

Widening and Weakening of the Hadley Circulation Under Global Warming

Yongyun HU**
Peking University, China

The Hadley circulation is one of the most important atmospheric circulations. Widening of the Hadley circulation has drawn extensive studies in the past decade. The key concern is that widening of the Hadley circulation would cause poleward shift of the subtropical dry zone. Various metrics have been applied to measure the widening of the tropics. What are responsible for the observed widening trends of the Hadley circulation? How anthropogenic and natural forcings caused the widening? How the widening results in regional climatic effects? These are the major questions in studying the widening of the Hadley circulation. While both observations and simulations all show widening of the Hadley circulation in the past few decades, there are no general agreements of changes in the strength of the Hadley circulation. Although some reanalysis datasets show strengthening of the Hadley circulation, it was shown that the strengthening trend could be artificial, and simulations show weakening of the Hadley circulation for global greenhouse warming. In the present paper, we shall briefly review the major progresses of studies in trends in width and strength of the Hadley circulation. We address answers to these questions, clarify inconsistent results, and propose ideas for future studies.