BNL-98969-2012-AB

# *LAND SURFACE ALBEDO AND ITS IMPACT ON MODELING LAND-SURFACE-ATMOSPHERE INTERACTIONS*

Yu Xie and Wei Wu

*For presentation at the*
American Geophysical Union 2012 Fall Meeting
San Francisco, CA
Dec. 3-7, 2012

**Environmental Sciences Department/Atmospheric Sciences Division**
**Brookhaven National Laboratory**
P.O. Box, Upton, NY
www.bnl.gov

**ABSTRACT**

Land-surface-atmosphere interaction has been received increasing attention in the past a few decades. The current land surface models and parameterizations are concerned with their performance when coupled to atmospheric models. Compared to many other land surface variables, e.g. surface humidity, water vapor flux and aerodynamic resistance, land surface albedo has a direct and distinct impact on the global energy budget through the partition between reflected and absorbed solar flux by the surface, and therefore should not be undeservedly neglected in the estimate of temperature and diurnal cycle of the boundary layer. Over the oceans, the surface albedo has been well estimated, both because of the singularity of surface type over the oceans and because of the extremely low reflectances that can be accessed through laboratory experiments. In contrast, over land the surface albedo has a strong seasonal dependence and may dramatically vary from 0.09 for coniferous trees to as high as 0.9 for fresh deep snow. The present study synthesizes knowledge of the land surface albedo, mainly paying attention to its impact on the coupled land and atmospheric models. Available observations from ground-based and airborne instruments are summarized for various land surface types and compared to the modeling efforts used in General Circulation Models (GCMs) and satellite retrieval of atmospheric properties. A number of numerical schemes for simulating radiative transfer within land surfaces are analyzed in order to improve our understanding of the direct effect of surface albedo to model simulations of the atmosphere. In addition, the surface albedo feedback to the coupled atmospheric model and its predictions is also discussed.