2. CASUS Annual Workshop

Fusing Artificial Intelligence & Simulation

High-dimensional data streams for understanding low-dimensional Earth system processes

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Location: livestream link follows

Abstract:
Earth system sciences are blessed with the benefits of a data rich world. Today, global remote sensing data are available at higher spatial, temporal, and spectral resolution than ever before. The combination of novel space data, in-situ observations, and long-term data archives via machine learning approaches allows to derive downstream data products of unprecedented spatial and temporal resolution. These data streams play an important role in describing the trajectories of the dynamics in multiple subsystems of the Earth. However, such high-dimensional data streams require novel data exploration strategies such as analysis ready data cubes that can be explored using user defined functions and workflows. In this talks I will show some examples of understanding Earth system processes using the emerging Earth system data cube. For instance, many of these novel data products are carriers of redundant information. Dimensionality reduction shows, for instance, that many land-surface related data streams can be effectively reduced to a few essential components that encode important orthogonal dynamics. Data-driven assessments of this kind are essential in identifying the essence and the gaps in our understanding of Earth system dynamics.

Biography:

Miguel Mahecha is a professor at the Leipzig University and head of the Earth System Data Science group at the Remote Sensing Centre for Earth System research. His main scholarly interests are on understanding ecosystem responses to climate extremes as well as the human environment nexus during extremes. He also works on understanding macroecological dynamics and ecosystem functioning. Over the last years he has developed the Earth System Data Cube concept and combines empirical findings with theoretical and conceptual understanding to understand complex interactions in the Earth system.