

## Introduction

- Evidence exists that the recent climate change trend is contributing to the widening of the tropical belt.
- Birner (2010) used tropopause statistical diagnostics to investigate this widening. He concluded that a seasonal cycle based on these diagnostics could be robust.
- The tropical belt can also be defined as the area between the Northern Hemisphere and Southern Hemisphere subtropical jet streams.
- This study identifies the subtropical jet streams by a local maximum in meridional monthly mean temperature gradient between the equator and 60°.

## Preliminary Conclusions

- The methods and datasets used in this study exhibit seasonal variability at 300 mb that is consistent with the tropopause-based methods in Birner (2010).
- Seasonal variability patterns for the tropical belt width at lower levels (e.g. 700 mb, 500 mb) are notably different from Birner (2010).
- Most notably, the variability pattern at the southern edge greatly differs from the pattern at the northern edge.

## References

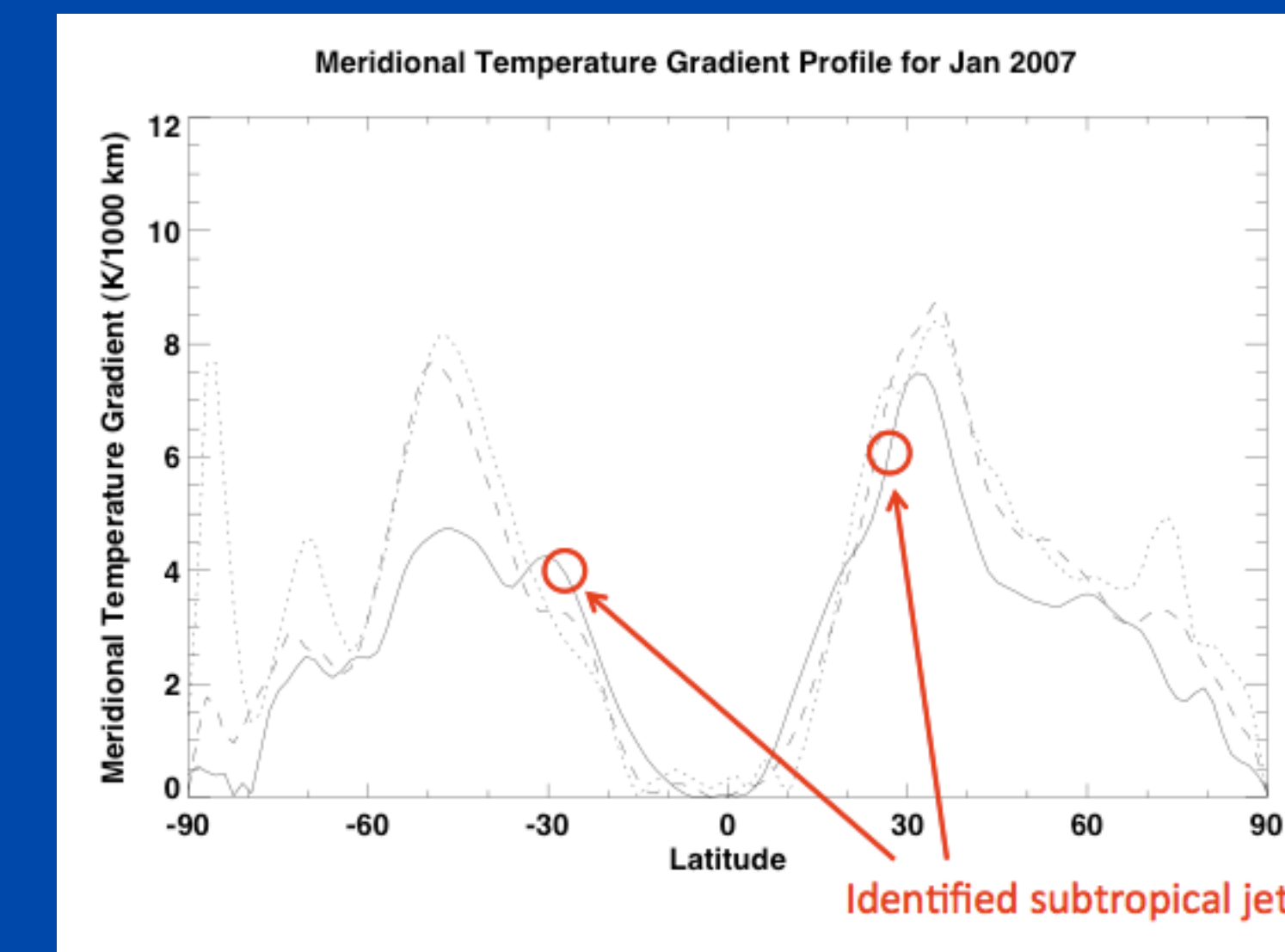
- Birner, T. (2010), Recent widening of the tropical belt from global tropopause statistics: Sensitivities, *J. Geophys. Res.*, 115, D23109, doi: 10.1029/2010JD014664.
- Seidel, D.J., Q. Fu, W. J. Randel, and T. J. Reichler (2008), Widening of the tropical belt in a changing climate, *Nat. Geosci.*, 1, 21-24.

## Acknowledgements

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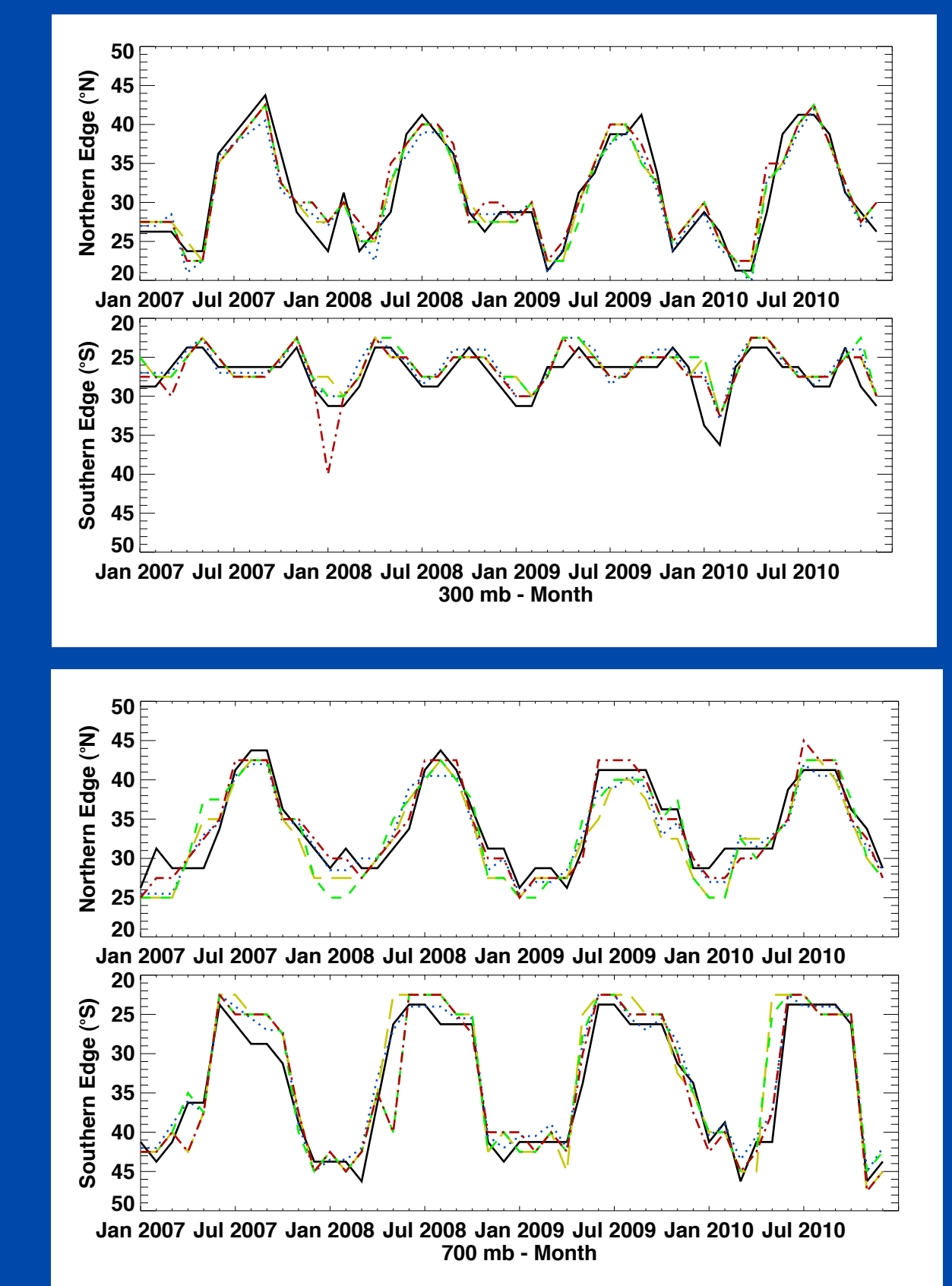
## Methods

- Generated temperature gradient data from raw data from GPS radio occultations.
- Reanalysis used:
  - ECMWF (ERA-INTERIM), NCEP, NCEP2, JRA25
- Data from Jan 2007 to Dec 2010 is used because of limitations in the GPS dataset.
- The latitude of the subtropical jet in a certain hemisphere in a certain month is defined as the latitude that falls at a 20% reduction threshold of the maximum between 60° and 0° closest to the equator.



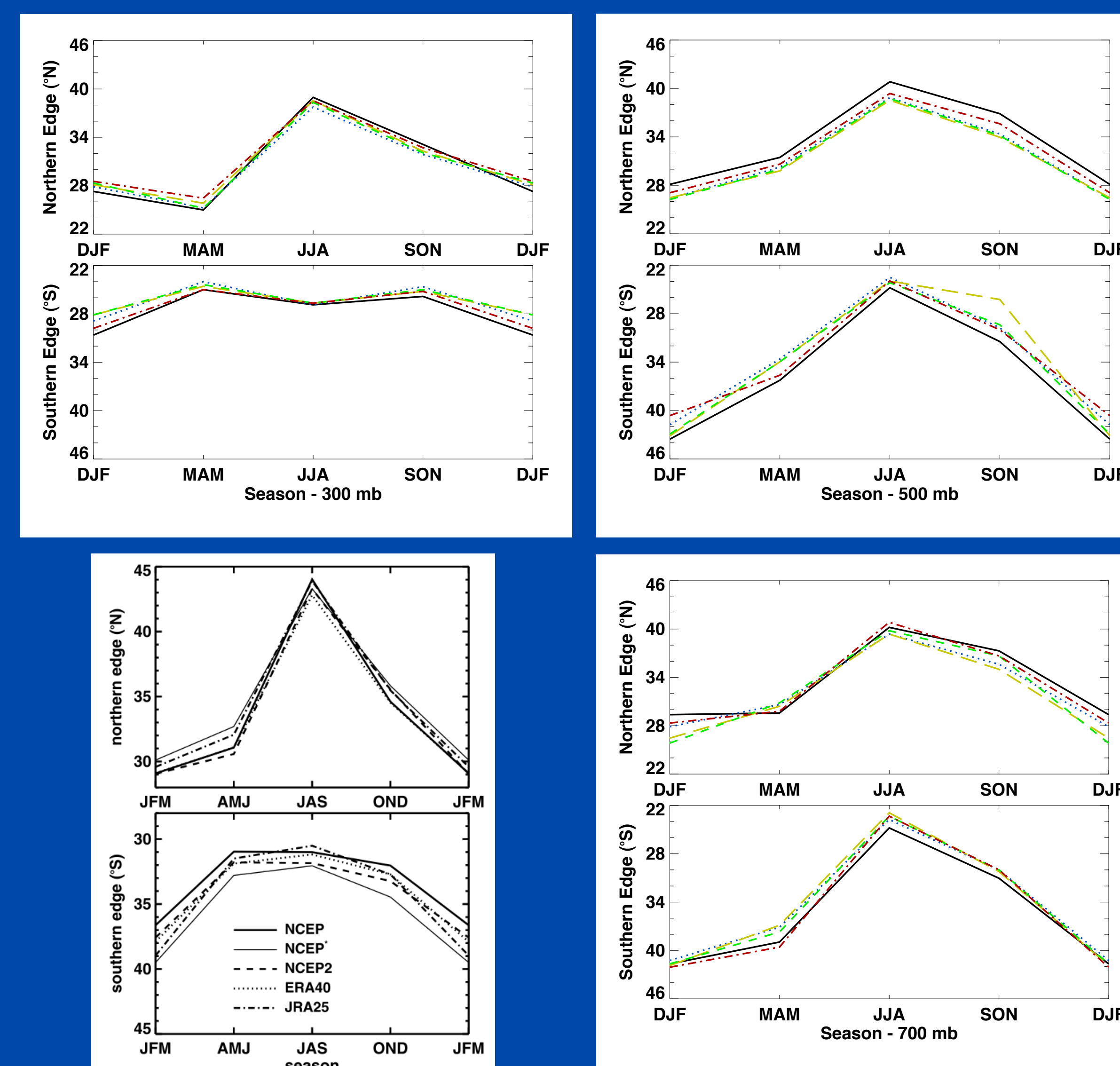
— GPS    ..... ECMWF    - - - NCEP    - - - NCEP2    - - - JRA25

## Time Series of Tropical Belt Edges



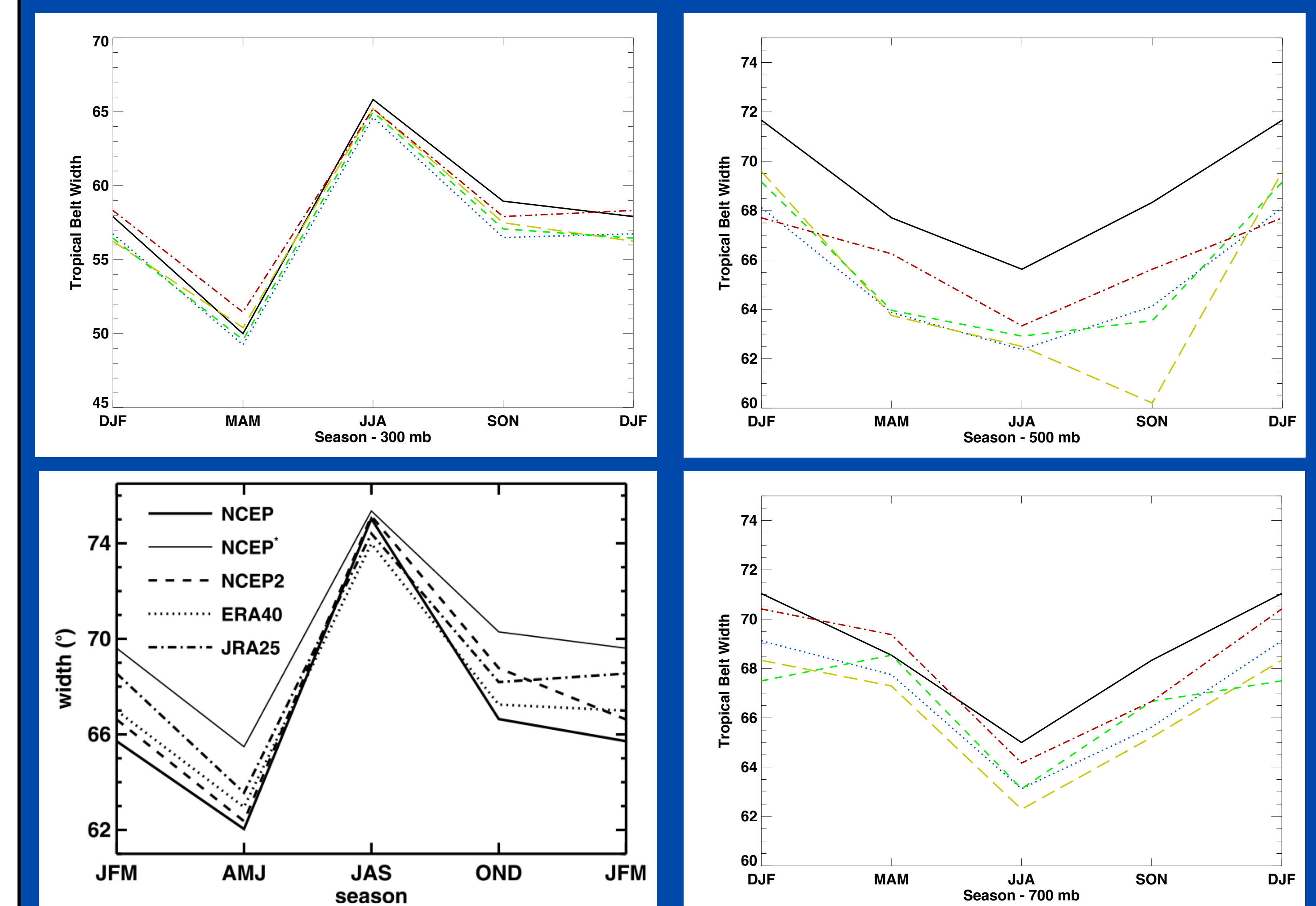
Monthly boundaries of the tropical belt at the northern (top of figure) and southern (bottom of figure) subtropical jets at 300 mb (top figure), and 700 mb (bottom figure).

## Seasonal Cycle of Tropical Belt Edges



Seasonal boundaries of the tropical belt at the northern (top) and southern (bottom) subtropical jets at 300 mb (upper-left), 500 mb (upper-right), and 700 mb (lower-right); and at the tropopause from Birner (2010; lower-left).

## Seasonal Cycle of Tropical Belt Widths



Seasonal widths of the tropical belt at the northern (top) and southern (bottom) subtropical jets at 300 mb (upper-left), 500 mb (upper-right), and 700 mb (lower-right); and at the tropopause from Birner (2010; lower-left).