



CLIM Program Transition Workshop

May 14-16, 2018

Lecture: *Statistical Emulation with Dimension Reduction for Complex Physical Forward Models*

Speaker: Emily Kang

Abstract:

The retrieval algorithms in remote sensing generally involve complex physical forward models that are nonlinear and computationally expensive to evaluate. Statistical emulation provides an alternative with cheap computation and can be used to calibrate model parameters and to improve computational efficiency of the retrieval algorithms. We introduce a framework of combining dimension reduction of input and output spaces and Gaussian process emulation technique. The functional principal component analysis (FPCA) is chosen to reduce the output space of thousands of dimensions by orders of magnitude. In addition, instead of making restrictive assumptions regarding the correlation structure of the high-dimensional input space, we identify and exploit the most important directions of this space and thus construct a Gaussian process emulator with feasible computation. We will present preliminary results obtained from applying our method to OCO-2 data, and discuss how our framework can be generalized in distributed systems. This is joint work with Jon Hobbs, Alex Konomi, Pulong Ma, and Anirban Mondal, and Joon Jin Song.