

HYSPLIT WES Cases Simulation Guide



**August 14-15, 2010 (OUN)
August 17, 2010 (TBW)**

**Presented by the
Warning Decision Training Branch**



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Ed Mahoney, Chief

Warning Decision Training Branch

Training Division, OCWWS

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Document History

The document history is provided to track updates and changes to the simulation guide. The version number, seen at the bottom of every page, will be updated as each significant change is made to the simulation guide.

Version	Date	Description
1.0	March 1, 2011	These simulations are in support of COMET's HYSPLIT training module.

Note: the date of modification is listed on the cover page.

To provide feedback, comments or ideas related to this document, please visit our web site at: <http://www.wdtb.noaa.gov>

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1: How to Use This Document

I. Introduction

Welcome to the **2010 HYSPLIT WES Cases** Simulation Guide! The purpose of this guide is to provide the trainer at a forecast office with case-specific materials needed to prepare and deliver effective simulations that accompany the HYSPLIT training module.

Since this document outlines the “answers” to the challenges of the event, it is specifically meant for the use of the trainer only.

In order to create effective simulations with this case, you will need to familiarize yourself with the details of this event. We recommend installing the case first, followed by reading each short section in order. See Table 1-1 for a description of the layout of this document.

Table 1-1: Simulation Guide Layout

1: How to Use This Document
The introduction describes the content of the simulation guide and how to use this document.
2: Background Information
Read this section to become familiar with loading a simulation, the data characteristics of this case, and information on WESSL.
3: The August 14-15, 2010 Event
The event overview provides a summary of the key components of the August 14-15, 2010 event.
4: The August 17, 2010 Event
The event overview provides a summary of the key components of the August 17, 2010 event.

After reviewing the simulation guide and becoming familiar with the details of this event, the trainer will be ready to begin loading simulations for the trainees. The trainer will need to understand the performance objectives associated with each simulation, which are directly tied to the HYSPLIT training module. You will be able to evaluate a trainee’s performance either during each simulation, or

afterwards as all HYSPLIT runs are archived online for each simulation. Each performance objective has corresponding evaluation criteria to allow you to assess the trainee's performance, all of which are provided in Section 4 of this document.

This set of HYSPLIT simulations contains effective ways of incorporating immediate feedback to the trainee without trainer interaction. However, training research indicates that one-on-one training, where ***trainer and trainee participate together for the optimum learning experience***, is the most effective way to run a simulation. While time consuming, this can insure that:

1. the trainee remains focused on the objectives of the simulation,
2. the trainee receives essential feedback on performance, and
3. the facilitator develops a solid understanding of how well the trainee comprehends the training and how well the trainee transfers the training to application.

In order to manage a simulation session, the trainer must be able to run a simulation as documented with the WES install and testing instructions included with the WES software. The simulations will be much more relevant if local AWIPS customizations (e.g. preferences, procedures, color tables, etc.) are ported to the WES machine as outlined in the WES installation instructions. For more information on the WES, visit <http://www.wdtb.noaa.gov/tools/wes/index.htm>

2: Background Information

I. WES9.2

This simulation is developed for WES9.2, but requires additional web server software to be installed which is done through the `webserver_installer` which is included on the DVD. WES9.3 and future WES releases will include the web server software.

NOTE: The WES is used in the HYSPLIT simulations to provide the meteorological and customer service context for the HYSPLIT simulation. WES itself does not include HYSPLIT capability; students must run HYSPLIT online using the ARL's web interface: <http://ready.arl.noaa.gov/hysplitnoaa/>

The WESSL also provides sample HYSPLIT output for comparison plus optional instructions to guide the student who might have difficulty navigating the ARL web interface.

II. Loading the Cases from DVD

1. August 14, 15 - OUN (1 simulation)

There are 2 install discs for the 14-15 August 2010 case, which occupies ~ 26 GB of disk space. For details on how to load the case, see the README.txt files found on both install discs. The first disc is installed as user "fxa" and the second as user "root". The second disc has two install steps. The first installs the remainder of the case (including pgdata for the text workstation). The second installs a web server which is required for the interactivity of the simulated conversations.

2. August 17 - TBW (2 simulations)

There are 2 install discs for the 17 August 2010 case, which occupies ~ 31 GB of disk space. For details on how to load the case, see the README.txt files found on both install discs. Both discs may be installed as user "fxa."

III. Customization and Localization

OB9.2 localizations for OUN and TBW are included with each respective data set. We encourage you to customize your WES from your AWIPS. For information on customizing WES, please see the WES users guide available with the WES release.

3: The August 14-15, 2010 Event

I. Event Overview

In the afternoon of Saturday, August 14, a cold front was located over southern Kansas. Ahead of the cold front, very warm conditions prompted heat advisories to remain in effect across Oklahoma through 7 PM local time on Sunday, August 15. The front was also a focus for severe thunderstorms. The SPC included southern Kansas and far northern Oklahoma in a slight risk, with severe winds being the primary threat (see Fig. 3-1).

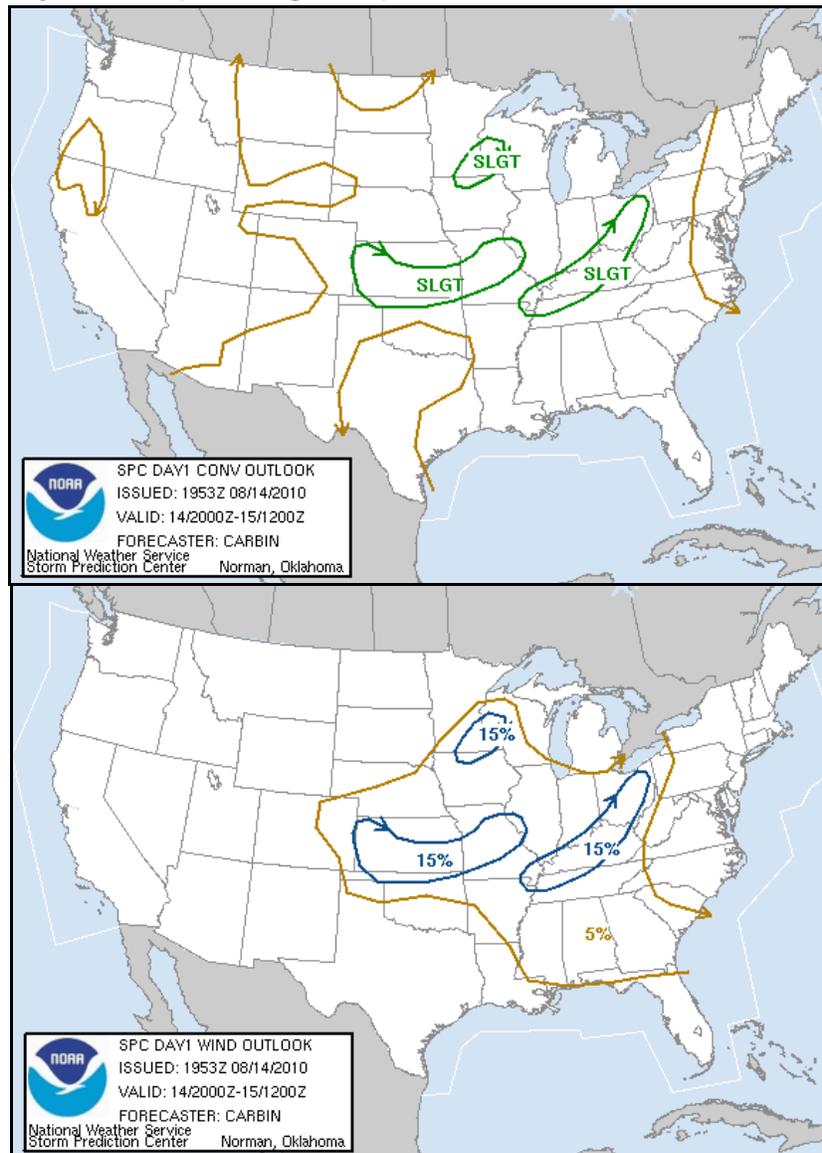


Figure 3-1. SPC Day 1 Convective Outlook (top) and SPC Day 1 Wind Threat Outlook valid 14 August 2000Z through 15 August 1200Z

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The SPC also issued a severe thunderstorm watch for central and southern Kansas and the northern tier of Oklahoma counties, covering portions of the ICT, DDC, OUN, and TSA county warning areas. The watch was effective from 4 PM – 11 PM local time.

By 8:00 p.m. local time (0100 UTC), a multicell complex had developed in southern Kansas (see Fig. 3-2). Significant outflow winds had pushed ahead of the storm complex, stretching from near Arkansas City, KS southwest to north of Enid, OK and into far northern Major county before bowing northwest along the Woodward/Woods county border. Some of these outflow winds were severe; OUN issued a SVR warning for Kay and Noble counties from 8:14 – 9:00 p.m.

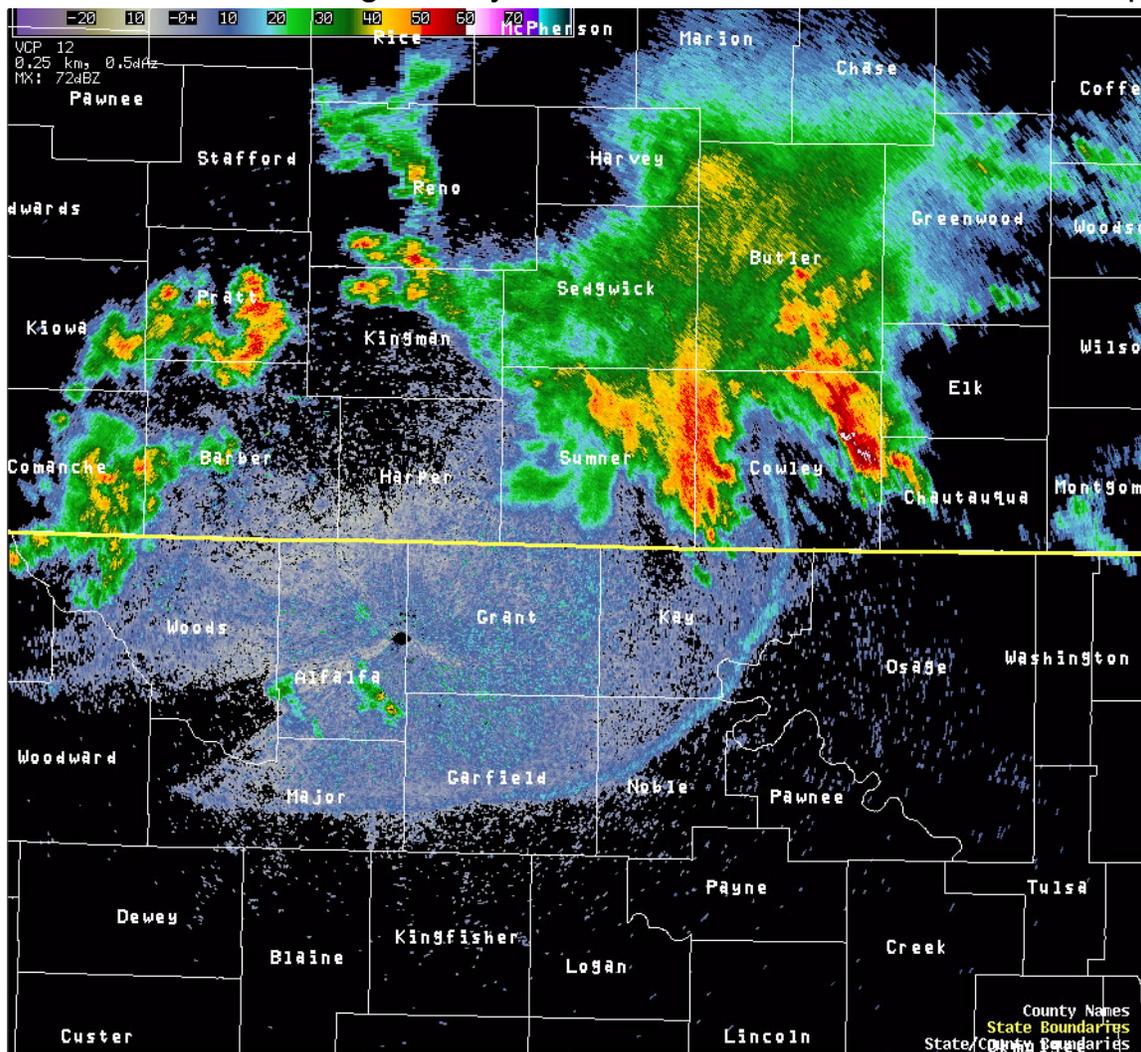


Figure 3-2. Reflectivity image from KVNK at 0143Z on 15 August 2010.

These event briefing materials are available to the student:

- OUN Forecast Discussion (1946 UTC)
- OUN Heat Advisory (1950 UTC)
- SPC Day 1 Convective Outlook (0057 UTC)
- SPC Mesoscale Discussions (2022 and 0042 UTC)
- Severe Thunderstorm Watch (2100 UTC)

II. Data Characteristics

The original data set came from the OUN and TSA office archives, but the entire dataset was not archived. Therefore, not all model and satellite data are present. However, there is enough data that the trainee should be able to satisfy the learning objectives. The details of the data sets are included below:

Model Data:

The following model data exists in this dataset: RUC, NAM80, GFS

Radar Data:

8-bit data exists for KVNK (primary), KICT, KTLX, KINX, and TTUL. Data from KICT and KINX are from the SBN (lowest 4 tilts of base data).

Other Data:

This case also includes redbook graphics, some text workstation products, and Oklahoma Mesonet observations (via LDAD station plots). The student pre-briefing gives an overview of Oklahoma Mesonet and a tutorial on how to decode the cursor readout, which is summarized in the table below.

Parameters available in cursor readout for Oklahoma Mesonet data

ID	Parameter	Value/Units
STID	Site ID	
TIME	Date/Time	UTC
RELH	Relative Humidity	%
TAIR	Air Temperature (1.5 m)	°C
WSPD (#3)	Scalar Wind Average Speed	m/s
WVEC	Vector Wind Average Speed	m/s
WDIR (#5)	Average Wind Direction	degrees
WDSD	Standard Deviation of Wind Dir	degrees
WSSD	Standard Deviation of Wind Speed	m/s
WMAX (#8)	Wind Gust	m/s
RAIN	Accumulation since 0Z	mm
PRES	Altimeter Setting	mb
SRAD	Solar Radiation	W/m ²
TA9M	Air Temperature (9m)	°C
WS2M (3rd from the end)	Wind Speed (2m)	m/s

III. WESSL

This simulation presents the request for a HYSPLIT run in a realistic customer-support context. WESSL presents several simulated telephone conversations to the trainees; the trainees should type their response in the spaces provided during the simulation. This simulation is also unique in the fact that it interprets one of the trainee responses and presents different information depending on that response.

These simulated conversations were implemented using a web server, Articulate Quizmaker and some custom scripts. WESSL simply executes several system commands to launch an interaction in a web page at the appropriate times. Each time, WESSL presents an Event Log pop-up window to acknowledge receipt.

The WESSL script contains an introductory Articulate presentation that loads immediately after the simulation starts. This presentation provides an overview of the simulation and other bits of important information. The simulation pauses to give the student time to digest the pre-briefing and corresponding weather briefing. Each simulated conversation in the WESSL script requires the student to enter a response that is saved in a log file located at `/data/awips/2010Aug14/wessl/hysplitSim1.log`.

IV. WESSL Script Details

Here are details about the simulated conversations that WESSL presents to the student. Each response is annotated in the log file with the label indicated in the table.

Time (UTC)	Event	Details	
0155	1. Simulation Begins		
0155	2. Web server is started	Allows the conversation results to be interpreted to display the appropriate content for the two branches	
0156	3. Pre-Briefing	Articulate Presenter presentation (setting)	
0156	4. Weather Briefing web page	Meteorological setting; simulation is paused; can be resumed when student is comfortable in continuing	
0200	5. Conversation 1	Dispatcher calls with request for a wind forecast. Student provides a response. Student is asked if they asked why the forecast was needed. The simulation branches based on this yes or no response.	
		“YES” branch	“NO” Branch
		Forecaster is told there’s a chemical spill at an oil refinery and that the County EM will call back with details. Log File Annotation: Conversation 1	Forecaster is told the County EM will call back. Log File Annotation: Conversation 1
0210	6. Conversation 2	County EM gives forecaster all details to be able to run the HYSPLIT model (lat/lon/chemical/release start and approximate duration and contact info) Log file annotation: Conversation 2a (Yes branch)	Forecaster learns it’s a refinery issue, but County EM is not able to give all details. Ponca City EM will call back with details. Log file annotation: Conversation 2b (No branch)

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0215	7. Conversation 3	<p>Distractor: a concerned citizen from Ponca City calls and asks why he hears the storm sirens</p> <p>Log file annotation: Citizen Call (yes branch)</p>	<p>Ponca City EM calls with details to run the HYSPLIT model (lat/lon/chemical/release start and approximate duration and contact info)</p> <p>Log file annotation: Conversation PoncaEM (no branch)</p>
0217	8. Wrap-Up/Debrief web page	<p>Web page gives forecaster the ability to check his HYSPLIT model results. Student is asked about the representativeness of the HYSPLIT results.</p> <p>There's also a final interaction with the Kay County EM. Student can practice issuing a Civil Emergency Message using GFE. Student is asked to consider what issues would result if the plume was oriented in other directions.</p> <p>Log File Annotations: Results, Final Considerations</p>	
0230	9. Web Server is stopped		
0230	10. Simulation Ends		

V. Simulation Details

The simulation focuses on a chemical incident at an oil refinery in Kay County, OK, superimposed on this weather event. Because a request to run HYSPLIT almost always comes from external customers, WESSL also provides a customer-support context. The student will be required to provide some responses which are written to an external log file. This log file is located at /data/awips/2010Aug14/wessl/hysplitSim1.log. The simulation also interprets one of the student responses and branches to present information at different times based on the response.

Here are some additional details on the customer service setting: The refinery is located just outside the city limits of Ponca City, placing it in the jurisdiction of the Kay County EM, who is based in Newkirk. Kay County EM would have been

at the County EOC in Newkirk because of storm watch activities associated with the severe weather, then would have traveled to the refinery location, where the Ponca City EM also would have responded. Normally sounded during such emergencies, warning sirens are located at the refinery, and they can be easily heard within the city limits of Ponca City. There are tribal facilities located south of the refinery as well as in Osage County to the east.

VI. Starting the Simulation

Open a terminal window and type `start_simulator`. Click "Tools" and then click "Convert Case Data to DRT Format." When the data has been converted, click "Exit" and then enter the `start_simulator` command again. (Converting the case data to DRT format only needs to be done the first time this simulation is run or if for any reason the case data is restored to its original format.) Click "Run Simulation" and then click "Load Saved Settings" and select `Hysplit_Sim_1`. Your window should then look like the image in Figure 3-3.

The screenshot shows a window titled "Simulation Entry" with a "Please Enter:" label. It contains the following fields and buttons:

- FXA_DATA (i.e. case location):
- FXA_INGEST_SITE:
- Case Start Time:
- Case End Time:
- WESSL Script (optional):
- WESSL Case Flags (optional):
- GFE Directory:
- GFE Grid:
- TAFs Directory:

At the bottom of the window, there are two buttons: "Save Current Settings" and "Load Saved Settings". At the very bottom, there are "OK" and "Cancel" buttons.

Figure 3-3. Screenshot of simulation entry window for the Ponca City simulation.

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Wait for the simulation to prepare and then click "Run Simulation" to begin the simulation. The simulation will end automatically when the end time is reached.

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4: The *August 17, 2010* Event

I. Event Overview

During the afternoon of Tuesday, August 17, a sea breeze sets up early in the afternoon, as is the case most every summer afternoon in western Florida, with westerlies at the surface and easterlies aloft. Clearing occurs along the shore and convection develops along the sea breeze boundary, and there is another area of convection to the north. Later, for simulation 2, an outflow boundary from the convection to the north collides with the sea breeze convection outflow causing shifting winds, making the plume forecast difficult. No watches or warnings were in effect during this period.

II. Data Characteristics

The original data set came from the TSA office archives, but the entire dataset was not archived. Therefore, not all model and satellite data are present. However, there is enough data that the trainee should be able to satisfy the learning objectives. The details of the data sets are included below:

Model Data:

The following model data exists in this dataset: GFS40, NAM12, NAM40, NAM80, RUC40

Radar Data:

KTBW, TTPA

III. WESSL

The WESSL script contains an introductory Articulate presentation that loads immediately after each simulation starts. These presentations will show the physical and geographical characteristics of the CWA. In addition, the WESSL script will have pop-up windows that are essential to the purpose of the simulation, so it is important that attention is paid to them. Loading the appropriate

saved settings macro from the simulation setup window will automatically insert the correct WESSL files for each simulation.

IV. Simulation Details

The simulations focus on two different chemical releases – a tanker truck releasing acetylene near Sarasota at 19z (simulation 1) and a train accident that released benzene near Plant City at 2130z (simulation 2). Make sure the student selects the **15Z** RUC or **12Z** NAM model on the HYSPLIT webpage when running the Sarasota simulation, and the **18Z** RUC or **18Z** NAM model on the HYSPLIT webpage when running the Plant City simulation. Because these two simulations are designed to be taken after the Ponca City event and the student will have learned the appropriate questions to ask and the proper order to run everything, the WESSL content for these simulations will not be as in depth, nor will the pre-briefs be as in depth. The student will be notified at the appropriate time to use Sarasota International Airport (SRQ) as the location of the chemical release.

V. Starting the Simulation

Open a terminal window and type `start_simulator`. Click "Tools" and then click "Convert Case Data to DRT Format." When the data has been converted, click "Exit" and then enter the `start_simulator` command again. (Converting the case data to DRT format only needs to be done the first time this simulation is run or if for any reason the case data is restored to its original format.) Click "Run Simulation" and then click "Load Saved Settings" and select `sarasota_2010Aug17` for the first simulation or `plantcity_2010Aug17` for the second simulation. Your window should then look like either of the images in Figure 4.1.

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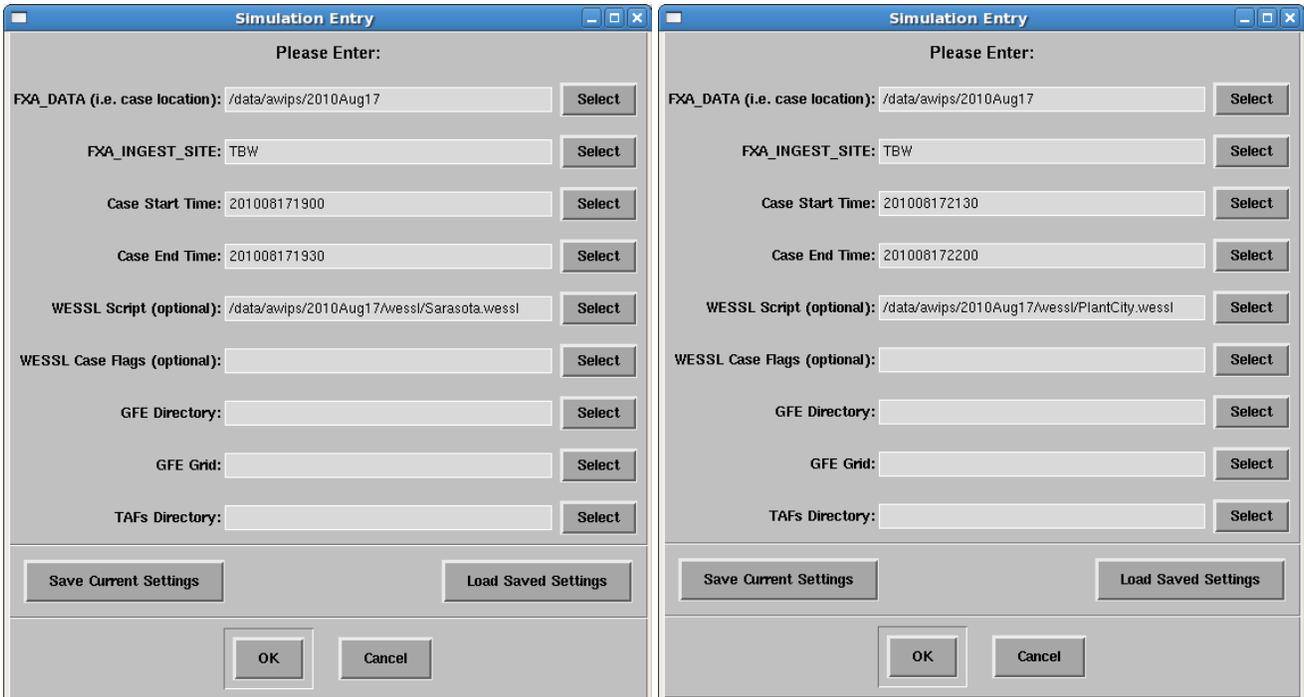


Figure 4-1. Screenshots of simulation entry window for the Sarasota (left) and Plant City (right) simulations.

Wait for the simulation to prepare and then click "Run Simulation" to begin the simulation.

At the end of each of the August 17 simulations (after the model comparison pop-up has shown and has been viewed by the trainee), stop the simulation. Open a new terminal window and type either:

```
firefox file:///data/awips/2010Aug17/wessl/hysplit-sims/Finale_Sarasota/player.html
```

OR

```
firefox file:///data/awips/2010Aug17/wessl/hysplit-sims/Finale_PlantCity/player.html
```

depending on the appropriate simulation.

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