Cleveland State University
EngagedScholarship@CSU

Undergraduate Research Posters 2016 | Undergraduate Research Posters

2016

How Big is a Cloud: A Statistical Analysis of Cloud Size Distributions Derived from Large Eddy Simulations

Dorothy Pharis
Cleveland State University

Nicholas Barron
Cleveland State University

Follow this and additional works at: https://engagedscholarship.csuohio.edu/u_poster_2016

 Part of the Life Sciences Commons, Medicine and Health Sciences Commons, and the Physical Sciences and Mathematics Commons

How does access to this work benefit you? Let us know!

Recommended Citation

Pharis, Dorothy and Barron, Nicholas, "How Big is a Cloud: A Statistical Analysis of Cloud Size Distributions Derived from Large Eddy Simulations" (2016). *Undergraduate Research Posters 2016*. 29.
https://engagedscholarship.csuohio.edu/u_poster_2016/29

This Book is brought to you for free and open access by the Undergraduate Research Posters at EngagedScholarship@CSU. It has been accepted for inclusion in Undergraduate Research Posters 2016 by an authorized administrator of EngagedScholarship@CSU. For more information, please contact library.es@csuohio.edu.

MSL ACADEMIC ENDEAVORS

How Big is a Cloud: A Statistical Analysis of Cloud Size Distributions Derived from Large Eddy Simulations

College of Sciences and Health Professions

Student Researchers: Nicholas Barron and Dorothy Pharis

Faculty Advisor: Thijs Heus

Abstract

To accurately represent cumulous clouds in climate and weather models, it is important to understand how large clouds, in certain cloud fields, are. These fields can be described by a cloud size distribution (CSD), the number of clouds of a certain defined size. This study utilized data from a Large Eddy Simulation (LES), a high resolution numerical model describing the atmosphere, to explore what defines the cloud size distribution. First, we have developed a toolkit to illustrate the cloud size distribution by using the slope and deriving an estimate for the scale break. Second, we performed a statistical analysis of cloud size distributions for several cases and measurement methods. Based on this analysis, we found that cloud size distributions do not compare well from case to case; but are comparable, regardless of time, within cases. Large eddy simulations of smaller domain sizes result in cloud fields that underestimate the number of clouds. Lastly, analyzing the cloud size distribution methods showed that, although similar, not all measurement methods obtain identical results. In particular, CSDs from linear transects through the cloud layer ("fly-through") deviate significantly from other methods.