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Climatology and Long-Term Trends in the Stratospheric Temperature and Wind Using ERA5

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This study analyses long-term trends in temperature and wind climatology based on ERA5 data. We study climatology and trends separately for every decade from 1980 to 2020 and their changes during this period for winter (DJF for the NH and JJA for the SH) for 40–90°N/S. This study is focused on the pressure levels between 100–1 hPa, which essentially covers the whole stratosphere. We also analyze the impact of the sudden stratospheric warmings (SSW), North Atlantic Oscillation (NAO), El Niño Southern Oscillation (ENSO) and Quasi-biennial oscillation (QBO). This helps us to find details of climatology and trend behavior in the stratosphere in connection to these phenomena. ERA5 is one of the newest reanalysis, which is widely used for the middle atmosphere. We identify the largest differences which occur between 1990–2000 and 2000–2010 in both temperature climatology and trends. We suggest that these differences could relate to the different occurrence frequency of SSWs in 1990–2000 versus 2000–2010.