

Corn and Soybean Albedo Variations with Zenith Angle

Although surface albedo is dependent on many different variables such as surface properties or plant type, the surface albedo is also known to vary due to changes in the solar zenith angle. This paper examines a possible inverse linear relationship of albedo with the solar zenith angle observed from data taken at the Been Field, maintained by the United State Department of Agriculture (USDA) Agricultural Research Service (ARS) National Laboratory for Agriculture and the Environment (NLAE) on the Iowa State University campus in Ames, Iowa. Data was observed for maize and soybean from 2007 to 2011. Mean albedo has a diurnal variation, so it increases as the solar zenith angle also increases, and vice versa. The observed surface albedo exhibits the classic diurnal symmetry that is observed in a diurnal variation in the solar zenith angle. The surface albedo and the solar zenith angle have a positive exponential relationship. A two-term exponential model equation was also derived from the data for maize, soybean and a crop average. The equation can be used for local climate modeling and monitoring plant processes.