

Bio-geophysical feedback to climate caused by the conversion of Amazon Forest to soybean plantations

Date	20 th Jan. (Fri.)
Time	16:00 (UTC+8)
Venue	Zoom



Over the past two decades, soybean cultivation has become one of the principal replacements for forests in the Brazilian Amazon. Previous studies showed that the conversion of forests into large-scale soybean farms has different effects on local and regional climate than other forms of land use, e.g., conversion to pasture. The bio-geophysical feedbacks that lead to changes in temperature and rainfall caused by the expansion of commodity crops is not fully understood, and this has implications for both modeling potential future climatic change and understanding its impact. Here we performed model simulations to characterize the feedback to climate caused by the replacement of Amazonian forests with soybean and pastures. Our results show that: when compared to deforestation caused by pastures, the conversion of forests into soybean plantations results in more pronounced changes in the atmospheric boundary layer. Because they are characterized by a period of the year with bare soil, soybean fields transmit more long-wave radiation to the atmosphere than pastures, leading to an increase in boundary layer average temperature by 2.4K. Although soybean plantations tend to strengthen convective lifting, the decrease in boundary layer water vapor content plays a decisive role in reducing rainfall. Finally, we demonstrate that the climatic impacts associated with the replacement of forests by soybean is likely to be magnified with agricultural expansion along new frontiers in the northern and western regions of the Amazon basin due to a more pronounced reduction in water vapor content.



Zhang Jie is a Ph.D. student at the University of Hong Kong, whose research focuses on investigating the impacts of the expansion of large-scale commodity farming on the Amazon rainforest climate. His interests lay in climate change, Land use changes, and microclimate. He holds a bachelor's degree in atmospheric science and a master's degree in geography. In addition, he is also interested in mesoscale weather processes and the influence of urban on regional climate.

All are welcome!