CliMA's Approach Toward Data-Informed Climate Models With Quantified Uncertainties .

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While climate change is certain, precisely how climate will change is less clear. But breakthroughs in the accuracy of climate projections and in the quantification of their uncertainties are now within reach, thanks to advances in the computational and data sciences and in the availability of Earth observations from space and from the ground. I will survey the design of a new Earth system model (ESM), under development by the Climate Modeling Alliance (CliMA). The talk will cover key new concepts in the ESM, including turbulence, convection, and cloud parameterizations and fast and efficient algorithms for assimilating data and quantifying uncertainties through a three-step process involving calibration, emulation, and sampling.