

### 3.4A

## AN INTERACTIVE THERMODYNAMIC DIAGRAM FOR USE IN METEOROLOGY INSTRUCTION

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### 1. INTRODUCTION

The Cooperative Program for Operational Meteorology, Education and Training (COMET<sup>®</sup>) has developed a web-based interactive Skew-T, log-p module for meteorology education and training. The *Skew-T Mastery* module (Figure 1) was primarily funded by the Air Force Weather Agency and is intended to replace their reliance on the widely-used hardcopy version of the Air Force Skew-T manual (Air Weather Service, 1990). Besides the benefits to operational forecasters in the Air Force and other agencies, we anticipate a great deal of interest from instructors teaching university undergraduate meteorology courses. This module is freely available to the atmospheric science community via the MetEd website: <http://meted.ucar.edu/mesoprim/skewt/>



Fig. 1: Main page of the *Skew-T Mastery* module.

### 2. MODULE ORGANIZATION

The distance learning module is organized roughly along the lines of the aforementioned hardcopy Skew-T manual. The first two sections are a basic *introduction* and *description* of the Skew-T diagram. These are followed by a *parameters* section that defines and demonstrates techniques for determining important meteorological quantities. These quantities include temperatures (e.g. convective, potential temperatures), moisture (e.g. relative humidity, mixing ratio), other levels (e.g. equilibrium level), stability assessment (e.g. lifted index, CAPE) and shear assessment (e.g. helicity). In many instances, rich graphical animations are used to illustrate procedures, complemented by conceptual diagrams depicting meteorological processes. The module also includes a *stability* section that uses animations (Figure 2) to illustrate the basics of parcel processes and stability types as well as processes that change stability. In the *forecast applications* section of the module we highlight use of the Skew-T diagram in a variety of forecast scenarios, ranging from determination of precipitation type to forecasting hail size in severe thunderstorms.

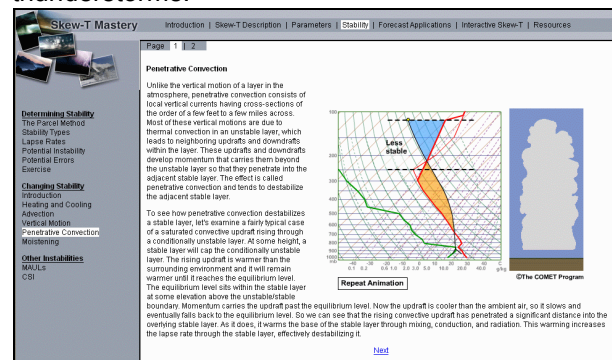


Fig. 2: Graphical depiction from the stability section showing sounding modification for an overshooting convective top that is an animation in the module.

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### 3. THE INTERACTIVE SKEW-T

The cornerstone of the module is the *interactive Skew-T diagram* (Figure 3), which displays a plotted sounding, along with a display of various sounding parameters. It features a click and drag capability which can be used to edit/modify the sounding, a display of wet bulb temperature, parcel processes, and the corresponding hodograph. A book marking feature allows modified soundings to be saved for future reference. The diagram is frequently used in the Interactive exercises imbedded throughout other sections of the module.

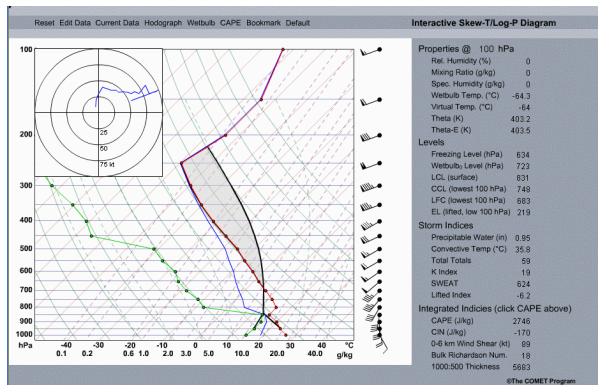


Fig. 3: The interactive Skew-T.

Our presentation will demonstrate many of the important features of this initial version of the module, and will outline next steps towards developing future additions and improvements. The reader is invited to visit the website <http://meted.ucar.edu/mesoprim/skewt/> to explore the module in more detail.

### 4. ACKNOWLEDGEMENTS

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### 5. REFERENCE

Air Weather Service, Revised March 1990: *The Use of the Skew-T/Log-P Diagram in Analysis and Forecasting*, AWS/TR-79/006, 153 pp.