SORS/WomenInBSC: Improving predictions by combining models into a supermodel

AI4S registration link

Abstract

To accelerate the skill of both short and long term predictions we combine state-of-the-art climate models and machine-learning based weather models into a ‘supermodel’, a novel form of physics-informed machine learning. Despite continuous development in Earth System Models (ESMs) the rate of improvement is relatively slow and many long-standing common biases in the models remain. A new promising area within climate modeling has been the development of data driven models. These models are improving at a rapid pace, and only take few resources to run compared to ESMs. Nevertheless, they tend to not show realistic physical behavior in multiple aspects and accumulate errors for longer predictions. In this presentation I will explain the supermodel concept and show the results of supermodelling in the context of physical models so far. I will show the first outcomes of a proof-of-concept supermodel that combines both the physical and the data-driven world: the physical knowledge within the Community Atmosphere Model (CAM) and the machine learning forecast model Pangu. This supermodel has great potential for reducing biases, while it is very efficient to run and maintains physical concistency.

Short Bio

I am a researcher at the University of Bergen, Norway. Originally trained in mathematics in Utrecht, the Netherlands, I decided to move to Bergen for a PhD on the topic of supermodelling: combining different models dynamically into an interactive ensemble. During my PhD I developed my own machine learning methods to train such a supermodel, i.e. which models to combine and to what extent. I started with toy models, but moved up to combining different versions of the Community Atmosphere Model (CAM) into an efficient atmosphere-supermodel. With the upcoming field of purely data-driven models, I saw very promising opportunities to combine these fast and in some aspects superior models with our traditional physical models into a hybrid supermodel.

Speakers

Speaker: Francine J. Schevenhoven, University of Bergen - Geophysical Institute
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