Better representing vegetation canopy structure in Earth System Models

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Addressing the impact of 3D vegetation structure on shortwave radiation transfer in Earth System Models (ESMs) is important for accurate weather forecasting, carbon budget estimates, and climate predictions. While leaf-level photosynthesis is well characterized and understood, estimates of global level carbon assimilation in the literature range from 110 to 175 PgC.yr⁻¹. I will explore how neglecting canopy structure leads to significant uncertainties in shortwave radiation partitioning, as well as second order derived canopy properties, such as leaf area index (LAI). I will also cover how modeled carbon assimilation of the terrestrial biosphere is impacted when a satellite derived clumping index is incorporated into the UKESM. Finally, I will touch on how the clumping index might be integrated into hyperspectral ESMs to explore the theoretical relationship between canopy structure and photosynthesis.