Landing Events Database (version 1.2.2) Quick User Guide

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- Metropolitan Washington Airports Authority (Jennifer Dermody)

Database Information Provided

- A large database of landing events at 37 airports in the United States
- Data contains more than 11.7 million landing events
- Data extracted from the Airport Surface Detection Equipment (ASDE-X)
- Contains information of runway exit use by airport and aircraft type
- The tables in the next two pages provide detailed information on the contents of the database

Database Information Provided (1)

Analysis	Purpose	Metrics and Ready-Made Query Options
Aircraft Mix	Provides an overview of aircraft fleet mix in the form of a pie chart with the top 10 aircraft in the fleet mix presented.	By runway By runway exit
Runway Occupancy Time	Provides three values of runway occupancy time measured at three locations: 1. Runway edge 2. Fuselage out 3. At hold bar	1.Average ROT (in seconds) by runway, runway exit and aircraft 2.Median ROT (in seconds) by runway, runway exit and aircraft 3.Probability Density Function (PDF) of ROT (dim) by runway, runway exit and aircraft 4.Cumulative density function of ROT by runway, runway exit and aircraft 5.Runway exit utilization (percentage) by runway exit and aircraft
Speed	Provides information about five aircraft ground speeds at different locations of the landing profile: 1. Threshold 2. Nose gear down 3. Point of curvature 4. Runway edge 5. Hold bar	1.Average ROT (in seconds) by runway, runway exit and aircraft 2.Median ROT (in seconds) by runway, runway exit and aircraft 3.Probability Density Function (PDF) of ROT (dim) by runway, runway exit and aircraft 4.Cumulative density function of ROT by runway, runway exit and aircraft 5.Detailed speed profiles as a function of distance by aircraft, runway and runway exit 6.Detailed speed profiles as a function of time by aircraft, runway and runway exit
Nose Gear Location	Provides estimates of nose gear distance. The nose gear distance is estimated in the landing algorithm to initiate the nominal deceleration.	1.Nose gear distance from runway landing threshold by runway, aircraft and runway exit 2.Probability Density Function (PDF) of nose gear distance (feet or meters) by runway, runway exit and aircraft 3.Cumulative density function of nose gear distance (feet or meters) by runway, runway exit and aircraft

Database Information Provided (2)

Analysis	Purpose	Metrics and Ready-Made Query Options
Deceleration	Provides two values of aircraft deceleration on the runway: Nominal Nominal location to point of curvature (Nominal to PC)	Average deceleration (in m/s2) by runway, runway exit and aircraft Median deceleration (in m/s2) by runway, runway exit and aircraft Probability Density Function (PDF) of deceleration (in m/s2) by runway, runway exit and aircraft (both average and median values can be plotted) Cumulative density function of aircraft deceleration (in m/s2) by runway, runway exit and aircraft (both average and median values can be plotted)
Raw Data	Provides detailed information (in a table) on 30 key parameters for every landing contained in the Landing Events Database. Provides graphical information of every landing in the database. Provides a graphical depiction of individual landings in a Microsoft NAVTEQ map layer (bottom viewport)	30 key parameters defining the landing profile of each landing operation. Parameters include: flight ID, aircraft type, runway, runway exit use, time of operation, nose gear touchdown distance and time, nominal deceleration, deceleration from nominal point to PC, exit speed, and airport wind conditions. Speed-distance profile of each landing event Speed-time profile of each landing event Acceleration-time profile of each landing event Acceleration-distance profile of each landing event Processed numerical data with speed, acceleration, distance and time for individual landings.
Statistics	Summarizes the landing statistics processed by airport by month.	Total landing records Valid records Number of records with missing parameters Number of records with unreasonable parameters Records with no associated runway Go-around records

Computer Requirements

- Landing Events Database client takes 93 Mb of hard disk space
- Operating systems supported: Windows 7 or 10
- Intel processor i5 or i7 with 16 GB RAM
- A fast Internet connection

- Notes:
- The database resides on an external server
- A fast Internet connection will facilitate the transfer of information from the server to your local computer

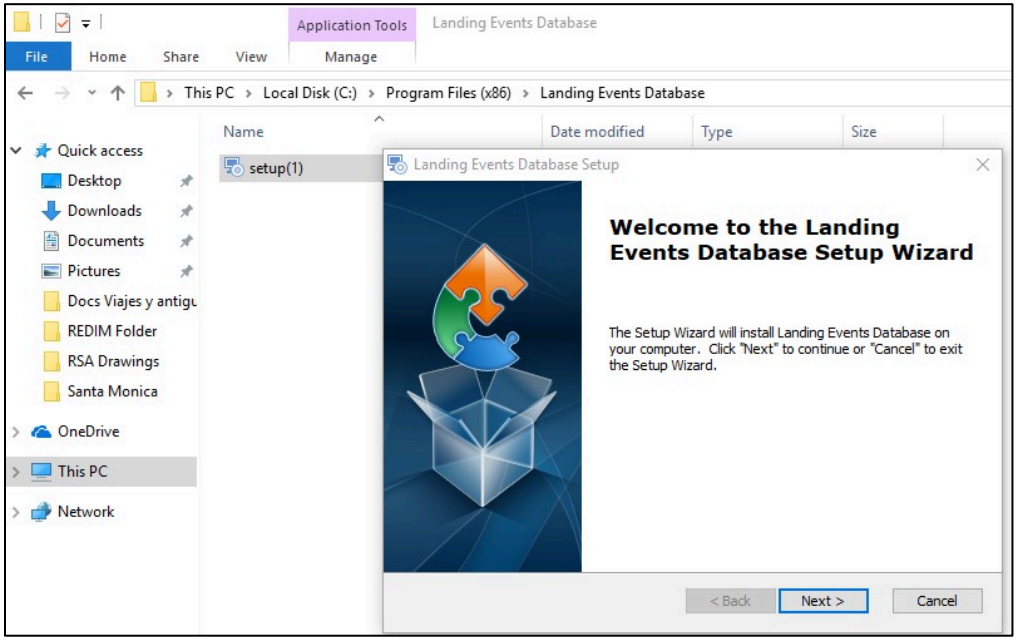
Landing Events Database Installation Instructions

Installation Instructions (1)

- Step 1: Download the database setup file from:

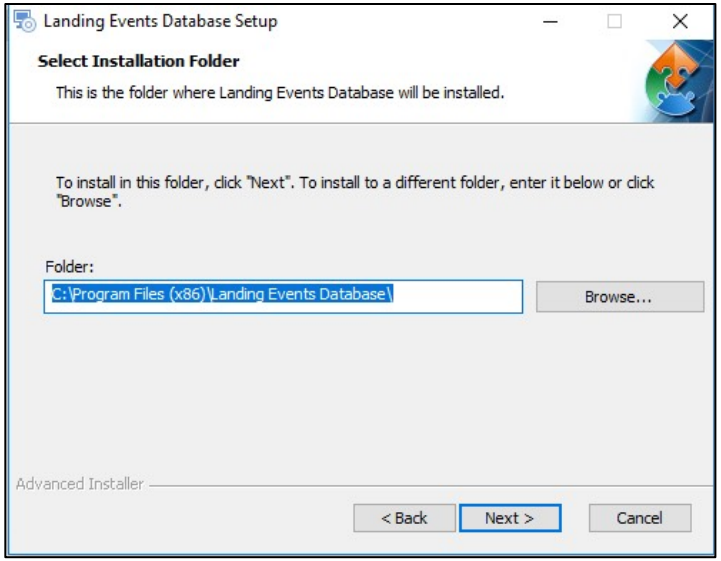
  https://atsl-software-downloads.s3.amazonaws.com/landing-events-database/V1.2.2/setup.exe

- Step 2: Run the program setup

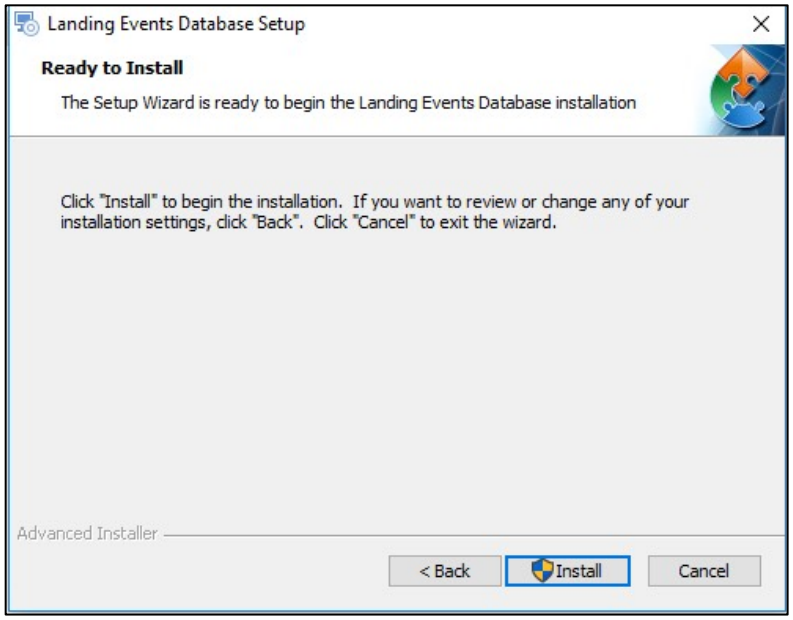


Installation Instructions (2)

- Step 3: Select installation folder:

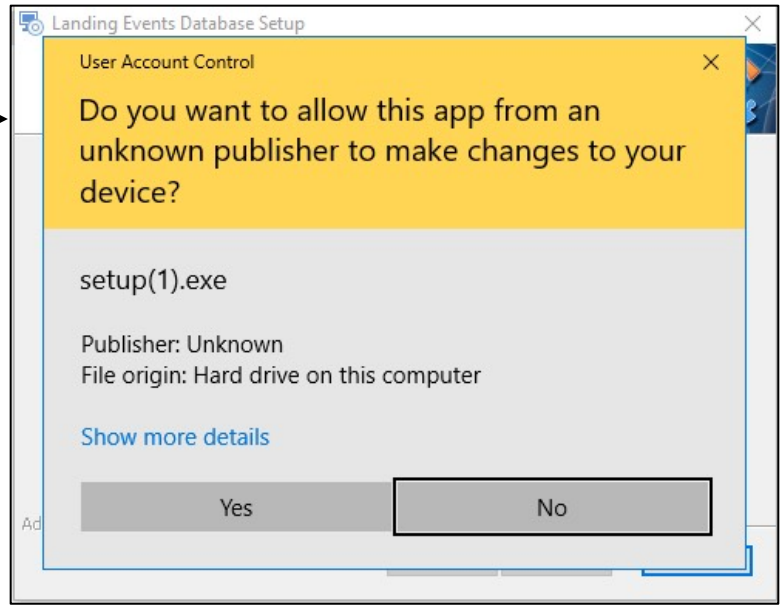


- Step 4: Proceed with the installation

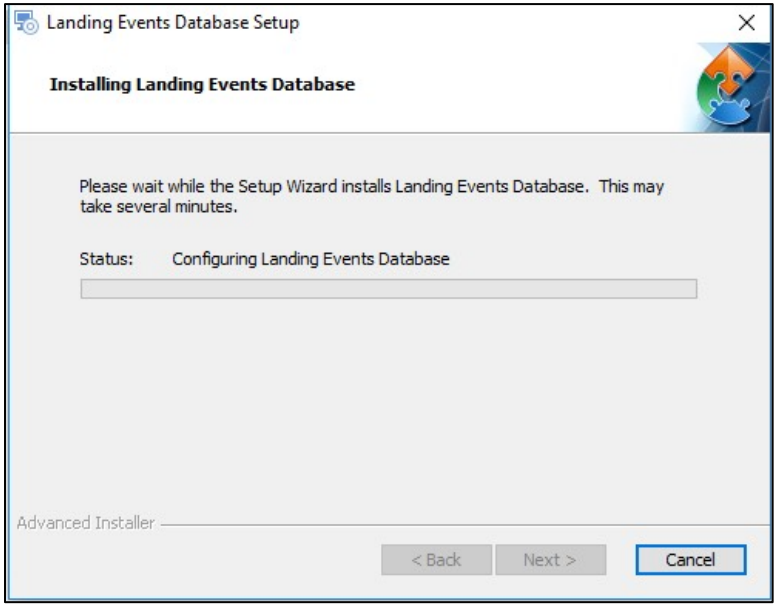


Installation Instructions (3)

- Warning message

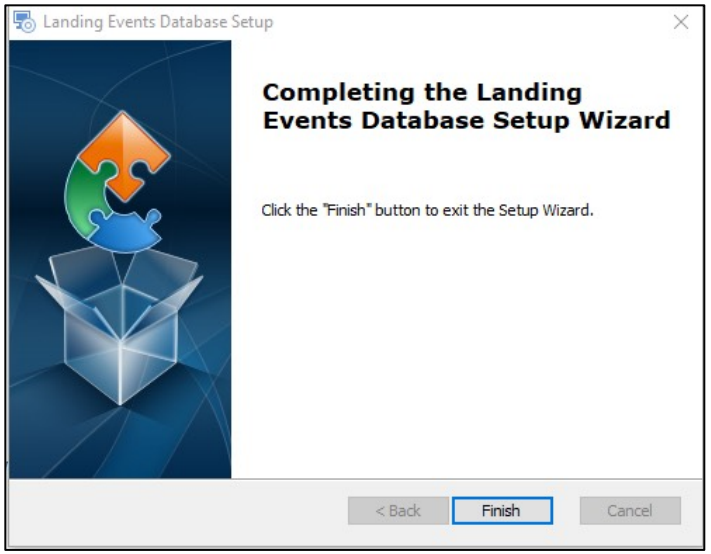


- Installation bar

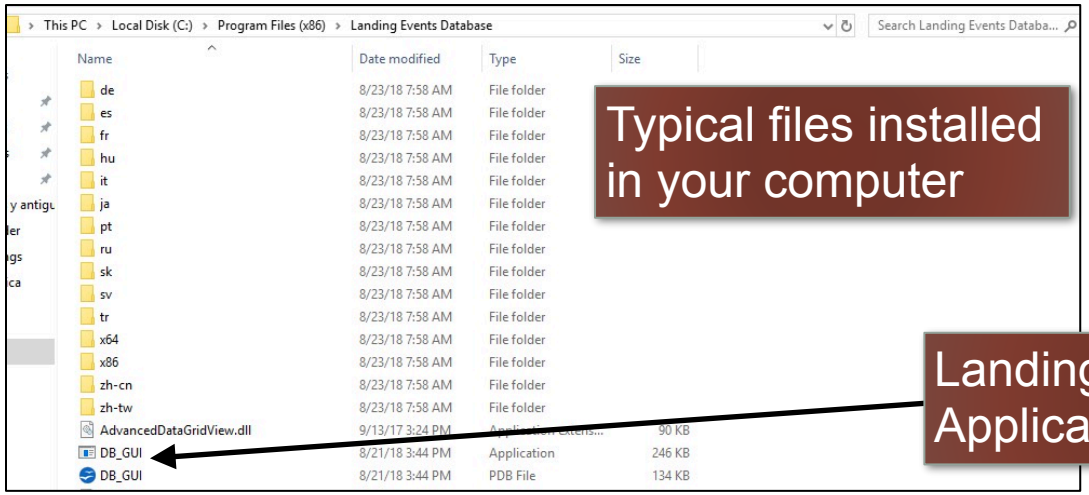


Installation Instructions (4)

Completing installation message



Installation completed



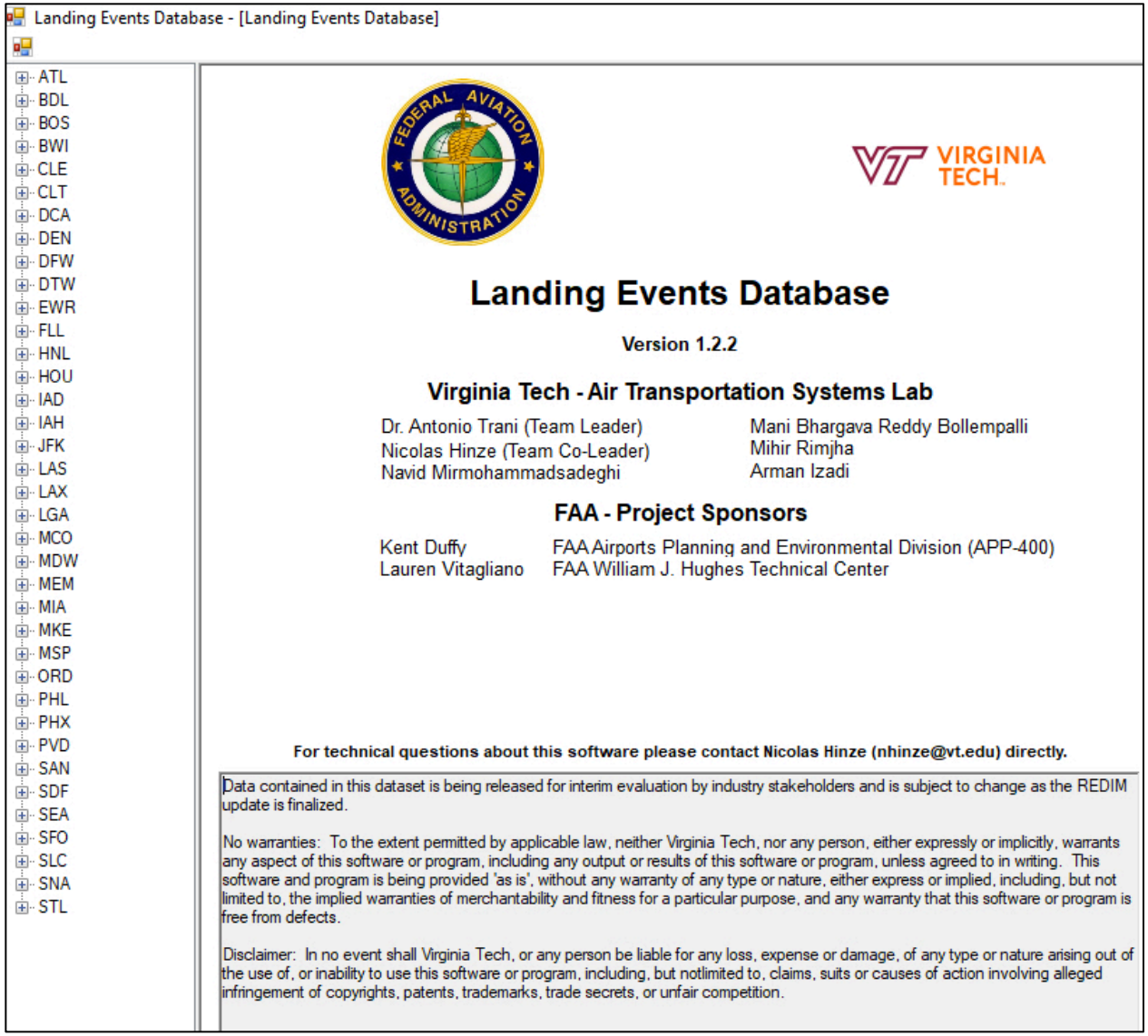
Typical files installed in your computer

Landing Events Database Application

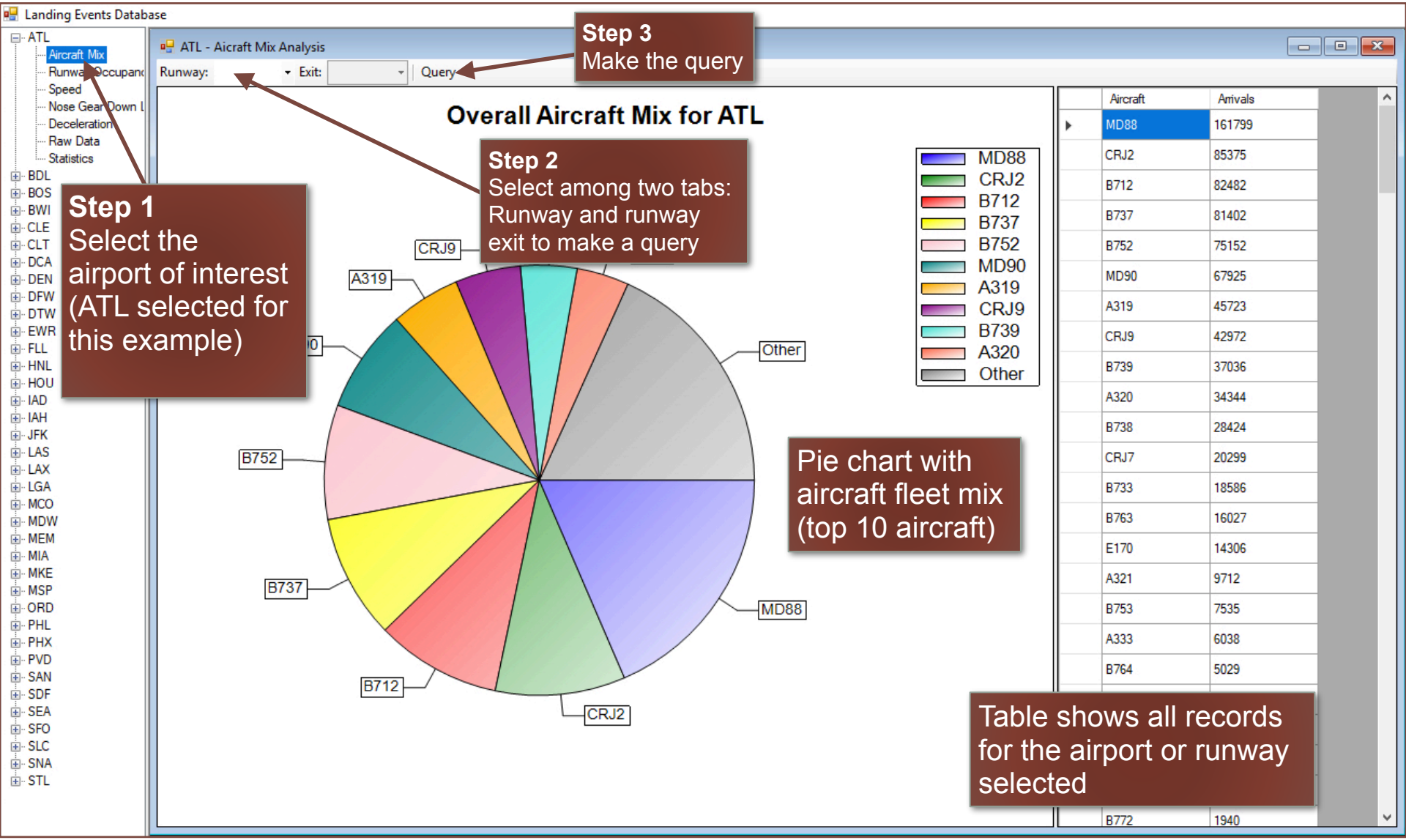
Using the Landing Events Database

Landing Events Database

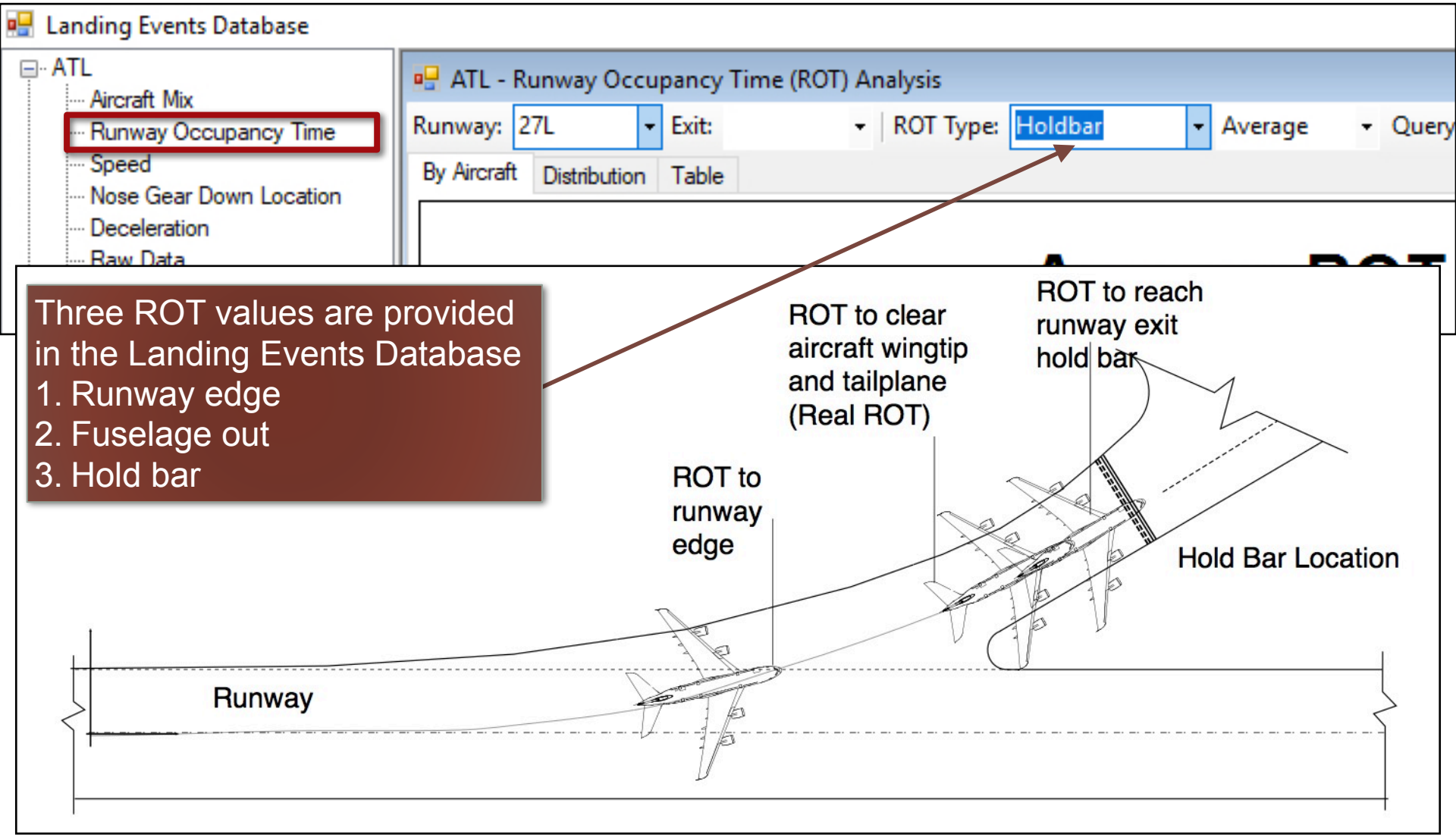
Database
Graphic User
Interface



Airport and Runway Fleet Mix Chart



Definitions of Runway Occupancy Time



Runway Occupancy Time Plots

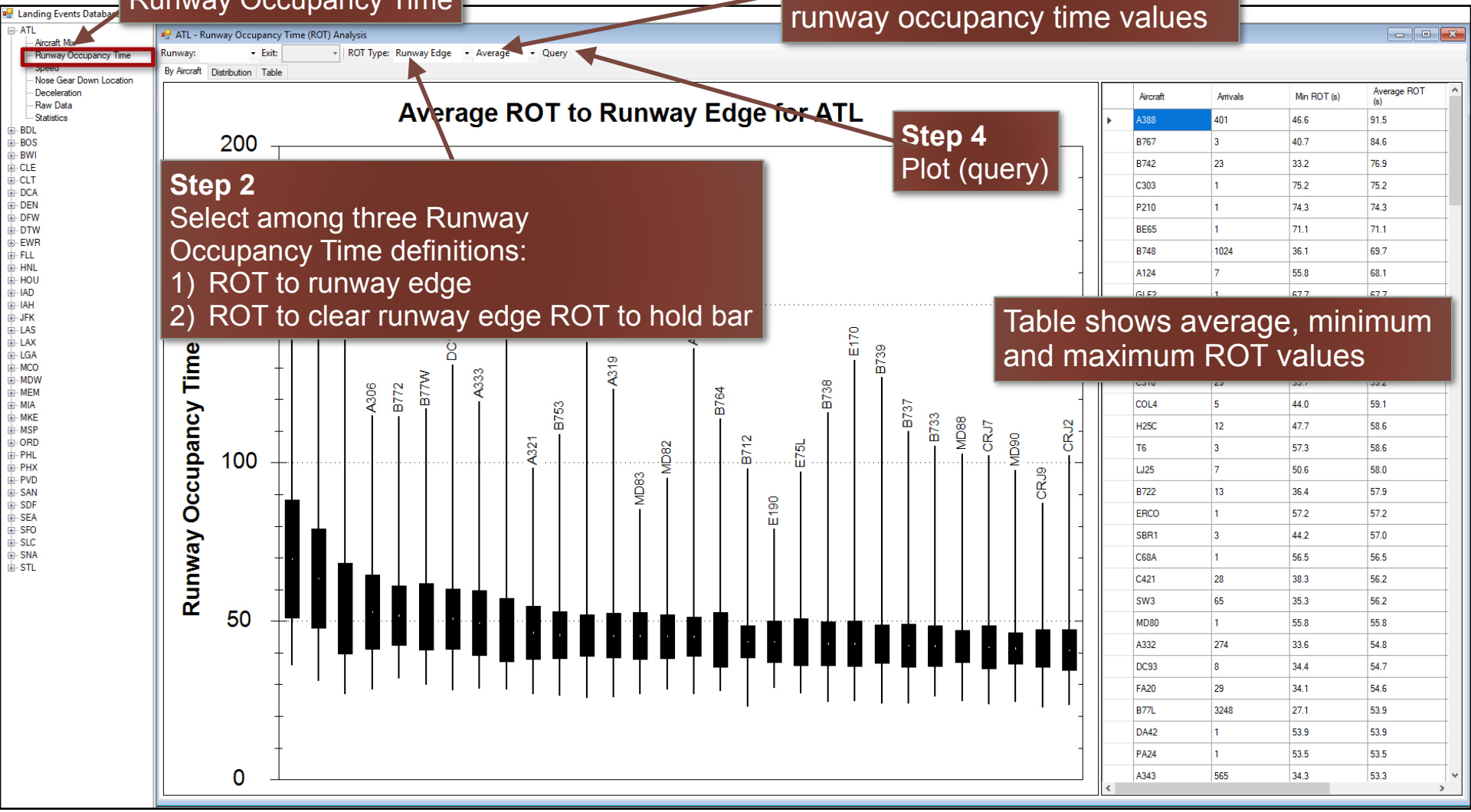
Step 1
Runway Occupancy Time

Step 3:
Select average or median runway occupancy time values

Step 2
Select among three Runway Occupancy Time definitions:
1) ROT to runway edge
2) ROT to clear runway edge ROT to hold bar

Step 4
Plot (query)

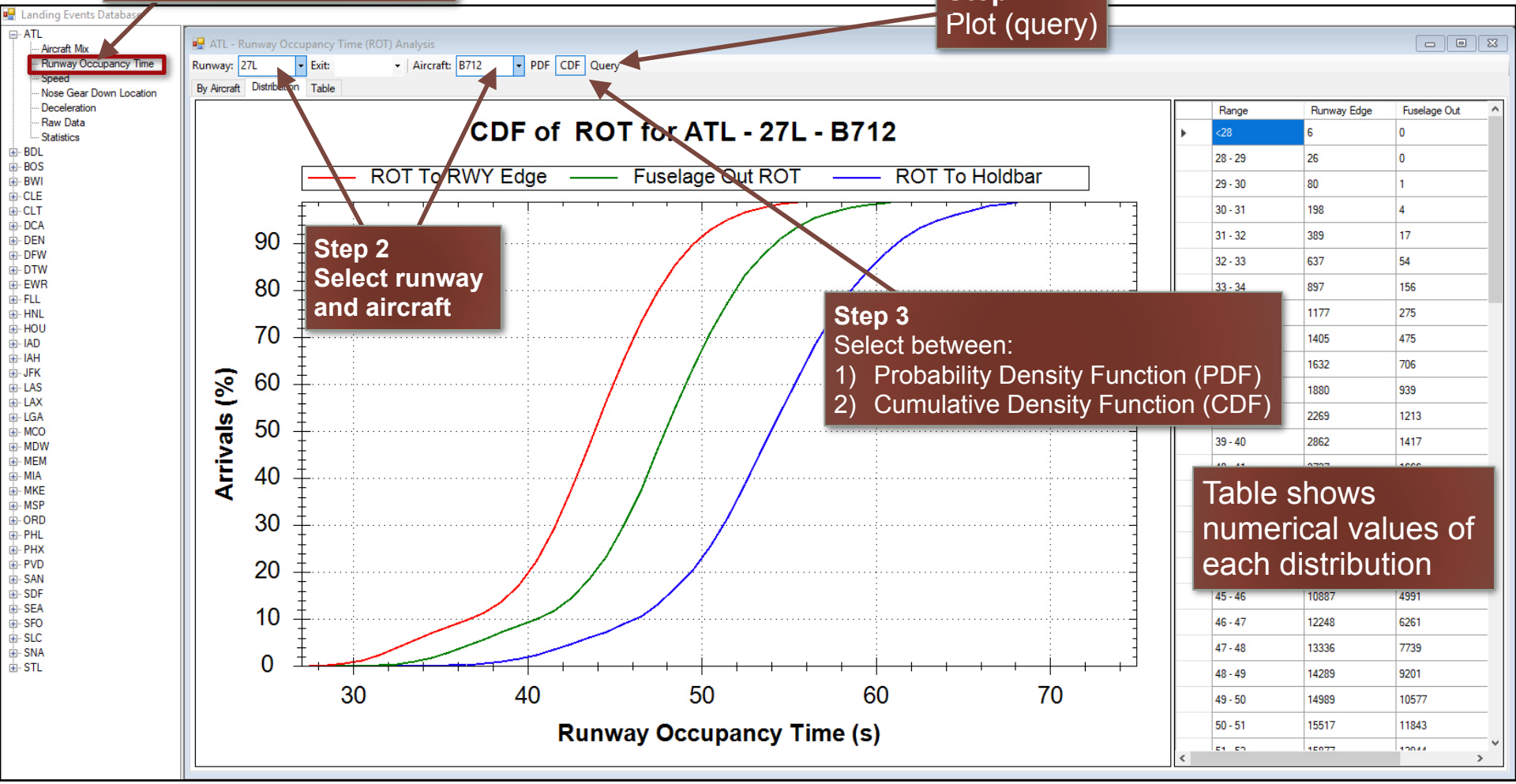
Table shows average, minimum and maximum ROT values



Runway Occupancy Time Probability Density Functions

Step 1
Runway Occupancy Time

Step 4
Plot (query)



Step 2
Select runway and aircraft

Step 3
Select between:
1) Probability Density Function (PDF)
2) Cumulative Density Function (CDF)

Table shows numerical values of each distribution

Runway Occupancy Time Probability Density Functions (by Aircraft and Runway Exit)

Step 2
Select an aircraft and runway exit

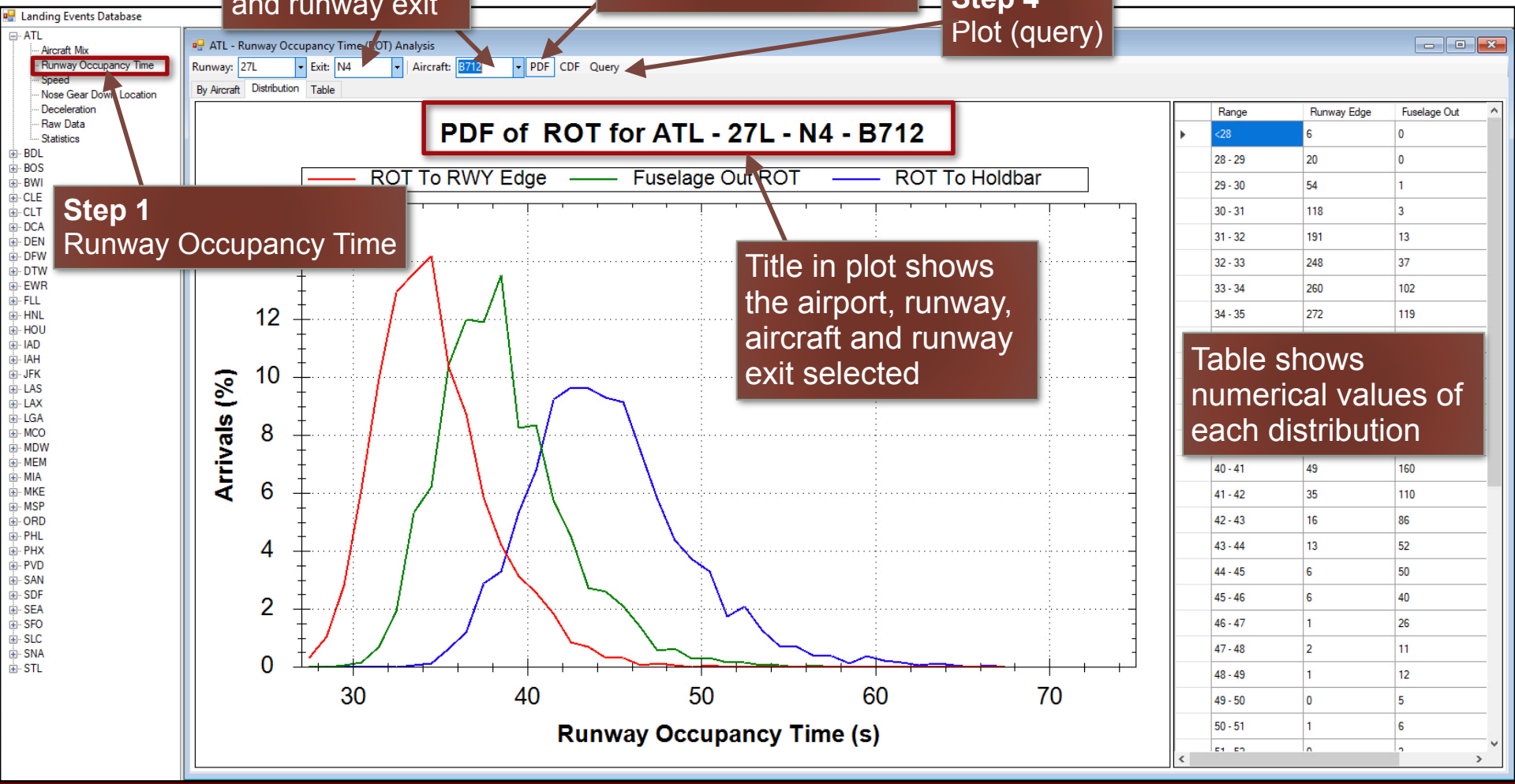
Step 3
Plot either PDF or CDF

Step 4
Plot (query)

Step 1
Runway Occupancy Time

Title in plot shows the airport, runway, aircraft and runway exit selected

Table shows numerical values of each distribution



Runway Occupancy Time Tables

Step 1
Runway Occupancy Time

Step 2
Select runway

Step 3
Select ROT Table
1) ROT to runway edge
2) ROT to clear runway
3) ROT to hold bar

Step 4
Plot (query)

Landing Events Database

- ATL
  - Aircraft Mix
  - Runway Occupancy Time
  - Speed
  - Nose Gear Down Location
  - Deceleration
  - Raw Data
  - Statistics
- BDL
- BOS
- DFW
- DTW
- EWR
- FLL
- HNL
- HOU
- MSP
- ORD
- PHL
- PHX
- PVD
- SAN
- SDF
- SEA
- SFO
- SLC
- SNA
- STL

ATL - Runway Occupancy Time (ROT) Analysis

Runway: 08L | ROT Type: Fuselage Out | Query

By Aircraft | Distribution | Table

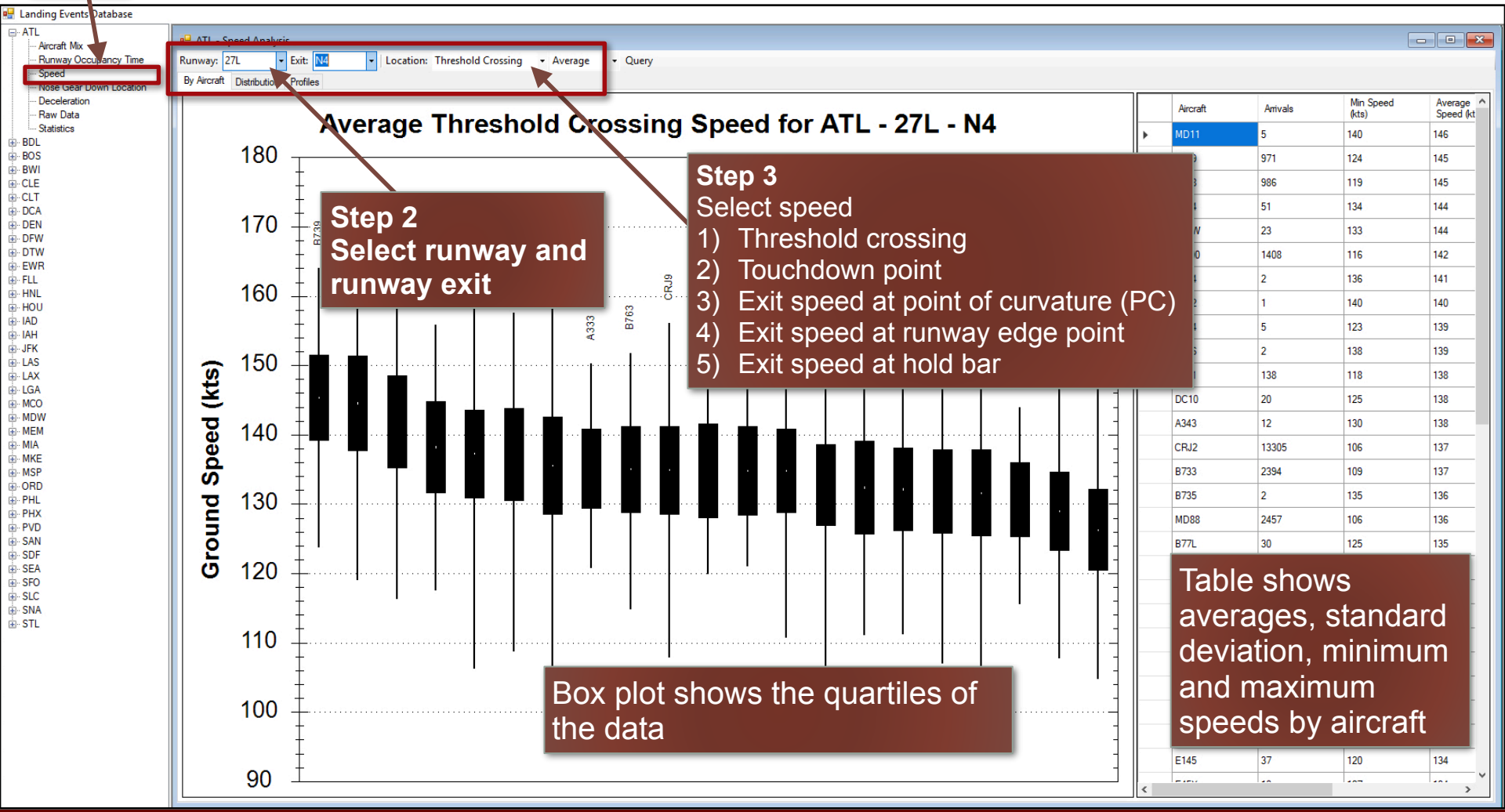
Fuselage Out ROT for ATL - 08L

Aircraft	A	A4	A6-1	A6-2	B11	B13	B15	B5	B7	C-L	C-R	D-L	D-R	Average
A124						114.2s 100.0%								114.2s
A306	90.0s 3.0%		62.2s 33.3%	61.8s 53.3%	44.5s 0.3%					47.6s 2.0%		52.7s 8.1%		61.7s
A310			62.5s 45.5%	60.6s 34.1%						49 2.				
A319	75.6s 0.0%			59.8s 0.2%	50.5s 77.3%	71.2s 1.2%	78.7s 0.0%	36.2s 0.0%	41.3s 14.9%	47 0.				
A320	81.9s 0.0%			54.4s 0.1%	48.7s 89.4%	70.3s 3.1%	69.3s 0.1%		40.6s 5.0%					
A321	83.0s 0.1%		57.3s 0.1%	53.8s 0.3%	47.8s 81.3%	69.4s 14.2%	75.7s 0.4%		39.8s 3.0%					
A332					56.2s 77.8%	78.3s 20.4%	72.1s 1.9%							
A333					54.0s 81.1%	75.0s 16.3%	80.8s 1.1%		48.4s 0.8%					
A343					56.3s 67.1%	79.1s 30.4%	82.1s 1.3%		49.8s 1.3%					
A346					54.5s 71.6%	80.0s 28.4%								
AC50										55 10				
AC90										46 10				
AC95										59 60				
AEST				68.3s 16.7%						70.3s 33.3%		69.8s 50.0%		69.7s
ASTR				53.1s 31.3%						43.4s 18.8%		45.8s 50.0%		47.6s
AT43		34.1s 16.7%								47.1s 16.7%		51.8s 66.7%		48.1s
AT72										44.1s 50.0%		49.0s 50.0%		46.5s
B190				61.1s 0.4%						47.2s 53.6%		50.2s 45.9%		48.7s
B350		38.0s 8.8%								50.5s 59.3%		53.5s 31.9%		50.3s
B712	72.0s 0.0%			48.1s 0.1%	46.3s 94.6%	66.6s 0.8%	65.9s 0.0%		38.8s 3.7%		40.6s 0.2%		42.8s 0.6%	46.2s
B732				51.1s 100.0%										51.1s
B733				53.9s 0.1%	47.7s 68.9%	67.7s 0.4%			39.5s 20.7%		41.6s 3.1%	45.8s 0.1%	43.0s 6.8%	45.6s
B734	70.6s 5.1%			52.2s 79.5%	51.5s 1.7%	71.7s 0.9%	78.3s 0.9%			43.2s 3.4%		45.8s 8.5%		52.7s
B735				55.6s 33.3%	48.6s 33.3%								43.1s 33.3%	49.1s

Cells in table show:
1) Average runway occupancy time by runway exit at the selected runway
2) Percent of aircraft using each runway exit

Average Ground Speeds at Five Points Along the Runway

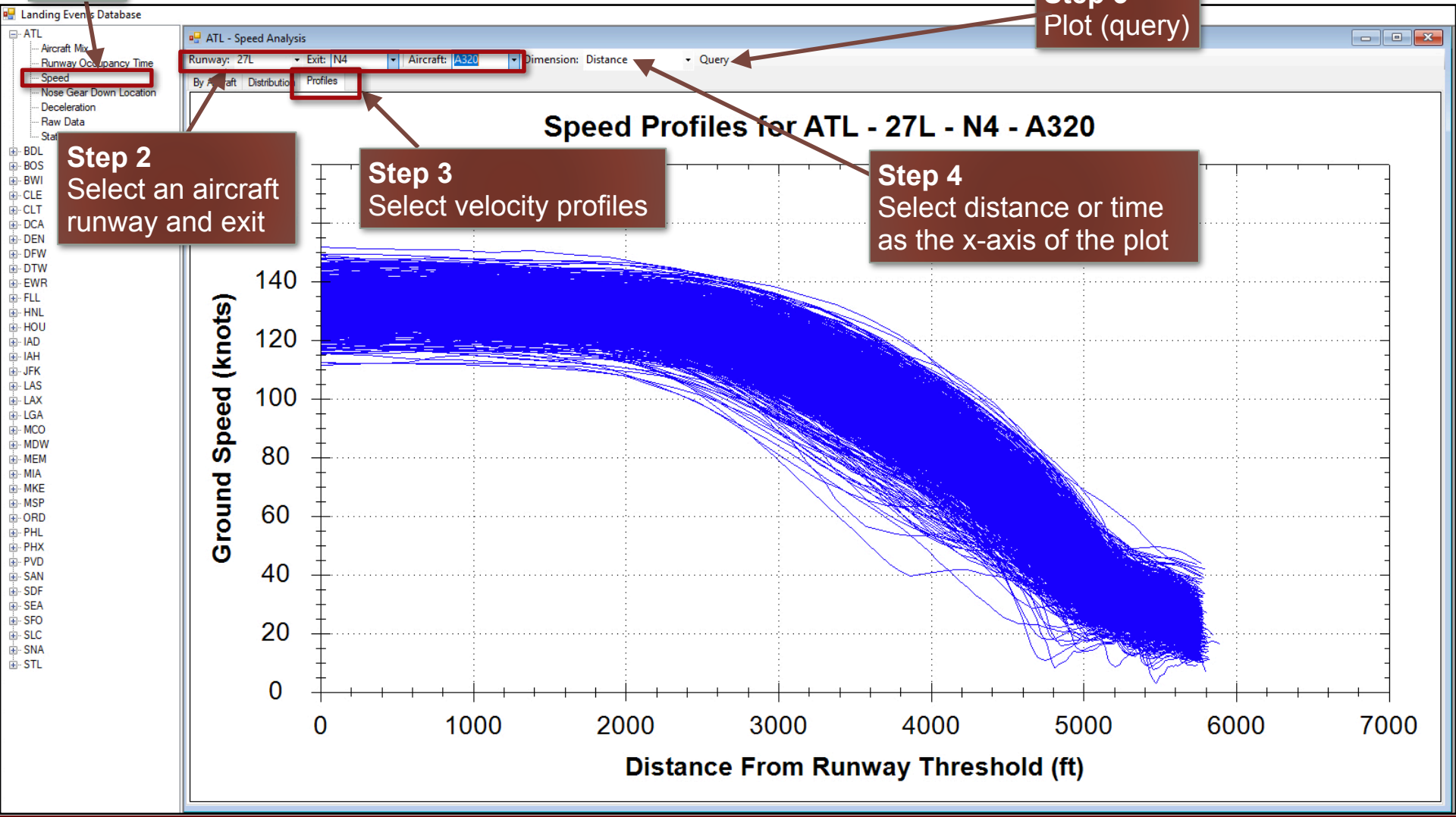
Step 1
Speed



Ground Speed Velocity Profile vs Distance Profiles

Step 1
Speed

Step 5
Plot (query)



Step 2
Select an aircraft runway and exit

Step 3
Select velocity profiles

Step 4
Select distance or time as the x-axis of the plot

Nose Gear Touchdown Location from Runway Threshold

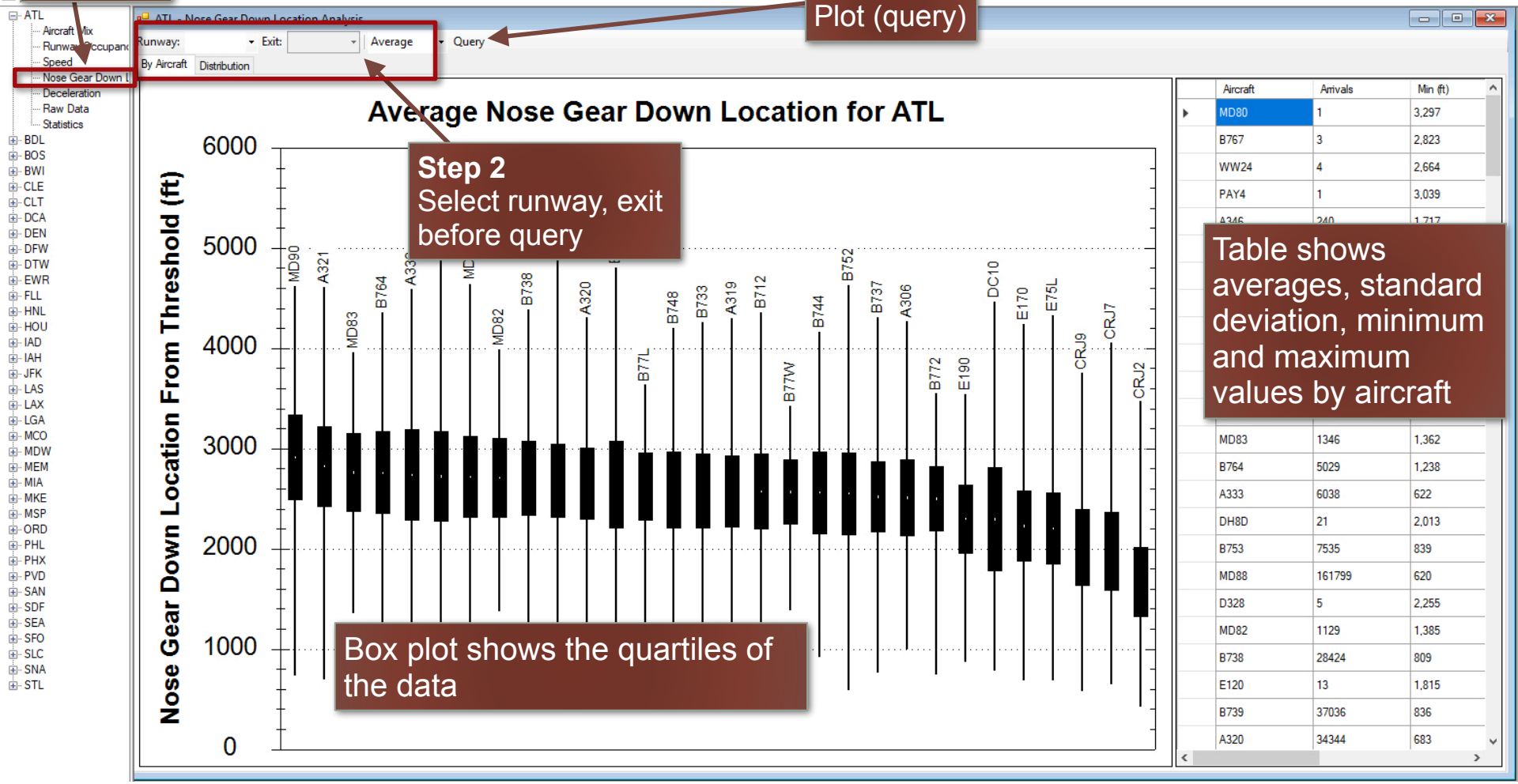
Step 1
Nose Gear TouchDown

Step 3
Plot (query)

Step 2
Select runway, exit before query

Box plot shows the quartiles of the data

Table shows averages, standard deviation, minimum and maximum values by aircraft



Nose Gear Touchdown Location from Runway Threshold

Step 1
Nose Gear TouchDown

Step 4
Plot (query)

Step 2
Select runway, exit before query

Step 3
Select distribution PDF or CDF

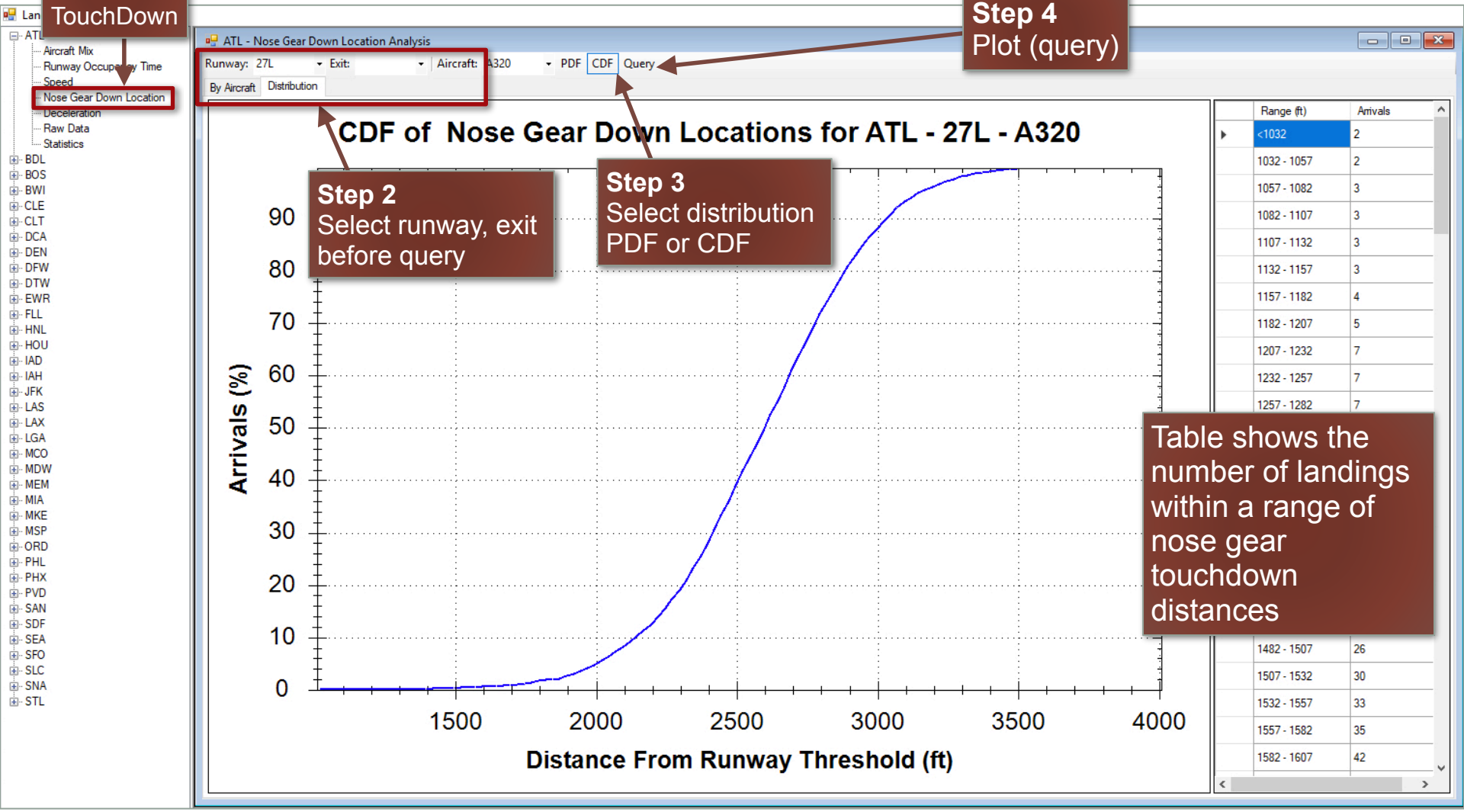
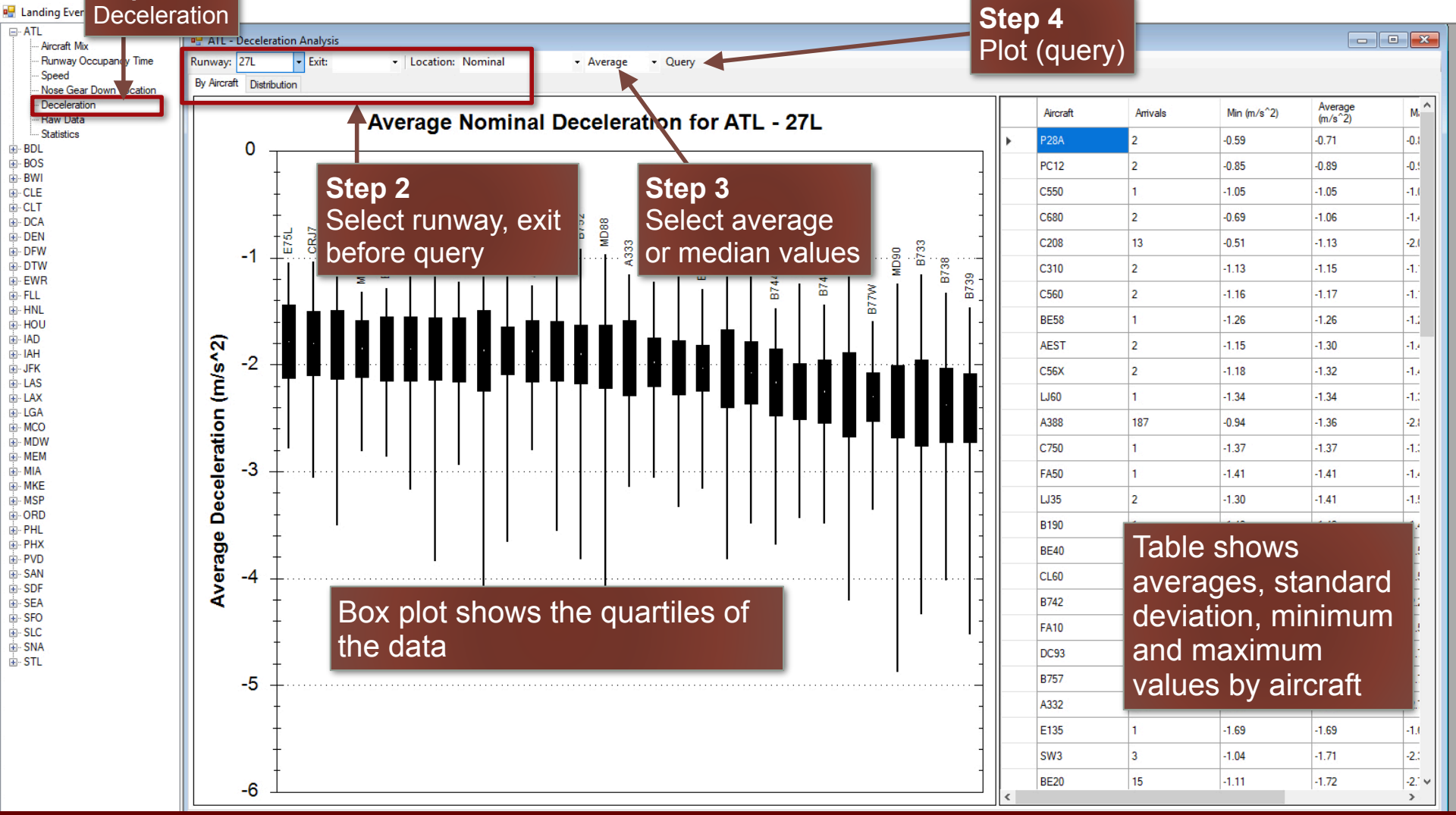


Table shows the number of landings within a range of nose gear touchdown distances

Deceleration Parameters on a Runway

Step 1
Deceleration

Step 4
Plot (query)



Step 2
Select runway, exit before query

Step 3
Select average or median values

Box plot shows the quartiles of the data

Table shows averages, standard deviation, minimum and maximum values by aircraft

Raw Landing Data Viewer

Step 2
Select a runway from the drop-down menu

Step 3
Perform a Query

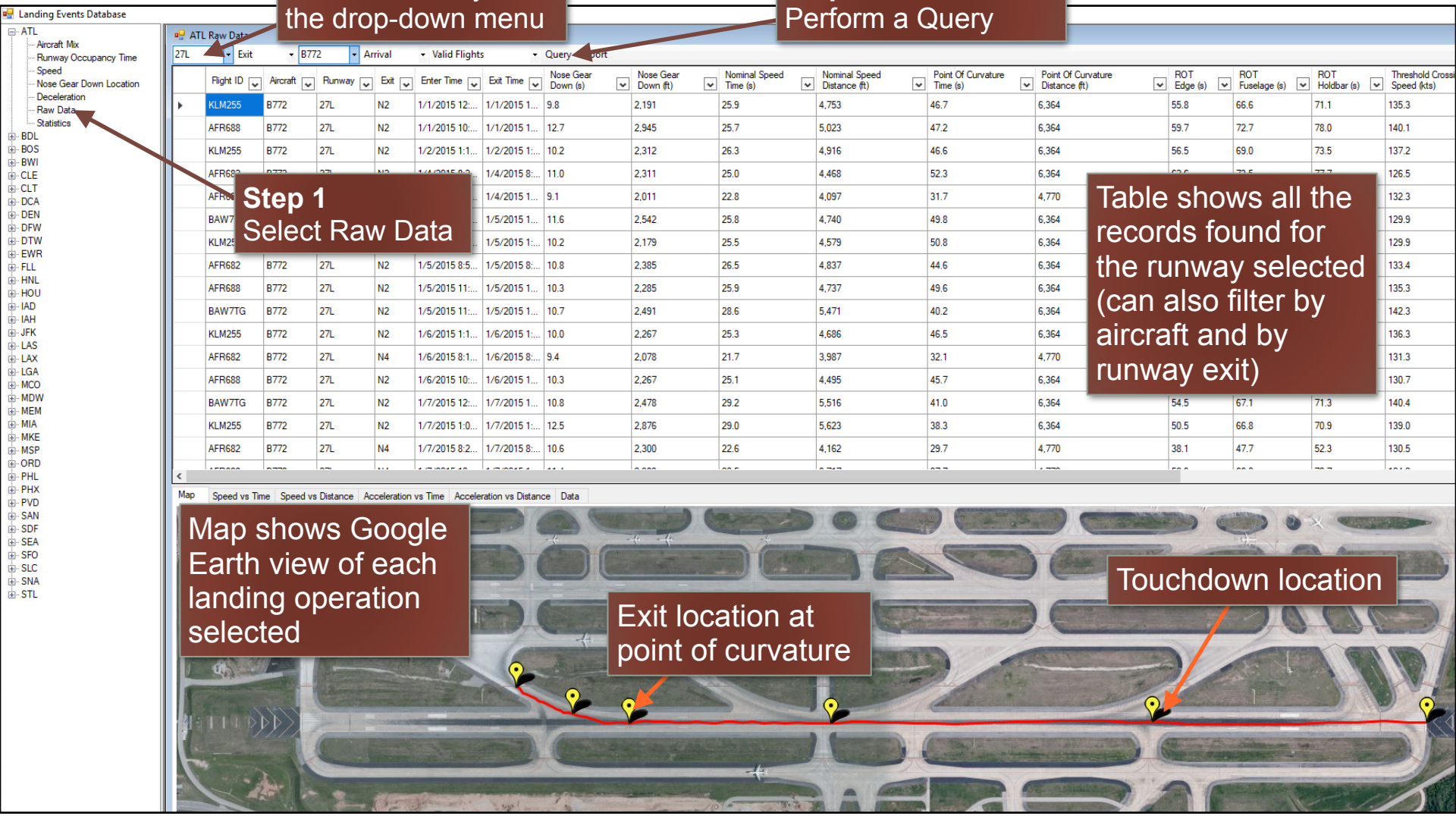
Step 1
Select Raw Data

Table shows all the records found for the runway selected (can also filter by aircraft and by runway exit)

Map shows Google Earth view of each landing operation selected

Exit location at point of curvature

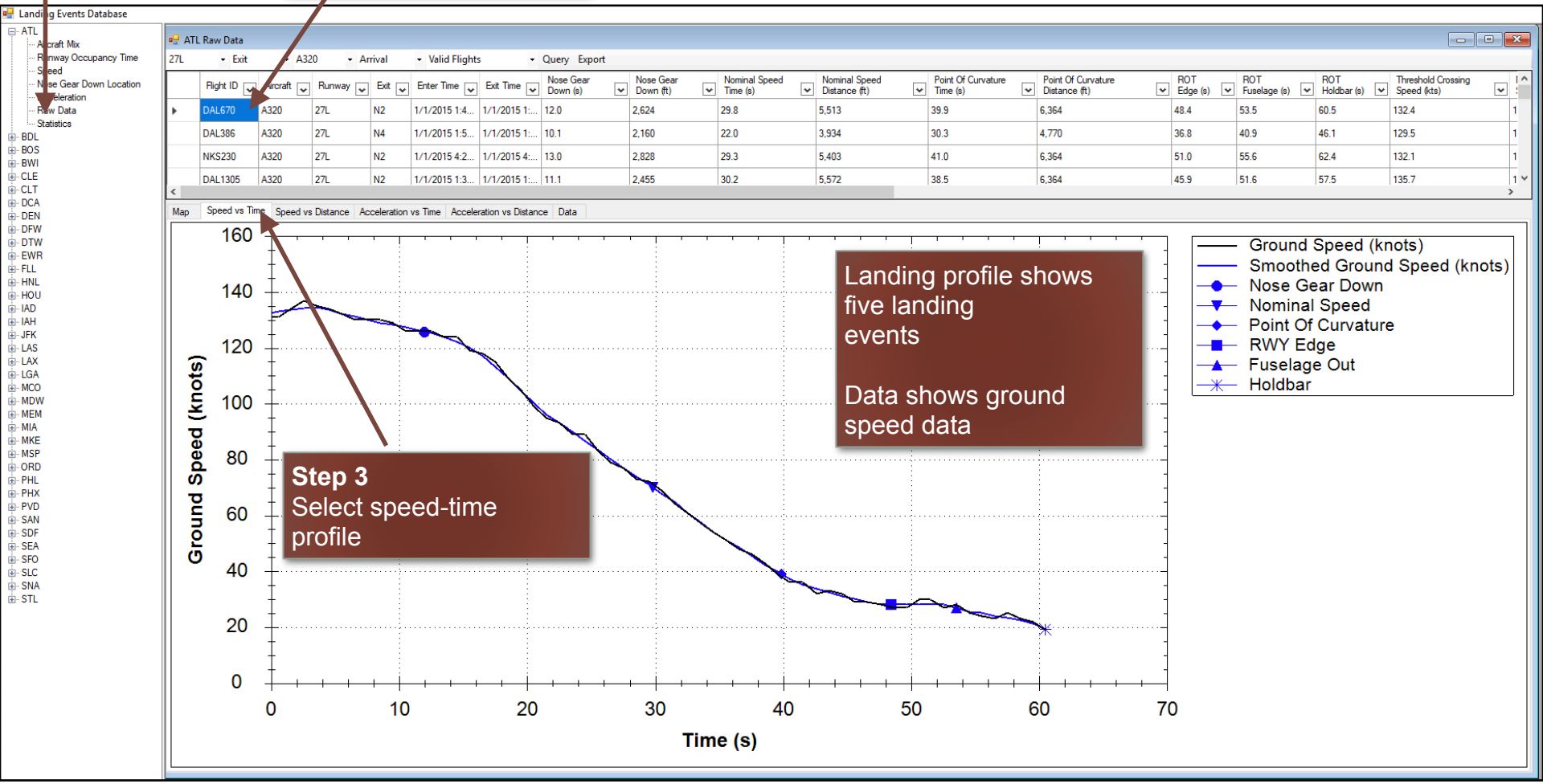
Touchdown location



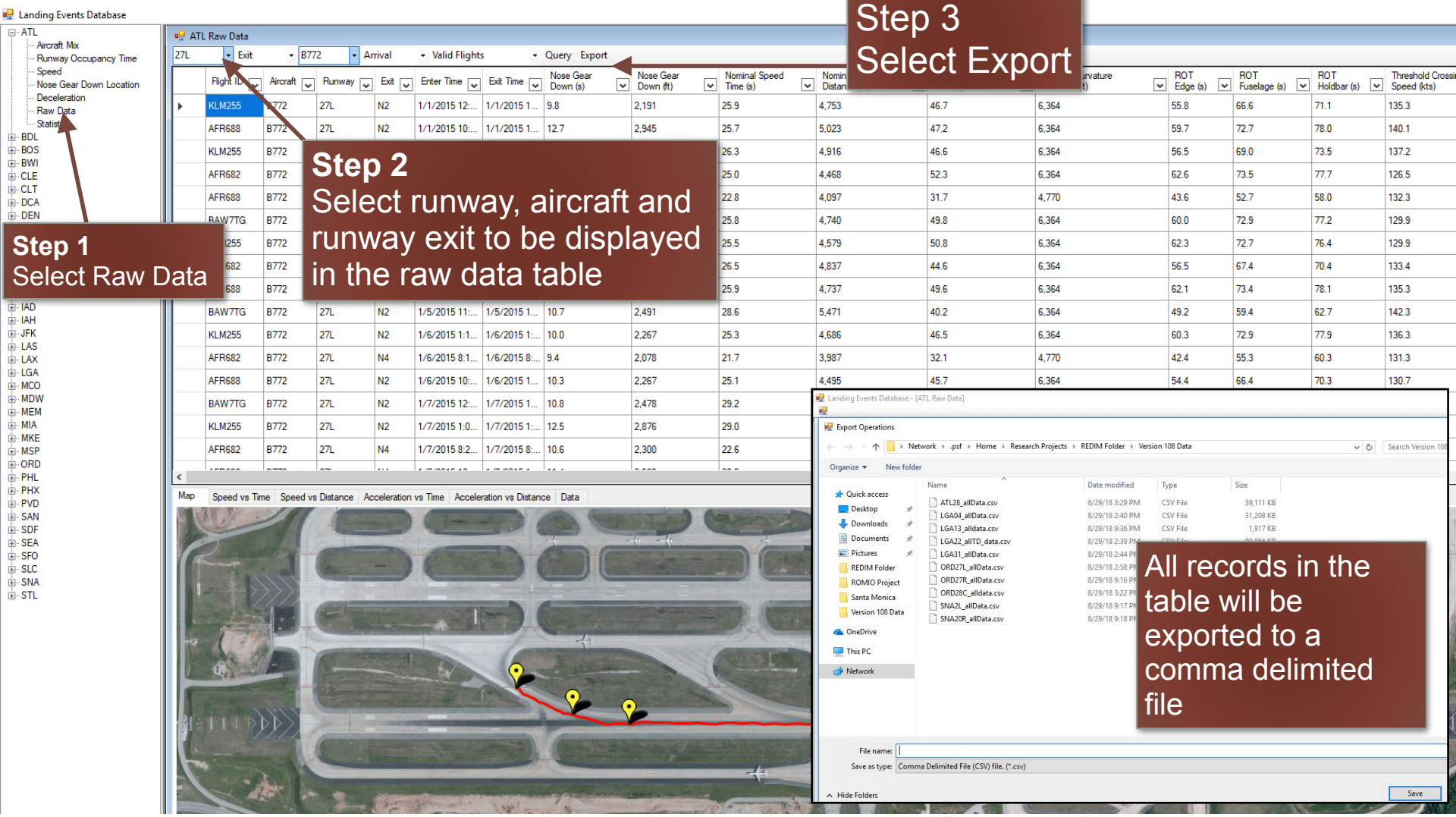
Raw Landing Data Viewer: Individual Landing Profile

Step 1
Select Raw Data

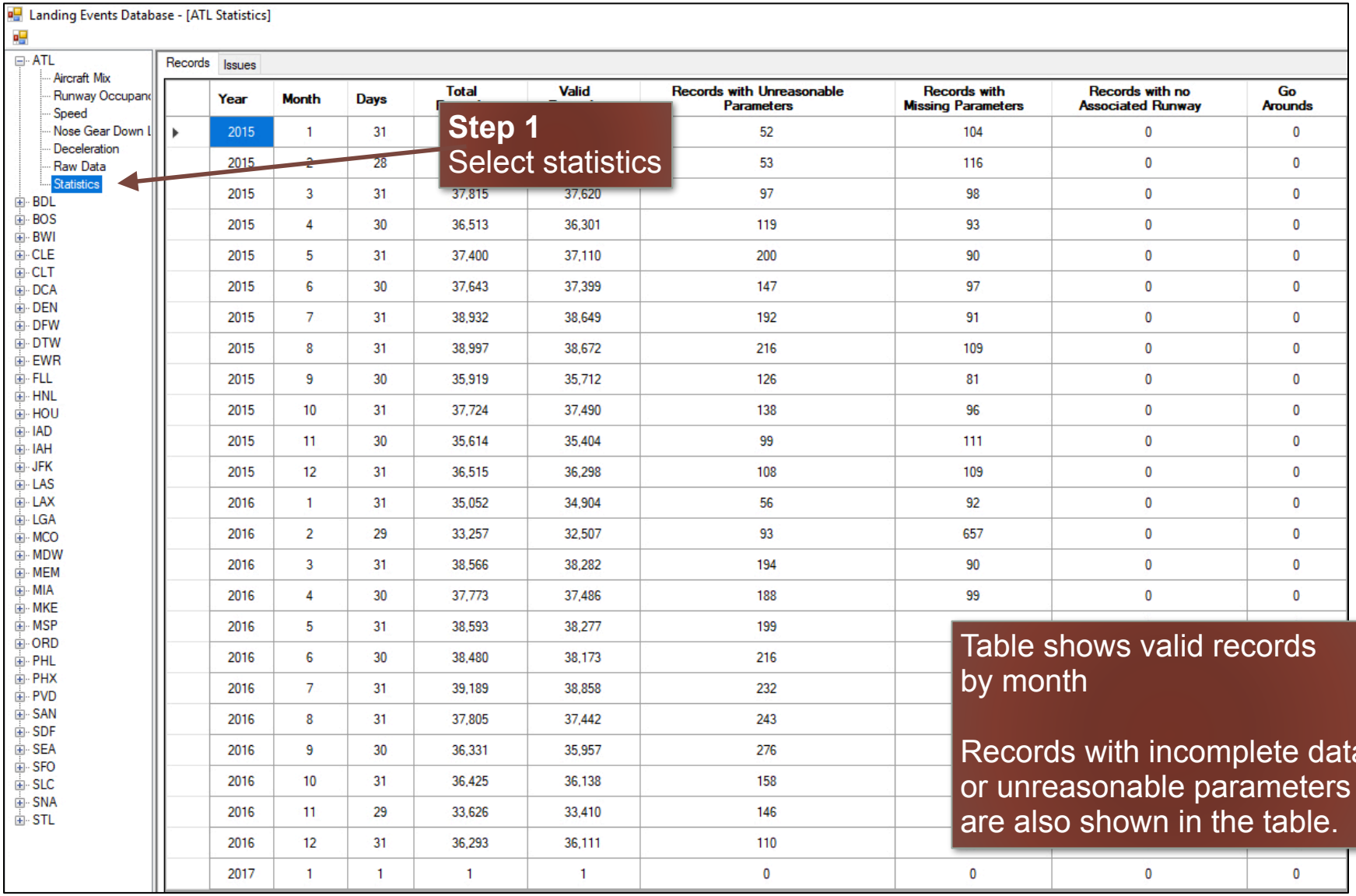
Step 2
Select a landing operation from table



Raw Landing Data Viewer : Export Data



Summary Airport Statistics



Year	Month	Days	Total	Valid	Records with Unreasonable Parameters	Records with Missing Parameters	Records with no Associated Runway	Go Arounds
2015	1	31			52	104	0	0
2015	2	28			53	116	0	0
2015	3	31	37,815	37,620	97	98	0	0
2015	4	30	36,513	36,301	119	93	0	0
2015	5	31	37,400	37,110	200	90	0	0
2015	6	30	37,643	37,399	147	97	0	0
2015	7	31	38,932	38,649	192	91	0	0
2015	8	31	38,997	38,672	216	109	0	0
2015	9	30	35,919	35,712	126	81	0	0
2015	10	31	37,724	37,490	138	96	0	0
2015	11	30	35,614	35,404	99	111	0	0
2015	12	31	36,515	36,298	108	109	0	0
2016	1	31	35,052	34,904	56	92	0	0
2016	2	29	33,257	32,507	93	657	0	0
2016	3	31	38,566	38,282	194	90	0	0
2016	4	30	37,773	37,486	188	99	0	0
2016	5	31	38,593	38,277	199			
2016	6	30	38,480	38,173	216			
2016	7	31	39,189	38,858	232			
2016	8	31	37,805	37,442	243			
2016	9	30	36,331	35,957	276			
2016	10	31	36,425	36,138	158			
2016	11	29	33,626	33,410	146			
2016	12	31	36,293	36,111	110			
2017	1	1	1	1	0	0	0	0

Table shows valid records by month

Records with incomplete data or unreasonable parameters are also shown in the table.

Providing Feedback to Improve the Database

- We welcome your feedback

- Please contact:

Nick Hinze (nhinze@vt.edu)
Senior Research Associated - Air Transportation Systems Lab

or

Dr. Antonio Trani (vuela@vt.edu)
Director of the Air Transportation Systems Lab