

# [Spotfire Builders Blog](#)

Tips, tricks and development news for DecisionSite visioners

## Recent Posts

- [Spotfire Builders Blog is moving](#)
- [Interactive Visual Analytics with Amazon's Web Services, Google, and DecisionSite](#)
- [DecisionSite 8.1 Beta Program](#)
- [Extending the Spotfire Expression Language with new text manipulation functions](#)
- [Configuring the DecisionSite Gene Ontology Browser](#)
- [DecisionSite 8 - Setup custom message in the login dialog](#)
- [Importing Data from SAS®](#)
- [For DecisionSite 8.0 - How to set up your initial DecisionSite Library](#)
- [How to set up your users and passwords](#)
- [Automated Poster creation & distribution](#)

## Categories

- [Administration](#)
- [Analysis](#)
- [Development](#)

## Recent Comments

- [Thomas Lundborg](#) on [Importing Data from SAS®](#)
- [Thomas Lundborg](#) on [Importing Data from SAS®](#)
- [Martin Nilsson](#) on [Guided Analysis in a Portal](#)
- [Tobias Lehtipalo](#) on [WisserWays Spotfire Hurricane Track Analyzer](#)
- [Luca](#) on [Using a curve fit component](#)
- [Martin Nilsson](#) on [For DecisionSite 8.0 - How to set up your initial DecisionSite Library](#)
- [Martin Nilsson](#) on [Shared Analysis in Portal](#)
- [David Nick](#) on [Using a curve fit component](#)
- [Martin Nilsson](#) on [Shared Analysis in Portal](#)
- [Chris Silvia](#) on [Shared Analysis in Portal](#)

## Archives

- [February 2005](#)
- [December 2004](#)
- [November 2004](#)
- [October 2004](#)
- [August 2004](#)
- [May 2004](#)
- [April 2004](#)
- [March 2004](#)
- [February 2004](#)
- [December 2003](#)

Powered by [TypePad](#)

[« Importing Data from SAS®](#) | [Main](#) | [DecisionSite 8 - Setup custom message in the login dialog »](#)

## September 10, 2004

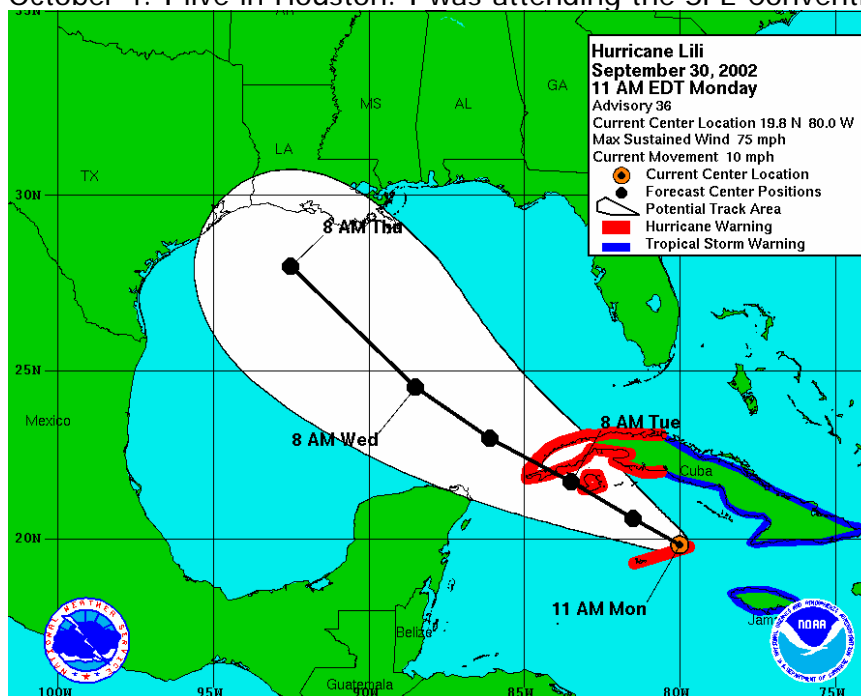
### WiseryWays Spotfire Hurricane Track Analyzer

WiseryWays Spotfire Case Study: Hurricane Path Prediction using Historical Hurricane Track Data in Spotfire  
By Stephen M. Rasey, Ph.D.

Copyright © 2002, 2004 by WiseryWays, LLC. Some Rights Reserved

This work is under a [Creative Commons License: Attribution-NonCommercial-ShareAlike 2.0](#).

**Situation:** On September 30, 2002, the National Weather Service reported Hurricane Lili East of the Cayman Is. on a track to reach Houston on October 4. I live in Houston. I was attending the SPE Convention in San



Antonio on September 30. Picture:

**Question:** Is Houston a likely target? Do I need to hurry back and help my family prepare for a Hurricane in 4 days?

**A Hypothesis:** What tracks did past hurricanes take from Lili's current position at approximately the same time of year? Let's assume hurricanes are subject to large weather circulation patterns and that circulation patterns are seasonal and largely governed by the time of year.

**Case Study Objective:** Can I take a table of historical hurricane tracks data, place it into Spotfire with map background image, and help understand where hurricanes have moved in the past from the same position at the same time of year.

**Total time for this work: 4 hours.**

It is meant to be an illustration of the power of Spotfire as a data visualization tool. It is not meant as a replacement to the NOAA Hurricane Center's forecasts. The visualization and analysis below was shown at the Spotfire booth at the Society of Petroleum Engineers convention in San Antonio, September 30, 2002, 4 days before Lili landfall. We had no knowledge beyond NOAA, our data and predictions where Lili might go.

Step 1: Find on the internet tables of historical hurricane tracks. Here here is one source:

<http://weather.unisys.com/hurricane/atlantic/>

Step 2: Read the tables into Excel to convert them to database fields: See [http://excelsig.org/PastMtgs/0210/Oct\\_2002.htm](http://excelsig.org/PastMtgs/0210/Oct_2002.htm) (Notes by Stephen Rasey)

Step 3: Load the Excel tables into Access. 25,000 records

Table: Hurricane - Fields:

HYear, HMonth, HDay, HHour (numeric GMT time and date of the hurricane position):

HYN Hurricane Record number in the season HSeqN: Hurricane ID:

HRecNum: Time-Ordered Record Number within a Hurricane. Renumbers with each HSeqN:

HName: Hurricane Name (Prior to 1950, they were not named. 1953 started to use female names):

HLat: Decimal degrees Latitude, positive North:

HLon: Decimal degrees Longitude, positive West (must negate to use in a map) HWind: Wind speed miles per hour:

HBar: Barometric Pressure in the eye, millibars.

Step 4: Create a query in Access to load data into Spotfire. A key element in the query is to create a cartesian join with every position for each hurricane refering to all other positions for the same hurricane. Each record then has two sets of Lat/Longs: Where it is and where it came from or will go to.

We will call these arbitrarily the H Lat/Longs and the J Lat/Longs.

```
SELECT -H.Hlon AS HLonW, H.Hlat, -J.Hlon AS JLonW, J.Hlat AS JLat, ([h].[hrecnum]-  
[j].[hrecnum])/4 AS JHDays, H.HYN, H.Hyear, DateSerial(2000,[h].[hmonth],[h].[hday]) AS  
HMonday, H.Hmonth, H.Hday, H.Hhour, H.HSeqN, H.HRecNum, H.Hname, H.Hwind, H.Hbar, H.ID  
FROM Hurricane AS H INNER JOIN Hurricane AS J ON H.HSeqN = J.HSeqN;
```

Unconstrained this query, this is 950,000 records. If you limit (J.HLat Between 0 and 33) you can cut it down to 310,000 records.

I created HMonday as a DateSerial using an arbitrary year 2000 for all hurricanes. This way I get a single range select query device to select Aug 15 to Sept 15 over all years.

Step 5: From Spotfire, get data using ODBC to the Access query.

File >> Import >> Import Data... >> Machine Data >> find the access.mdb. >> pick the query.

Step 6a: We create an "H Map" Scatter Plot.

X Axis: HLonW,

Y Axis: HLat,

Size by H.HWind (wind speed),

Color by H.HYN (Hurricane Number within the Year),

Connect Points by H.HSeqN (Hurricane Sequence number from the dataset),

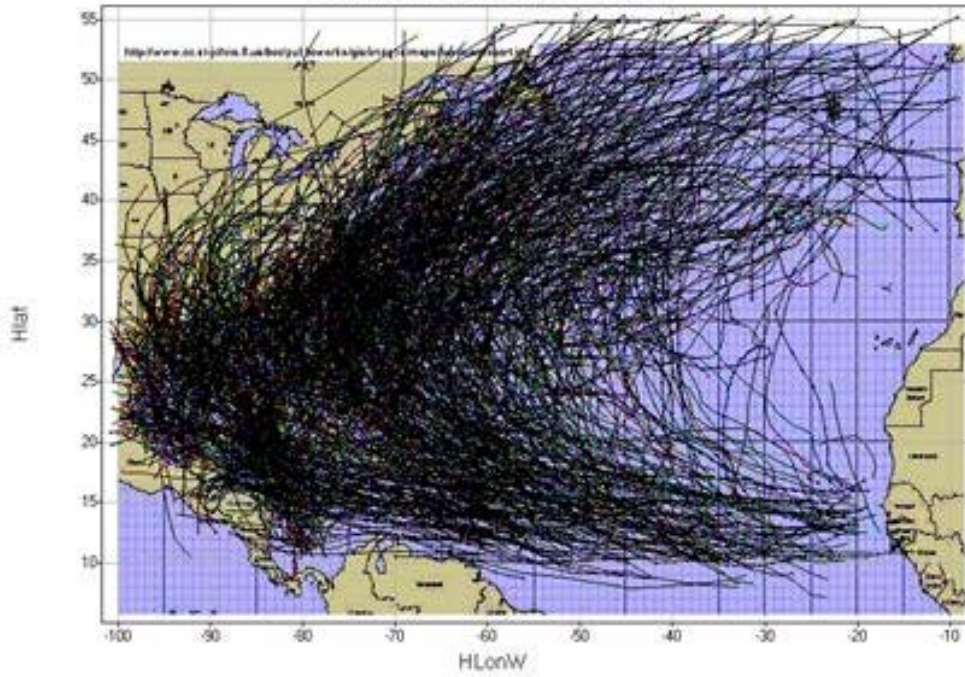
Order by HDays, use arrows for direction.

Step 6b: Search the internet for a public domain image of a map of the North Atlantic with an Orthogonal Cartesian projection.

[www.co.st-johns.fl.us/bcc/publicworks/gis/images/...](http://www.co.st-johns.fl.us/bcc/publicworks/gis/images/) is one such site. Crop the image to known latitude and longitude grid lines.

Step 6c: Attach the map to the Spotfire plot. Register it.

Hurricane Tracks 1900 - 1998



If we use the query devices to show a hurricanes from 1987 to 1992 inclusive  
Hurricane 1987 to 1992



Step 7: Repeat 6a to make the "J Plot: Scatter plot on JLon and JLat.  
Do NOT size markers, make all points small.  
Do Not connect the points.  
Attach the map to the background.

Step 8: Use Spotfire to show only the hurricanes that passed between the Cayman Islands and Cuba, just as Lili is doing on September 30, 2002. Using the J Scatter plot, mark some points around the hurricane's current location, +/- 2 degrees East-West and North-South.

J Plot Selected points within 2 deg of Lili on Sept. 30



Step 8b: Ctrl-M to display only the marked points. Release the Marked records by draggin on an empty space on the chart.

Switch to the H Plot to see all the Hurricanes positions for the selected records.

Step 9 . Weather systems influence Hurricane tracks. Time of year influences weather systems. Look at only those hurricanes that passed the Cayman's within three weeks of October 1: (September 12 to October 20). Size the point by Wind speed. Color by Hurricane number of the year

H Plot Tracks passing within 2 deg of Lili on Sept. 30



**Conclusion:**

In Late September to Early October, Hurricanes passing between Cayman and Cuba seem to leave Houston alone. They either pass to the south over Yucatan and South Texas or veer north to Louisiana or southern Florida and the Bahamas. Out of 30 historical hurricanes, none seriously affected Houston. I felt better and choose not to hurry home.

**Epilog:** In fact, Lili did turn north and made landfall in southern Louisiana on October 3, 2002. It most closely followed the path of Hilda (1964), the brown track that hit the south coast of Louisiana on October 4, 1964.



## 2004 Followup:

Hurricanes Charley and Francis damaged Florida. Ivan quickly reaches Category 4 by the evening of Sept. 5. I have a trip scheduled for the week of September 12. The [Sept 5 11PM EDT 5 day prediction from NOAA](#) predicted Ivan would hit the Bahamas and Houston would not be in danger.

I ran a [Spotfire Hurricane track for Ivan for the Sept 5, 11PM position](#). Most tracks were consistent with the NOAA prediction, but about 1/4 of them followed the path of 1988 Gilbert

I ran another plot on [Sept 6, 11PM](#) and saw half of the tracks heading for Yucatan and Guatamala, the other half East of Florida. I wrote a collegue in Mexico noon on Sept 7:

2 days ago, the 8 AM Thursday [Sept 9] estimate was the SE corner of the Dominican Republic. Now it is 250 miles SW of that point. Another 250 mile shift SW and it is headed for Cancun on Sunday [Sept 12].

I wouldn't be surprised if this ultimately follows Gilbert's track. It will be interesting to watch. I only hope I can watch from a distance. ;-)

On Sept 9 at noon time, I stuck my neck out. The Sept 9 11am NOAA 5 day forecast had Ivan headed for Ft Meyers, Florida (White Track and cone in the plot below). My Spotfire Plots showed that if this happened, Ivan would be highly unusual.

Ivan Tracks on Sept 9 11am EDT with NOAA 5 day Prediction drawn on

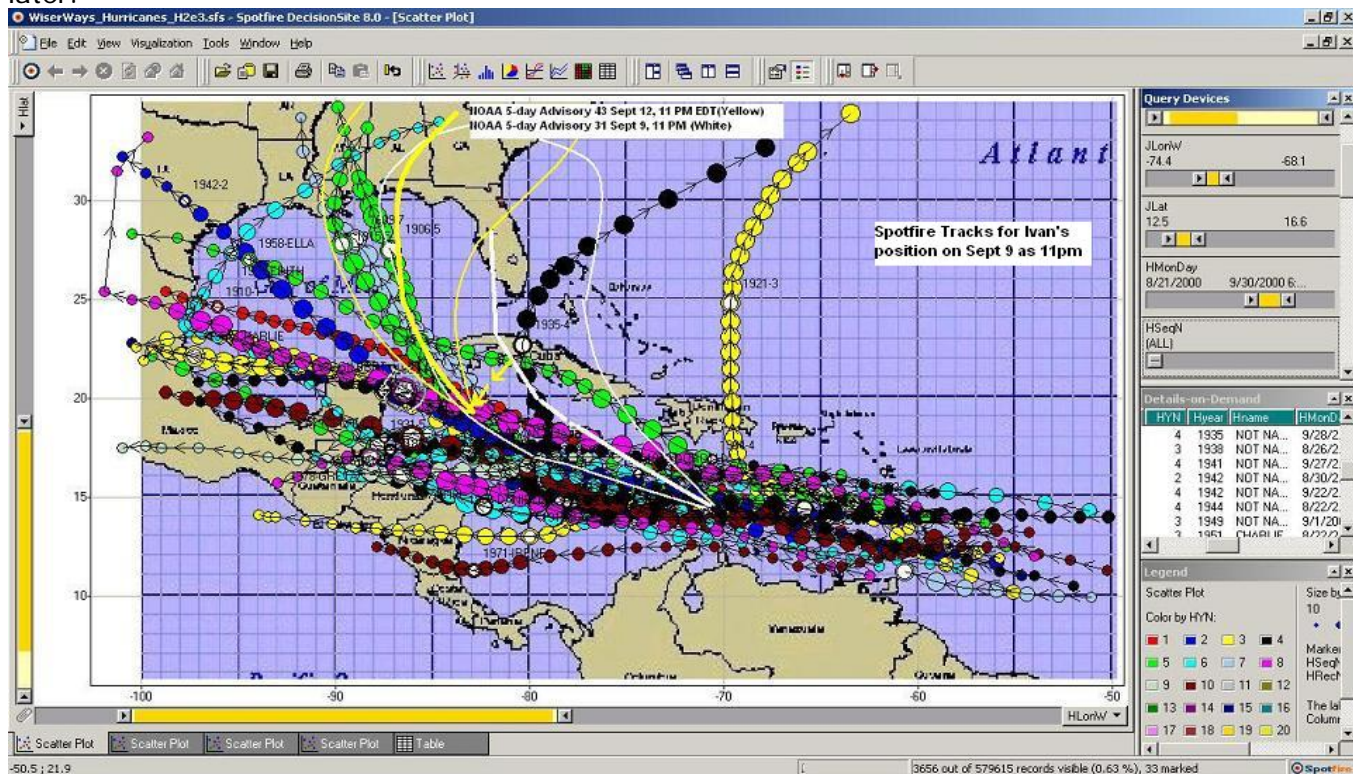


I wrote KTRKWWWWeatherTeam@abc.com on 9/9 12pm.

A side story about Hurricane Ivan is that since 1900, no hurricane has moved to Florida from Ivan's current position [during September]. I have been tracking Ivan against historical data for the past three days. See [http://stephenrasey.com/Hurricanes/20040909\\_11am\\_Ivan.htm](http://stephenrasey.com/Hurricanes/20040909_11am_Ivan.htm).

75% of the hurricanes at Ivan's position in late August and September head for Central America or Yucatan (like Gilbert). A few other hit New Orleans. Florida has been spared.

Below is the Sept 9 11pm Spotfire Plot. In White is the NOAA advisory at that time predicting a similar to only 1 out of 29. Most keep heading WNW to Yucatan. In Yellow is the NOAA advisory from Sept 12, 11pm, 3 days later.



It is 11pm CDT on Sept 12. Ivan is still moving WNW. NOAA thinks it is going to turn north immediately. The [Sept. 12 11pm Spotfire Plots Show](#) that Florida could be hit, but New Orleans to Mobile is more likely. And Yucatan was also still a high probability.

If Ivan keeps tracking Gilbert or Beulah and hits the Mexican or Texas Gulf Coast or Hits New Orleans, we saw it coming with Spotfire.

Stephen Rasey  
Houston, Texas  
September 13, 2004 12:38 am



This work is licensed under a [Creative Commons License: Attribution-NonCommercial-Share Alike](#).

Posted by Stephen in [Analysis](#) | [Permalink](#)

## TrackBack

TrackBack URL for this entry:  
<http://www.typepad.com/t/trackback/1113036>

Listed below are links to weblogs that reference [WiserWays Spotfire Hurricane Track Analyzer](#):

## Comments

New York Times concludes the following today:  
"MOBILE, Ala., Sept. 16 - Ending its ominous, slow waltz through the Caribbean and the Gulf of Mexico, Hurricane Ivan thrashed the Gulf Coast from midnight to sunrise Thursday."

<http://www.nytimes.com/2004/09/17/national/17storm.html>

Posted by: [Tobias Lehtipalo](#) | September 16, 2004 11:31 PM

## Post a comment

Name:

Email Address:

URL:

Remember personal info?

Comments:



## Links

- [About this Blog](#)
- [Spotfire Home](#)
- [Spotfire Training](#)
- [Spotfire Support](#)
- [Developer Network](#)

[Email Me](#)

[Syndicate this site \(XML\)](#)