



**MUMS Program Opening Workshop
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SPEAKER TITLE/ABSTRACT

Jenný Brynjarsdóttir

Case Western Reserve University

“Model Discrepancy and Physical Parameters in Calibration and Prediction of Computer Models”

The main goal of calibration is usually to improve the predictive performance of the simulator but the values of the parameters in the model may also be of intrinsic scientific interest in their own right. As an example of the latter we will discuss CO₂ retrievals from the the Orbiting Carbon Observatory 2 (OCO-2). In order to make appropriate use of observations of the physical system it is important to recognize model discrepancy, the difference between reality and the simulator output. We illustrate through a simple example that an analysis that does not account for model discrepancy may lead to biased and over-confident parameter estimates and predictions. The challenge with incorporating model discrepancy in statistical inverse problems is being confounded with calibration parameters, which will only be resolved with meaningful priors. For our simple example, we model the model-discrepancy via a Gaussian process and demonstrate that through accounting for model discrepancy our prediction within the range of data is correct. We will then discuss the effect of model discrepancy in CO₂ retrievals. This is joint work with Anthony O'Hagan, University of Sheffield, and Jonathan Hobbs and Amy Braverman at the Jet Propulsion Laboratory.