1. reads in monthly U data and handles the calendar/extracts the desired time range (this phenomenon occurs in the recent record ~1979+)
2. calculates the DJF mean QBO index consistent with [our paper](#).
    - reads in monthly zonal wind at 50mb level
    - calculates monthly anomalies for U50
    - averages the data across latitudes for 10S-10N and all longitudes
    - calculates a 3-month running mean of these and then the standard deviation of that smoothed timeseries
    - then, we extract and average only the DJF season
3. we read in daily OLR for 30S-30N, again extracting the same desired time period, and calculate the mjo-filtered OLR following wheeler and kiladis 2009. i wrote a description with more specifics in our paper, but generally:
    - we use the kf_filter function in NCL (and i found a version in python here: https://github.com/tmiyachi/mcclimate/blob/master/kf_filter.py) which transforms the data to frequency space and filters out all waves except the mjo and back-transforms.
    - we use the criteria in the kf_filter for periods 20-100 days, waves 1 to 5, and wavetype kelvin to get the mjo filtered olr.
    - then, we extract only the DJF season
    - and calculate the standard deviation of mjo-filtered olr for DJF
4. then we partition the DJF seasons by QBO phase (easterly or westerly)
    - we use the threshold of +/- 0.5 standard deviation to define the QBO phase
    - and we partition all daily mjo-filtered olr for that DJF season into east, west, and neutral QBO phase
    - then take the standard deviation of QBOE mjo-filtered olr and QBOW mjo-filtered olr for plotting
5. currently in separate code, we plot the stddev of mjo-filtered olr for DJF along with the difference between QBOE and QBOW stddev of mjo-filtered olr.