06 Exploiting Artificial Intelligence for Advancing Earth and Environmental Systems Science

As observations of the Earth system increase in spatial resolution and temporal frequency, and with simulation output growing even faster, this data explosion is outpacing our ability to analyze, evaluate, and constrain Earth system models. To realize the promise of scientific discovery, data-driven modeling and machine learning approaches must be employed. An overview of artificial intelligence methods being adopted in Earth and environmental systems science will be presented, and new hybrid process-/machine learning-based modeling techniques will be discussed.

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Dr. Forrest M. Hoffman develops and applies Earth system models (ESMs) to investigate the global carbon cycle and feedbacks between biogeochemical cycles and the climate system. He applies data mining and machine learning methods using high performance computing to problems in landscape ecology, ecosystem modeling, remote sensing, and large-scale climate data analytics. Forrest is also a Joint Faculty Member in the University of Tennessee's Department of Civil & Environmental Engineering in nearby Knoxville, Tennessee, USA. Full list of Dr. Hoffman's research publications is available at https://scholar.google.com/citations?user=v7zlehDVGS4C&hl=en