Impacts of sea surface temperatures on 2017 hurricanes

The 2017 Hurricane Season was the seventh most intense hurricane season in the Atlantic basin since 1850. As the costliest tropical cyclone season on record (≥ $368.66 billion), most of the damages were caused by 3 major hurricanes: Harvey, Maria, and Irma. The sea surface temperature (SST) along the paths of tropical cyclones (TC) is one of the major factors that influencing the intensity of hurricanes. In this study, we use the Weather Research and Forecasting (WRF) model to investigate the impacts of sea surface temperature on the intensity of the 2017 hurricanes through the SST sensitivity experiments. Two convection-permitting simulations are performed here with the control simulation using the 2017 SST and the sensitivity simulation using the mean SST averaged over 2001 to 2016 as the lower boundary condition. The SST over the Atlantic basin during the summer of 2017 is about 0.5 to 1 K warmer than 16-yrs mean but with great spatial variability. The SST changes along the track are consistent with the hurricanes intensity differences between the two WRF RCM runs. The spatial pattern of the SST also has considerable impacts on the hurricane structure. For example, for Hurricane Irma, the eyewall size becomes smaller in the control simulation. The power dissipation index (PDI) and destructive potential (PDS) are calculated in this study. These two index show that different hurricane's intensity change differently when the SST is replaced by the 16-yrs mean. The major hurricanes Harvey, Irma and Maria show higher intensify with the 2001-2016 SST. The SST anomaly may also have considerable impacts on the hurricane structure.For example for Hurricane Irma the eye wall velocity increases and the size becomes smaller in the control run.