

Impact of the Bermuda High on regional climate and air quality over the United StatesXin-Zhong Liang[†]; Jinhong Zhu[†] ESSIC, University of Maryland, USALeading author: xliang@umd.edu

The Bermuda high plays an important role in modulating the regional climate and air quality over the United States in summer. Observational reanalysis data shows that the westward extension and center intensity of the Bermuda high are closely associated with the intensity of the Great Plains low-level jet (LLJ), which in turn governs the northward transport of moisture and pollutants. In summer, when the Bermuda high is in its positive phase with a more westward extension, the LLJ is intensified and consequently precipitation is decreased in the Gulf States but increased in the Midwest. Meanwhile, the westward extension makes the eastern coastal States under control by the Bermuda high, producing more frequent regional air stagnations there. To facilitate the diagnosis of these and other relationships, an index for the Bermuda high (BHI) has been developed to characterize its regional structure and impacts. It is demonstrated that summer daily maximum 8-hour average (MDA8) surface ozone concentrations are strongly linked to BHI, with significant negative correlations along the Central Plains to the Midwest and positive correlations over the eastern coastal States. When BHI is above normal, the stronger and more westward extended Bermuda high enhances the LLJ, which brings clean marine air from the Gulf of Mexico into the Great Plains, causing lower ozone level there. The influence is extended further north and transport more pollutants from the Midwest to the New England. Together with more frequent air stagnations under the prevailing high pressures, this results in higher surface ozone concentrations over broad areas of the eastern United States. This poster will present these observed relationships and also compare the corresponding results simulated by both regional and global modeling systems. It will demonstrate that the regional model is more skillful than the global model in reproducing the climate and air quality responses to the Bermuda high variations.