

E-region Neutral Winds and Joule Heating derived from PFISR for 2010-2019.

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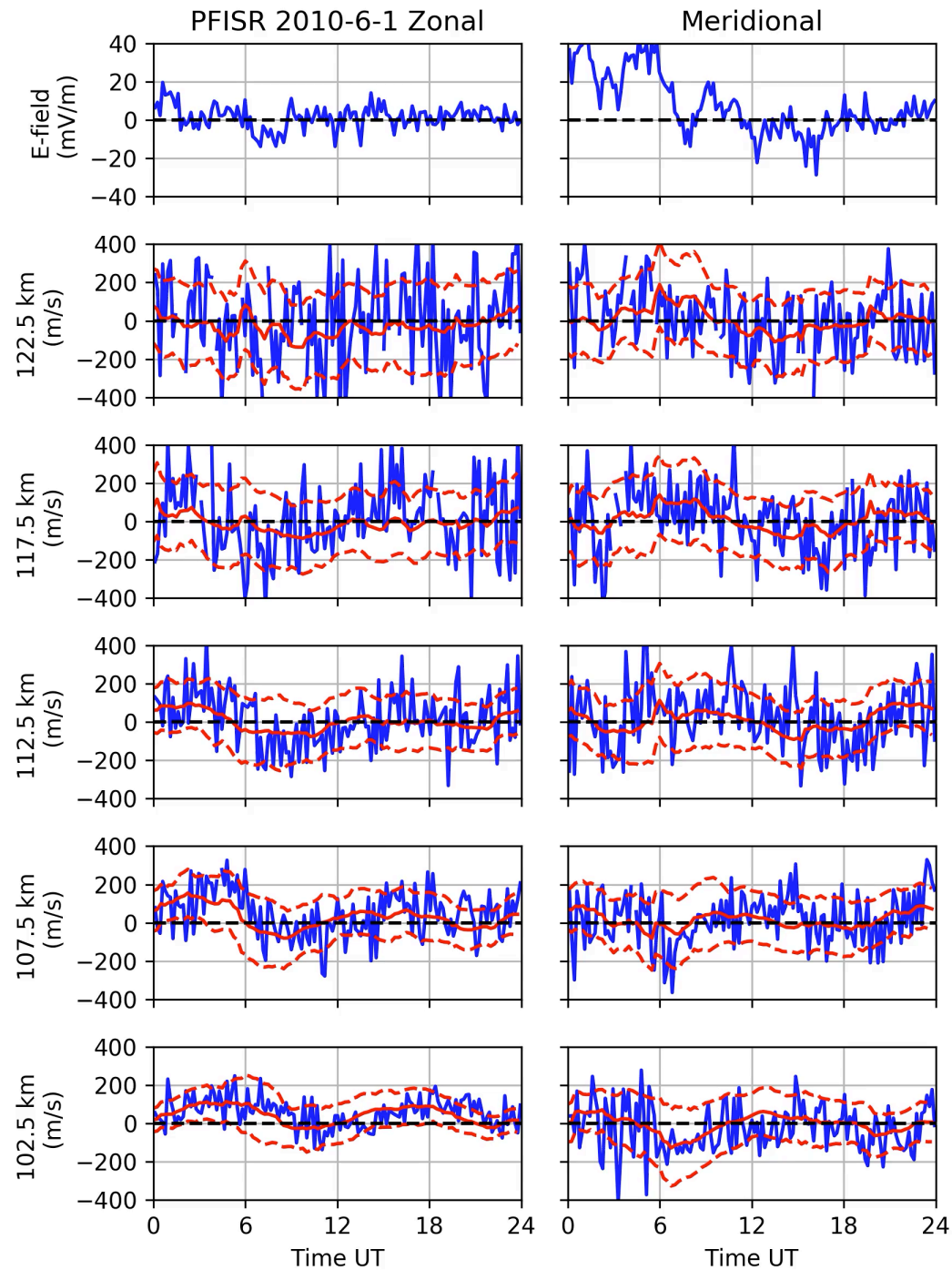
Motivation

- We have derived E-region thermospheric winds and Joule heating rates from March 2010- June 2019 using Poker Flat Incoherent Scatter Radar. We want to start doing more studies or assimilating these data into larger models/dataset
- Derived winds data located here and as part of Kaeppler et al., 2020 (Submitted JGR):
<https://doi.org/10.5281/zenodo.3885547>
 - **NOTE: these data will probably change again!**
 - Original ISR data:
<https://data.amisr.com/database/tmp/Kaeppler/winds/> and
<https://data.amisr.com/database/tmp/Kaeppler/missingIPY27.tar.gz>

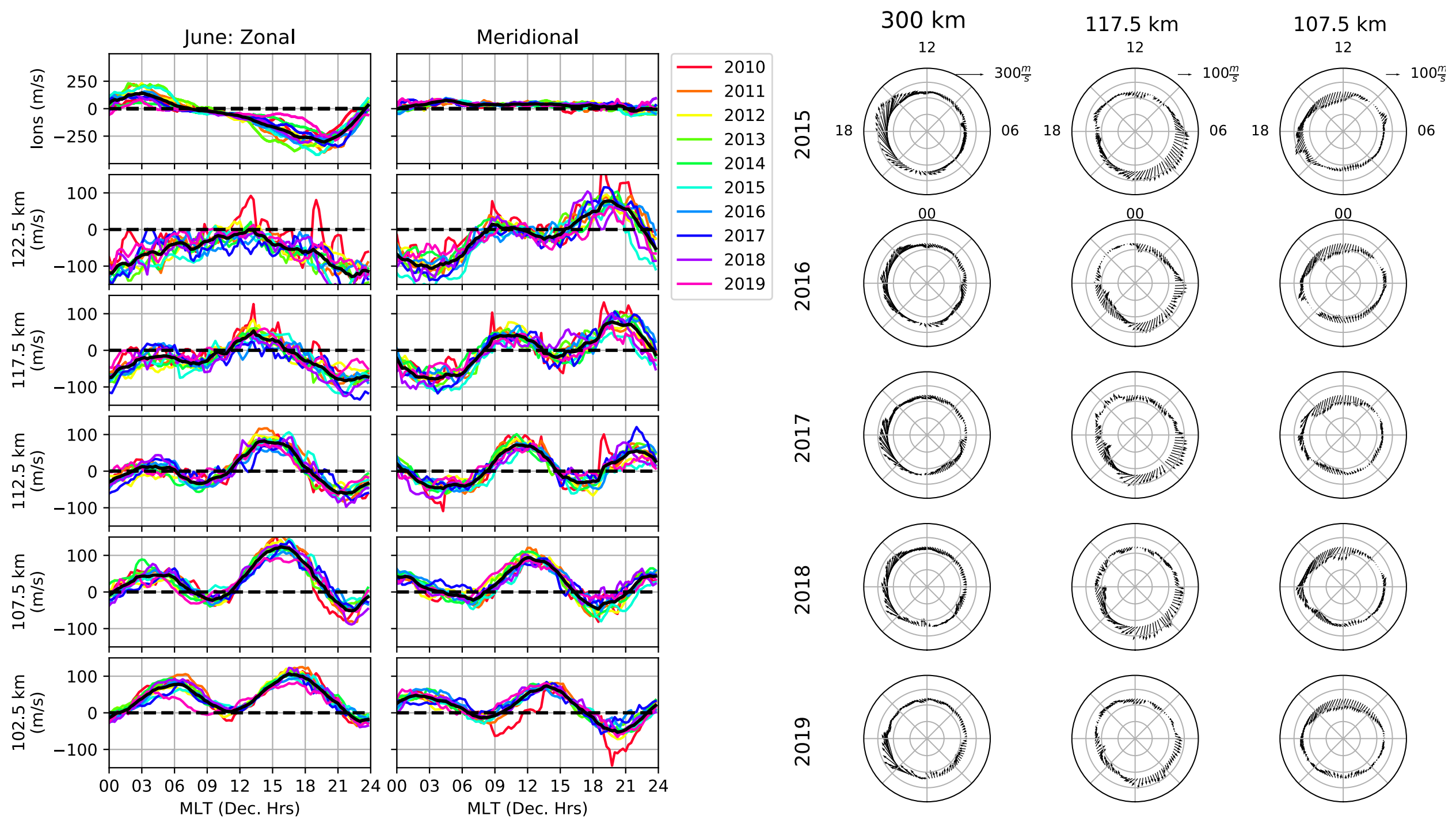
Methodology and Data

- Estimated electric field and neutral winds using method by Heinselman and Nicolls, 2008 (and described in Kaeppler et al., 2020, JGR, Submitted).
 - Will not cover details here, if you are interested, please contact me.
- Used all data we could, including 1% duty cycle IPY data.
 - Significant difference in data quality between 1% duty cycle vs. higher duty cycle modes (Need both transmit power/receive power and a radar target - electron density)
- Calculated monthly mean and will show primarily winds data from month of June from 2010-2019

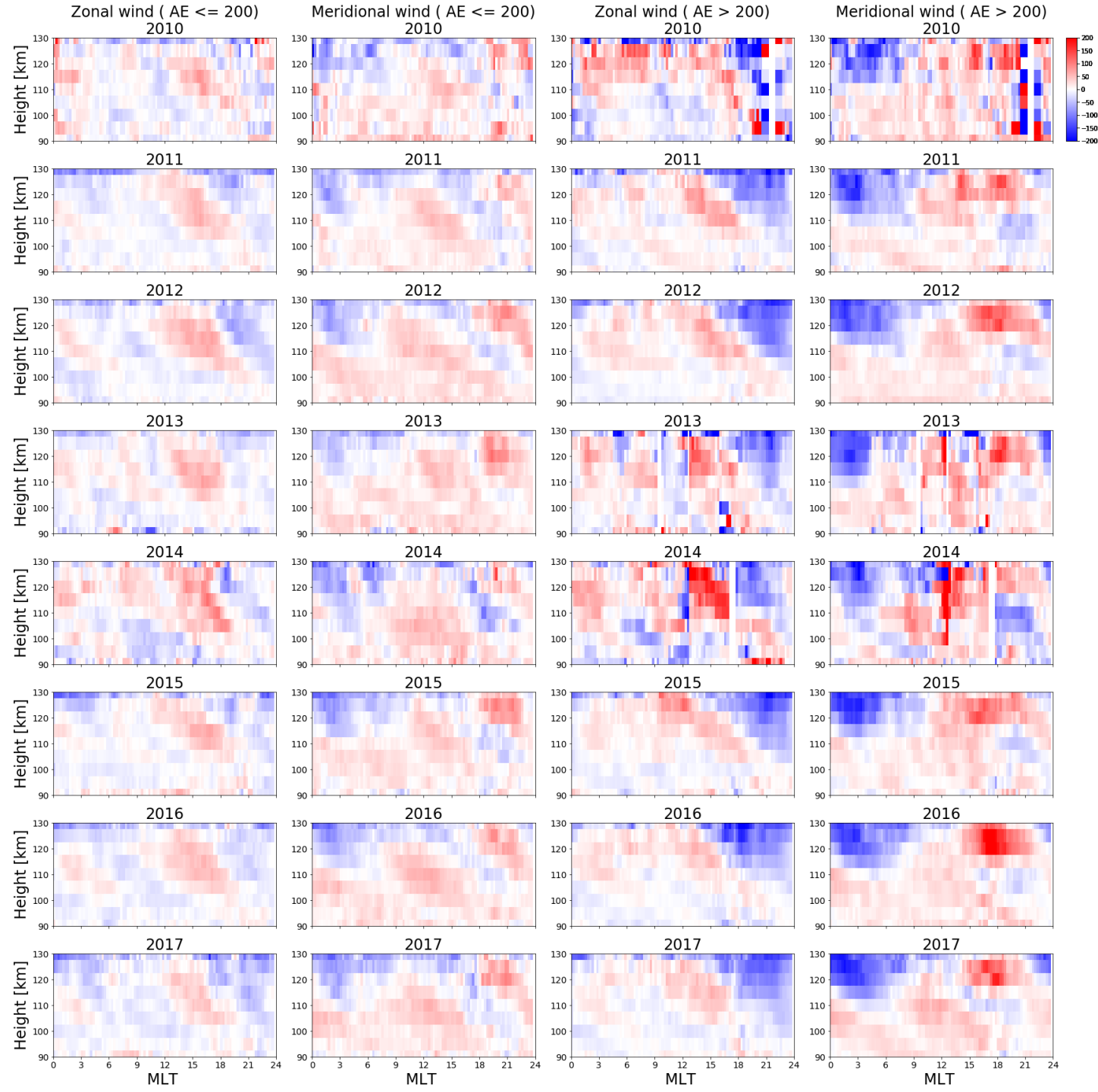
Diurnal Winds PFISR



Red solid line is monthly mean
Red Dashed line is sample standard deviation



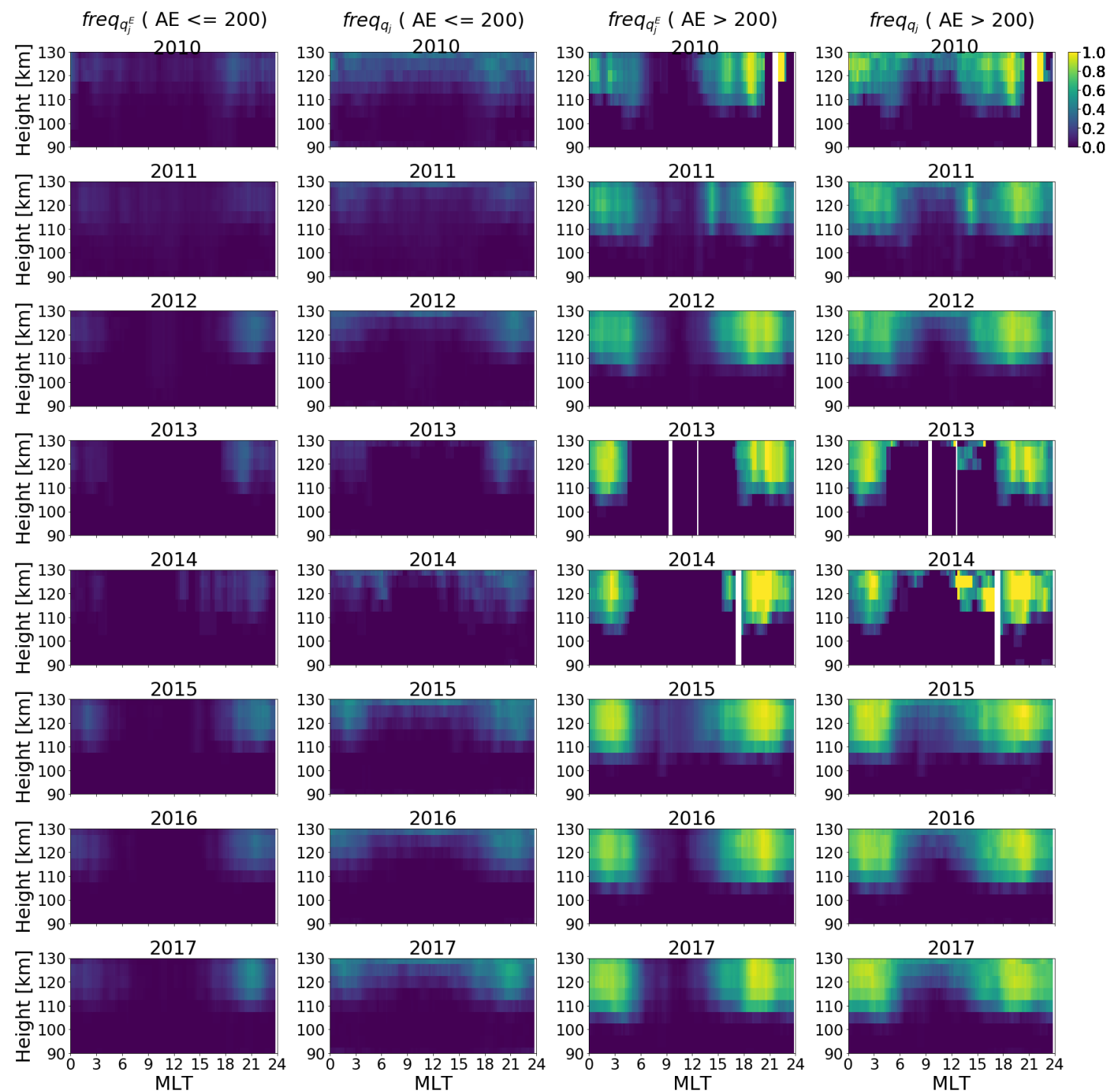
Mean winds year-to-year during spring (Feb, March, April) as a function of geomagnetic activity level



Joule Heating Results

- Total Joule heating (q_j) which includes the neutral wind contribution, using equations from Thayer, 1998, JGR
- Joule heating rate composed only of the electric field (q_E)
- Means are calculated for Spring Months (Feb, March, April) for $AE > 200$ and $AE < 200$ for 2010-2017 (no AE values after 2018)

Joule Heating Occurrence rates



Log

Log

