

05.04.2018, 15:15

KlimaCampus Kolloquium

Pierre Gentine

Changes in the water cycle with rising CO₂ and its coupling to the carbon cycle

With rising CO₂ concentration, the continental hydrological and carbon dioxide cycles are going to become more coupled. Predicting whether we will live in a drier or wetter world, with more or less droughts, is a relatively simple question, which has however widespread implications. Yet, we are not in a position to clearly answer this simple question. Models predict that surface CO₂ physiological effects will dominate the future continental hydrological cycle. Those effects appear critical to explain whether we will live in a drier or wetter world. Conversely, the water cycle and extremes, in particular, play a crucial role in allowing continents to be a future carbon sink, at least in models. This coupling between the carbon and water cycles depends on some key processes: the representation of precipitation in models, vegetation water stress and its response to rising CO₂. Those processes are currently poorly represented in models. High-resolution models, remote sensing data and simple weather station data can be harvested to inform those processes and better represent them in models and better inform our prediction of the changes in the water cycle.

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