

Exploring aerosol-cloud interaction using satellite retrievals

*Xiaoyan Ma¹, Hailing Jia¹, Johannes Quaas²

1. Nanjing University of Information Science and Technology, 2. Universität Leipzig

Long term MODIS level 3 data (MYD08_D3) from 2003 to 2016 was employed to investigate the correlation between aerosol and cloud properties over three major industrial regions in northern hemisphere (NH) and their adjacent oceans. Statistical analysis indicate that for liquid cloud, strong positive correlation between aerosol optical depth (AOD) and cloud effective radius (CER) is found over east China, i.e. CER increases with AOD, but becomes weak over east US and obscure over west Europe. In contrast, consistent negative correlation (i.e. CER decreases with AOD) is found over three adjacent oceans. Cloud properties such as cloud fraction (CF), cloud optical depth (COD), and liquid water path (LWP) and their relations with AOD were also examined. To understand the mechanisms leading to these findings, the ERA-interim reanalysis data was employed to investigate the impacts of lower tropospheric stability, vertical velocity, and precipitable water on the correlations between AOD and cloud properties. Possible explanations were discussed.

Keywords: aerosol, cloud, satellite retrievals