

Effects of energetic particle precipitation on the SH middle atmosphere in the latest reanalysis data

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The earth's middle atmosphere (i.e., stratosphere and mesosphere) is under the influence of several kinds of climate parameters such as solar activity in ultraviolet (UV) radiation, volcanic aerosol, Quasi-Biennial Oscillation (QBO), El Niño-Southern Oscillation (ENSO), etc. Recently effects of energetic particle precipitation on the earth's atmosphere are also studied in many literatures. However, their effects have not been well distinguished from the effects of the other climate factors. This study attempts to extract effects of energetic particle precipitation on the middle atmosphere in the southern hemisphere (SH) from the latest reanalysis datasets using a multiple regression analysis and bootstrapping. We compare effects of energetic particle precipitation obtained by several different methods and discuss how significant they are.

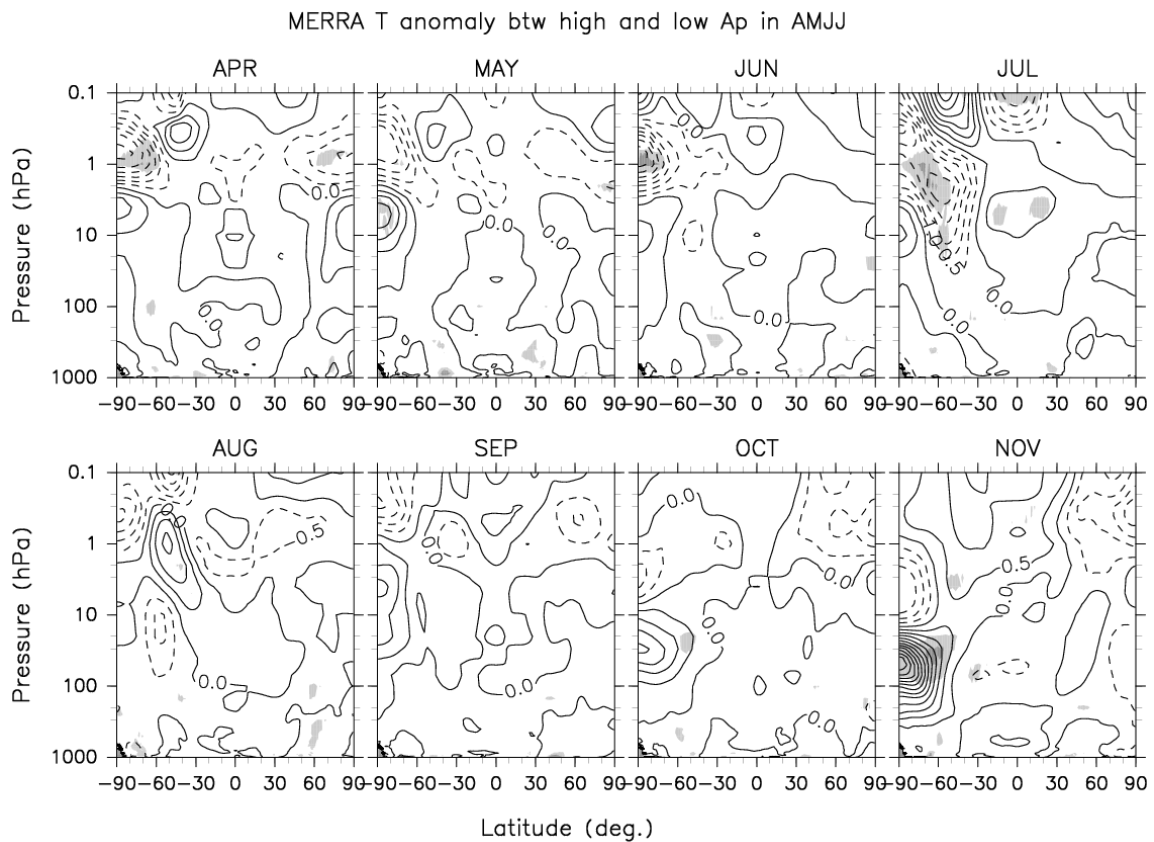


Figure 1. Temperature differences between high and low Ap index years during April through July calculated from the MERRA data. Contour intervals are 0.5 K. Negative values are dashed. Dark and light shades denote the statistical significance of 99% and 95%, respectively, obtained by bootstrapping.