

EGU21-10289, updated on 28 Jan 2022
<https://doi.org/10.5194/egusphere-egu21-10289>
EGU General Assembly 2021
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Impact of Antarctic Sudden Stratospheric Warming on Mid-Latitude Thermosphere and Ionosphere over USA and Europe

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Limited observational evidence indicates that ionospheric changes caused by Arctic SSWs propagate to at least the middle latitudes in the Southern Hemisphere. However, it is not known if similar ionospheric anomalies are produced by Antarctic SSWs, mostly because Antarctic SSWs occur less often than the Arctic events. The sudden stratospheric warming of September 2019 has provided a perfect opportunity to investigate whether SSW are linked to upper atmospheric anomalies at middle latitudes of the opposite hemisphere. In this study we provide an overview of thermospheric and ionospheric anomalies observed in September 2019 at middle latitudes in the Northern Hemisphere. Our results indicate persistent and strong positive anomalies in total electron content and thermospheric O/N₂ ratio observed in the western region of USA. Central and eastern regions of USA do not experience similar positive perturbations and show mostly moderate suppression of TEC reaching 20-40% of the baseline. Both positive and negative anomalies are observed over the central Europe. We discuss potential mechanisms that could be responsible for the observed features and suggest that regional differences in TEC response could be related to modulation of thermospheric winds by SSW and large declination angle over Western US.