8.7 Creation of a Severe Thunderstorm Event Web Page for Research and Training Purposes at the National Severe Storms Laboratory and Storm Prediction Center

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1. INTRODUCTION

Climatologically most of the severe thunderstorm episodes in the United States occur in an area bounded by the Rocky Mountains on the west side and a line approximately 1000 - 1200 miles east of the Rocky Mountains on the east side. Nonetheless, severe thunderstorms can occur anywhere in the United States at any time of the year. The synoptic environments in which these storms develop can vary in many ways depending on region of the country and time of year. Experience in using tools needed to forecast severe thunderstorms is extremely important and essential if a forecaster is to be successful. Forecasters located in areas where severe thunderstorms occur infrequently have a limited number of opportunities to gain experience in making such forecasts. This experience limitation may have an impact on their skill and confidence during potentially significant weather events.

One of the ways to augment a forecaster's experience is to study events in which severe thunderstorms develop, especially as relevant to their area of interest. In an attempt to do this, a web page has been developed to identify organized severe thunderstorm episodes and to list them chronologically. The events provided appear as a standardized package of synoptic analyses and other environmental displays such that forecasters can review and compare them to other severe thunderstorm episodes relative to a current situation or for research and training purposes. The events presented are not intended to be a set of case studies, but rather a collection of events which will provide forecasters and researchers an opportunity to quickly review synoptic and mesoscale environments related to various severe thunderstorm episodes.

This work is a continuation of earlier Technical Memos by Hales and Crowther (1985) and Hales and Polston (1993) but relies on electronic medium rather than paper publication to convey information.

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2. SELECTION CRITERIA

All events contained in the data base focus on the "convective day" which is typically defined as 1200UTC on one day through 1200UTC on the following day. Events which span 1200UTC the following day are considered independently. The selection criteria for inclusion in the data base is more structured than was done previously (Hales and Crowther 1985, and Hales and Polston 1993).

The standard National Weather Service (NWS) definition for a severe thunderstorm is a thunderstorm which produces hail $\geq$3/4 inch, and/or damaging winds or wind $\geq$50 knots, and/or a tornado. Since the major focus of this work is on organized severe thunderstorm episodes, the criteria for determining which events are to be used will be those days when there is considerable severe thunderstorm activity confined to a relatively small area (ranging from approximately the size of Kansas to about four times the size of Kansas) and over a relatively short time interval (6, 12, and 24 hours). These severe thunderstorm events are keyed to well-organized severe thunderstorm episodes most capable of damage and/or injury. They are not intended to cover every isolated or marginally severe thunderstorm. Pulse-type thunderstorms, consisting primarily of solitary brief severe downdrafts are not considered to be organized convection of this type. Thunderstorms barely meeting severe thunderstorm criteria will not be considered when determining severe thunderstorm events for this web page. Days when unusually dense and/or large areas of marginally severe thunderstorms are reported may be requested as events by Storm Prediction Center (SPC) forecasters, SPC Science and Operations Officer (SOO), and/or National Severe Storms Laboratory (NSSL) scientists. Since severe thunderstorm episodes are considerably less frequent in the western U.S. (west of the Rocky Mountains) versus the central and eastern U.S., criteria for inclusion of events in the database were adjusted to include a representative number of events across a wide geographic domain.

Table 1. Event selection criteria for United States. * Number of Severe reports is for any one or combination of ≥1 inch hail, wind damage, wind ≥50 knots, and/or tornadoes (any F-value).

	East of Rocky Mountains	Rocky Mountains and Westward to Pacific Ocean
Tornadoes: F-scale rating (Fujita, 1973)/ Area size (sq. mi.) / Time period (h)	≥ One F2 or greater/any/≤24 ≥ 10 any F-value/80,000/6 ≥ 20 any F-value/160,000/12 ≥ 40 any F-value/320,000/24	Any tornado report regardless of F-value, area size, or time period ≤24 hours.
*Number of severe reports / Area size / Time period	≥30 / 80,000 / 6 ≥60 / 160,000 / 12 ≥120 / 320,000 / 24	≥10 / 160,000 / 12 ≥20 / 320,000 / 24
Fatalities /Injuries /Estimated damage for the event.	≥1 / ≥5 / ≥$1,000,000	≥1 / ≥3 / ≥$500,000
SPC Day 1 Forecast	Any Forecast of Moderate or High Risk	Any Forecast of Moderate or High Risk

Events were selected based on number, distribution and severity of reports. Specific Criteria used are provided in Table 1. Application of these criteria have resulted in approximately 100-120 events per year since 2000.

3. STRUCTURE AND CONTENT

The Severe Thunderstorm Event Web Page can be internet accessed at http://www.spc.noaa.gov/exper/archive/events (browser must be frames capable). The home page of the site contains an image of the surface and upper air composite map for the approximate time of the tornado that was forecast by Fawbush and Miller on March 25, 1948 (Maddox and Crisp, 1999). A list of internal links and links to archived displays for each event are provided in Figures 1 and 2 respectively. Since new events will be added on a continuing basis, updates and modifications will be made as necessary. New events will be posted as soon as possible, in many instances the day following the event.

a. Internal Links (Fig. 1) These links take you to the various parts of the web page. 1) Abstract, Introduction, and Acknowledgments provides information about the web page and historical perspective. 2) Site Content: Examples & Descriptions links to descriptions of all parts of the web page. 3) The Index of Events allows the user to select any event in the database for review. 4) The References link contains as list of references to work of others that was used in the development of the web page. 5) Front Page takes you to a web page that contains additional information including links to SPC case study data sets for which data were archived locally for training and collaborative research purposes.

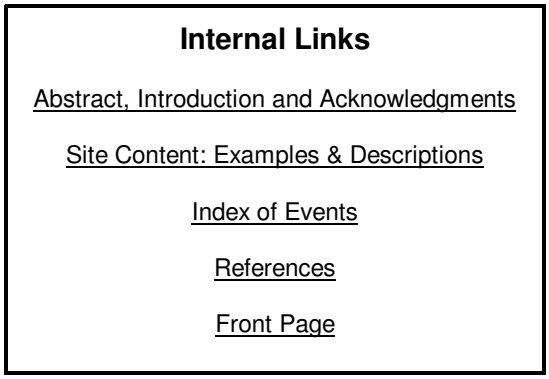

Figure 1. Internal Links. Left frame on first page of Severe Thunderstorm Event Web Page containing links to major parts of the page.

b. After clicking on an event in the index, a web page is displayed for that event. The Event Menu (Fig. 2) is a list of links to specific data for each event. This menu is located in a narrow frame on the left side of the page and will always be visible for display of new fields (displayed in the right frame) relative to the event. There is also a Site Navigation menu that will link to any major part of the web page. The following is a brief description of specific data available for each event.

1) SPC Preliminary displays a plot of the severe reports received by the SPC within two days of the event in a display in the upper right frame and the text description in the lower right frame.

2) Storm Data displays a graphic with a report plot and text data about the event being viewed. The Storm Data (Department of Commerce, 1990) will be entered only one time per year and will have a time lag of nine months to one year.

3) Meteorological Synopsis will display two graphics pertaining to the event in the upper right frame and a general description of the event with a description of some features that are common to most severe thunderstorm episodes in the lower right frame.

4) Composite Analysis of Surface & Upper Air Parameters gives an interactive display that allows the user to click on and off the surface parameters and upper air parameters for different levels. Selections are for both the 1200UTC and 0000UTC data base times. Most of the parameters on these composites follow the symbology and color coding presented by Miller (1972).

5) Composite Surface Analysis for both 12UTC and 00UTC can be viewed. These have isobaric and isodrosothermal analyses with highs, lows, fronts and discontinuity lines displayed.

6) Upper Air Objective Analyses for 12UTC and 00UTC at the 925hPa, 850hPa, 700hPa, 500,hPa, 300hPa, and 250hPa levels can be selected for individual viewing. The 12UTC maps are produced using an upper data plot with a first guess from the 06UTC Eta 6-hour forecast for the objective analysis overlain. The 00UTC maps are produced using an upper air data plot with a first guess from the 18UTC Eta 6-hour forecast for the objective analysis overlain.

7) Skew-T Plots and Analyses, gives a two frame display. The left frame contains selections for the 12UTC or 00UTC data base time and the location for which the plot and analysis is desired. The plot and analysis, for the station selected, will be displayed in the right frame.

8) Radar Loop or Satellite Loop, will be displayed in the right frame. Radar Loop is a set of regional composite base reflectivity images extracted from the UNISYS' National Radar Composite base reflectivity images. The Satellite Loop is a set of IR images for the United States. These displays are interactive and allow a variety of user defined options (zoom, variable dwell rates, etc.).

9) SPC's Convective Outlooks for 0600Z Day 1, 1300z Day 1, 1630Z Day 1, 2000Z Day1, and 0100Z Day 1 display a graphic of the forecast with lightning data overlain in the upper right frame and the forecast text in the lower right frame.

10) SPC's Mesoscale Discussions or Watches, display all Mesoscale Discussions or Watches issued during the convective day.

11) Case Studies and Publications About This Event is a list of known case studies and/or publications that have been produced about this particular event. Users are encouraged to contact the authors if they know of case studies or publications about a listed event that do not appear on this list.

Event Menu

Activity Summaries
SPC Preliminary
Storm Data

Meteorological Synopsis

Composite Analysis of Surface & Upper Air Parameters

Composite Surface Analysis(es)
12Z 00Z

Loop of Surface Data Plots

Upper Air Objective Analyses

925	12Z	00Z
850	12Z	00Z
700	12Z	00Z
500	12Z	00Z
300	12Z	00Z
250	12Z	00Z

Skew-T Plots and Analyses

Image Loops
Radar Loop
Satellite Loop

SPC Convective Outlooks
0600Z Day 1
1300Z Day 1
1630Z Day 1
2000Z Day 1
0100Z Day 1

Mesoscale Discussions

Watches

Case Studies and Publications About This Event

Figure 2. Event Menu. Left frame that appears when a particular severe thunderstorm event is selected. A list of links to specified data displays for each event.

4. FUTURE WORK ON WEB PAGE

Future work will concentrate on getting all the parts of the unfinished events completed but new events take priority. The plan is to work backwards in time toward the first event in 2000 such that a continuing archive can be maintained. The value of this web page to forecasters and researchers is well understood and will strongly influence any decision to change its content and/or structure.

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