The Challenges and Opportunities for Extending Plant Genomics to Climate Research and Modeling

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Our inability to accurately represent plant functional traits (e.g., those traits governing productivity) for a wide array of taxa and the interaction of those traits with variable environmental conditions are considered key uncertainties in land-surface models including the DOE BER funded Community Land Model (CLM). Given the importance of this issue, it is unfortunate that the scientific community is not currently leveraging advances in genomics and genetics to better predict plant traits that govern species' performance under variable climatic conditions. In this presentation, we propose an alternative strategy by incorporating high-resolution genomic-based modeling efforts for inclusion into climate models. We will illustrate this strategy with a use-case exemplifying a key plant-microbe interaction governing C and N cycling in a critical peatland ecosystem. Such a strategy has the potential to lessen the current disconnect between the genomic and climate modeling efforts, and thereby set the precedent where advances from biological system research are brought to bear in climate system research.