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A new a posteriori test for the subgrid-scale stress models QINGLIN CHEN, CHENNING TONG, Clemson University, MARTIN OTTE, Duke University, PETER SULLIVAN, NCAR — Traditional *a posteriori* tests of SGS models often compare large eddy simulation (LES) profiles of statistics with measurements. In this study a new *a posteriori* test is employed to study SGS model performance. We compare the conditional means of the LES-generated SGS stress and the conditional stress production rate conditional on the resolvable-scale velocity, which must be reproduced by the SGS model for large eddy simulation (LES) to correctly predict the one-point resolvable-scale velocity joint probability density function, with measurements. The results for convective atmospheric boundary layers show that the level of the anisotropy of the SGS stress is underpredicted by both the Smagorinsky model and the Kosovic nonlinear model. The magnitudes of the conditional means are also underpredicted by both models whereas the trends are generally better predicted by the Kosovic nonlinear model. However, the alignment between the conditional SGS stress and its production rate are over-predicted by both models. The model strength and deficiencies observed here were also identified in our previous statistical *a priori* tests analyzing these conditional statistics. The remarkable consistency between the two types of tests suggests that statistical tests analyzing the conditional SGS stress and its production rate are a highly capable approach for identifying specific model deficiencies and for evaluating SGS model performance in simulations. Supported by NSF.

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