Extreme Temperature Regimes in association with two types of El Niño

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During the winter season, extreme temperature regimes (ETRs), including cold air outbreaks (CAOs) and warm waves (WWs), affect regional economies and human safety and have significant impacts on energy consumption, local agriculture and human health. The primary focus of this study is to investigate the different behaviors of the extreme temperature regimes (CAOs or WWs) between CP-type and EP-type El Niños. These two El Niño types are classified by the spatial structure of sea surface temperature (SST) anomalies over Pacific Ocean. Equatorial heat convections associated with two El Niño types trigger different Rossby wave propagations and resultant regional circulations generate significantly different patterns in the near surface air temperature (SAT) anomalies over North America and Eurasia continents. In this study, we applied an impact factor metric to characterize the behavior of ETRs, which quantifies the cumulative effect of CAOs and WWs per winter season. Anomalous composites of yearly impact factor for CAOs and WWs shows that the dipole over Pacific Ocean for CP-type El Niño is displaced to westward compared with EP-type El Niño . Consequently, negative anomaly of CAOs shifts westward and positive anomaly of CAOs becomes significant over central south US. Another dipole over Eastern Europe to Central Asia is also displaced westward and located over Eastern Atlantic and Western Europe with strong significance, which enhances (reduces) the intensity of CAOs over Western Europe (Northwestern Africa). We also suggest underlying dynamics for those differences via several statistical analyses.