

Supermodeling by combining imperfect models

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Supermodeling by combining imperfect models SUMO

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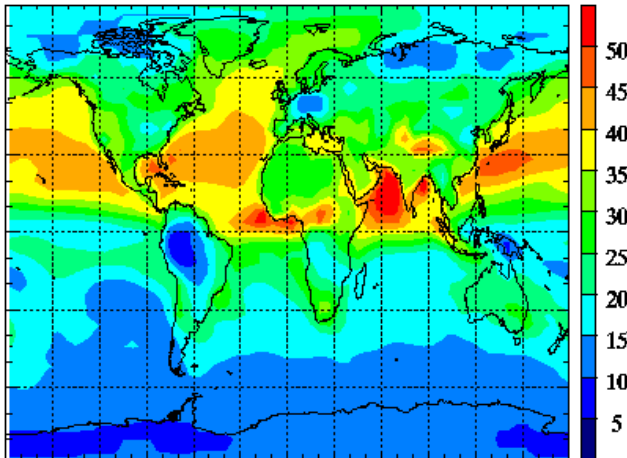


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The SUMO project

The **SUMO** project is an international effort, funded under Framework Program 7 of the European Union, designed to develop a novel computational strategy to improve climate simulations.

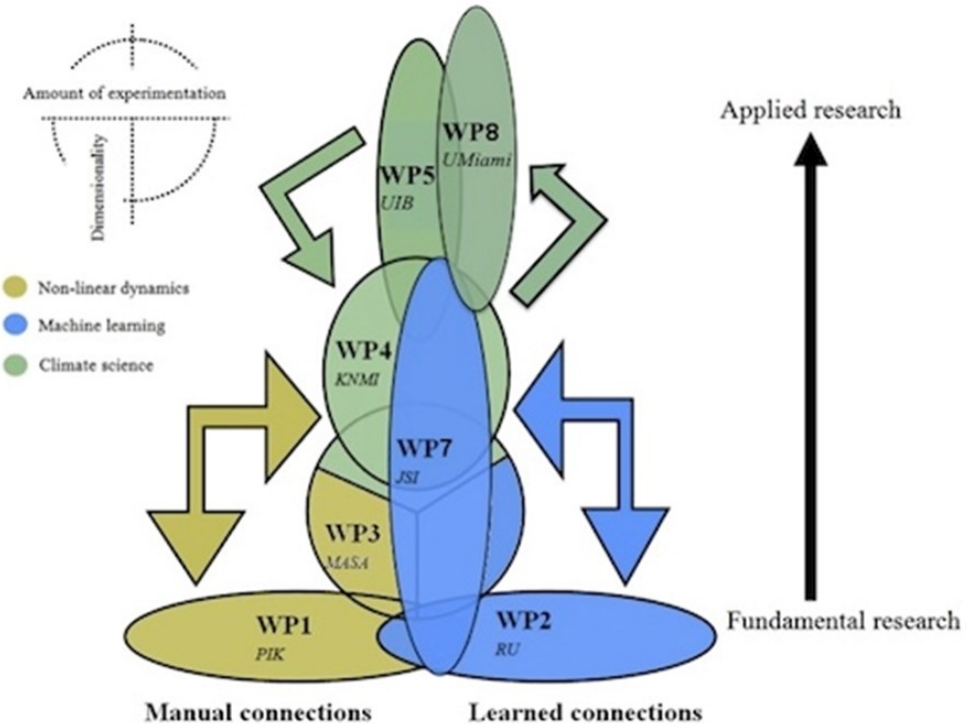
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The novelty of this approach is summarized in the concept of supermodeling: a supermodel is an interconnected ensemble of

existing imperfect models of a real, observable system. The connections between the models can be learned from observational data using methods from machine learning. The supermodel outperforms the individual models in simulating the behavior of the real system since it has learned to combine the strengths of the individual models. The concept of supermodeling is based on a new combination of insights from climate science, nonlinear dynamical systems, and machine learning.

Supermodeling by combining Imperfect models— SUMO



SUMO has a hierarchical structure as reflected in this graphical representation of the nature of and interconnections between the six work packages. The vertical dimension of the ovals representing each work package reflects the dimensionality of the model systems that are subject of research, the horizontal dimension the amount of experimentation that is possible in that work package. The vertical ordering of the work packages reflects the nature of the research from more fundamental at the bottom to more applied to the top. The colours indicate the prevailing expertise needed in each work package. The arrows reflect the flow of information between the work packages. By the end of the three years of research in SUMO the super modeling strategy will be demonstrated by a climate change simulation with a climate supermodel connecting three state-of-the-art global climate models.