BNL-94419-2010-AB

ENHANCED CLOUD REGIME CLASSIFICATION FOR EVALUATION OF MODEL FAST PHYSICS

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Submitted to the American Geophysical Union Fall Meeting,
San Francisco, CA, Dec. 13-17, 2010

November 2010

Atmospheric Sciences Division/Environmental Sciences Dept.

Brookhaven National Laboratory

U.S. Department of Energy
Office of Science

Managed by
Brookhaven Science Associates, LLC
for the United States Department of Energy under
Contract No. DE-AC02-98CH10886

ABSTRACT

Distinct cloud regimes exist locally and globally that have been identified commonly through the use of objective classification methods. Such classification helps identify the meteorological conditions that are closely associated with specific cloud regimes, and facilitates evaluation of cloud parameterizations. This study focuses on cloud regime classification using k-means clustering for the Atmospheric Radiation Measurement Program's cloud observations at South Great Plain site, along with coincident satellite cloud measurements. Two approaches will be used and compared: cluster analysis using mean cloud statistics, coupled with a set of meteorological parameters; and cluster analysis using pixel-level cloud properties. The scale dependence of the classified cloud properties derived from the two clustering approaches will be investigated, with an aim of evaluating the scale dependent cloud parameterization for future high-resolution climate models. Cloud life cycle is also introduced in the classification process using the sequencing of the clusters and the evolution stage of typical synoptic weather patterns. For heavily precipitating clouds, cloud tracking of mesoscale convective systems and cyclone tracking of synoptic weather patterns will be employed to determine the evolution stage of clouds. Single column model results will be evaluated for different cloud regimes.