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Internal vs Forced Variability metrics for Geophysical Flows using Information theory[1] AAKASH SANE, BAYLOR FOX-KEMPER, Center for Fluid Mechanics, Brown University — We propose a metric for measuring internal and forced variability in ensemble geophysical flow models using information theory: Shannon entropy and mutual information. Information entropy fundamentally determines variability by measuring the amount of variation in a distribution, as opposed to variance measuring the second moment. Shannon entropy and mutual information naturally take into account correlation coefficient, apply to any data, and are insensitive to outliers as well as a change of scale. We combine these two to quantify internal vs forced variability in (1) idealistic Gaussian vectors, (2) a realistic coastal ocean model and we show our metric's advantage over variance metrics. Our metric applies to any ensemble flow models where intrinsic and extrinsic factors compete to control variability.

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