Detection of SuperDARN-Observed Medium Scale Traveling Ionospheric Disturbances in the Southern Hemisphere

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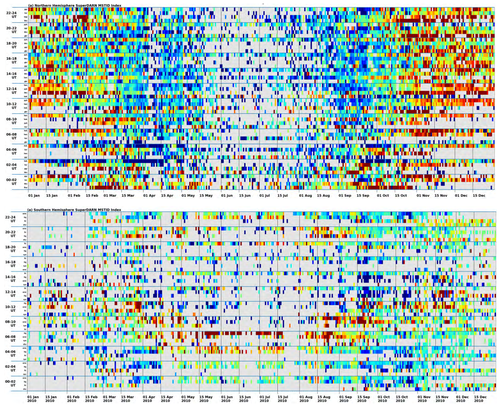
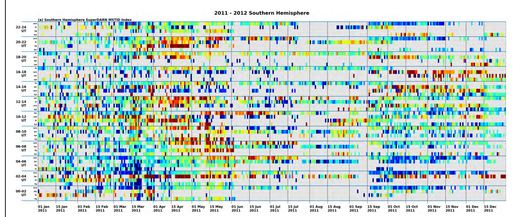
Introduction

- Existing Studies have largely focused on Identifying MSTIDs in the Northern Hemisphere
- This is for a variety of reasons including more consistent ground scatter, more radars, and a better understanding of space weather in the Northern Hemisphere
- *Frissell et al.* (2016) used frequency analysis to identify periods of high and low MSTID activity in the Northern Hemisphere during the Winter and Spring during daytime hours
- This is done by calculating a MSTID index for each radar over a 2hr window
- The MSTID Index indicates high or low MSTID activity for a given radar over the season based on the integrated power spectral density curve
- The existing code has since been modified to work on Southern Hemisphere Radar Data for all days and times
- These plots show only the top 4 radars within each 2hr period for a given year
- The top plots for a given year represent the MSTID index for Northern Hemisphere radars
- The bottom plots represent the corresponding MSTID index for Southern Hemisphere radars

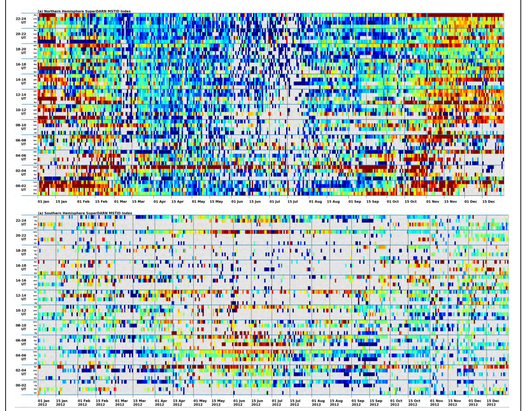
2010



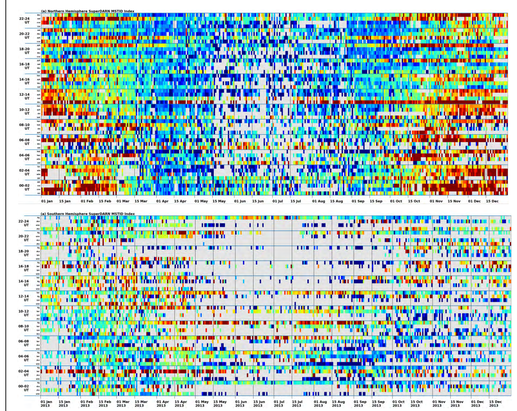
2011



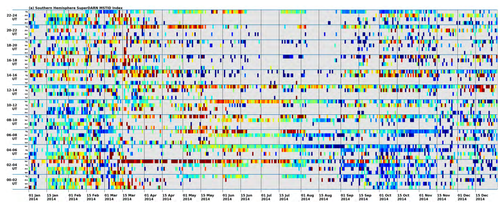
2012



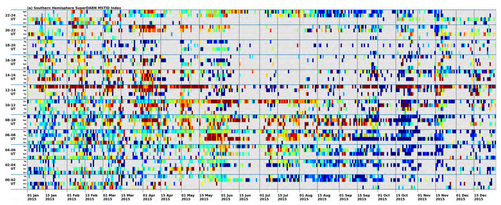
2013



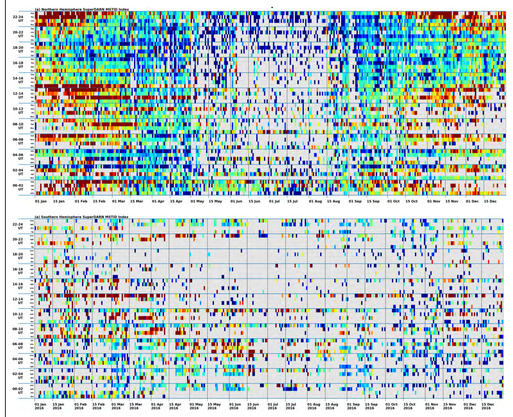
2014



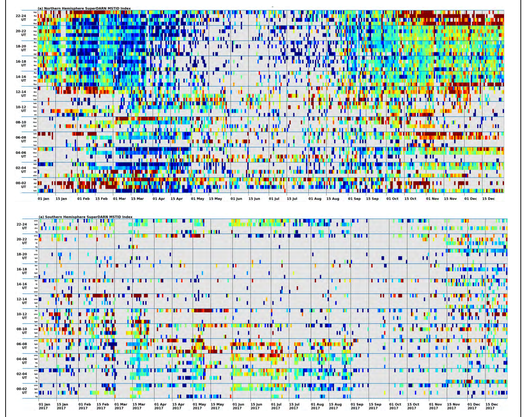
2015



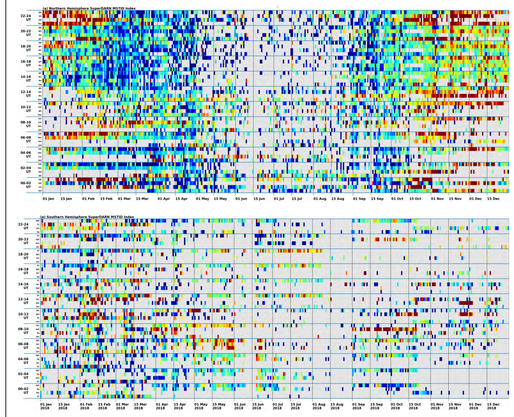
2016



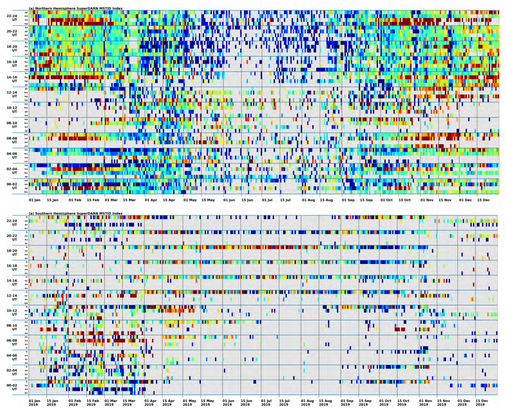
2017



2018



2019



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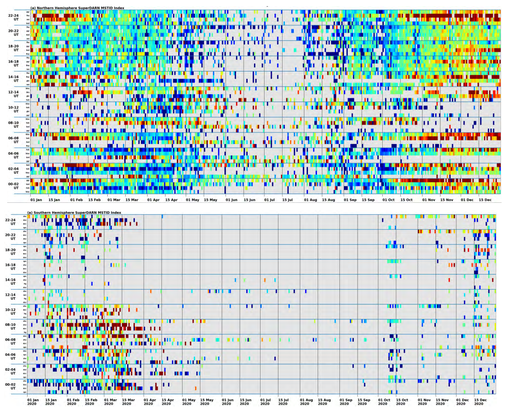
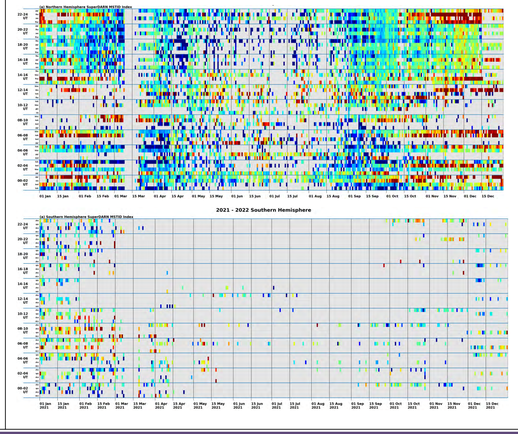


2021



2022

Summary

- In comparison the Northern Hemisphere Radars produce more data when used with this algorithm
- Data quality appears to decrease in later years for Southern Hemisphere Radars
- The graphs repeat some general trends year to year, but it is possible that there is a bias favoring certain times of day or certain months
- Future analysis is needed in order to ensure that the MSTID detection algorithm used is accurate on this larger dataset

References

Frissell, Nathaniel A., et al. "Sources and characteristics of medium-scale traveling ionospheric disturbances observed by high-frequency radars in the North American sector." *Journal of Geophysical Research:* Space Physics 121.4 (2016): 3722-3739.

Acknowledgements

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