Model Application

## Objectives:

* Gain understanding in using crop simulation models for yield projection under a changing climate.
* Discuss the strengths and weaknesses of crop models, and their potential applications.
* Extend your understanding of process-based models from crop/plant models that operate at the single-plant level to large-scale Earth System Models (additional reading with Bonan, 2008).

## Required Readings:

Hsiao, J., Swann, A. L. S. & Kim, S.-H. Maize yield under a changing climate: The hidden role of vapor pressure deficit. *Agric. For. Meteorol.* **279**, 107692 (2019).

## Additional Readings:

Bonan, G. B. Forests and climate change: forcings, feedbacks, and the climate benefits of forests. *Science.* **320**, 1444–1449 (2008).

## Reading Questions:

1. Why did the authors in Hsiao et al. (2019) use a crop simulation model to analyze yield impact under a changing climate? What are some of the advantages in using such an approach?
2. How did temperature, VPD, and CO2 levels affect maize growth and yield in the simulation results? How did the results differ when considering the yield impacts from all climate factors combined?
3. Based on what you’ve learned in lecture so far, what are some of the strengths and limitations in applying crop simulation models to analyze climate impacts on crop growth and yield?
4. What are some other applications you can think of for crop simulation models?

## Bonus questions on additional reading:

1. What are some additional components an Earth System Model represents about vegetation when compared to a process-based crop simulation model (refer to Fig. 2 in Bonan, 2008)?
2. What are some scientific questions researchers leverage the land and vegetation component within Earth System Models to gain insight on?