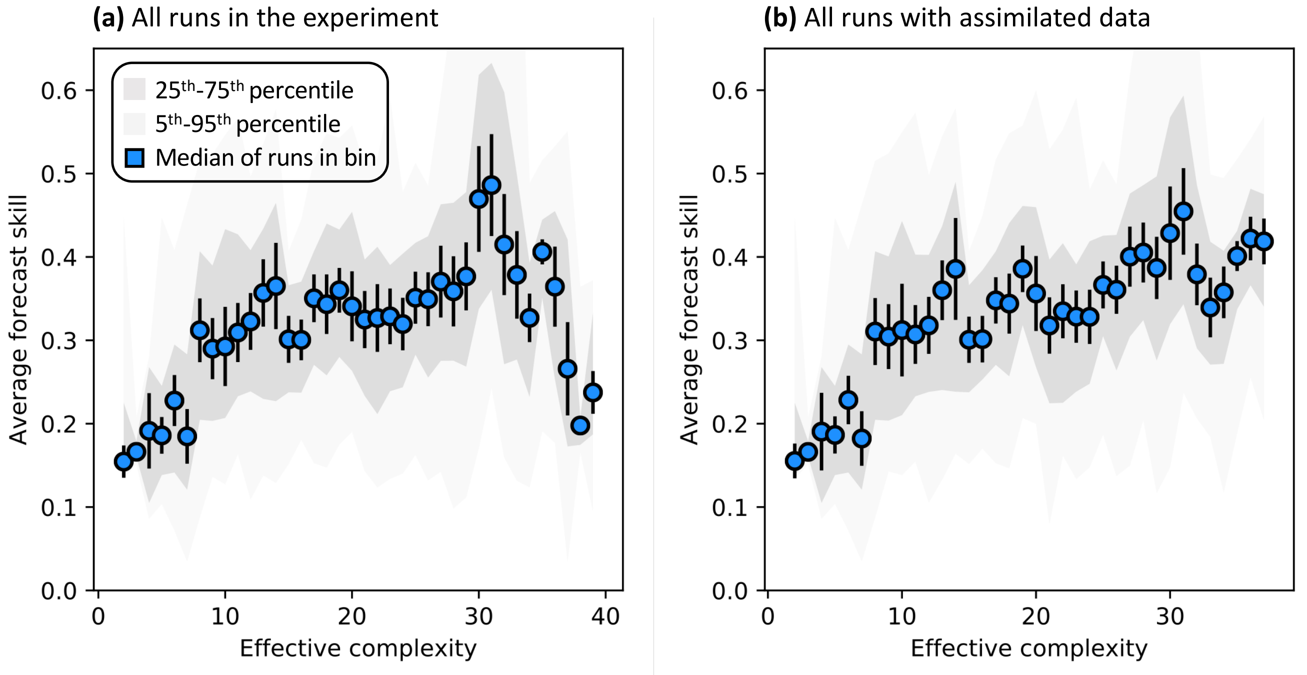

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Fig. S5: Complexity–skill relationship for NEE predictions, where a bootstrapping procedure has been performed to equalize number of runs within each complexity bin. Error bars represent one standard deviation of skill across the different bootstrap combinations.

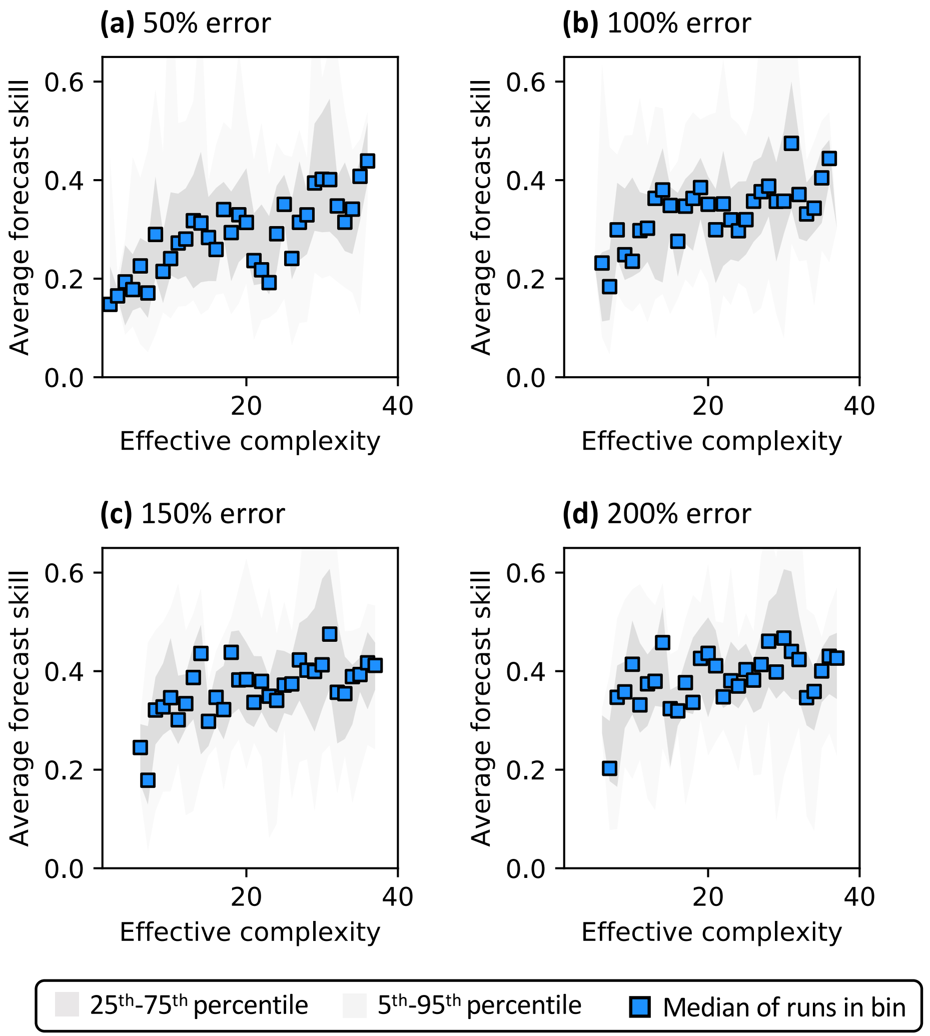

Fig. S6: Complexity–skill relationship for NEE predictions, split by observational error scalar (title of each subplot). Dark gray shading spans the 25^{th} to 75^{th} percentile of runs; light gray shading spans 5^{th} to 95^{th} percentile; blue points are medians of complexity bins. Average forecast skill is computed using the histogram intersection metric.

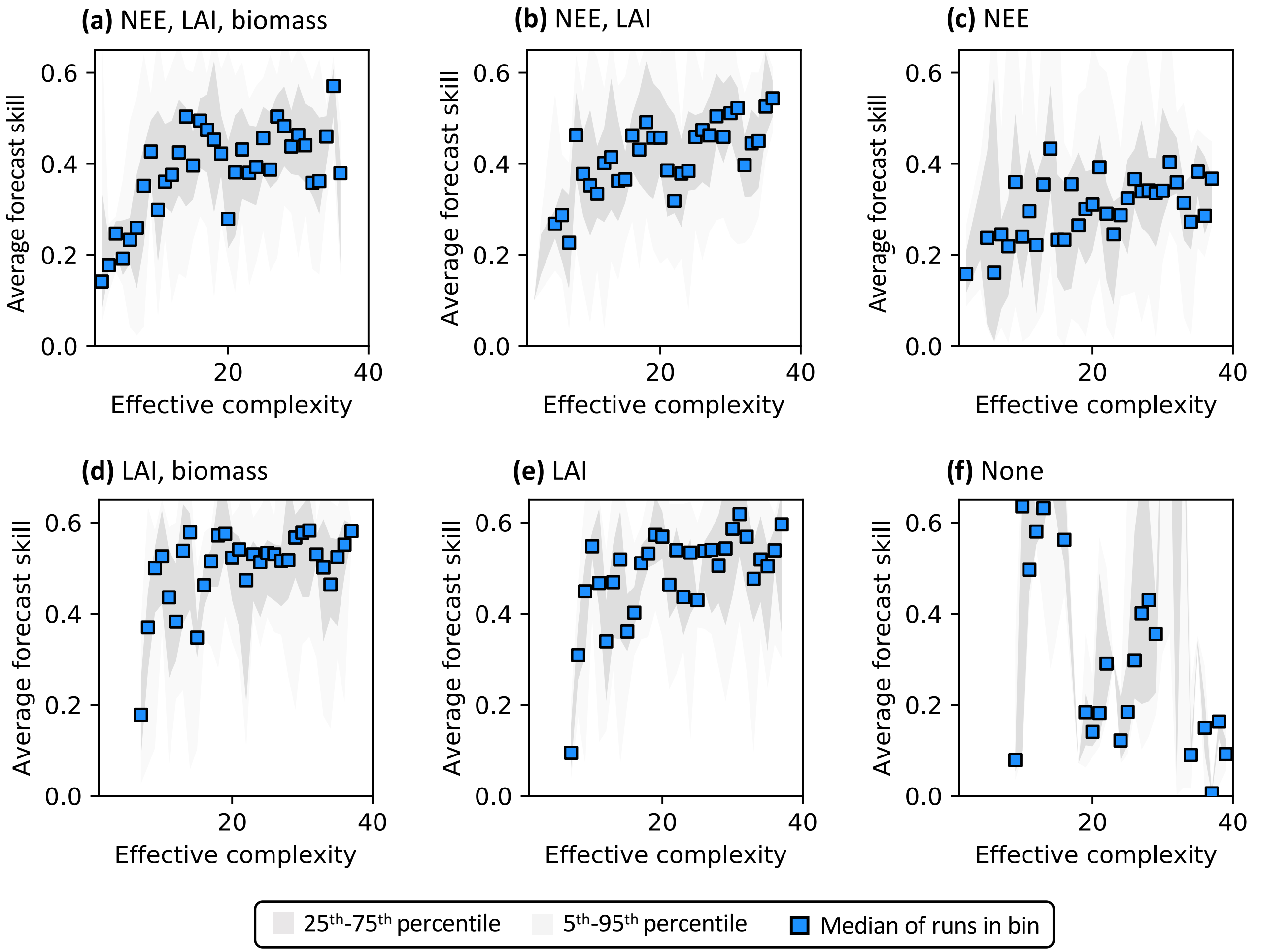

Fig. S7: Complexity–skill relationship for LAI predictions, split by assimilated data subset (title of each subplot). Dark gray shading spans the 25th to 75th percentile of runs; light gray shading spans 5th to 95th percentile; blue points are medians of complexity bins. Average forecast skill is computed using the histogram intersection metric. Ordering of subplots reflects strongest (a) to weakest (f) data constraint.