



## Climate Program Opening Workshop August 21-25, 2017

### ***Lecture: An Information-Theoretic Framework for Improving Multi-Model Predictions & Data Assimilation Techniques***

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#### **Abstract:**

Multi Model Ensemble (MME) predictions are a popular ad-hoc technique for improving predictions of high-dimensional, multi-scale dynamical systems. The heuristic idea behind MME framework is simple: given a collection of models, one considers predictions obtained through the convex superposition of the individual probabilistic forecasts in the hope of mitigating model error. However, it is not obvious if this is a viable strategy and which models should be included in the MME forecast in order to achieve the best predictive performance. I will present an information-theoretic approach to this problem which allows for deriving a sufficient condition for improving dynamical predictions within the MME framework; moreover, this formulation gives rise to systematic and practical guidelines for optimising data assimilation techniques which are based on multi-model ensembles. Time permitting, the role and validity of “fluctuation-dissipation” arguments for improving imperfect predictions of externally perturbed non-autonomous systems - with possible applications to climate change considerations - will also be addressed.