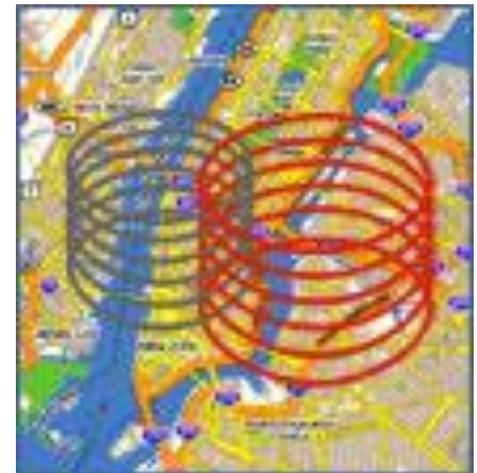
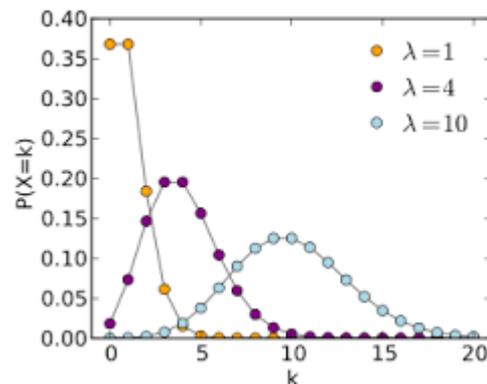


SaTScan

Aglomerados no Espaço-Tempo

Modelo Discreto de Poisson



ESTATÍSTICA DE VARREDURA NO ESPAÇO-TEMPO

- ✓ **Agregação Espaço-Temporal de Doenças** → expressão de processos contagiosos. Utilizadas prioritariamente na investigação de doenças transmissíveis ou infecciosas de etiologia desconhecida.
- ✓ **Agregação Espaço-Temporal** → tem sido aplicada também no estudo de algumas neoplasias.
- ✓ **Outros Usos** → avaliar o impacto de programas de prevenção, sugerir padrões de disseminação de doenças transmissíveis, monitorar a ocorrência de doenças infecciosas em ambiente hospitalar.

ESTATÍSTICA DE VARREDURA NO ESPAÇO-TEMPO

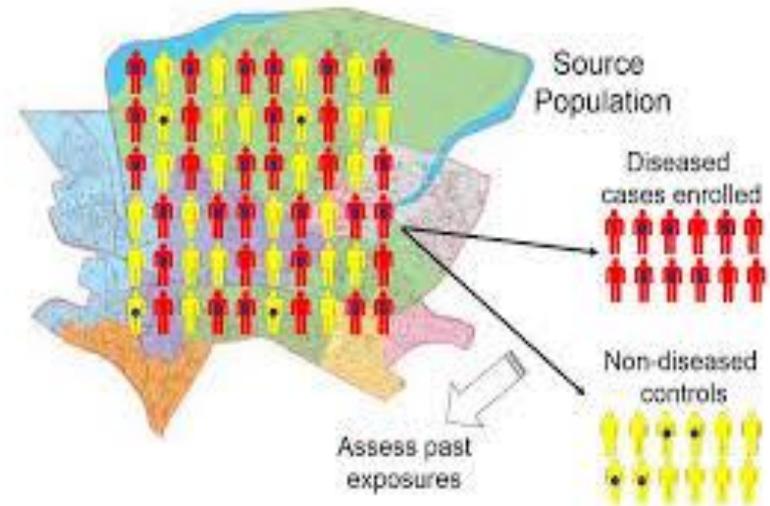
- ✓ **Janela de Varredura** → cilindro com uma **base** geográfica circular ou elíptica, e com **altura** correspondente ao tempo.
- ✓ A **base** é definida exatamente como para a estatística de varredura espacial, e as **alturas** refletem o período de tempo dos aglomerados potenciais.
- ✓ **Janela Cilíndrica** → movida no espaço e no tempo para cada possível localização e tamanho geográfico. Cada possível período de tempo também é visitado.
- ✓ **Análises Espaço-Temporais** → n^0 de casos deve ser estratificado pelo **tempo (data do diagnóstico)**.

ESTATÍSTICA DE VARREDURA NO ESPAÇO-TEMPO

- ✓ São criados infinitos número de **cilindros sobrepostos** de diferentes tamanhos e formatos, cobrindo a região de estudo.
- ✓ **Cada cilindro reflete um possível aglomerado.**
- ✓ Usada para a **análise retrospectiva simples (dados históricos)** ou para a **vigilância prospectiva**: as análises são repetidas, por exemplo, todos os dias, semanas, meses ou anos.

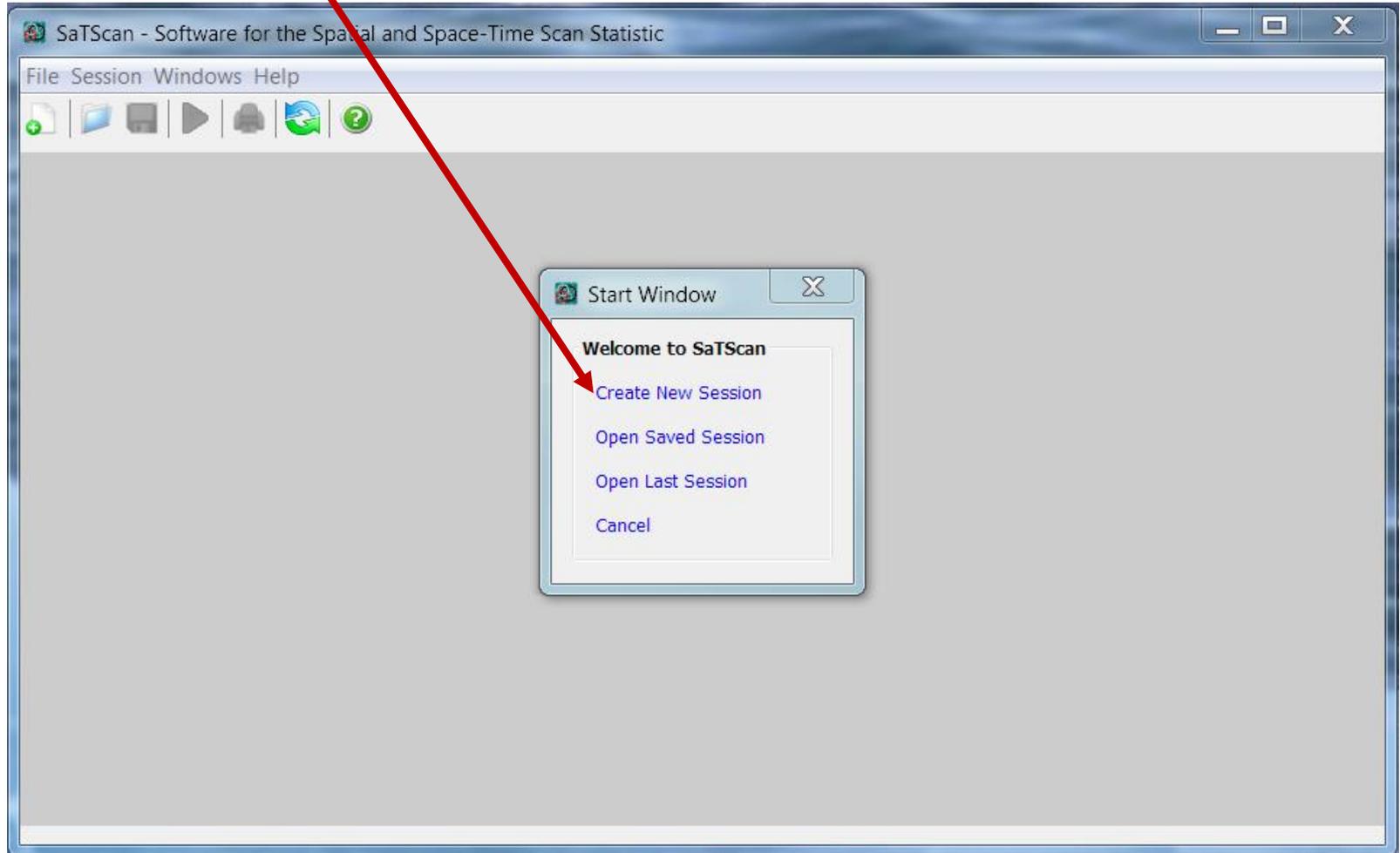
MODELO DISCRETO DE POISSON

- ✓ Usado quando a população de base reflete uma certa **massa em risco**: por exemplo, **pessoas-tempo** vivendo em uma área.
- ✓ Os **casos** são incluídos como parte da **contagem da população**.



ESTATÍSTICA DE VARREDURA NO ESPAÇO-TEMPO

Abrir o SaTScan e importar os arquivos de **casos**, de **população** e de **coordenadas**.



Tab "Input"

Importar o arquivo de

casos:

'cancer_mex_cas.xls'

Clicar no botão: "Case File" (Import File Wizard).

Selecionar as colunas, conforme figura - agora iremos incluir o tempo (ano)!

Escolher o diretório e Importar.

Import File Wizard

Display SaTScan Variables For: discrete Poisson model

SaTScan Variable	Source File Variable
Location ID	Local
Number of Cases	caso
Date/Time (optional)	ano
Covariate1 (optional)	gr_idade
Covariate2 (optional)	sexo
Covariate3 (optional)	unassigned

Clear

Generated Id #	One Count #	Local	caso	ano	gr_idade
location2	1	Grant	1	1977	2
location3	1	SanJuan	1	1974	8
location4	1	Bernalillo	1	1977	13
location5	1	DonaAna	1	1977	14
location6	1	Union	1	1977	16
location7	1	Sandoval	1	1977	11

= Column is not actually defined in file but can be used as SaTScan variable.

< Previous Next >

Tab "Input"

Definir o
"Time
Precision"
em Ano e
fixar o
"Study
Period"
entre 1973
e 1991.

Input Analysis Output

Case File: SATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Cases.cas ...

Control File: (Bernoulli Model) ...

Study Period

Start Date: Year: 1973 Month: 1 Day: 1 End Date: Year: 1991 Month: 12 Day: 31

Population File: (Poisson Model) ...

Coordinates File: ...

Grid File: (optional) ...

Time Precision

None Year Month Day Generic

Coordinates

Cartesian Lat/Long

Advanced >>

Tab "Input"

Importação
do arquivo
de
população:
'cancer_me
x_pop.xls'.

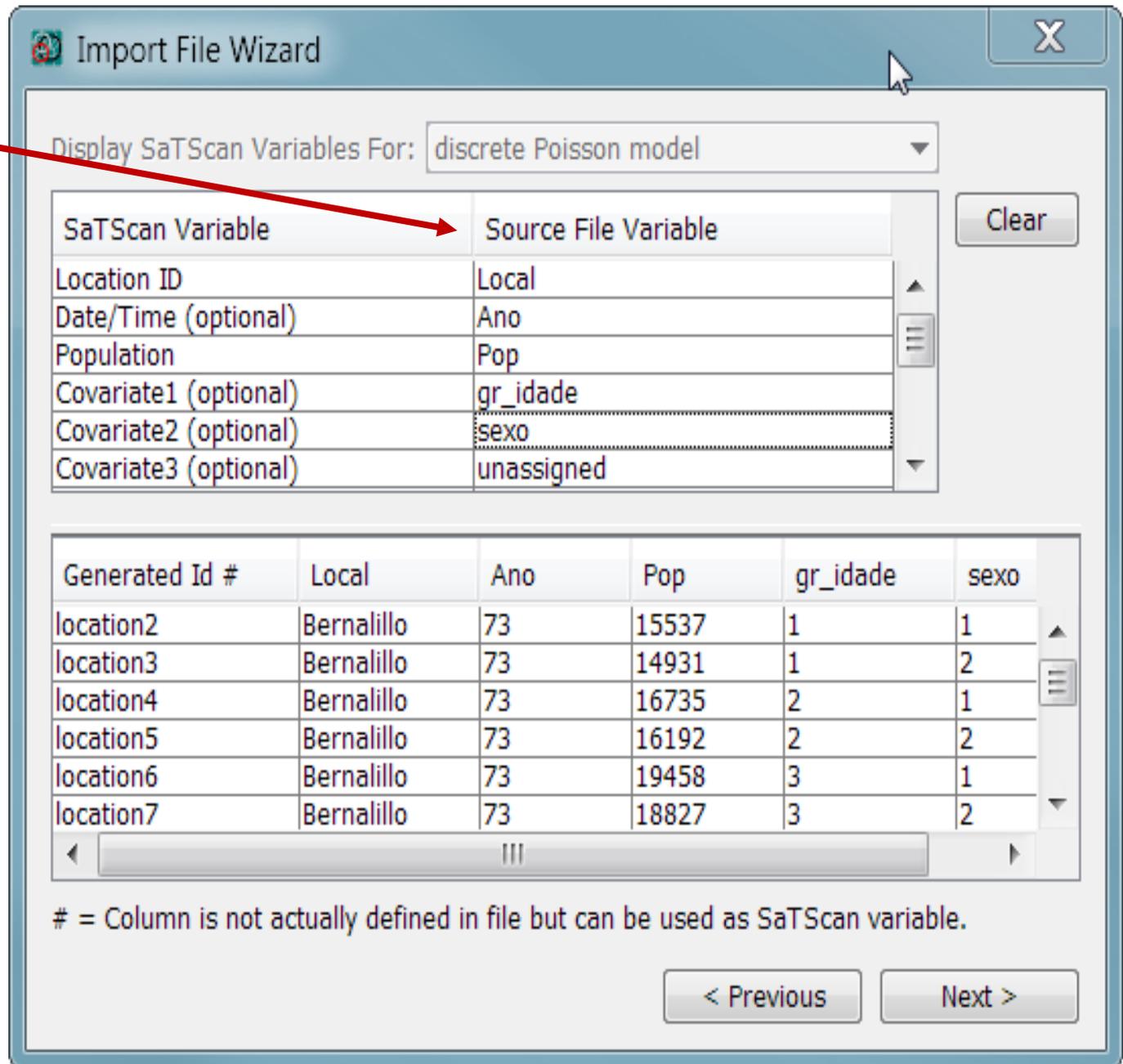
The screenshot shows the 'Input' tab of a software interface. It features several input fields and options:

- Case File:** A text box containing the path `5ATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Cases.cas` and a browse button (...).
- Control File:** A text box containing `(Bernoulli Model)` and a browse button (...).
- Study Period:** A section with two date pickers. The **Start Date** is set to Year: 1973, Month: 1, Day: 1. The **End Date** is set to Year: 1991, Month: 12, Day: 31.
- Population File:** A text box containing `(Poisson Model)` and a browse button (...). A red arrow points from the text on the left to this field.
- Coordinates File:** A text box and a browse button (...).
- Grid File:** A text box containing `(optional)` and a browse button (...).
- Time Precision:** A group box with radio buttons for `None`, `Year` (selected), `Month`, `Day`, and `Generic`.
- Coordinates:** A group box with radio buttons for `Cartesian` and `Lat/Long` (selected).
- Advanced >>** A button at the bottom right.

Definir os campos necessários. Depois, clicar em “Next >”

(Usar os botões “Next>” e “<Previous” para navegar).

Escolher o diretório onde será criado o arquivo e Importar.



Import File Wizard

Display SaTScan Variables For: discrete Poisson model

SaTScan Variable	Source File Variable
Location ID	Local
Date/Time (optional)	Ano
Population	Pop
Covariate1 (optional)	gr_idade
Covariate2 (optional)	sexo
Covariate3 (optional)	unassigned

Clear

Generated Id #	Local	Ano	Pop	gr_idade	sexo
location2	Bernalillo	73	15537	1	1
location3	Bernalillo	73	14931	1	2
location4	Bernalillo	73	16735	2	1
location5	Bernalillo	73	16192	2	2
location6	Bernalillo	73	19458	3	1
location7	Bernalillo	73	18827	3	2

= Column is not actually defined in file but can be used as SaTScan variable.

< Previous Next >

Tab "Input"

Importação do arquivo de coordenadas: 'cancer_mex_geo.xls'.

Escolher o tipo de coordenadas (no caso, cartesianas) adequado.

The screenshot shows the 'Input' tab of a software interface. It contains the following elements:

- Case File:** A text box containing the path `\\ATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Cases.cas` and a browse button (...).
- Control File:** A text box containing `(Bernoulli Model)` and a browse button (...).
- Study Period:** A section with two date pickers. The **Start Date** is set to Year: 1973, Month: 1, Day: 1. The **End Date** is set to Year: 1991, Month: 12, Day: 31.
- Population File:** A text box containing the path `\\ATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Population.pop` and a browse button (...).
- Coordinates File:** An empty text box and a browse button (...).
- Grid File:** An empty text box and a browse button (...).
- Time Precision:** A group box with radio buttons for None, Year, Month, Day, and Generic.
- Coordinates:** A group box with radio buttons for Cartesian and Lat/Long.
- Advanced >>** button at the bottom right.

Red arrows from the text on the left point to the 'Coordinates File' field and the 'Cartesian' radio button.

Tab "Input"

Importação do arquivo de coordenadas: 'cancer_mex_geo.xls'.

Definir os campos necessários.

Escolher o diretório e Importar.

Import File Wizard

Display SaTScan Variables For: Cartesian (x, y) Coordinates

SaTScan Variable	Source File Variable
Location ID	Local
X	coordx
Y	coordy
Z1 (optional)	unassigned
Z2 (optional)	unassigned
Z3 (optional)	unassigned

Generated Id #	Local	coordx	coordy
location2	Bernalillo	66	102
location3	Catron	8	57
location4	Chaves	126	47
location5	Colfax	123	162
location6	Curry	161	79
location7	DeBaca	132	82

= Column is not actually defined in file but can be used as SaTScan variable.

< Previous Next >

Tab "Input"

LAYOUT FINAL

The screenshot displays the 'Input' tab of a software application. The interface includes a tabbed menu at the top with 'Input', 'Analysis', and 'Output'. The main area contains several sections for file selection and configuration, each enclosed in a red dashed box:

- Case File:** A text box containing the path `3ATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Cases.cas` and a browse button (...).
- Control File:** A text box containing the text `(Bernoulli Model)` and a browse button (...).
- Time Precision:** A group box with radio buttons for `None`, `Year` (selected), `Month`, `Day`, and `Generic`.
- Study Period:** A group box with date selection fields. The **Start Date** is set to Year: 1973, Month: 1, Day: 1. The **End Date** is set to Year: 1991, Month: 12, Day: 31.
- Population File:** A text box containing the path `\TSCAN\SaTScan_EspacoTemporal\bancos_aula_14\Population.pop` and a browse button (...).
- Coordinates File:** A text box containing the path `:CAN\SaTScan_EspacoTemporal\bancos_aula_14\Coordinates.geo` and a browse button (...).
- Grid File:** A text box containing the text `(optional)` and a browse button (...).
- Coordinates:** A group box with radio buttons for `Cartesian` (selected) and `Lat/Long`.

At the bottom right of the window, there is a button labeled `Advanced >>`.

Tab “Analysis”

Rodar a análise espaço-temporal

Para o modelo discreto de Poisson e

Áreas com Altas Taxas.

The screenshot shows a software window titled 'Analysis' with three tabs: 'Input', 'Analysis', and 'Output'. The 'Analysis' tab is active and contains several sections of options:

- Type of Analysis:**
 - Retrospective Analyses:
 - Purely Spatial
 - Purely Temporal
 - Space-Time
 - Seasonal
 - Spatial Variation in Temporal Trends
 - Prospective Analyses:
 - Purely Temporal
 - Space-Time
- Probability Model:**
 - Discrete Scan Statistics:
 - Poisson
 - Bernoulli
 - Space-Time Permutation
 - Multinomial
 - Ordinal
 - Exponential
 - Normal
 - Continuous Scan Statistics:
 - Poisson ...
- Scan For Areas With:**
 - High Rates
 - Low Rates
 - High or Low Rates
- Time Aggregation:**
 - Units: Year, Month, Day
 - Length: Years

An 'Advanced >>' button is located at the bottom right of the window.

Tab “Analysis”

Na aba
‘Temporal Window’,
definir o:

‘Tamanho Máximo do Cluster Temporal’.

Advanced Analysis Features

Space and Time Adjustments Inference Border Analysis Power Evaluation

Spatial Window Temporal Window Cluster Restrictions

Maximum Temporal Cluster Size

is 50.0 percent of the study period ($\leq 90\%$, default = 50%)

is 1 years

Minimum Temporal Cluster Size

1 years

Include Purely Spatial Clusters (Temporal Size = 100%)

Flexible Temporal Window Definition

Include only windows with:

Start time in range: 2000 1 1 to 2000 12 31

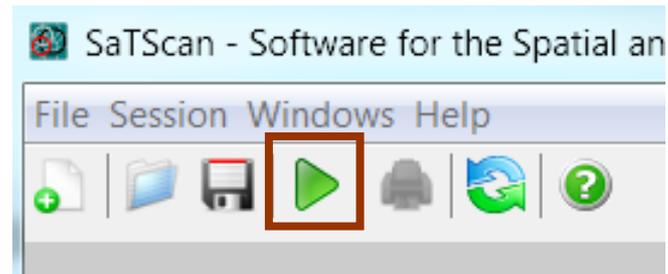
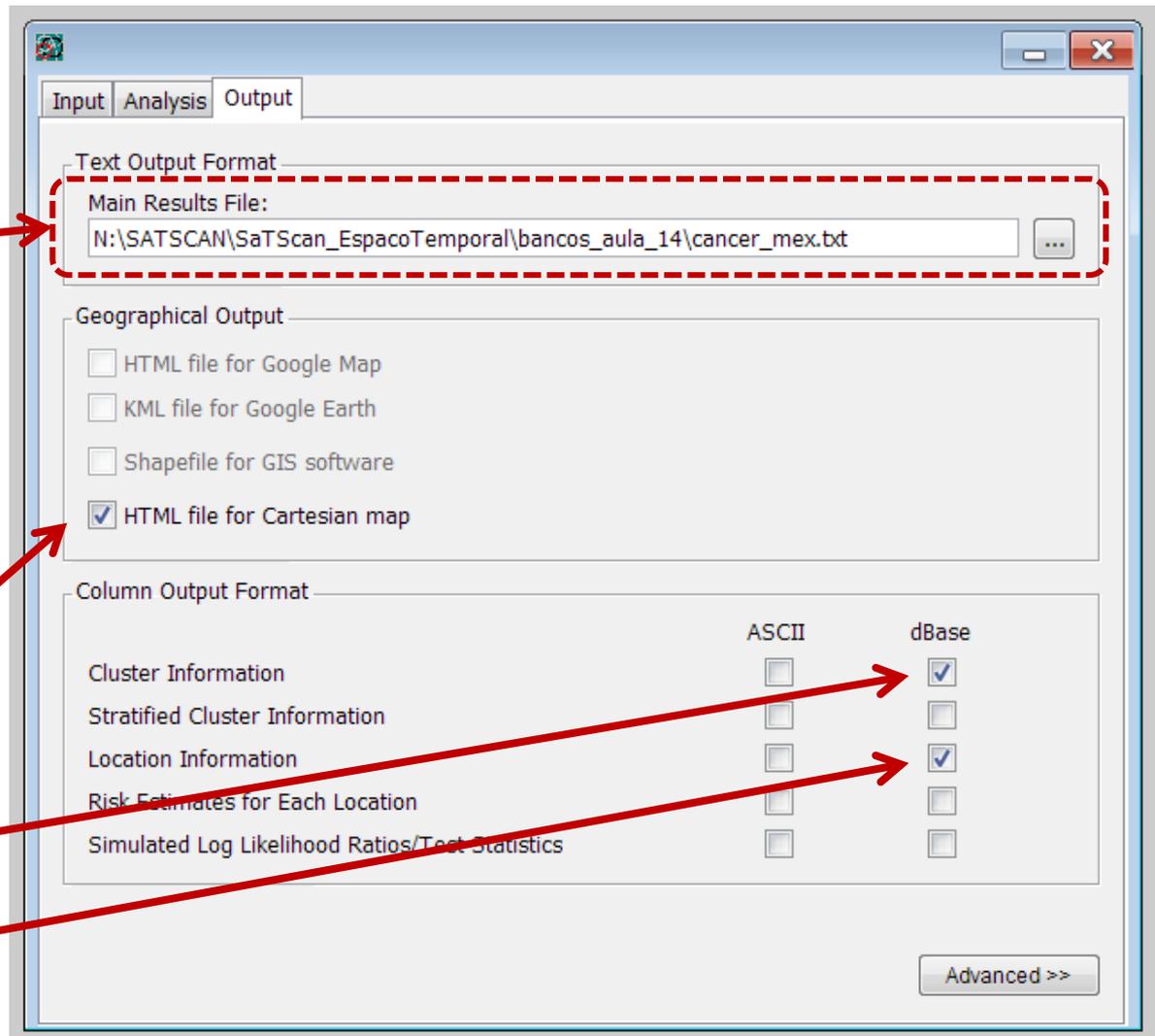
End time in range: 2000 1 1 to 2000 12 31

Set Defaults Close

Tab “Output”

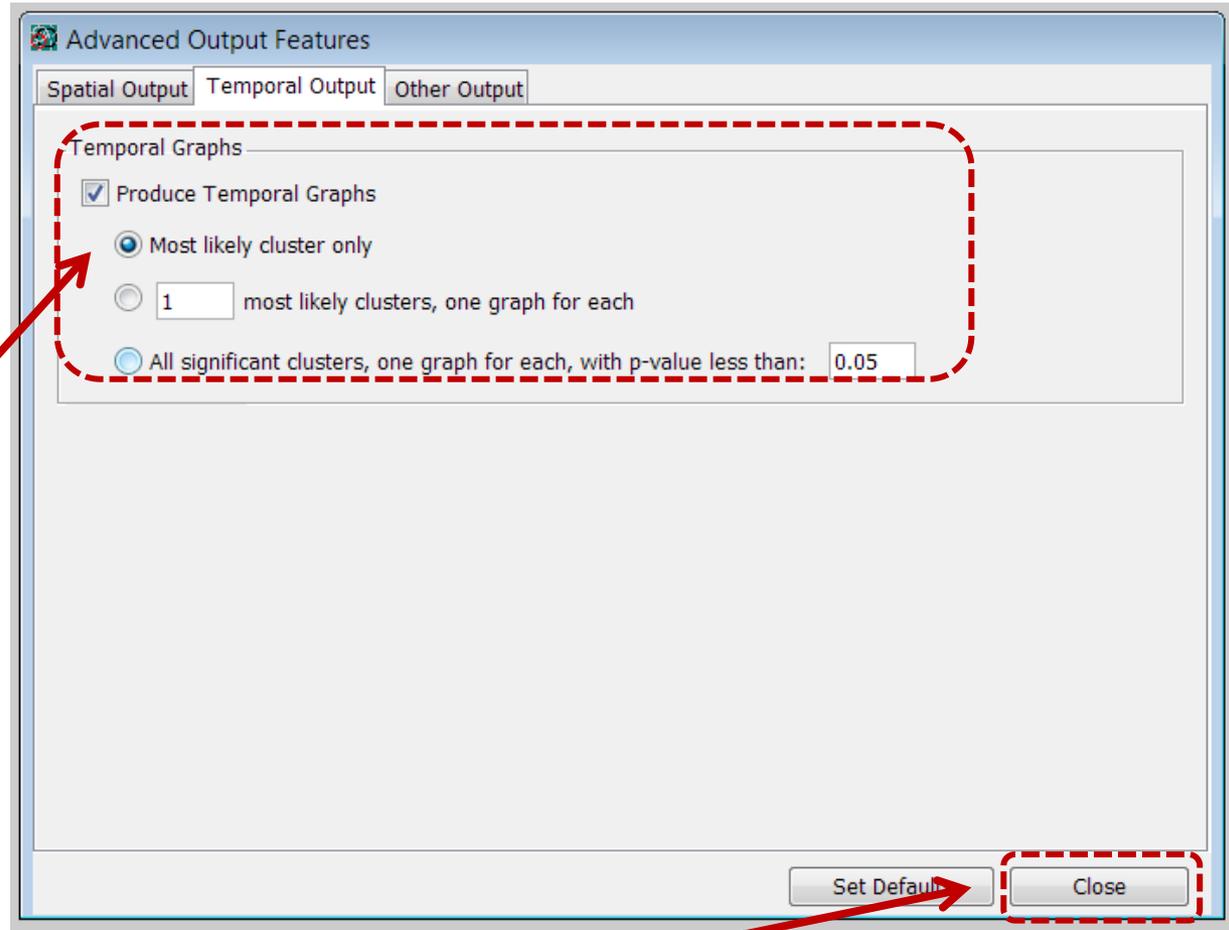
Escolher um nome e um diretório para incluir o arquivo do resultado.

Selecionar as opções “HTML file...”, “Cluster information” e “Location Information”, em extensão .dbf (dBase).

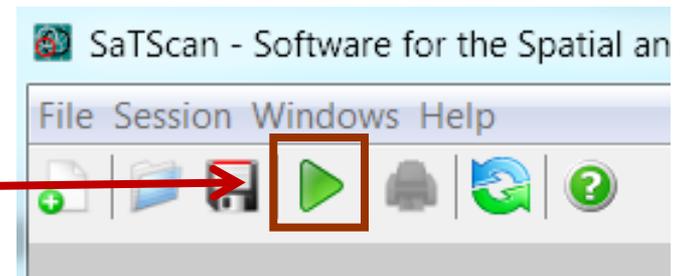


Tab “Output”

Em ‘Advanced’,
escolher a aba
‘Temporal
Output’ para
Produzir
Gráficos
Temporais,
conforme a
figura.

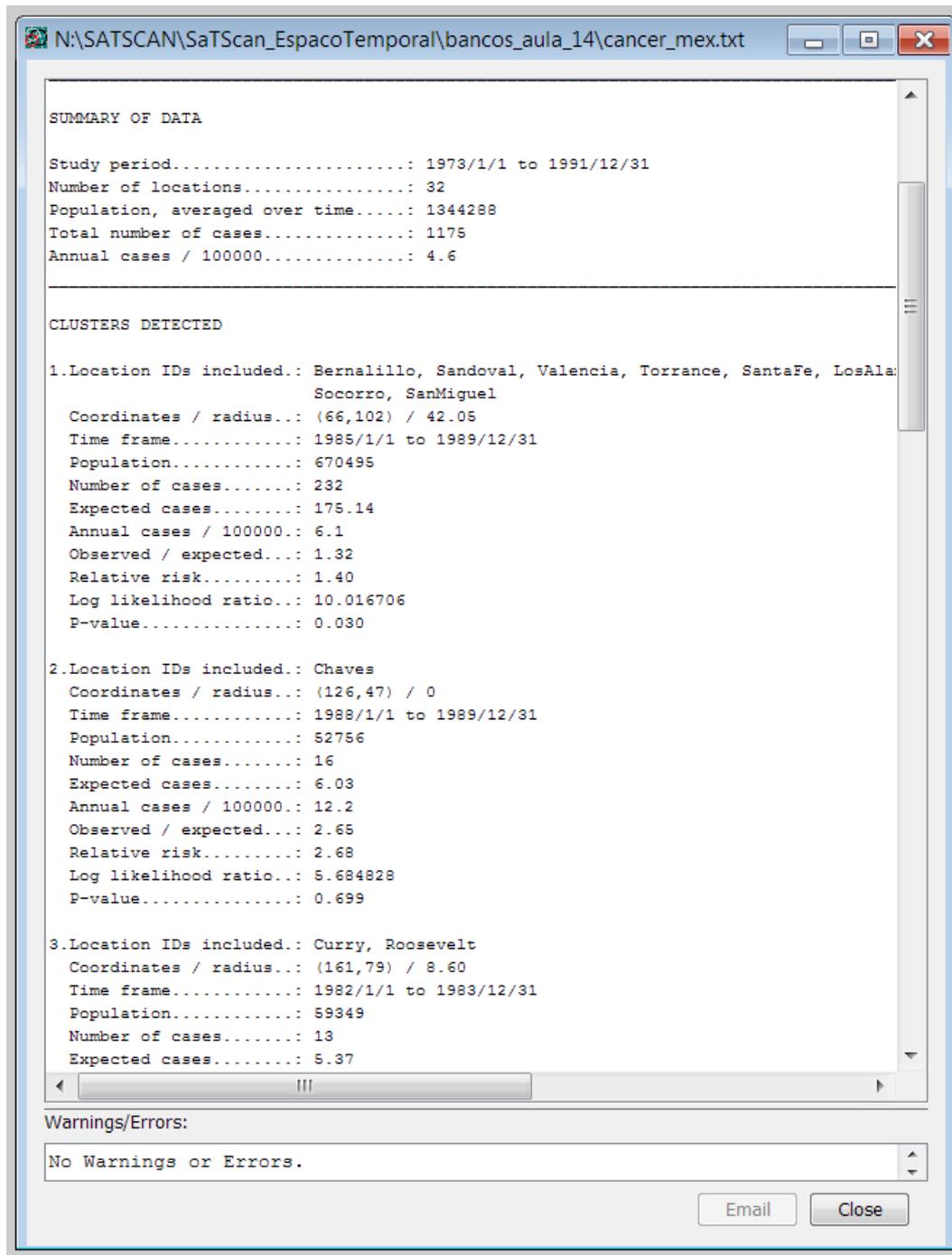


Clicar em **Close**
e depois rodar
no botão ‘**Run**’.



**Resultados
obtidos: são
diferentes em
relação aos
obtidos com o
uso da opção
“análise
puramente
espacial” ???**

**No que
diferem??**



The screenshot shows a text file window titled "N:\SATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\cancer_mex.txt". The content is as follows:

```
SUMMARY OF DATA

Study period.....: 1973/1/1 to 1991/12/31
Number of locations.....: 32
Population, averaged over time.....: 1344288
Total number of cases.....: 1175
Annual cases / 100000.....: 4.6

CLUSTERS DETECTED

1.Location IDs included.: Bernalillo, Sandoval, Valencia, Torrance, SantaFe, LosAla
Socorro, SanMiguel
Coordinates / radius..: (66,102) / 42.05
Time frame.....: 1985/1/1 to 1989/12/31
Population.....: 670495
Number of cases.....: 232
Expected cases.....: 175.14
Annual cases / 100000.: 6.1
Observed / expected...: 1.32
Relative risk.....: 1.40
Log likelihood ratio..: 10.016706
P-value.....: 0.030

2.Location IDs included.: Chaves
Coordinates / radius..: (126,47) / 0
Time frame.....: 1988/1/1 to 1989/12/31
Population.....: 52756
Number of cases.....: 16
Expected cases.....: 6.03
Annual cases / 100000.: 12.2
Observed / expected...: 2.65
Relative risk.....: 2.68
Log likelihood ratio..: 5.684828
P-value.....: 0.699

3.Location IDs included.: Curry, Roosevelt
Coordinates / radius..: (161,79) / 8.60
Time frame.....: 1982/1/1 to 1983/12/31
Population.....: 59349
Number of cases.....: 13
Expected cases.....: 5.37

Warnings/Errors:
No Warnings or Errors.
```

Buttons for "Email" and "Close" are visible at the bottom right of the window.

COMPARAÇÃO DOS RESULTADOS OBTIDOS - OPÇÕES:

“PURAMENTE ESPACIAL” e “ESPAÇO-TEMPORAL”



SUMMARY OF DATA

Study period.....: 1973/1/1 to 1991/12/31
Number of locations.....: 32
Total population.....: 1344288
Total number of cases.....: 1175
Annual cases / 100000.....: 4.6

MOST LIKELY CLUSTER

1.Location IDs included.: Bernalillo, Sandoval, Valencia,
Torrance, SantaFe, LosAlamos, Socorro,
SanMiguel

Coordinates / radius...: (66,102) / 42.05
Population.....: 670495
Number of cases.....: 642
Expected cases.....: 581.86
Annual cases / 100000.: 5.1
Observed / expected...: 1.10
Relative risk.....: 1.23
Log likelihood ratio...: 6.163801
P-value.....: 0.023

SECONDARY CLUSTERS

2.Location IDs included.: Chaves

Coordinates / radius...: (126,47) / 0
Population.....: 52756
Number of cases.....: 64
Expected cases.....: 52.26
Annual cases / 100000.: 5.6
Observed / expected...: 1.22

Warnings/Errors:

No Warnings or Errors.

Email Close



N:\SATSCAN\SaTScan_EspacoTemporal\bancos_aula_14\c...

SUMMARY OF DATA

Study period.....: 1973/1/1 to 1991/12/31
Number of locations.....: 32
Population, averaged over time.....: 1344288
Total number of cases.....: 1175
Annual cases / 100000.....: 4.6

CLUSTERS DETECTED

1.Location IDs included.: Bernalillo, Sandoval, Valencia, Torrance, Santa
Socorro, SanMiguel

Coordinates / radius...: (66,102) / 42.05
Time frame.....: 1985/1/1 to 1989/12/31
Population.....: 670495
Number of cases.....: 232
Expected cases.....: 175.14
Annual cases / 100000.: 6.1
Observed / expected...: 1.32
Relative risk.....: 1.40
Log likelihood ratio...: 10.016706
P-value.....: 0.030

2.Location IDs included.: Chaves

Coordinates / radius...: (126,47) / 0
Time frame.....: 1988/1/1 to 1989/12/31
Population.....: 52756
Number of cases.....: 16
Expected cases.....: 6.03
Annual cases / 100000.: 12.2
Observed / expected...: 2.65
Relative risk.....: 2.60

Warnings/Errors:

No Warnings or Errors.

Email

REFERÊNCIAS BIBLIOGRÁFICAS

- ✓ Kulldorff M. A spatial scan statistic. Commun Statist – Theory Meth. 26(6): 1481-96, 1997.
- ✓ Kulldorff M. SaTScan - Use Guide for version 9.6. Disponível em: <<http://www.satscan.org>>. Acessado em: 21/02/2019.
- ✓ Kulldorff M. SaTScan – Manual do Usuário para a versão 9.4. Disponível em: <<https://www.satscan.org/techdoc.html>>. Manual traduzido para o português (Alessandra Cristina Guedes Pellini). Acessado em: 21/02/2019.