

Overview

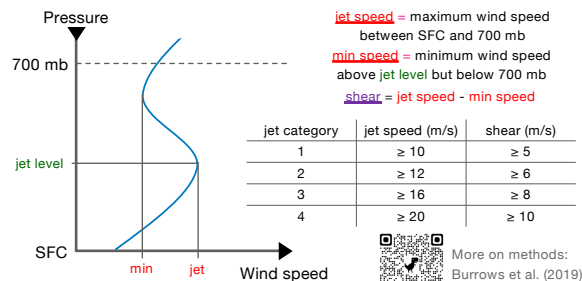
The Great Plains low-level jet (GPLLJ), characterized by its diurnally varying southerly winds in the lower troposphere, is a critical component of the hydroclimate in the central US. Here, we evaluate the representation of the GPLLJ in the Modern-Era Retrospective analysis for Research and Applications, version 2 (MERRA-2) developed by NASA's Global Modeling and Assimilation Office (GMAO).

Based on a preliminary analysis of several strong GPLLJ events, MERRA-2 is shown to be a valuable dataset for studying the horizontal, vertical, and diurnal characteristics of the LLJ. A comparison with rawinsonde and radar wind profiles suggests that the strength and height of the LLJ is overall realistic in MERRA-2.

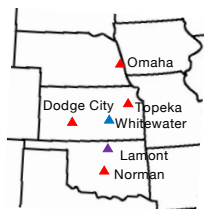
Data and Methods

MERRA-2: 0.625°lon x 0.5°lat, 25 hPa resolution in lower troposphere, 3-hourly temporal frequency, 1980-present

A LLJ is detected and categorized on the basis of the wind speed and shear in the lower troposphere (sfc. to 700 mb):



A jet is further classified as **coupled** if associated with a mid-level (500 mb) cyclone to the west or **uncoupled** otherwise.

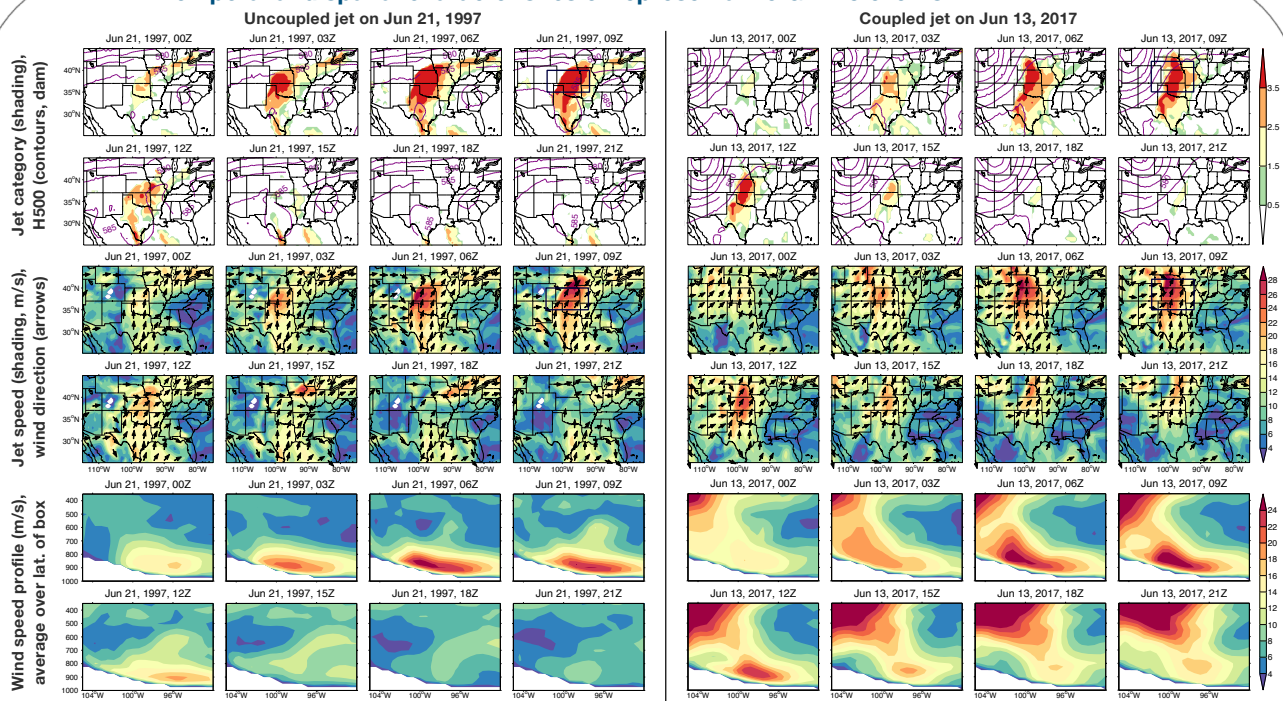


▲ Rawinsonde station
▲ ARM station
▲ Rawinsonde and ARM

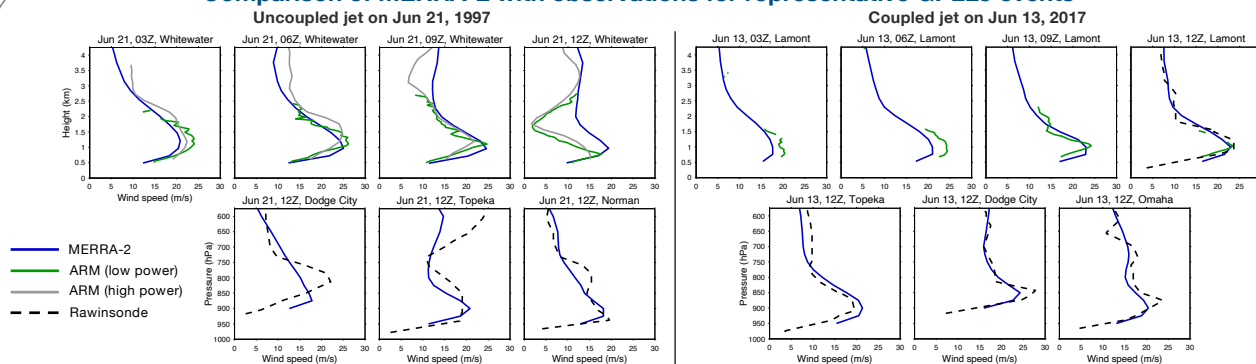
Rawinsonde data available at 00Z and 12Z, obtained from University of Wyoming

Atmospheric Radiation Measurement (ARM) data: 915 MHz radar wind profiler (lower troposphere) available hourly

Temporal and spatial characteristics of representative GPLLJ events in MERRA-2



Comparison of MERRA-2 with observations for representative GPLLJ events



While MERRA-2 occasionally underestimates the wind speed, the jet strength and height are overall well represented.



Scan for MERRA-2 reanalysis citation
Gelaro et al. (2017), *Journal of Climate*

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