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WEATHER from W.A.L.T.E.R.

AN INTERACTIVE CD FOR WEATHER EDUCATORS

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1. INTRODUCTION

The availability of concurrent weather information covering local to synoptic scales is a challenge faced by many instructors in the field of meteorology. Internet sources adequately cover the synoptic pattern but are often too large to download quickly. Also, by using Internet sources, data can, and most likely will, be spread out over several sites. This reduces reliability and effectively reduces accessibility, because of the lengthy process of assembling the data. We, at the Weather Analysis Laboratory for Teaching and Educational Research (W.A.L.T.E.R.), at Minnesota State University, have collated an all-inclusive and interactive CD and Website for instructors. This delivers a teaching aid covering a series of thunderstorm events that occurred in Southern Minnesota during the summer of 2001.

2. THE CD

The goal behind this project was to provide a real-world comprehensive demonstration of summertime thunderstorm genesis and dissipation, bringing together information and data from state of the science equipment. This includes satellite, radar, model forecasts, re-analysis data, storm chase and sky-cam video, and some field observations.

Since many instructors do not have access to high-end computer hardware needed for viewing memory intensive computer imagery, we formatted the CD so that the data can be viewed from any computer platform through any Internet browser.

3. THE DATA SETS

Four separate storm systems are covered on the CD. Each storm had different characteristics and behaviors that illustrate typical summer weather patterns occurring in an upper Midwest setting in the continental USA.

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3.1 MAY 1, 2001

The day started off warm and humid and temperatures rose steadily into the mid 80's by afternoon and dew points into the 60's. By 20:00Z (2 pm CST) a strong cold front moved into the area triggering several severe thunderstorms ahead of its front. As the storms moved eastward heavy rain and hail was reported in Minnesota and later in Wisconsin. These storms were tracked on radar and satellite from the central console in WALTER, and a chase team was guided to potential development areas in the hope of video-taping any tornado signatures. While unsuccessful in capturing tornadoes, some interesting footage of shelf clouds and wall clouds were seen and have been included on the CD. The CD contains good radar coverage of the storm along with some high-resolution satellite imagery. Surface and upper air charts are included together with dew-point, temperature and wind soundings. Also shown is a 3-dimensional rendition of the storm sequence using the EWB visualization software that gives viewers a clear overall depiction of this weather event.

3.2 MAY 9, 2001

The day dawned with a low pressure system centered over the Dakotas supported by strong south-westerly to westerly upper air winds. A strong cold front moved steadily eastwards crossing into Minnesota in mid-morning. The NWS issued warnings of a moderate risk of severe thunderstorms developing, which included portions of SW Minnesota for early afternoon. At 3:56 PM (CST), the NWS issued a tornado watch for south central and southeastern Minnesota. By 5:10 PM (CST), the local NWS office was issuing tornado warnings for their forecast area. These storms moved across Minnesota from W to E through the afternoon and early evening hours delivering torrential rain (2.5 inches in places), large hail (up to 2 inches in diameter) and several F0 – F2 tornadoes. The CD shows satellite, radar, synoptic map and video coverage of this storm sequence along with visualizations of the storms 24-hour development history. This storm system was on a much larger scale than the 1 May 2001 storm, and some superior graphics are available with this storm than the previous.

3.3 JUNE 11, 2001

The most notable features about this event were its size, duration and destructive history. By mid day local temperatures in southern Minnesota were in the middle 80s and dew points into the 70s! Energy flows into these storms were abundant and would come to affect seven states before finally dissipating. These storms matured across Minnesota, continued east into the Great Lakes region and finally dissipating over Ohio some 12 hours later. Apart from the size and intensity of these storms, an interesting feature was the apparent influence that Lake Michigan had on the development of the storms as they crossed. The inflow into the systems were weakened over the cool waters of the lake, and this can be clearly recognized in both the radar and satellite loops. No sky-cam or storm chase video is included in this event, but some spectacular radar and satellite imagery is contained here..

3.4 AUGUST 29, 2001

This storm was quick to develop and it reached maturity over the local area. High winds, rain and hail were the products delivered by this storm. Temperatures throughout the day were steady in the middle 60s until 8 PM (CST) when temperatures suddenly rose into the low 80's.

Dew points concurrently rose from the middle 60's to the lower 80's! By 10:30 PM (CST) the storms had reached their peak and continued into the early morning hours. No storm-chase or sky-cam videos were feasible and this sequence again contains some spectacular examples of radar and satellite imagery along with supporting pressure, temperature, upper-air maps and sounding reports.

4 SUMMARY

The CD 'Weather from WALTER' provides instructors with four typical summer weather sequences for an upper mid-west setting. Instructors will be able to demonstrate the progress of storms as seen on high resolution satellite imagery, radar, forecast maps, 3-D visualization programs, as well as sky-cam and storm-chase video clips. While all four sequences may not be practicable to use in a single class setting, the instructor has the flexibility of choosing what best fits the lesson, and can talk about the events using these state-of-the-science visual tools. We intend to produce a series of such CD's with the next illustrating typical winter storm systems. Instructors who have access to the web may benefit from visiting the WALTER web site (www.mnsu.edu/weather) as all of these technologies together with their visuals are viewable here in real time.

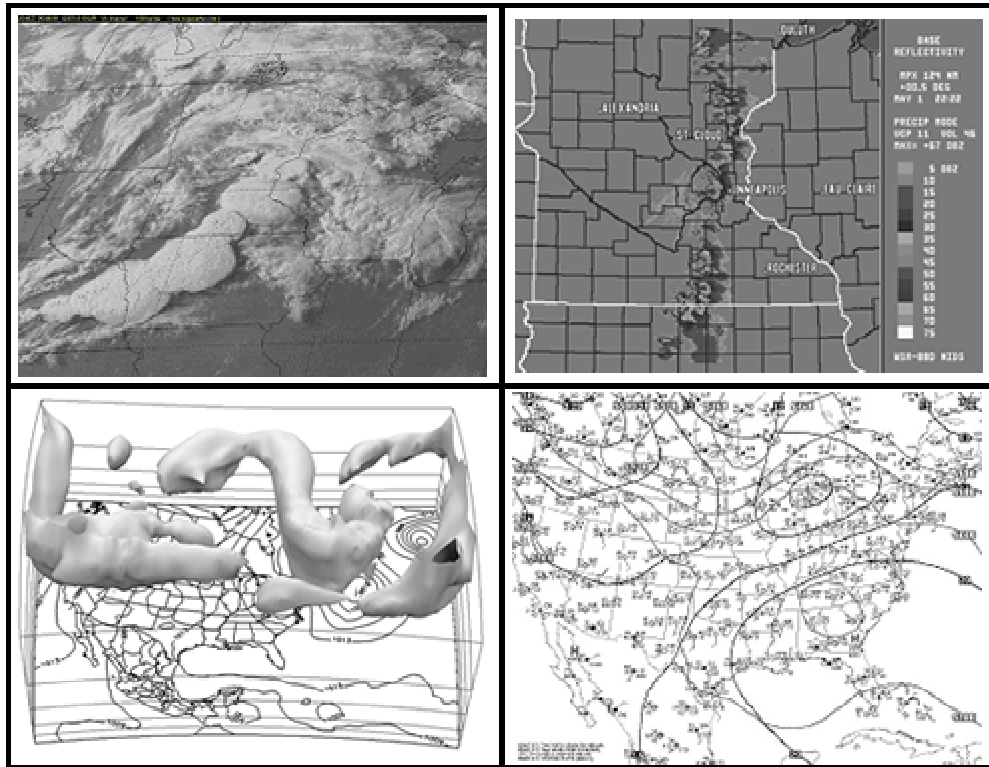


Figure 1: A composite of pictures showing the types of graphics included on the 'Weather from WALTER' CD.