SaTScan Version History

SUMMARY

1997 **Version 1.0:** Spatial and space-time scan statistics. Poisson model.
1998 **Versions 2.0-2.1:** Bernoulli model. Purely temporal scan statistic.
2002 **Versions 3.0-3.1:** Space-time permutation model. Prospective analyses.
2003 **Version 4.0:** Risk adjustments. Missing data.
2004 **Versions 5.0-5.1:** Multivariate scan statistics. Bernoulli model covariate adjustment.
2005 **Versions 6.0-6.1:** Ordinal model. Exponential model. Elliptic window shape.
2006 **Version 7.0:** Normal model. User defined neighbors file. Iterative analysis adjusting for more likely clusters.
2009 **Version 8.0-8.1:** Multinomial model, Weighted normal model, Continuous scan statistics, Isotonic scan statistic, Multiple coordinates per location, Meta locations. Support for 64-bit platforms.
2010 **Version 8.2:** Support for Mac OS X platform.
2010 **Version 9.0:** Spatial variation in temporal trends, Weighted normal model with covariates, Sequential Monte Carlo p-values, Gumbel based p-values, Generic input dates.
2010 **Version 9.1:** Gumbel based p-values with space-time analyses
2013 **Version 9.2:** KML and shapefile geographical output, Statistical power estimation, Cluster selection using the Gini index, Adjustment for day-of-week effects.
2014 **Version 9.3:** Minimum temporal cluster size.
2015 **Version 9.4:** Shapefile input, Temporal graphs, Oliveira's F.
2018 **Version 9.5:** Seasonal scan statistic, Cluster restrictions by risk level or minimum number of cases, Spatial output graph for Cartesian coordinates.
2018 **Version 9.6:** Google Maps geographical output, Spatial output graph for latitude/longitude coordinates.
2021 **Version 9.7:** Log quadratic temporal trend adjustment.
2021 **Version 10.0:** Detecting clusters on a network, Drilldown to find clusters within a cluster, Uniform time probability model.
2022 **Version 10.1:** Outbreak investigation tools, Email alert notices.

DETAILS

Version 10.1, July 2022

New Analytical Features

Added option to include event level and line list columns in case file.
Added ability to send email notifications which alert users of significant results.

Other Improvements

Added ability for user to define criterion which identifies a cluster as significant in result files.
Creates result file which details line list information for significant clusters.
Event level data included in KML (Google Earth) file, grouped by line list categories.
Updated case file read process to optionally read meta-data rows, which detail event and line list columns.

Updated file wizard to include options to define event and line list columns in case file.
Updated to Java 17.

Version 10.0.1, October 2021
Minor Fixes
Corrected error when reading Excel files through file wizard.

Version 10.0, July 2021
New Analytical Features
Detecting clusters with a user defined network instead of circles.
Drilldown to detect and evaluate clusters within a previously detected cluster.
Probability model with a uniform distribution for time.
Non-parametric purely temporal adjustment for the space-time Bernoulli model.
For multiple data set analyses, require clusters to have a total minimum number of cases.
For multiple data set analyses, require clusters to have a minimum combined relative risk.
Recurrence intervals when the frequency of analysis is different from data resolution.

Other Improvements
Graphical user interface for running and managing multiple SaTScan analyses.
The SaTScan installation now bundle Java, so that it does not have to be pre-installed (Windows and Mac versions).

Minor Fixes
More detailed temporal graphs for prospective analyses without any data aggregation.
Corrected a shapefile error when the location file has duplicate coordinates.

Version 9.7, January 2021
New Analytical Features
Log-quadratic temporal trend adjustment.
Simultaneous non-parametric temporal and non-parametric spatial adjustments.

Other Improvements
Log linear time trend adjustments are reported in the user specified time units.

Minor Fixes
Day of week adjustment is redundant with a non-parametric temporal trend adjustment, so both cannot be selected.

Version 9.6.1, September 2020
Minor Fixes
Correction to prospective analyses when performing temporal adjustments.
Fixed program error involving multiple coordinates per location.

Version 9.6, March 2018
Improvements
Geographical output for Google Maps

Spatial output graph in HTML for latitude/longitude coordinates

Minor Fixes
Multinomial model categories now permit alphanumeric data.
Population now reported in additional output files.
Mac version updated to work with Oracle Java 9.
Fixed program crash when reporting error from command-line executable.

Version 9.5, January 2018
New Analytical Features
Seasonal scan statistic where the data is on a circle or other connecting loop.
Cluster restrictions: Boscoe's limit on clusters by risk level
Cluster restrictions: Minimum number of cases
Gumbel p-values for purely spatial ordinal and multinomial probability models

Other Improvements
Spatial output graph for Cartesian coordinates in HTML
Removed prospective start date from GUI. Still available from command-line.
Improved reporting on the computing time to completion
Option to have column header with Excel import.
Updated survival example data set to work for the seasonal scan statistic
Mac version updated to Oracle Java

Minor Fixes
KML section header set to standard results filename
Fixed version 9.4.3 bug where using non-Euclidian neighbors file and requesting 'Location Information File' caused program exception.
Fixed bugs in the KML output file when using the ordinal model (color display reversed) or executing iterative scan statistic (only the first iteration's cluster was reported).
Fixed bug where analyses using the flexible temporal window definition could report clusters larger than the specified window ranges
Run history and program configuration file written to user home directory.

Version 9.4.4, August 2016
Fixes
Fixed bug in spatial variation in temporal trend analysis when a cluster has zero population at some point in time.

Version 9.4.3, June 2016
Minor Improvements
Optional output file Location Information includes coordinates of cluster locations.

Fixes
Maximum spatial cluster sizes that are less than 1.0 could cause unexpected program behavior.

Select command-line overrides caused ambiguous parameter error.
Corrected memory leak in file wizard.
Revised software update to handle redirect.
Correction to temporal graph to better handle x-axis with many ticks.

Version 9.4.2, July 2015

Fixes

Correction to the purely temporal analysis when adjusting for known relative risks at the location level.

Version 9.4.1, March 2015

Minor Improvements

Added additional step-wise information to the isotonic scan results.
For isotonic regression, the step-wise relative risks compares the risk in the step to risk outside the cluster.

Fixes

For isotonic regression, corrected the layout of the results.
Correction to v9.4 calculation of the Gini index.

Version 9.4, February 2015

New Analytical Features

Border analysis, using Oliveira's F to determine the likelihood of each location to be in the true cluster.

Other Improvements

Temporal graphs in HTML format, depicting the observed and expected counts over time, both inside and outside the cluster.
Print and save temporal graphs in PNG, JPEG, PDF and SVG file formats.
The output shapefile can be made to contain the location points within each reported cluster.
Ability to import data from GIS shapefiles.
Ability to name the saved input files when using the import wizard.
Option to read input data live from a data source, without an intermediate file in SaTScan format.
An improved application updater to better prompt user in a UAC escalation.
Ability to specify a user defined title for each analysis.

Minor Fixes

The CLU_RISK and LOC_RISK columns were renamed to CLU_RR and LOC_RR, respectively in the optional 'Cluster Information' file.

Version 9.3.1, October, 2014

Minor Fix

Total population reported with Iterative Scan Statistic was not adjusted for earlier iterations when using the Poisson model.

Version 9.3, March 2014
New Analytical Features
Minimum temporal cluster size for purely temporal and space-time analyses.

Other Improvements
Update feature revised to enable automatic periodic polling for new versions.
File browse dialog revised to give a more Mac-like experience on the Mac platform.
New Mexico sample data now uses latitude/longitude rather than Cartesian coordinates.

Minor Fixes
Corrected a bug in the GUI which could occur when running simultaneous analyses from the same parameter setting session.

Version 9.2, October 22, 2013
New Analytical Features
Statistical power estimation.
Use of the Gini index to determine the best set of non-overlapping clusters to report.
Adjustment for day-of week effects in temporal and space-time Poisson analyses.
Adjustment for space by day-of-week interaction in space-time permutation analyses.
Ability to define different temporal cluster parameters at different spatial locations.

Other Improvements
KML geographical output files for Google Earth and Google Maps.
Shapefile output for ArcGIS, QuantumGIS, TerraView and other geographical software.
Slide over help system within the graphical user interface
Batch mode input revised such that all parameter settings can be program arguments.

Minor Fixes
Faster computing time when only reporting non-overlapping clusters.
Enhanced text output file for binomial, ordinal and multinomial models.

Version 9.1, October 29, 2010
New Analytical Features
Gumbel based p-values with space-time analyses for Poisson, Bernoulli and space-time permutation models

Minor Fixes
Corrected bug with normal model with weighted and purely temporal analyses.
Corrected Java problem with polygon inequalities editor.

Version 9.0.1, July 23, 2010
Minor Fix
Corrected bug that prevented new parameter window from being saved to file.

Version 9.0, July 19, 2010

New Analytical Features

Spatial variation in temporal trends analysis

Ability to adjust for covariates with the purely spatial weighted normal model.

Sequential Monte Carlo based p-values, Gumbel based p-values and a default combination of different types of p-values

Other Improvements

Ability to specify input file dates in generic numerical format.

Option to print Monte Carlo rank of reported clusters.

Option to print column headers in ASCII output files.

Minor Fixes

Corrected bug when the adjustments for known relative risk file when using flexible scanning window.

Corrected bug that could occur with iterative scan when not using grid file.

Corrected import wizard to properly report error when CSV file record is missing columns.

Version 8.2.1, April 8, 2010

Minor Fix

Corrected bug which caused program to crash when insufficient memory is available to create all requested simulation threads.

Version 8.2.0, March 16, 2010

Improvement

Added support for Mac OS X platform.

Minor Fixes

Added missing parameter check with continuous Poisson model.

Corrected missing parameter setting in results summary file.

Corrected failing behavior of Poisson alternate randomizer.

Version 8.1.1, December 14, 2009

Minor Fixes

Corrected bug which occurred when reading parameter file.

Version 8.1.0, December 3, 2009

Improvement

Added support for 64-bit platforms.

Version 8.0.2, November 9, 2009

Minor Fixes

Corrected bug in reported recurrence interval for prospective surveillance adjusting for earlier analyses.

Corrected format error with date fields of file importer.

Corrected several typos in graphical application and messaging.

Refactored the compactness penalty input field for Java change in behavior.

Version 8.0.1, June 8, 2009

Minor Fixes

Corrected bug when the adjustments for known relative risk file was used for prospective analyses.

Corrected issue with the windows graphical user interface using excessive amounts of memory when executing Monte Carlo replications.

Corrected issue with reading the maximum temporal cluster size into the windows graphical user interface when value is greater than 50.

Version 8.0, March 9, 2009

New Analytical Features

Multinomial probability model

Weighted normal probability model

Continuous scan statistic with a Poisson probability model

Isotonic spatial scan statistic

Multiple coordinates per location

Meta Locations; an enhancement to the user defined neighbors.

Other Improvements

Re-implementation of the graphical interface in Java.

Graphical user interface available for Linux.

Minor Fixes

Minor improvements in the output files.

Correction of an erroneous error message that was sometimes reported from the graphical user interface when running the space-time permutation model.

Correction to the zero population check.

Version 7.0.3, May 10, 2007

Minor Fixes

Correction in temporal adjustment for log linear with automatically calculated time trend.

Version 7.0.2, March 8, 2007

Minor Fixes

With multiple data sets defined, constructed circles/ellipses could exceed defined maximum when defined as percentage of population at risk. Updated to consider population in all data sets.

Version 7.0.1, October 12, 2006

Minor Fixes

Added requirement that detected clusters have at least two cases when using Normal probability model.

Version 7.0, August 14, 2006

New Analytical Features

Normal model for continuous data.

Specification of user defined neighbors file to define windows with non-Euclidean distance metrics.
Iterative analysis option whereby the p-values for secondary clusters are adjusted for the existence of more likely clusters that are found and reported.

Other Improvements
Option to disable temporal data checking feature. Rather than generating an error, cases and controls outside the study period are simply ignored.
Option to disable spatial data checking feature. Rather than generating an error, cases, controls and population that do not correspond to a location specified in the coordinates file are simply ignored.
More flexibility in defining different combinations of the maximum scanning window size and the maximum reported cluster size.

Minor Fixes
Removed the need to specify a coordinates file when doing a purely temporal analysis.

Version 6.1.3, May 4, 2006
Minor Fixes
Correction in geographical overlap of secondary clusters (platform variation).
Corrected possibly incorrect ranking of reported clusters when executing with more than one processor and applying early termination option.

Version 6.1.2, April 7, 2006
Minor Fixes
Corrected reported relative risk in cluster case information file when using multiple data sets.

Version 6.1.1, March 28, 2006
Minor Fixes
Corrected calculation of semi-minor and semi-major axes.
Correction in geographical overlap of secondary clusters.

Version 6.1, March 13, 2006

New Analytical Features
Spatial and space-time scan statistics using an elliptic rather than circular spatial cluster shape, with or without a non-compactness penalty. This feature is only available with Cartesian coordinates but not with latitude/longitude coordinates.

Other Improvements
Faster computations for purely temporal analyses.
Option to specify the maximum size of reported clusters in a different unit than the one used for the maximum size of all clusters evaluated.
The Cluster Information file has been split into to two separate output files, to make the size more manageable.
Option to suppress warning messages.

Version 6.0, October 24, 2005

New Analytical Features

Ordinal probability model for categorical data that is ordinal in nature.

Exponential probability model for continuous survival time data with and without censoring.

Other Improvements

Utilization of parallel processors when available on the computer for faster computing times.

Less memory requirements for certain very large data sets with many geographical locations.

The number of different data sets that can be analyzed as part of the multiple data set feature has been increased to twelve.

Minor Fixes

Windows interface option to suppress calculation of critical values.

Updated user guide and help system.

Corrected minor error in the radius reported in the cluster information file, which did not take the curvature of the earth into account.

Updated the import wizard to provide correct error messages when the specified dBase file cannot open.

Additional data validation tests implemented for the Poisson model.

Revised reporting of cluster information multivariate analyses with multiple data sets.

Version 5.1.3, April 18, 2005

Minor Fixes

Corrected the reported population value for purely spatial clusters when running a space-time analysis using the Bernoulli model.

Version 5.1.2, March 24, 2005

Minor Fixes

Ability in batch mode to suppress the calculation of the loglikelihood value required for statistical significance at the 0.01 and 0.05 levels.

Version 5.1.1, March 18, 2005

Minor Fixes

Parameter file read correction when there are multiple data sets.

Suppress zero population warnings when there is input data from multiple data sets.

Prospective surveillance start date no longer validated when not adjusting for earlier analyses.

Version 5.1, December 30, 2004

Improvements

Faster computing time for prospective space-time analyses.

Ability to run a Poisson based purely temporal analysis without a population file, assuming a constant risk over time.
Option to save the imported files in any location specified by the user.

Minor Fixes
Updated User Guide.
User Guide available on the help pull down menu.
New print button for the main results file to the toolbar and file menu.
Some dBase output fields changed to numerical.
Reorganized parameter file.

Version 5.0, September 21, 2004

New Analytical Features
Multivariate scan statistics, with simultaneous analysis of up to four different data sets.
Adjustment for covariates in the Bernoulli model.
Adjustments for a temporal trend that is automatically calculated by SaTScan.
Adjustment for purely spatial clusters with the Poisson model.

Other Improvements
Redesigned windows interface, separating standard and advanced features.
Improved interface for the SaTScan import wizard.
Faster speed for data sets with a very large number of cases.
A wider variety of date options allowed in the SaTScan file format input files.

Minor Fixes
The study time period can now have the same start date and end date.
When requesting a report of only non-overlapping clusters, overlapping is now defined in terms of having one or more location IDs in common rather then the previous definition of the two circles overlapping each other. Results will in most cases be identical.
Fixed problem when calculating the expected number of cases when the population in the population file is specified in days.
Updated error and warning messages.
Ability to define time intervals in years when the time aggregation is defined in terms of month, and in years or months when the aggregation is defined in terms of days.
The definition of the circle radius redefined from the length of a straight line through the crust of the earth 'as the worm crawls' to the length of a curved line along the surface of the earth 'as the crow flies'.

Version 4.0.3, February 3, 2004

Minor Fixes
Incorporated SaTScan license agreement as part of the installation procedure.
Fixed bug, where SaTScan was unable to read more than five decimals for latitude/longitude coordinates.

Version 4.0.2, November 10, 2003

Minor Fixes
Problem when using the relative risk adjustment file fixed.
Improved error messages.

Version 4.0.1, October 23, 2003

New Analytical Features
Adjustment for covariates when the space-time permutation model is used.
Adjustments for purely spatial, purely temporal or space-time clusters, using a special adjustments file with user specified relative risk adjustments for each spatial, temporal and/or space-time location.
Ability to adjust for missing data.
Nonparametric adjustment for temporal trends using stratified randomization, replacing the previous nonparametric adjustment method used in versions 2 and 3 (only for Poisson model). The old version is still available in batch mode.
Prospective purely temporal analysis.
An optional special circle size file for defining the maximum geographical circle size that is distinct from the regular population file.
Completely flexible specification of ranges for the start and end time of temporal clusters to be evaluated.
Option to terminate the Monte Carlo simulations early when the p-value is large.
Ability to use a percentage of the study period as the maximum temporal cluster size when running a prospective analysis (previously only available for retrospective analyses).
Option not to adjust for previous analyses when doing prospective analyses. This replaces the alive cluster option, which did the same thing but with more limited output information.

Other Improvements
Faster space-time analyses.
Option to report only small cluster up to a maximum size, even when larger clusters are adjusted for in the analysis.
When launching SaTScan, a dialog box asks whether to open a new, a saved or the last worked on session.
Button within SaTScan allows user to quickly check whether there is a newer version. If there is, an automatic update feature is available.
A pull-down menu lets the user quickly select one of the ten last opened sessions.
Automatic reading of case and control time precisions, whether day, month or year.

Minor Fixes
Improved and more detailed error messages.
A problem when reading more than four Cartesian coordinates when opening the special grid file with the Import Wizard has been fixed

Version 4.0, October 20, 2003

Limited release.

Version 3.1.3, October 16, 2003

Minor Fix
Error in the calculation of the null occurrence rate corrected.

Version 3.1.2, July 16, 2003

Minor Fixes
Updated SaTScan user guide.
Minor changes in the output files.
Fixed error when purely spatial clusters are included in a prospective space-time analysis.

Version 3.1.1, June 13, 2003

Minor Fixes
Fixed error when purely temporal clusters are included in a prospective space-time analysis.

Version 3.1, June 9, 2003

New Analytical Features
Population counts can now be specified for specific months or day, in addition to years.
Null occurrence rates, such as 'once every 15 months', are shown for clusters detected in prospective analyses.

Other Improvements
Analysis history file created with brief information about each analysis run performed. It is automatically generated in dBase format.
Parameters file structure switched to the more flexible windows style 'ini file', maintaining support for the previous line based parameter files.
Input population file can read decimal population numbers in addition to integers.
Locations that specify the same geographical coordinates are automatically combined and are treated as one location in the analysis.
Top ten most likely clusters are reported when zero simulations are requested.
Improved and more detailed error messages for invalid parameters and input data.
Optional output files with relative risks and simulated log likelihood ratios available in dBase format.
Import wizard expanded to handle character delimited and fixed column input file formats.
Data importer interface improved for ease of use.
Areas with a single case ignored when evaluating clusters.
About box with hyperlinks to website and email.
Updated SaTScan User Guide

Minor Fixes
Corrected problem when printing results from the run analysis window.
Simultaneous SaTScan runs within the same session can no longer access the same result file concurrently.
Format of results files corrected to prevent excess space between data fields.
Input file names can now be directly typed into parameter window controls (as in v2.1).
Installed sample parameter files no longer have hard coded paths for respective data files.
Main window buttons enabled based upon active child window.

Fixed problem with the import wizard, which was unable to read more than three covariates in the population file.
Fixed problem where the import wizard could not read read-only dBase files.

Version 3.0.5, April 15, 2003

Minor Fix
Corrected problem with maximum temporal window size for prospective analyses.

Version 3.0.4, February 6, 2003

Minor Fixes
Fixed error by which the special grid file was ignored unless the parameters were saved before a run.
Program terminated with an error when there were locations with zero population and zero cases. The error is now shown only when there are locations with cases but zero population.

Version 3.0.3, January 2, 2003

Improvement
Improved and easier to use import file wizard.

Version 3.0.2, December 10, 2002

Minor Fixes
Fixed error when reading latitude and longitude from dBase import files.
The dBase version of the 'Cluster Information' output file reported the log likelihood rather than log likelihood ratio.

Version 3.0.1, December 4, 2002

Minor Fixes
Fixed problem with the import wizard, that was unable to import dBase population files.

Version 3.0, October 17, 2002

New Analytical Features
Space-time permutation model using only case data, for the detection and evaluation of space-time interaction clusters, adjusting for purely spatial and purely temporal clusters.
Prospective space-time analyses for the early detection of disease outbreaks, adjusting for a sequence of daily or other time-periodic analyses.
Option of showing more secondary clusters in the output files, using various criteria for the type of geographical overlap.
Ability to specify maximum temporal window size in days, months or years, instead of as a percent of the study period.

Other Improvements

Import wizard reading dBase input files.
Ability to save parameter settings for future use.
Ability to simultaneously run multiple SaTScan runs within the same session.
'Location information' output file in dBase format, in addition to ASCII (optional)
Optional 'cluster information' output file in ASCII and/or dBase format, with same information as the standard results file in a format easier to export to other programs.
Decreased memory use, leading to increased speed for some large data sets.
SaTScan user guide in pdf format.
New Sample Data Set: Hospital Emergency Room Admissions Due to Fever at New York City Hospitals, Nov 1–24, 2001.

Version 2.1.3, September 17, 1998

Minor Improvements and Fixes

Version 2.1.2, August 25, 1998

Minor Improvements and Fixes

Version 2.1.1, August, 1998

Minor Improvements and Fixes

Version 2.1, July 29, 1998

New Analytical Features
Bernoulli model, for 0/1, case/control type data.
Purely temporal analyses.
Ability to specify geographical coordinates in latitude and longitude.
Ability to include purely temporal clusters in space-time analyses.
Adjustment for temporal trends using either a log-linear or nonparametric model.

Other Improvements
Sample data: Childhood leukemia and lymphoma in North Humberside, England, 1974-1986.
Option to print simulated log likelihoods to a file.
Option to print relative risks for each census area as part of the output file.

Version 1.0.5, March 16, 1998

Minor Fixes

Version 1.0.4, January 21, 1998

Minor Fixes

Version 1.0.3, October 31, 1997

Minor Fix

Corrects a problem with SaTScan sometimes terminating abnormally when there are census areas with zero population.

Version 1.0.2, September 18, 1997

Improvements

Expanded help text, including the sections on statistical method and comparisons with other methods.

SaTScan icon created

Version 1.0.1, July 17, 1997

Analytical Features

Poisson model.

Purely spatial and space-time analyses.

Adjustment for covariates.

Scanning for high, low or either high or low rates.

Optional special grid file to define circle centroids.

Geographical coordinates in two or three dimensions, in the regular Cartesian coordinate system.

Max geographical circle size defined as percent of population at risk.

Max temporal cluster size defined as percent of study period.

Space-time analyses scanning either 'all' clusters or only 'alive' clusters.

Ability to include purely spatial clusters in space-time analyses.

Other Features

Installation program.

Help system.

Sample data: Brain cancer incidence in New Mexico.

Standard text based output file.

Location information output file in ASCII format, with each row containing information about a particular location and its cluster membership (*.gis).

Version 1.0.0, June 30, 1997

Private Release