

THESIS TITLE GOES HERE

by

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This thesis, submitted by MY NAME in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Advisor

Committee Member

Committee Member

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Grant McGimpsey
Dean of the School of Graduate Studies

DATE

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Title	Thesis Title Goes Here
Department	Atmospheric Sciences
Degree	Master of Science

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My Name
March 25, 2019 (Today's date)

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ACKNOWLEDGMENTS

Lovely acknowledgments to your advisor, committee, friends and family, and funding go here.

This is where you dedicate your thesis to someone.

ABSTRACT

This is where your abstract goes!

CHAPTER 1

INTRODUCTION

This is an example of a few chapters and sections for your thesis. This template will also provide a general figure setup and reference, table, and equation. Labels are added to each chapter and section to allow easy reference to them. For example, this is Chapter 1.

1.1 How to add an equation

Here is an example of how to add an equation into your document.

$$PV = \frac{1}{\rho} \left[\left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y} \right) + f \right] * \frac{\partial \theta}{\partial z}, \quad (1.1)$$

where ρ is density, v and u are horizontal velocity, f is Coriolis, and θ is potential temperature. Equations can also be referenced easily by their labels. For example, Eq. 1.1 is Ertel's Potential Vorticity.

Another example is

$$\zeta = \frac{\partial v}{\partial x} - \frac{\partial u}{\partial y} \quad (1.2)$$

where ζ is relative (vertical) vorticity.

CHAPTER 2

BACKGROUND

2.1 How to add a figure

Here is an example of how to add in a figure. The figure should be located in the same folder as your LaTeX document. The label **MUST** come after the caption. When a Figure is referenced, it is automatically numbered and gets placed where ever the figure is included in the .tex file. When you call in the figure, you do not add .png, .jpg, etc. The label should be somewhat short and helpful so it can easily be referenced throughout the document. Example: Figure 1 shows an example application of the SL3D algorithm to a discrete supercell.

A corresponding vertical cross-section is shown in Fig. 2.

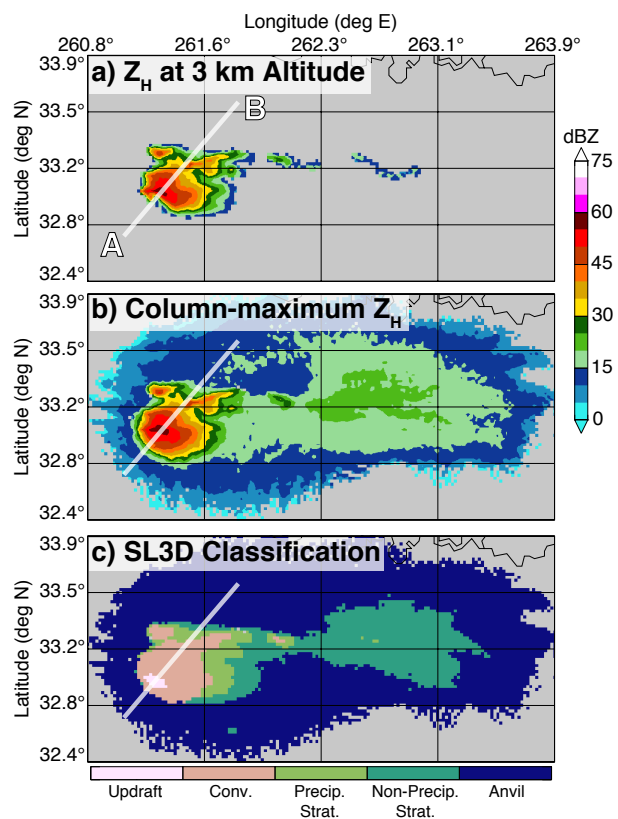


Figure 1: Maps of (a) Z_H at 3 km altitude, (b) column-maximum Z_H , and (c) SL3D classification for a supercell located in northeast Texas on 18 May 2013 at 0055 UTC. The thick lines labeled A–B on each map show the location of the vertical cross-sections in Fig. 2.

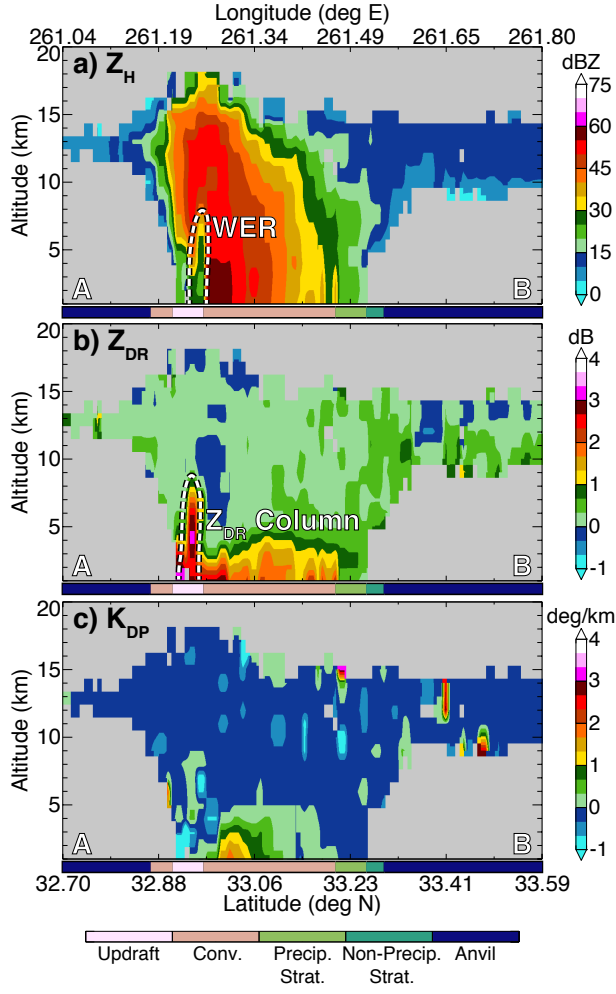


Figure 2: Vertical cross-sections of (a) Z_H , (b) Z_{DR} , and (c) K_{DP} following the thick line in Fig. 1, from A (left) to B (right). The thick colored line at the base of each cross-section shows the corresponding SL3D classification.

CHAPTER 3

METHODOLOGY

3.1 How to add a table

Here is an example of how to add in a table. Please note that this is a very basic table and you can make several adjustments to the contents, layout, etc. There are a lot of different table options, all it generally takes is a simple google search. You can reference the table just like a figure. This would be table 1

For a slightly more complicated table example, please see the code for Table 2.

Table 1: Table showing the analysis grid average tropopause height at 1 hour, total mass transported above the tropopause, and absolute and relative difference of mass transport with respect to the constant altitude tropopause definition. The constant altitude tropopause definition calculated $3.4 * 10^{11}$ kg of mass above the tropopause at 1 hour.

1 hour			
Definition	Average Tropopause Height (km)	Mass Transport (kg * 10^{11})	Absolute Diff w.r.t CA (kg * 10^{11})
WMO I	10.94	2.7	-0.7
WMO II	10.94	2.9	-0.5

Table 2: The criteria required for classification into the five SL3D categories, where Z_H is horizontally-polarized reflectivity, $Z_{H\max}$ is the column-maximum Z_H , and Z_{Melt} is the height of the melting layer.

Classification	Criteria
Convection	$Z_H = 25$ dBZ echo top altitude ≥ 10 km or Z_H peakedness exceeding threshold in at least 50% of echo column between surface and 9 km or $Z_H \geq 45$ dBZ above Z_{Melt} $Z_H \geq 20$ dBZ at 3 km or $Z_H \geq 10$ dBZ below 3 km
Precip. Stratiform	No echo or $Z_H < 20$ dBZ at 3 km, and echo present below 5 km No echo at or below 5 km altitude, but echo present above Z_{Melt}
Non-Precip. Stratiform Anvil	$Z_{H\max} \geq 40$ dBZ and $\frac{\partial Z_H}{\partial z} \geq 8$ dBZ km^{-1} with echo in at least 6 of 8 horizontally adjacent grid volumes or $Z_H \geq 15$ dBZ and $Z_{\text{DR}} \geq 1.5$ dBZ extending at least 1 km above Z_{Melt} or $Z_H \geq 30$ dBZ and $K_{\text{DP}} \geq 0.5$ deg km^{-1} extending at least 1 km above Z_{Melt}
Updraft	

CHAPTER 4

RESULTS

4.1 How to add references

References are automatically organized and inserted, all you need to do is provide each citation a label and either enter the citation in by hand or using a bibtex document (see ‘Bibliography’ section below).

Citations are commonly inserted by either using them directly in text, or include the citation inside parentheses. For example... Starzec et al. (2017) ... or ... (e.g., Starzec et al., 2017).

CHAPTER 5

SUMMARY AND CONCLUSIONS

Bibliographies can be written by hand or by using a textbib file. To use a textbib file, you'll need a style sheet such as that used with AMS.

REFERENCES

Starzec, M., C. R. Homeyer, and G. L. Mullendore, 2017: Storm Labeling in Three Dimensions (SL3D): A Volumetric Radar Echo and Dual-Polarization Updraft Classification Algorithm, *Monthly Weather Review*, **145** (3), 1127–1145, doi:10.1175/MWR-D-16-0089.1.