N.H. Polar Jet Stream Isentropic Analysis:

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Previous work: Spring 2023

> NH polar jet core on a constant pressure surface using latitude of maximum Quasi-Geostrophic Potential Vorticity to locate jet at each longitude.

Current work: Fall 2023

>New method: Isentropic Analysis

>Air tends to move along isentropic surfaces, where potential temperature is constant and entropy is conserved. Jet streams typically move along a 310-315 K isentropic surface (neglecting diabatic heating).

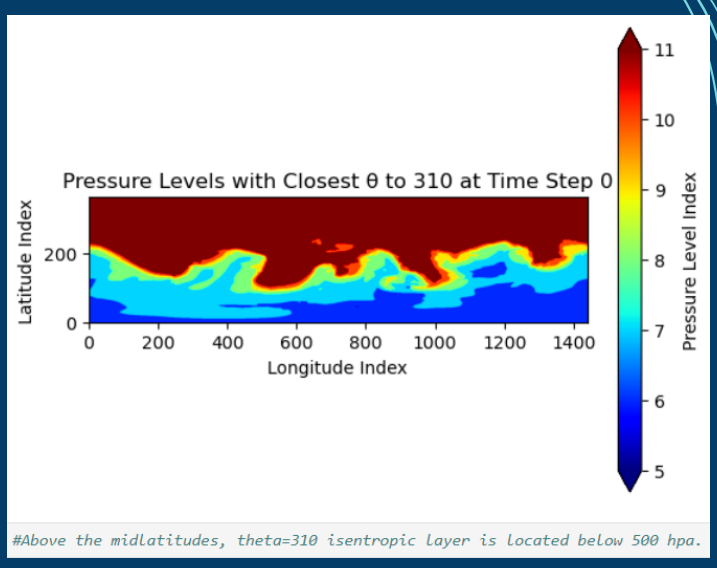


Figure 1. Theta = 310 K (upper troposphere)

Calculated the 310 K isentropic surface (**Figure 1**): Using ERA5 Reanalysis data, identified pressure level indices with potential temperature closest to 310 K at every latitude and longitude for each time step.

Found the daily Average Latitude of Maximum Potential Vorticity (jet core) for each day by first finding the latitude of maximum PV for each longitude at each time step (**Figure 2**). Then, daily (4 time steps) average latitude of max PV is calculated at each longitude (**Figure 3**) over one month - Dec 2021 (**Figure 4 and 5**).

FIGURE 2. LOCATION OF JET CORE FOR ONE DAY

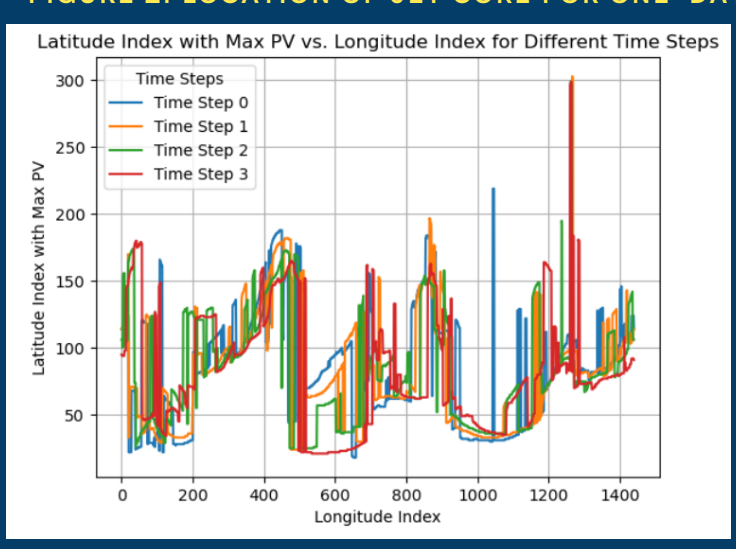


FIGURE 3. DAILY AVERAGE LOCATION OF JET CORE (1 WEEK DISPLAYED)

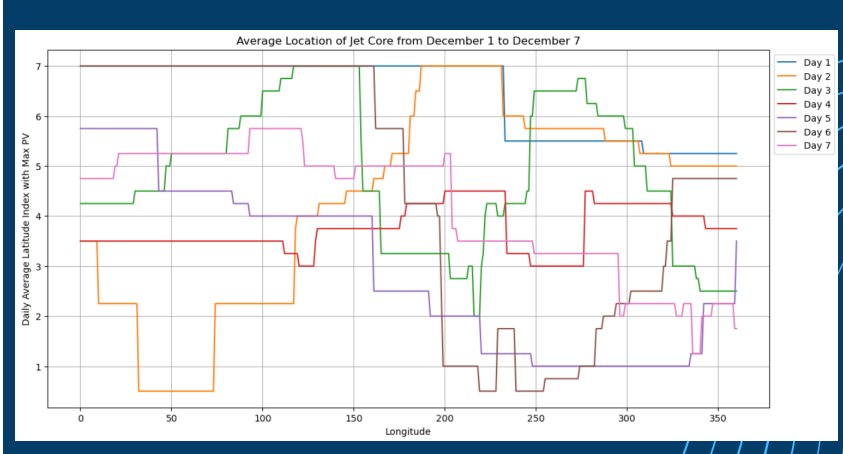


FIGURE 4. DAILY AVERAGE LOCATION OF JET CORE (1 MONTH DISPLAYED)

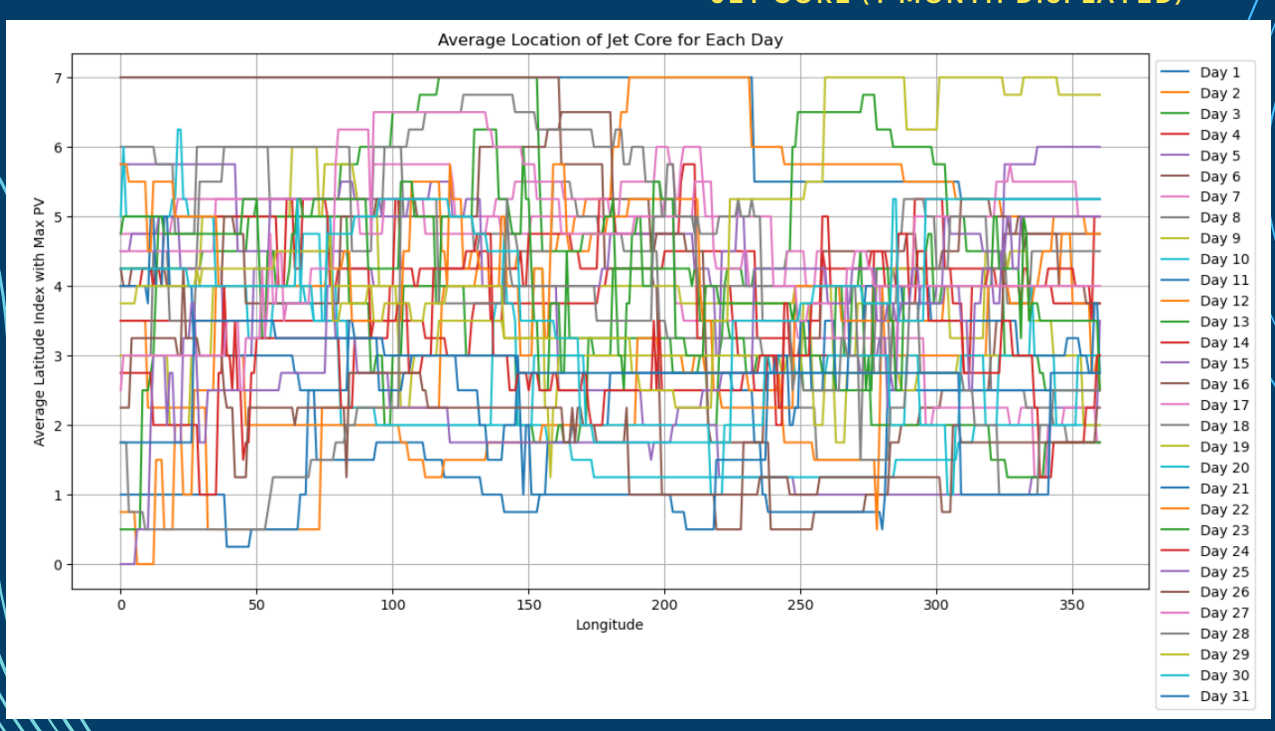
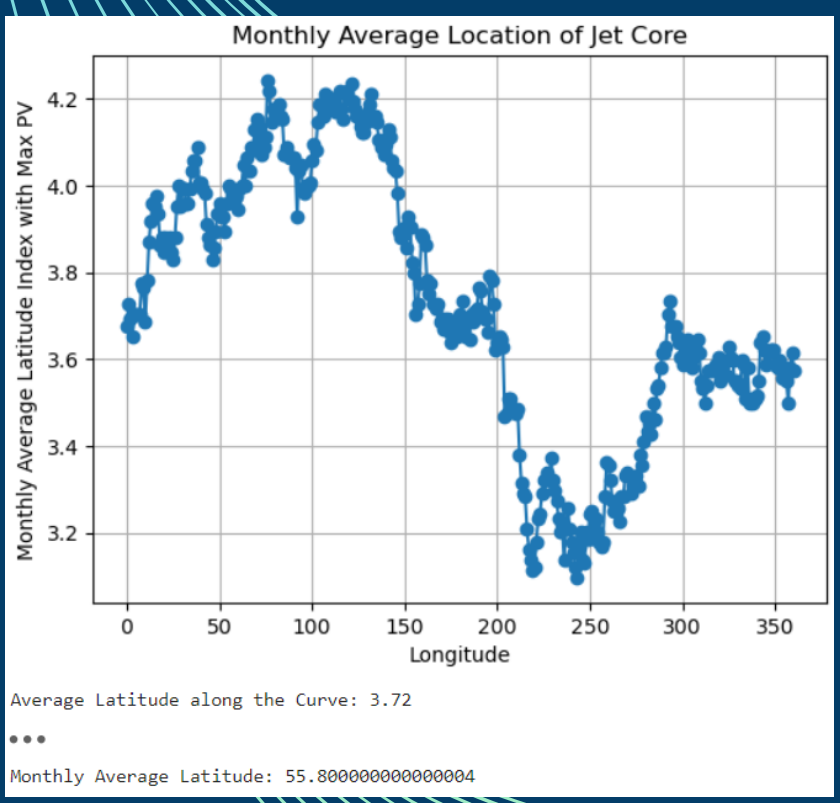


FIGURE 5. MONTHLY AVERAGED LATITUDES OF MAX PV



Future Work:

-Find monthly average latitude of max PV for longer time periods (years to decades) [Months (x), Mon Avg Lat Max PV (y)]

-Use daily and monthly average latitude of max PV to quantify jet waviness and analyze climatological and intraseasonal variability of the North Polar Jet.

-More data - Convert netCDF to CSV form