

Boundary-layer clouds in a changing climate

Christopher Bretherton[†];

[†] University of Washington, USA

Leading author: breth@u.washington.edu

The simulation of boundary-layer clouds is an important and longstanding challenge for climate models. Boundary layer clouds are typically associated with turbulent eddies that must be parameterized, are not well resolved by the grid of a typical climate model, and have strong feedbacks with radiation. The response of boundary layer clouds over the low- and mid-latitude oceans to future climate change is a leading source of intermodel differences in climate sensitivity. Over the past decade, great strides have been made in more skillful simulation of cloud-topped boundary layers, and the physical processes that control how they respond to global warming and aerosol changes are becoming better understood and quantified, through an interplay between large-eddy simulation modeling, process and global observations, and climate model development and analysis. Examples of important physical mechanisms controlling the regional distribution of boundary layer cloud and cloud changes will be discussed.