2010 Esri 中国区域用户大会

基于时间轴的GIS应用（时态）

ESRI中国（北京）有限公司 行业技术部 原 炫

GIS–让人类认知世界

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内容

- 什么是时态数据
- 时态数据的管理
- 时态数据可视化
- 存储和导出时态数据



什么是时态数据

什么是时态数据

- 什么样的数据能够使用时态
- 时态数据预览

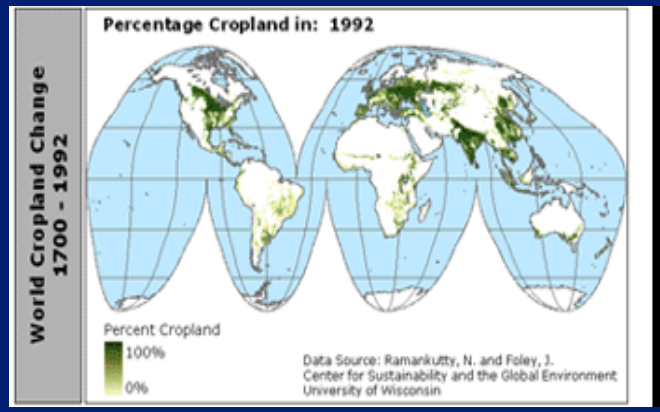
——存储时态数据

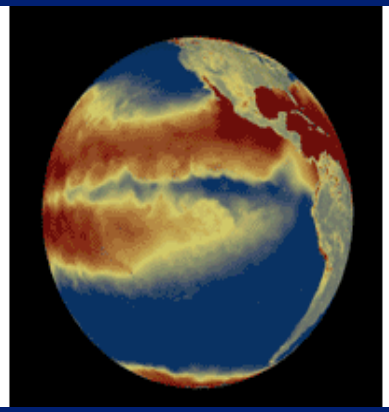
——存储时间值

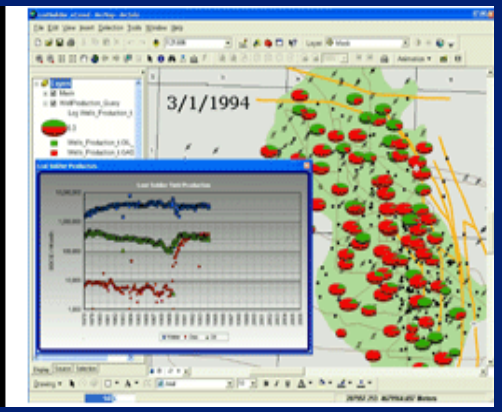
——arcgis中的时态数据

——快速预览时态数据的管理和可视化

什么样的数据能够使用时态

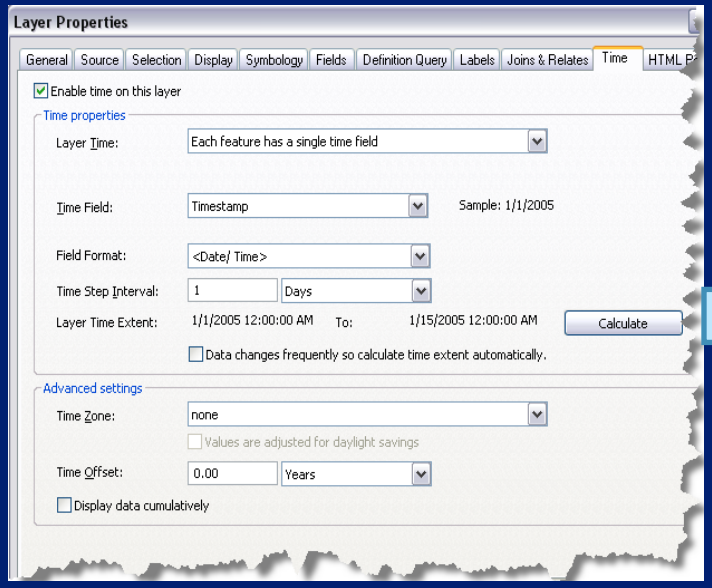




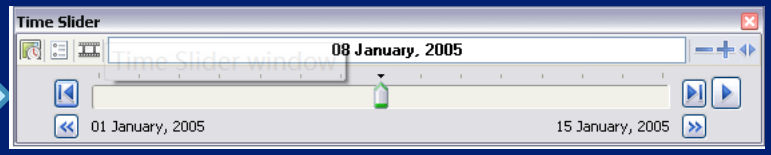


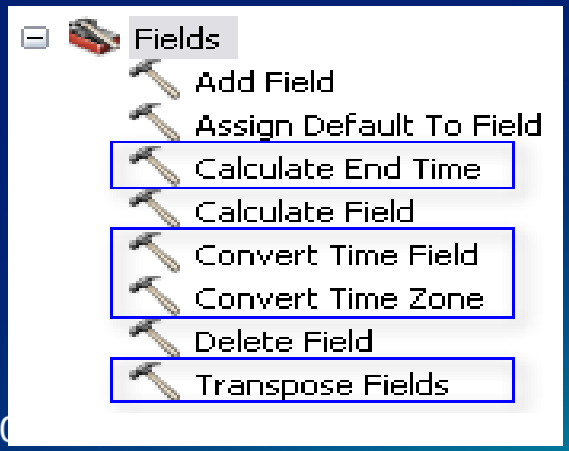
移动功能 —— 形象的海洋哺乳动物或其他人口，了解他们的运动模式的点位置
更改大小或形状的功能 —— 了解每个城市人口的增加或边界得更改。
更改颜色的功能 —— 了解一种疾病死亡人数不断增加的基于更改图层符号的颜色。
检查使用光栅目录或 netCDF 数据的变化 —— 查看海洋温度变化或天气模式。
一段时间内一小块情节的变化 —— 检测臭氧水平或在不同地点的水压力的变化。

快速预览时态数据的管理和可视化



TIME

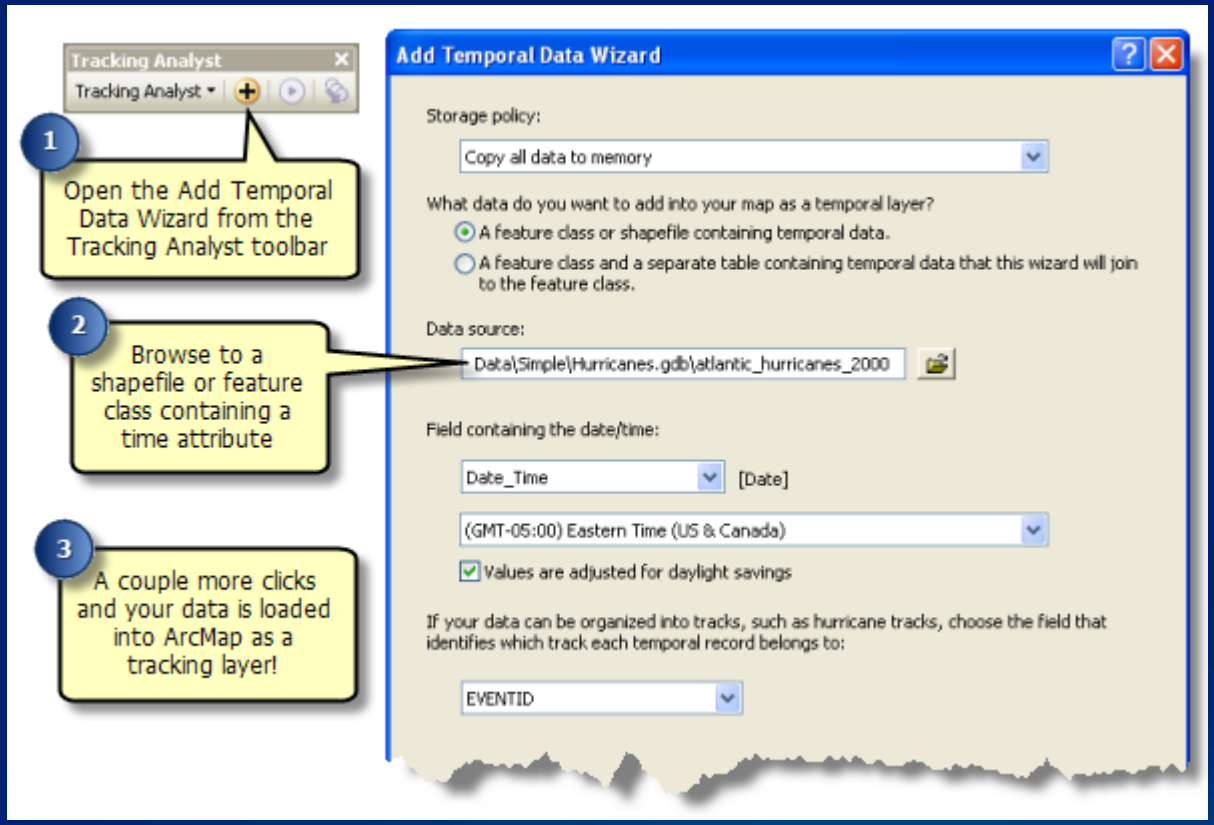




操作**demo**

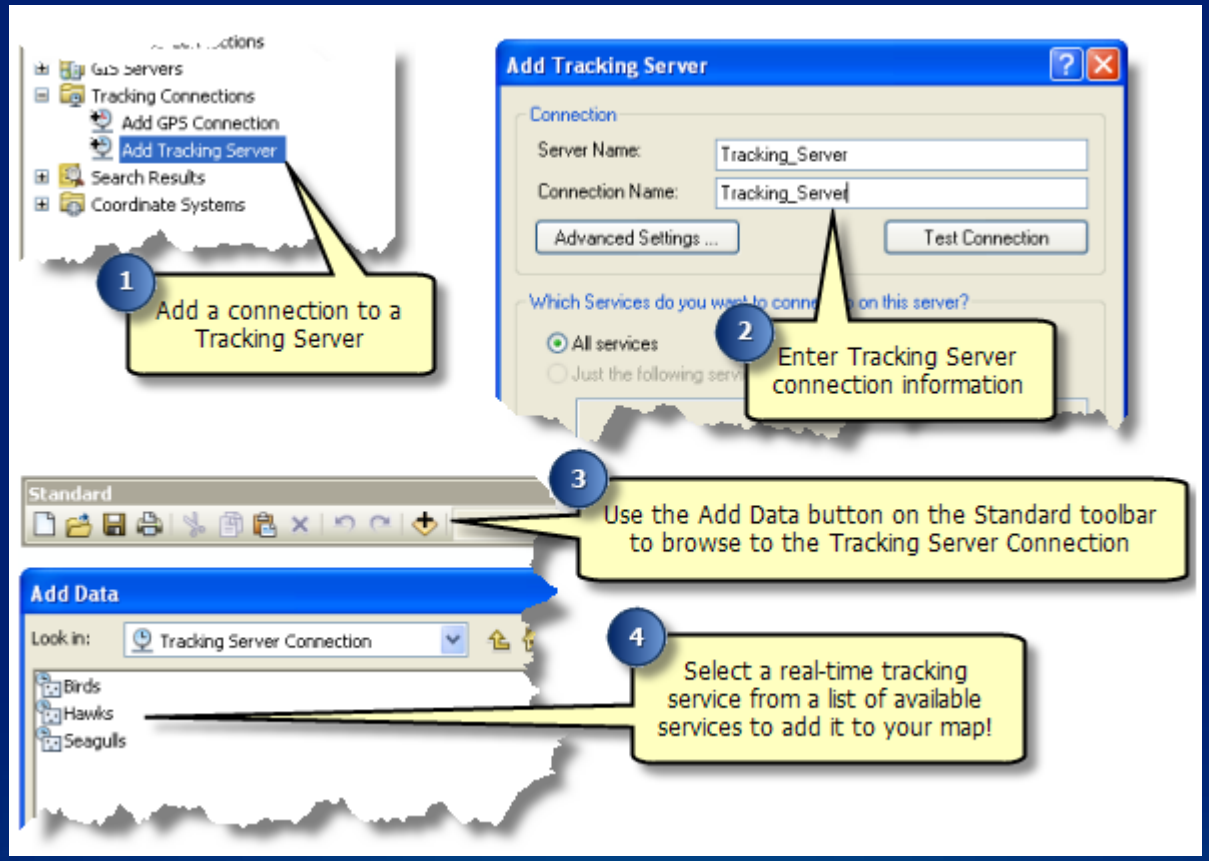
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快速预览时态数据的管理和可视化

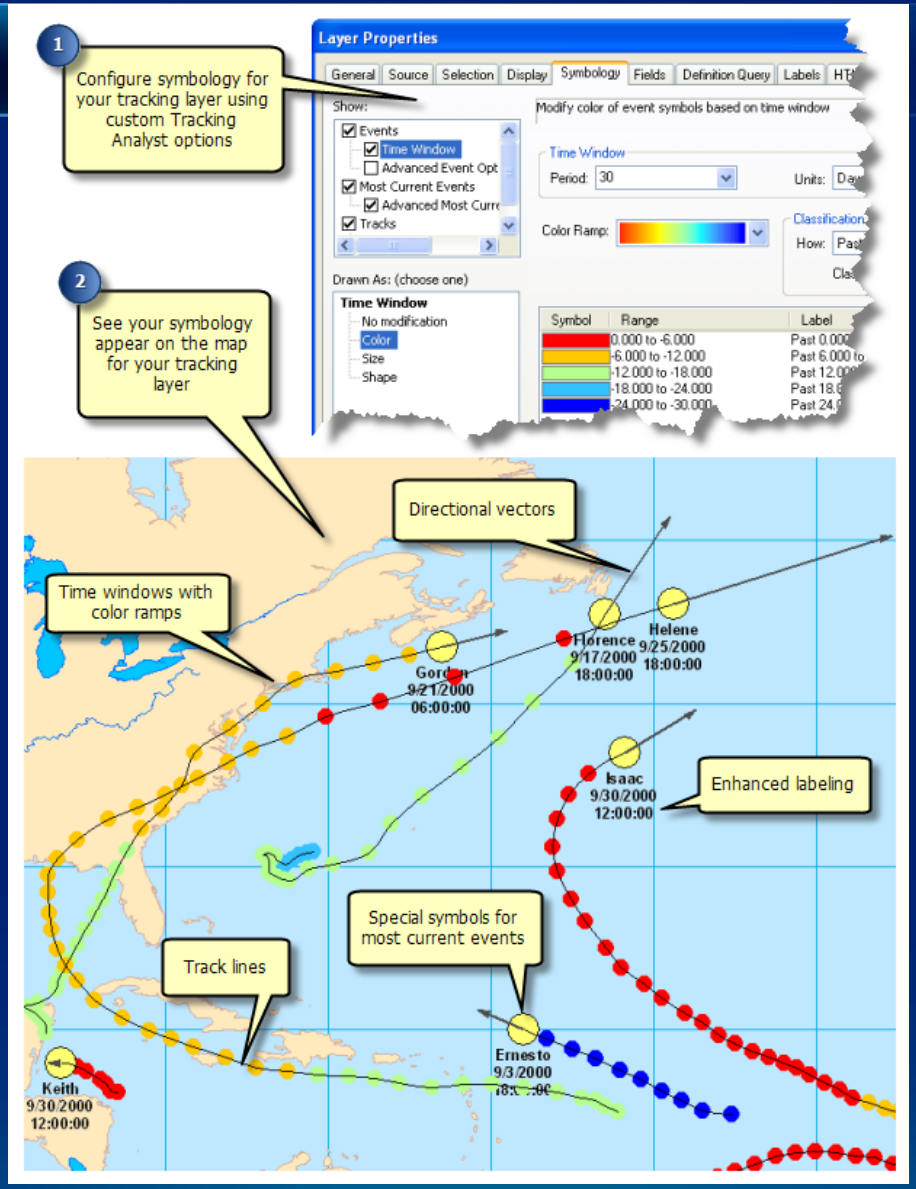


Tracking Analyst

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关键词

- Time-enabled layer：一个基于时间滑块显示的图层，这个图层必须在layer properties对话框的time标签中设置time enabled。
- Time instant：指的是在时间轴上的单点。
- Time stamp：时间标记
- Time step interval of the time-enabled layer：标识数据收集或更新的频率。
- Time step interval of the time slider：将刷新期间，显示合法的数据。
- Time extent：时间轴上的两个点之间的时间段。
- Time extent of temporal data：您已启用时间的图层中的最小和最大时间戳之间的距离
- Time extent of the time slider：
- Time window：用户希望使用时间滑块直观显示的时间段。
- Temporal reference：时间参考提供了有关时区和夏令时规则的信息。



时态数据的管理

时态数据的管理

- 空间数据中支持什么样的时间值
- 存储时间数据的最佳方式
- 在属性数据中存储时间值
- 表格格式的思考

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空间数据中支持什么样的时间值

- 存储在属性：feature classes, mosaic datasets, raster catalogs, tables and so on
- 存储在内部：such as in netCDF data or tracking layers

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Feature layers

- 1每个特点的形状和地点是恒定的，但是属性值可能随着时间的推移改变。
- 2形状和位置的每个功能随时间的变化。

OBJECTID*	Shape*	Name	State_Name	POP	DATE_ST	DATE_END	Shape_Length	Shape_Area
2698	Polygon	Abbeville	South Carolina	33400	01/01/1900	01/01/1910	162402.504779	1339524251.7354
5944	Polygon	Abbeville	South Carolina	34804	01/01/1910	01/01/1920	162402.504779	1339524251.7354
8975	Polygon	Abbeville	South Carolina	27139	01/01/1920	01/01/1930	162402.504779	1339524251.7354
12185	Polygon	Abbeville	South Carolina	23323	01/01/1930	01/01/1940	162402.504779	1339524251.7354
15135	Polygon	Abbeville	South Carolina	22931	01/01/1940	01/01/1950	162402.504779	1339524251.7354
18243	Polygon	Abbeville	South Carolina	22456	01/01/1950	01/01/1960	162402.504779	1339524251.7354
21371	Polygon	Abbeville	South Carolina	21417	01/01/1960	01/01/1970	162402.504779	1339524251.7354
24464	Polygon	Abbeville	South Carolina	21112	01/01/1970	01/01/1980	162402.504779	1339524251.7354

Stations feature class

OBJECTID*	SHAPE*	StationID
1	Point	43
2	Point	55
3	Point	21
4	Point	15
5	Point	30

Temperature table

OBJECTID*	StationID	Date_1	Temp
1	43	1/1/2000	50
2	43	1/1/2001	53
3	43	1/1/2002	49
4	43	1/1/2003	58
5	43	1/1/2004	55
6	55	1/1/2000	65
7	55	1/1/2001	70
8	55	1/1/2002	72
9	55	1/1/2003	69
10	55	1/1/2004	75
11	21	1/1/2000	40
12	21	1/1/2001	42
13	21	1/1/2002	45
14	21	1/1/2003	41
15	21	1/1/2004	43
16	15	1/1/2000	80
17	15	1/1/2001	82
18	15	1/1/2002	80

OBJECTID*	Shape*	AREA	PERIMETER	FIRE	Date_	Shape_Length	Shape_Area
328	Polygon	217872	2294.65	Fan	06/30/1988	2294.649455	217872.243312
3	Polygon	4604720	10191.8	Storm Creek	07/02/1988	10191.773276	4604722.684947
5	Polygon	4491390	10550.9	Mist	07/02/1988	10550.858045	4491388.674216
279	Polygon	7460250	12985.3	Fan	07/02/1988	12985.272888	7460252.205611
2	Polygon	1565920	13076.4	Storm Creek	07/03/1988	13076.352703	1565919.089657
1	Polygon	2189700	17740	Red	07/05/1988	17739.963328	2189696.846135
6	Polygon	782002	4207.37	Storm Creek	07/06/1988	4207.373773	782002.481009
262	Polygon	10847522	4682.46	Fan	07/05/1988	4682.455312	847521.689984

- Mosaic datasets类似于Feature layers
- Raster catalog layers

OBJECTID*	NAME	Shape*	Raster	Date_Time	SHAPE_Length	SHAPE_Area
1	Image1.gif	Polygon	Raster	1998-10-14 12:00:00	3068	522753
2	Image2.gif	Polygon	Raster	1998-10-15	3068	522753
3	Image3.gif	Polygon	Raster	1998-10-15 12:00:00	3068	522753
4	Image4.gif	Polygon	Raster	1998-10-16	3068	522753
5	Image5.gif	Polygon	Raster	1998-10-16 12:00:00	3068	522753
6	Image6.gif	Polygon	Raster	1998-10-17	3068	522753
7	Image7.gif	Polygon	Raster	1998-10-17 12:00:00	3068	522753

- Tables

OBJECTID*	FeatureID*	DateTime	Value
1	1	8/1/1998	453
2	1	8/2/1998	411
3	1	8/3/1998	389
4	1	8/4/1998	389
5	1	8/5/1998	569
6	1	8/6/1998	515

存储时间数据的最佳方式

- 用行的格式存储时态数据
- 将时间值存储在数据中
- 包含时间值的索引
- 使用标准时间

支持的字段格式

字符串格式

- YYYY
- YYYYMM
- YYYY/MM
- YYYY-MM
- YYYYMMDD
- YYYY/MM/DD
- YYYY-MM-DD
- YYYYMMDDhhmmss
- YYYY/MM/DD hh:mm:ss
- YYYY-MM-DD hh:mm:ss
- YYYYMMDDhhmmss.s
- YYYY/MM/DD hh:mm:ss.s
- YYYY-MM-DD hh:mm:ss.s

数字字段格式

- YYYY
- YYYYMM
- YYYYMMDD
- YYYYMMDDhhmmss

Convert Time Field geoprocessing tool

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日期和时间格式

Examples of Date and Time Format Pictures

Example data value	Format picture
30/05/1978 02:34:56	dd/MM/yyyy HH:mm:ss
2/4/2010 2:39:28 PM	M/d/yyyy h:mm:ss tt
6:05:12 a.m.	h:mm:ss tt
23:31:18.345	HH:mm:ss.s
Tuesday, August 20, 2002	dddd, MMMM dd, yyyy
Wed, Aug 31 1994	ddd, MMM dd yyyy
03281999030456	MMddyyyyHHmmss

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Date and Time Formats

Format	Format type	Description
d	Day of Month	Day of month as digits with no leading zero for single-digit days.
dd	Day of Month	Day of month as digits with leading zero for single-digit days.
ddd	Day of Week	Day of week as a three-letter abbreviation. The function uses the abbreviations associated with the specified locale, for example, Mon in English (United States). **Tip:** Days of the week are not verified when interpreting a date value. Therefore, it doesn't matter whether a day of the week appearing in your data correctly corresponds to the date represented in the data value.
dddd	Day of Week	Day of week as its full name. The function uses the full day names associated with the specified locale, for example, Monday in English (United States). **Tip:** Days of the week are not verified when interpreting a date value. Therefore, it doesn't matter whether a day of the week appearing in your data correctly corresponds to the date represented in the data value.
M	Month	Month as digits with no leading zero for single-digit months.

带分离符的

Example data value	Format picture	Date or time interpreted (displayed as MM/dd/yyyy or HH:mm:ss)
month12day30year2010	'month'MM'day'dd'year'yyyy	12/30/2010
30/12/2010	ddMMyyyy	12/30/2010
Time:18hr6min3sec	'Time:'h'hr'm'min's'sec'	18:06:03
18:6:3	HH:m:s	18:06:03

区域设置

Data value	Format picture	Locale	Date interpreted (MM/dd/yyyy)
November 30, 2010	MMMM dd, yyyy	English (United States)	11/30/2010
Noviembre 30, 2010	MMMM dd, yyyy	Spanish (Spain)	11/30/2010
Mon, Feb 22, 2010	ddd, MMM dd, yyyy	English (United States)	2/22/2010
30/12/2010	dd/M/yyyy	All locales	12/30/2010

AM与PM设置

Data value	Format picture	PM designator	Interpreted time (HH:mm:ss)
6:12:34 P	h:mm:ss t	P	18:12:34
6:12:34 p.m.	h:mm:ss tt	p.m.	18:12:34
6:12:34	H:mm:ss	PM	6:12:34
6:12:34 PM	h:mm:ss tt	PM	18:12:34

重新格式化表

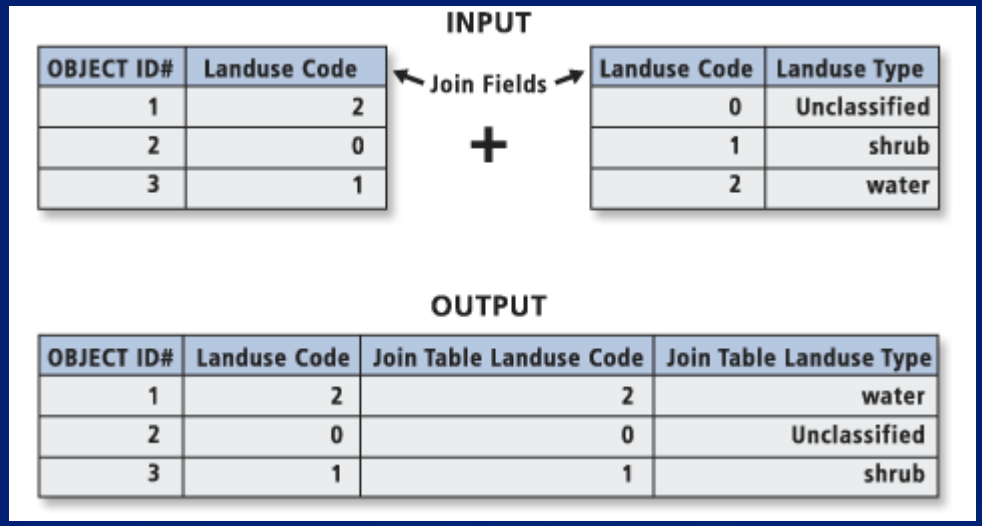
OBJECTID*	Shape*	Shape_Length	Shape_Area	STATE_NAME	Y1980	Y1981	Y1982	Y1983
1	Polygon	17.237647	12.897167	Alabama	106	105	115	129
2	Polygon	407.571028	277.524118	Alaska	20	22	22	25
3	Polygon	23.257265	28.859093	Arizona	0	0	0	0
4	Polygon	20.877157	13.517466	Arkansas	109	115	111	117
5	Polygon	42.260167	41.533613	California	539	706	697	707
6	Polygon	22.025629	28.0416	Colorado	101	113	122	136
7	Polygon	5.722455	1.392525	Connecticut	180	215	245	274



OBJECTID*	SHAPE*	SHAPE_Length	SHAPE_Area	Name	Time_	Expense
1	Polygon	17.237645	12.897165	Alabama	1980	106
2	Polygon	407.57095	277.52409	Alaska	1980	20
3	Polygon	23.257266	28.859101	Arizona	1980	0
4	Polygon	20.877127	13.517461	Arkansas	1980	109
5	Polygon	42.260156	41.533616	California	1980	539
6	Polygon	22.025622	28.041602	Colorado	1980	101

时态数据存储在不同的表中

- 一对一，多对一关系（Add Join geoprocessing tool ）



- 一对多关系表（Make Query Table geoprocessing tool）

Stations feature class

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4	Point	15
5	Point	30

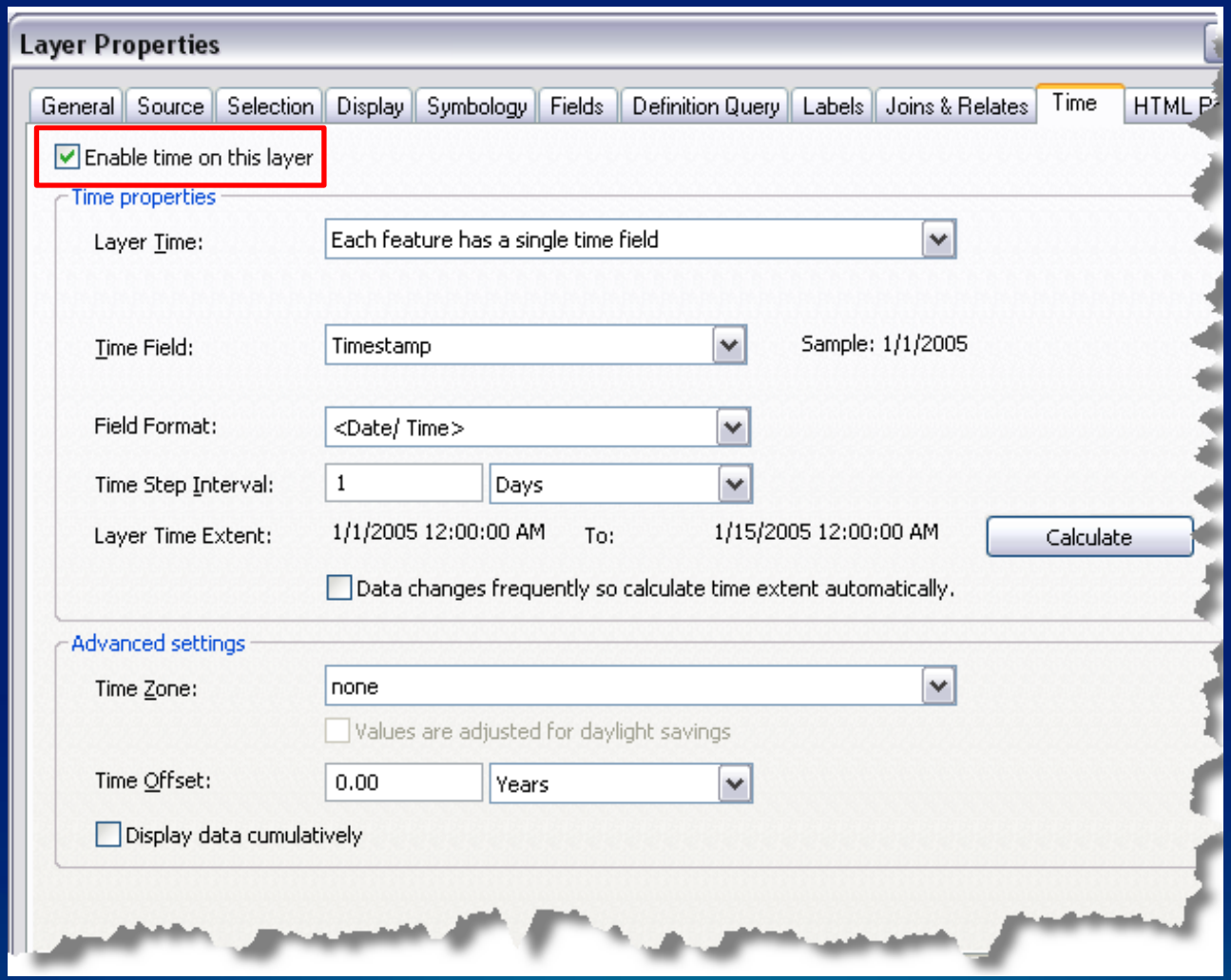
Temperature table

OBJECTID*	StationID	Date_1	Temp
1	43	1/1/2000	50
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3	43	1/1/2002	49
4	43	1/1/2003	58
5	43	1/1/2004	55
6	55	1/1/2000	65
7	55	1/1/2001	70
8	55	1/1/2002	72
9	55	1/1/2003	69
10	55	1/1/2004	75
11	21	1/1/2000	40
12	21	1/1/2001	42
13	21	1/1/2002	45
14	21	1/1/2003	41
15	21	1/1/2004	43
16	15	1/1/2000	80
17	15	1/1/2001	82
18	15	1/1/2002	80



时态数据可视化

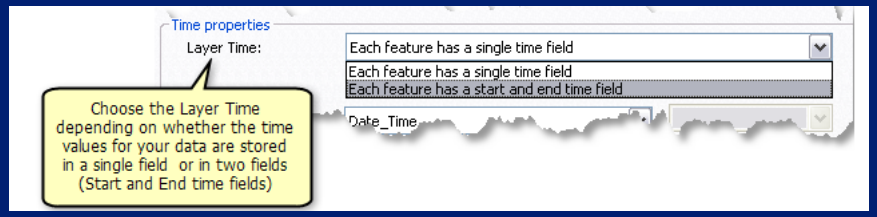
启动数据的时间可用性



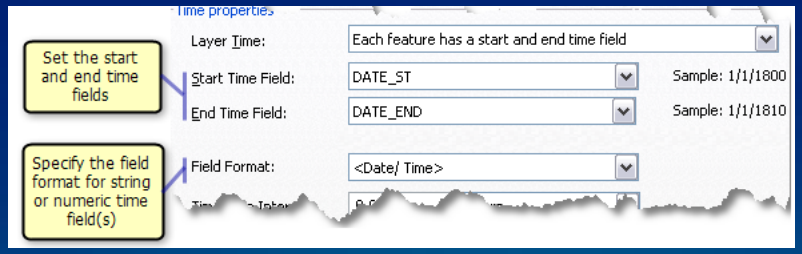
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设置数据的时间属性

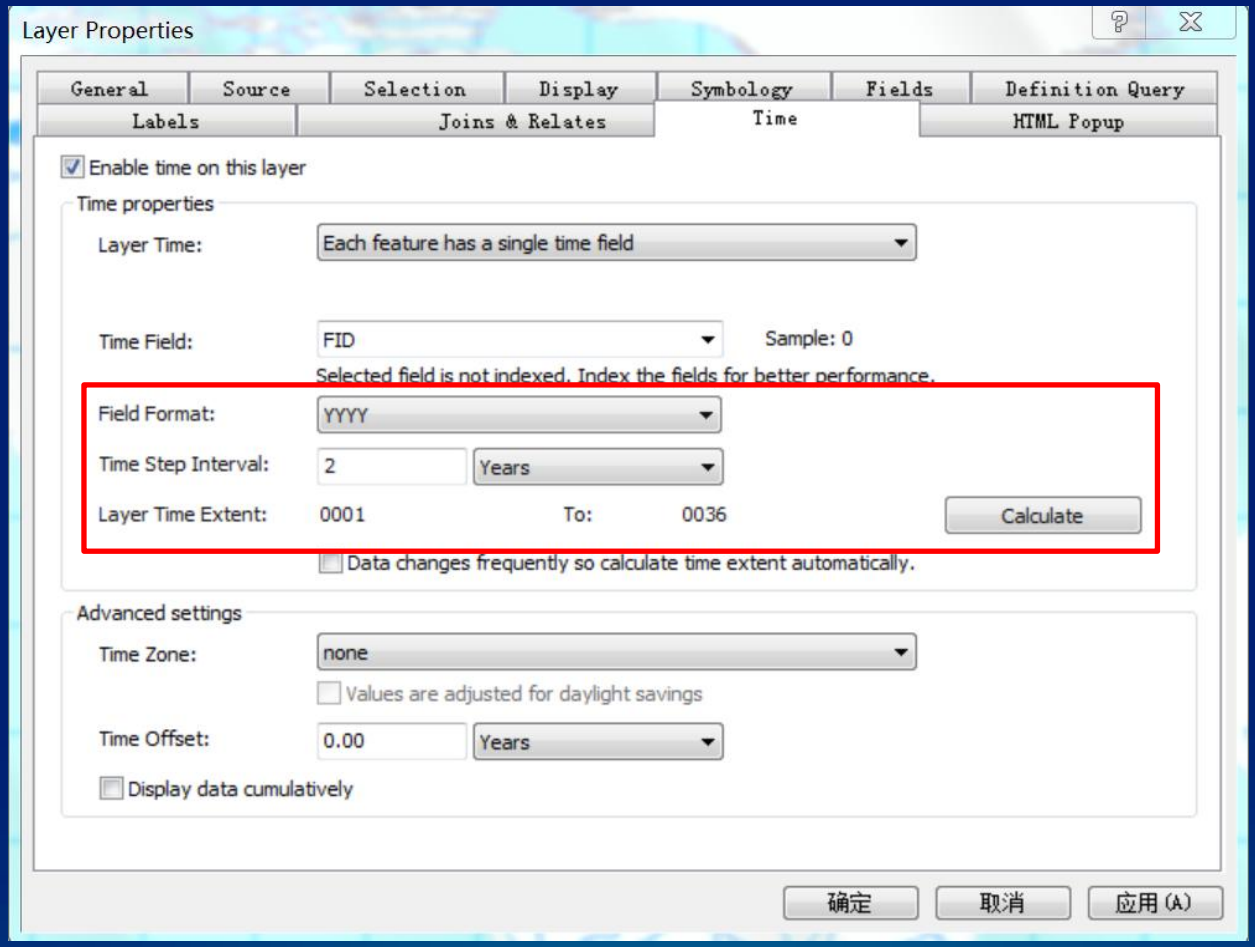
打开图层的属性对话框　　点击time标签　　选择Enable time on this layer

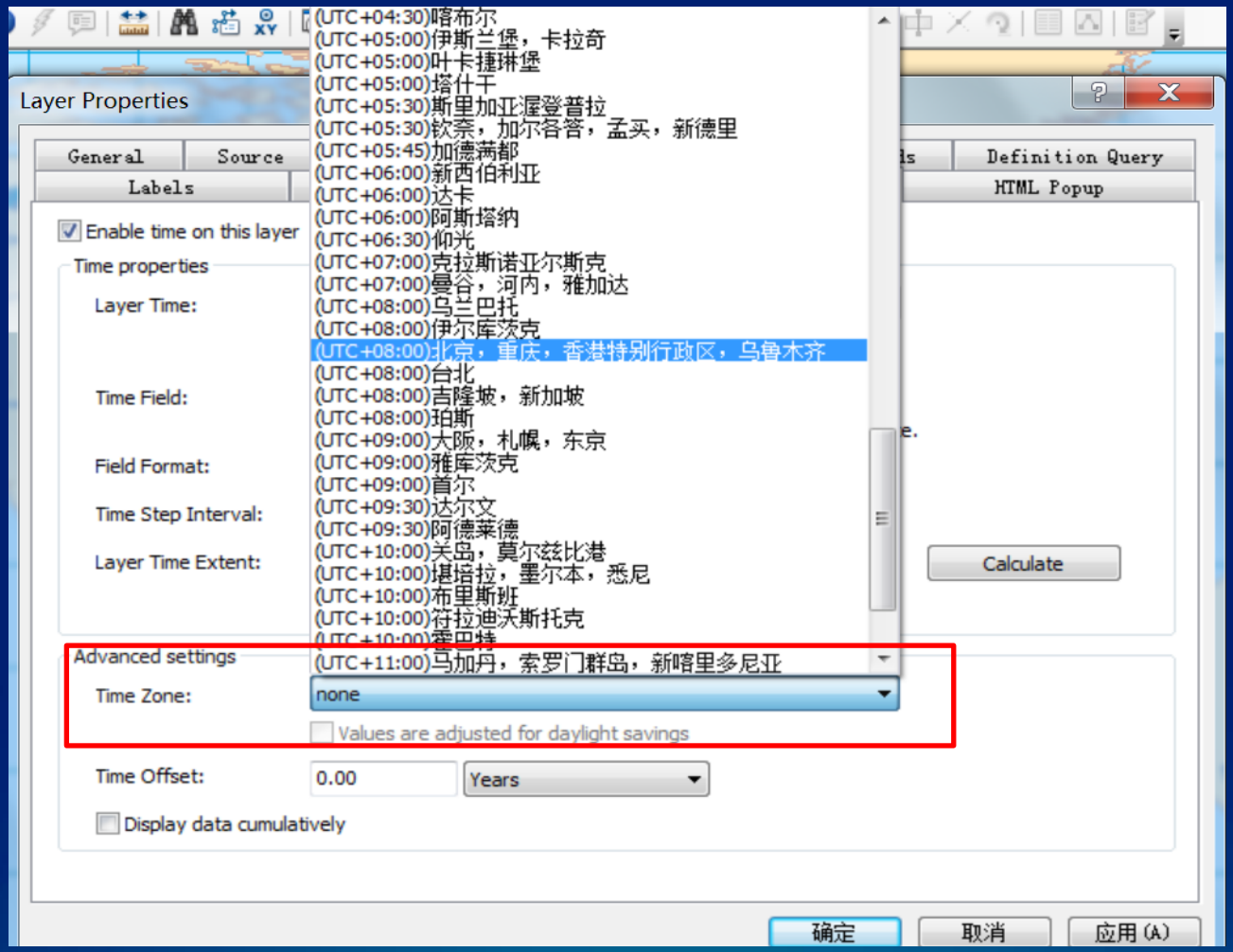




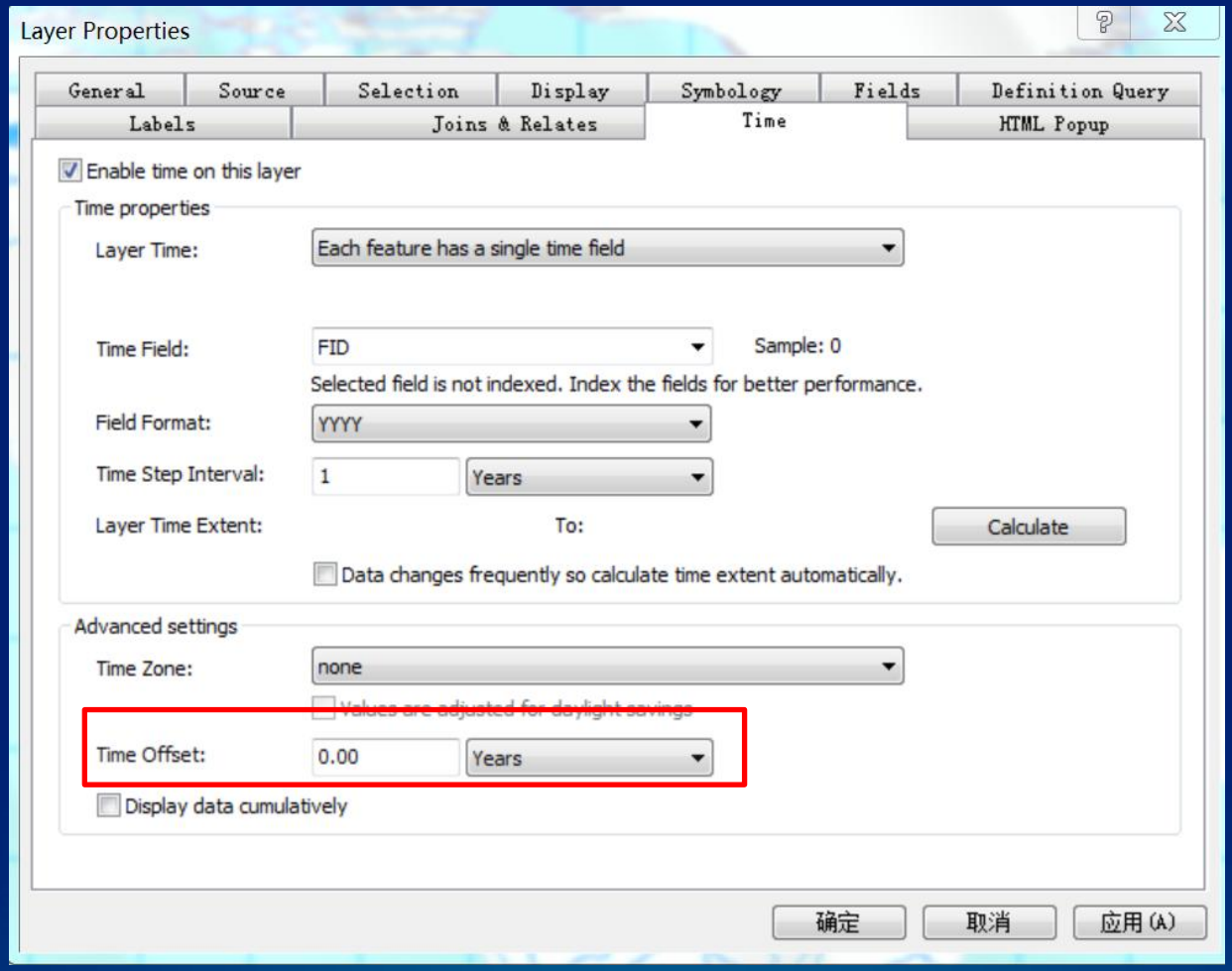


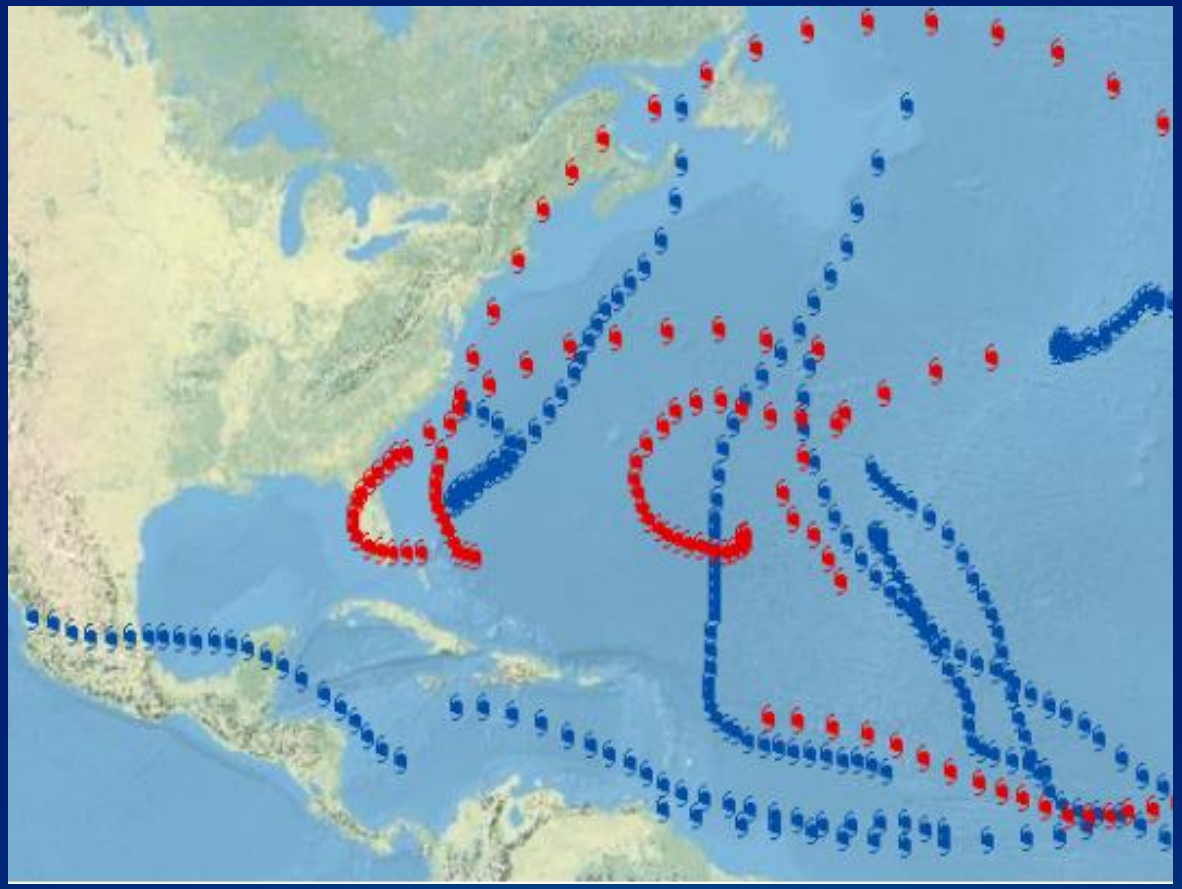
设置时间间隔


Layer Properties
General
Source
Selection
Display
Symbology
Fields
Definition Query
Labels
Joins & Relates
Time
HTML Popup
Enable time on this layer
Time properties
Layer Time:
Each feature has a single time field
Time Field:
FID
Sample: 0
Selected field is not indexed. Index the fields for better performance.
Field Format:
YYYY
Time Step Interval:
2
Years
Layer Time Extent:
0001
To:
0036
Calculate
Data changes frequently so calculate time extent automatically.
Advanced settings
Time Zone:
none
Values are adjusted for daylight savings
Time Offset:
0.00
Years
Display data cumulatively
确定
取消
应用 (A)


Layer Properties
General
Source
Definition Query
Labels
HTML Popup
Enable time on this layer
Time properties
Layer Time:
Time Field:
Field Format:
Time Step Interval:
Layer Time Extent:
Calculate
Advanced settings
Time Zone:
none
Values are adjusted for daylight savings
Time Offset:
0.00
Years
Display data cumulatively
确定
取消
应用(A)
(UTC+04:30)喀布尔
(UTC+05:00)伊斯兰堡，卡拉奇
(UTC+05:00)叶卡捷琳堡
(UTC+05:00)塔什干
(UTC+05:30)斯里加亚渥登普拉
(UTC+05:30)钦奈，加尔各答，孟买，新德里
(UTC+05:45)加德满都
(UTC+06:00)新西伯利亚
(UTC+06:00)达卡
(UTC+06:00)阿斯塔纳
(UTC+06:30)仰光
(UTC+07:00)克拉斯诺亚尔斯克
(UTC+07:00)曼谷，河内，雅加达
(UTC+08:00)乌兰巴托
(UTC+08:00)伊尔库茨克
(UTC+08:00)北京，重庆，香港特别行政区，乌鲁木齐
(UTC+08:00)台北
(UTC+08:00)吉隆坡，新加坡
(UTC+08:00)珀斯
(UTC+09:00)大阪，札幌，东京
(UTC+09:00)雅库茨克
(UTC+09:00)首尔
(UTC+09:30)达尔文
(UTC+09:30)阿德莱德
(UTC+10:00)关岛，莫尔兹比港
(UTC+10:00)堪培拉，墨尔本，悉尼
(UTC+10:00)布里斯班
(UTC+10:00)符拉迪沃斯托克
(UTC+11:00)马加丹，索罗门群岛，新喀里多尼亚

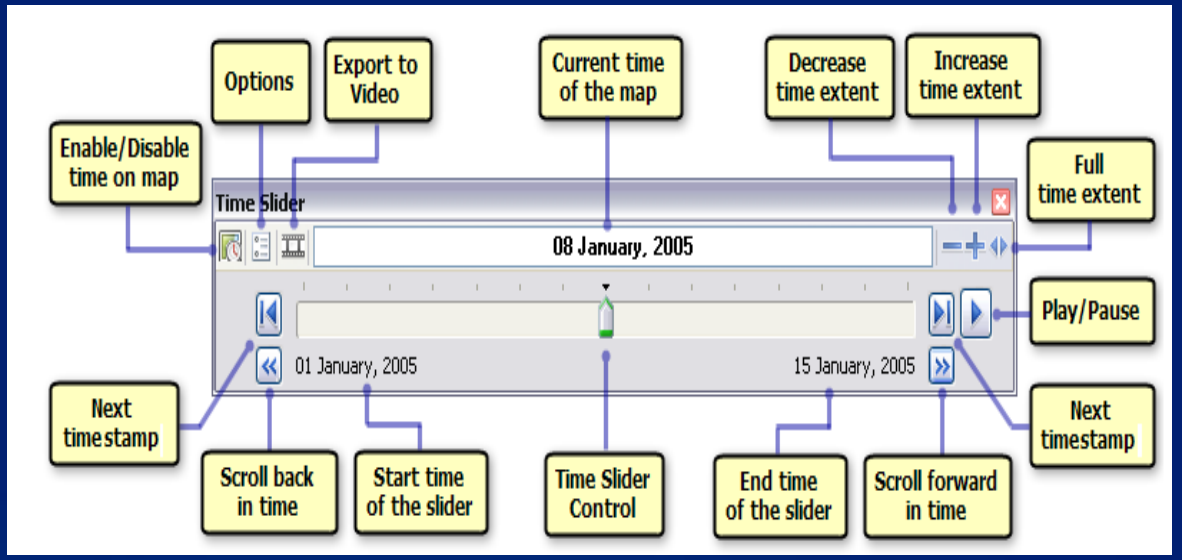
设置数据的偏移时间


Layer Properties
General
Source
Selection
Display
Symbology
Fields
Definition Query
Labels
Joins & Relates
Time
HTML Popup
Enable time on this layer
Time properties
Layer Time:
Each feature has a single time field
Time Field:
FID
Sample: 0
Selected field is not indexed. Index the fields for better performance.
Field Format:
YYYY
Time Step Interval:
1
Years
Layer Time Extent:
To:
Calculate
Data changes frequently so calculate time extent automatically.
Advanced settings
Time Zone:
none
Time Offset:
0.00
Years
Display data cumulatively
确定
取消
应用(A)



使用时间滑块




Options
Export to Video
Current time of the map
Decrease time extent
Increase time extent
Enable/Disable time on map
Full time extent
Time Slider
08 January, 2005
Play/Pause
01 January, 2005
15 January, 2005
Next timestamp
Next timestamp
Scroll back in time
Start time of the slider
Time Slider Control
End time of the slider
Scroll forward in time

在时间滑块上选择时间间隔



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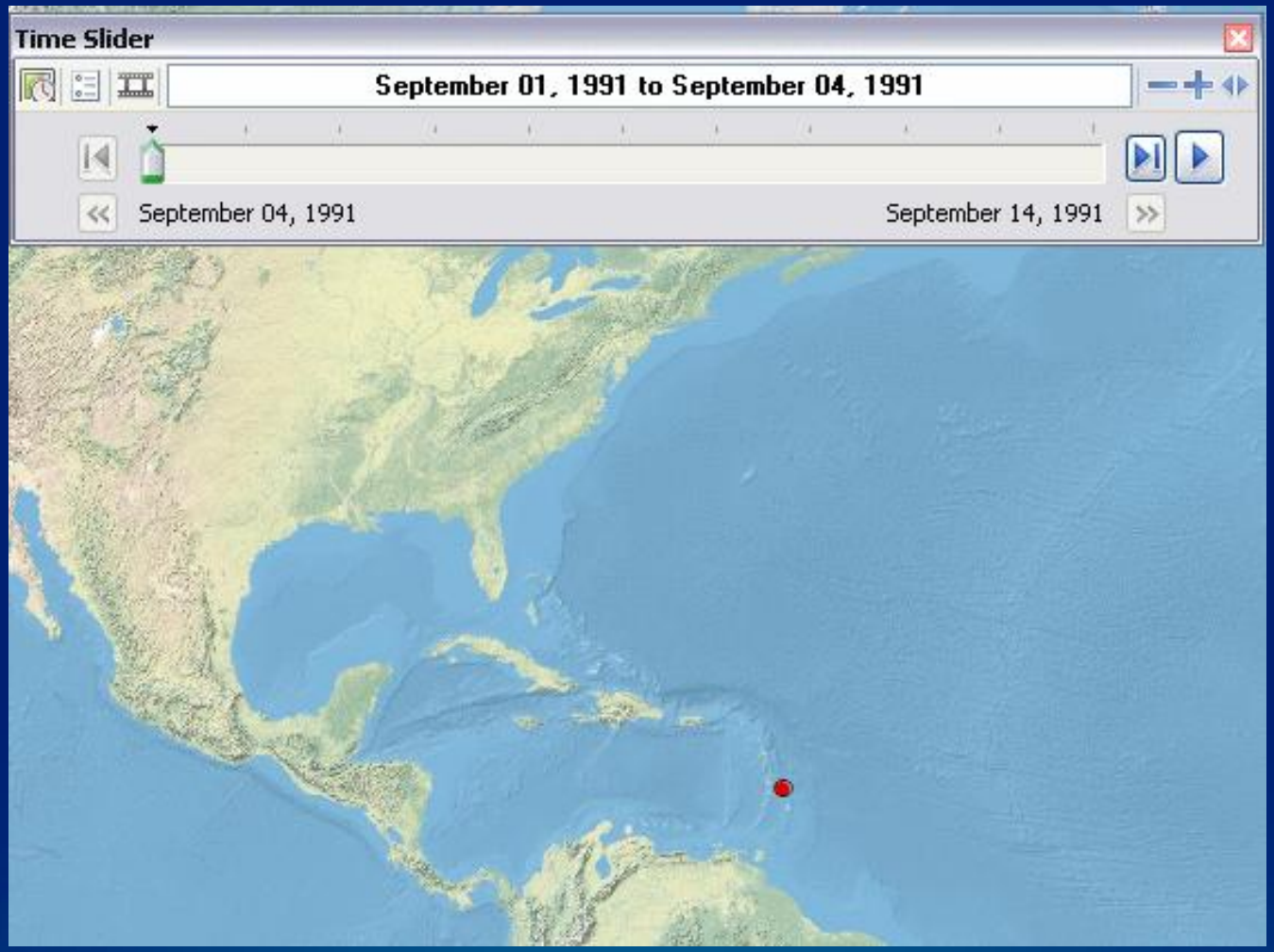


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设置一个时间窗口

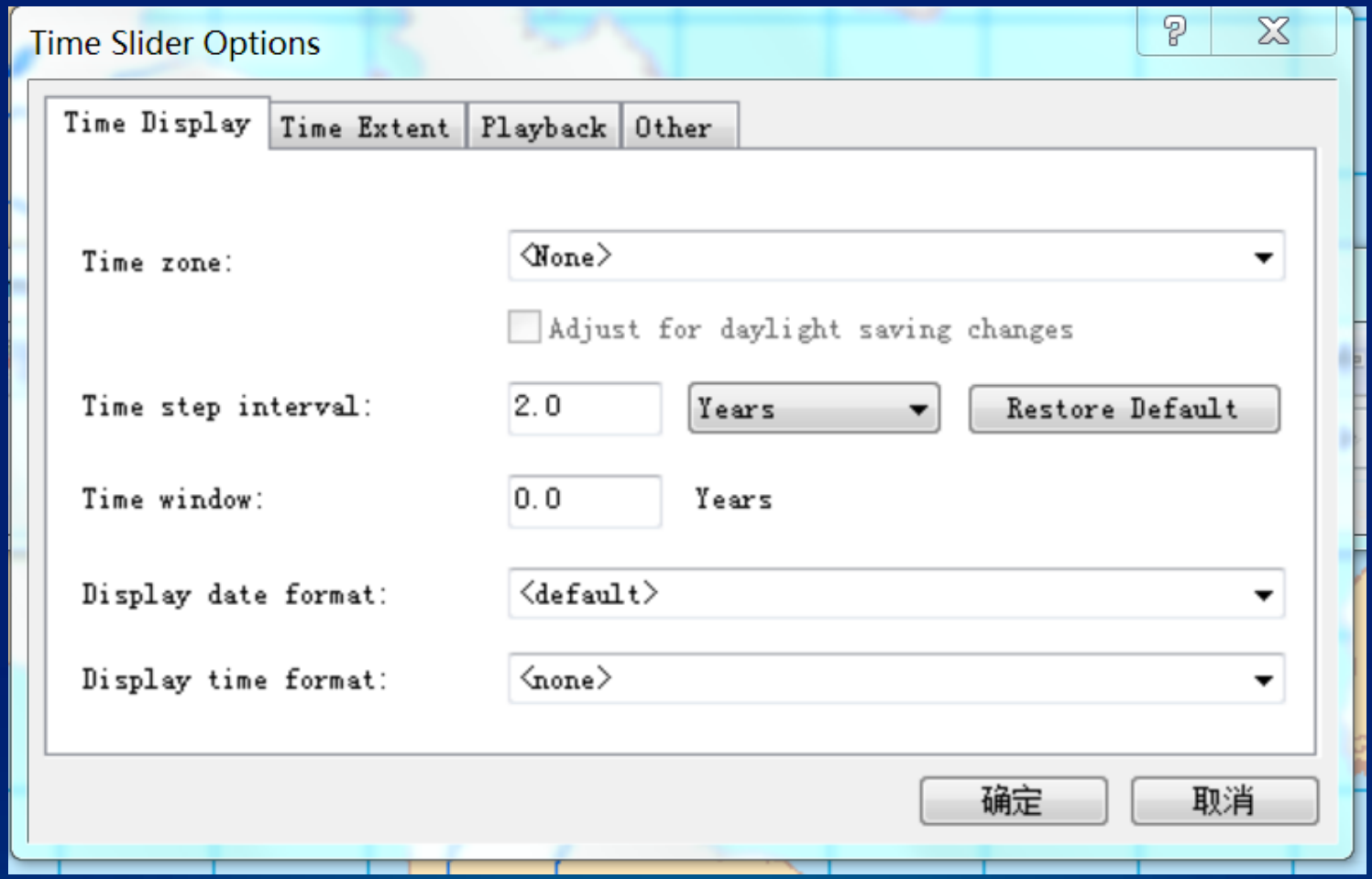


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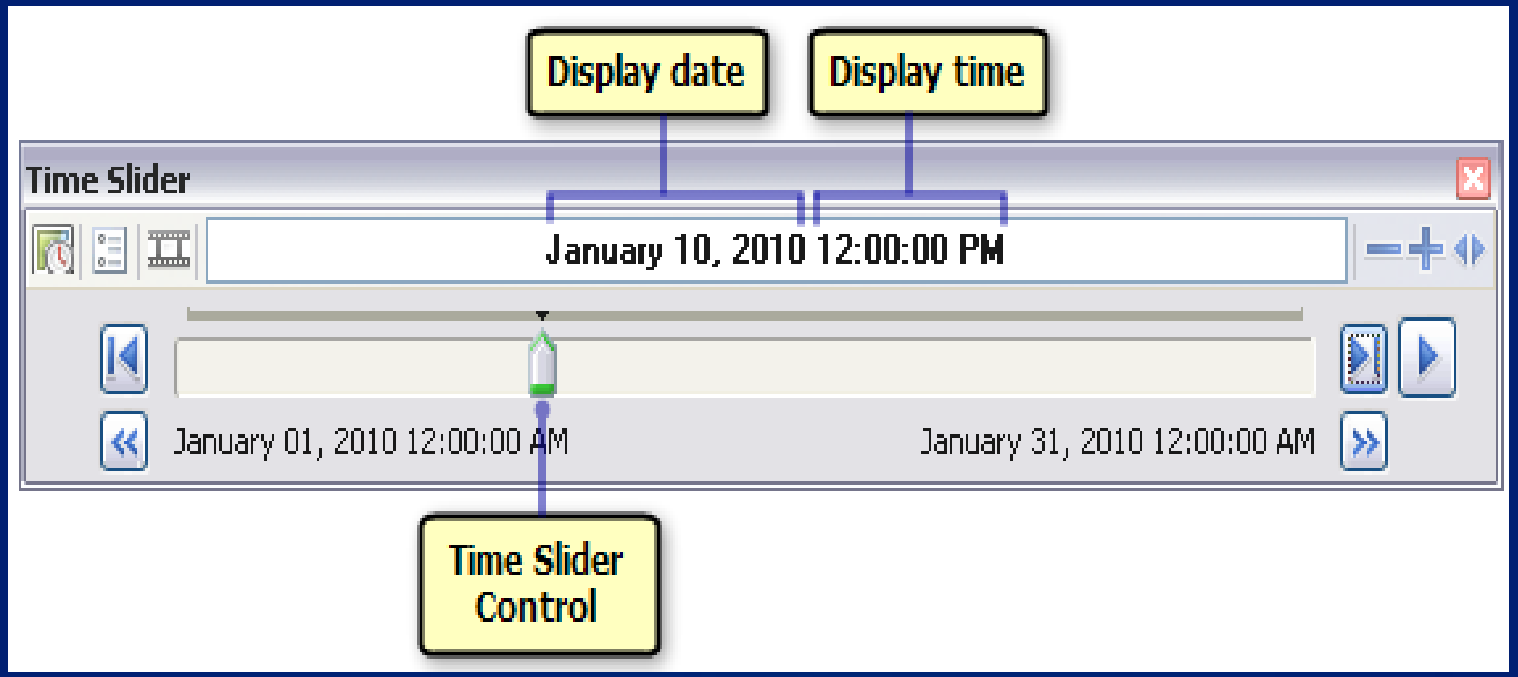
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设置时区

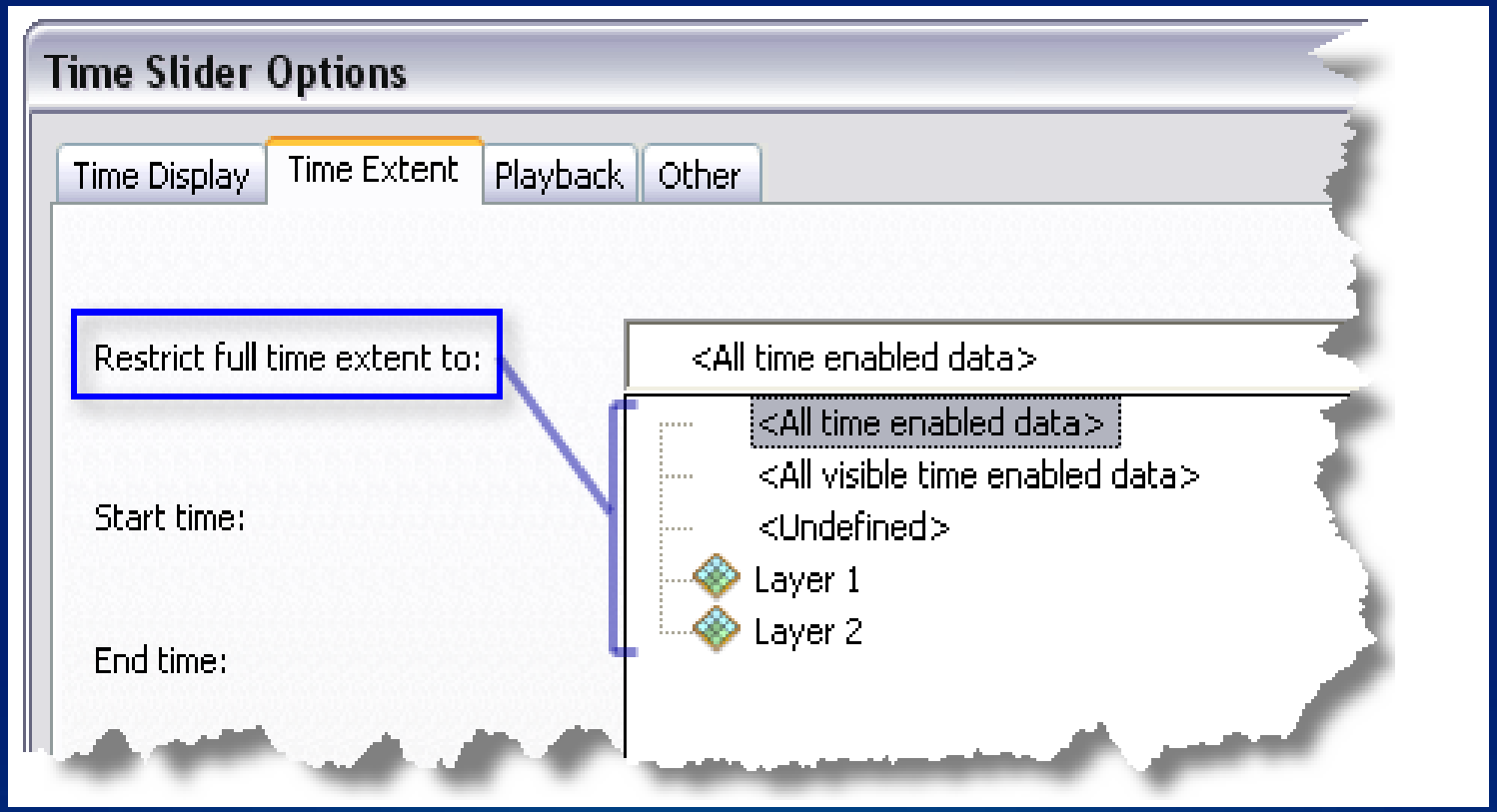


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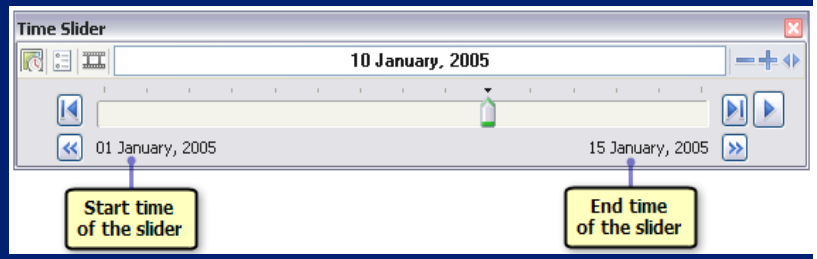
设置时间滑块上的日期和时间显示

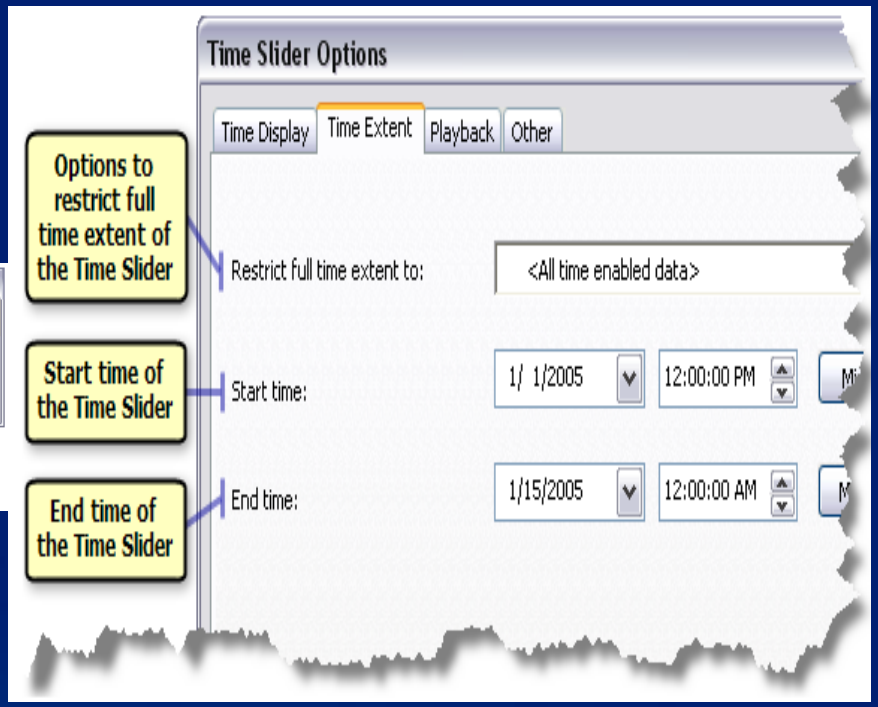


设置时间滑块的全部工作时间范围



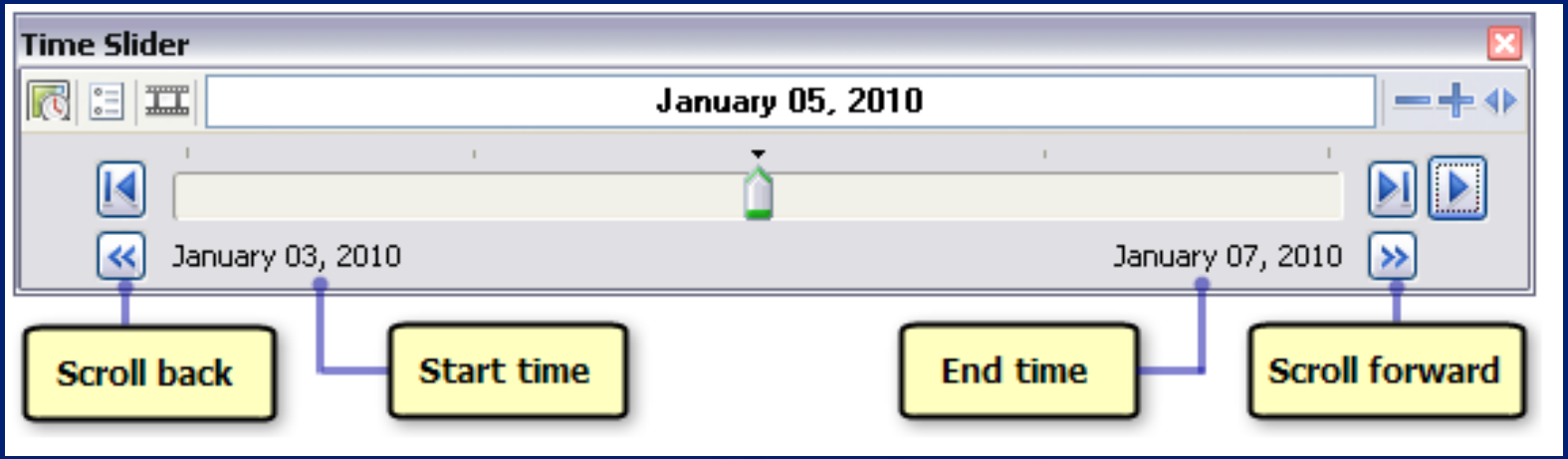
修改时间滑块的开始和结束时间





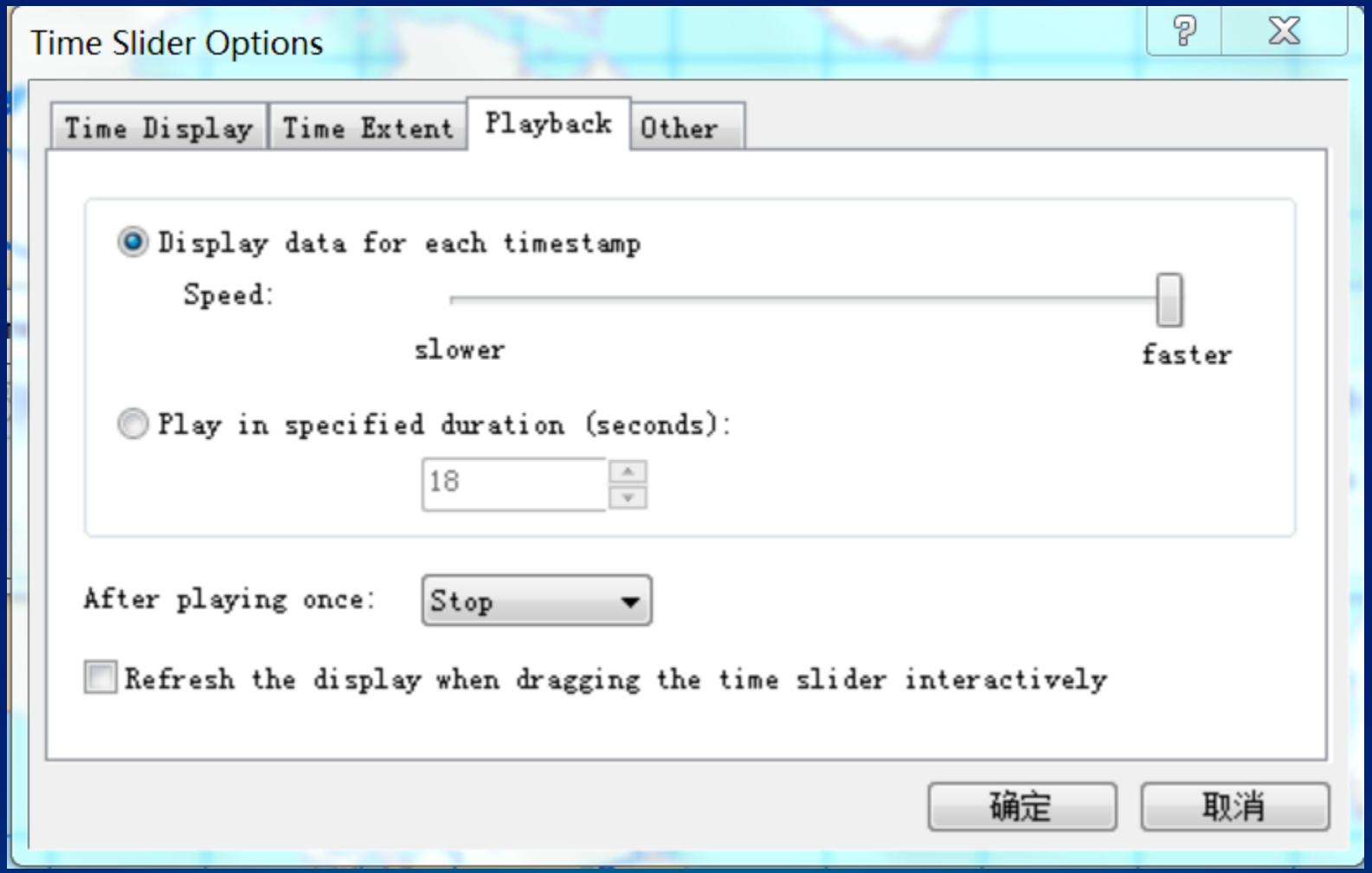
更改开始时间和结束时间

- 交互式更改开始时间和结束时间
- 手动更改开始时间和结束时间



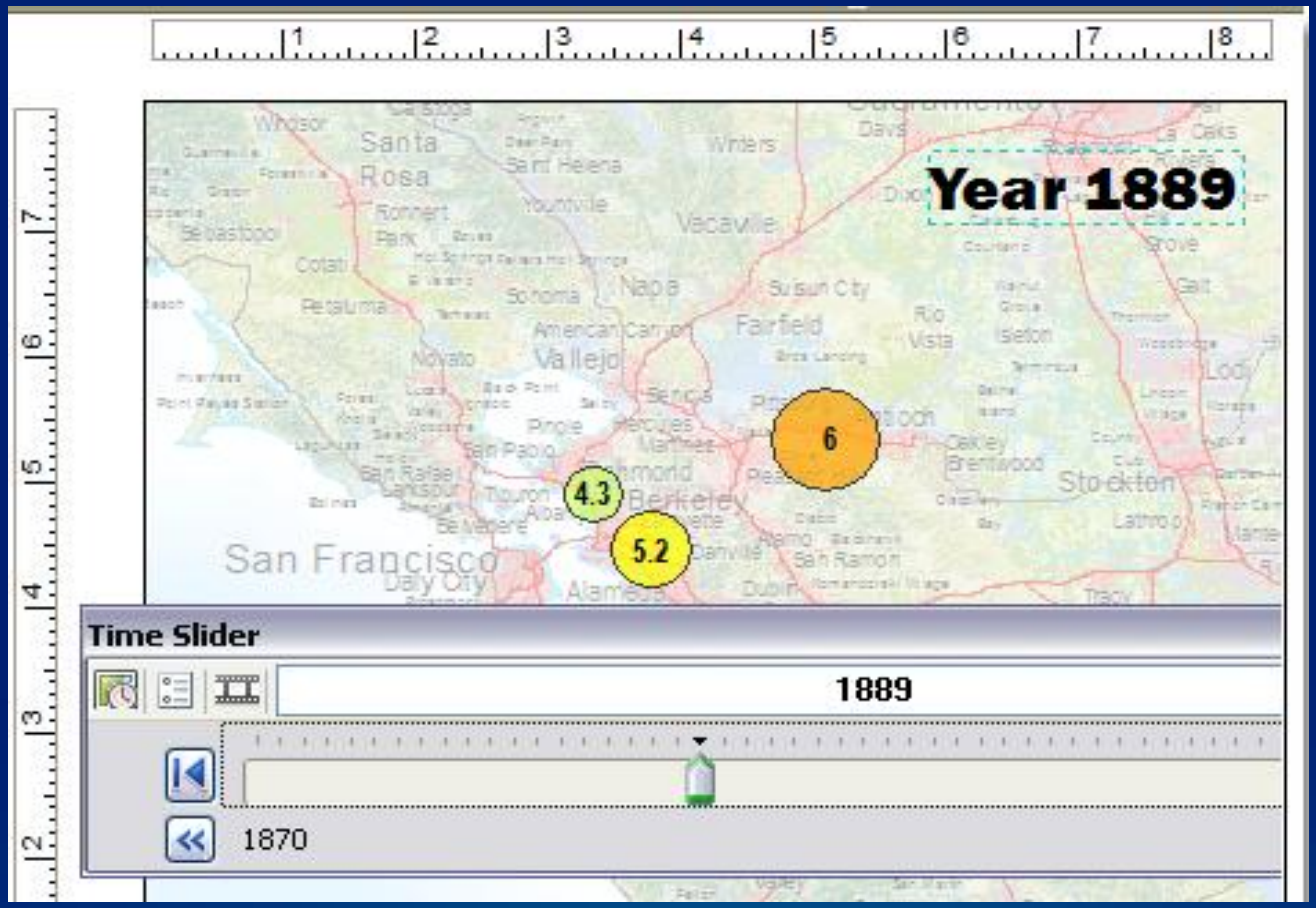
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播放时间数据

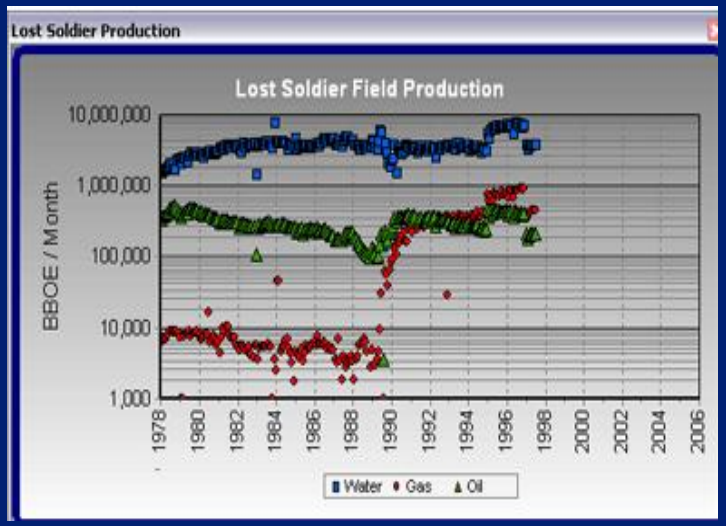


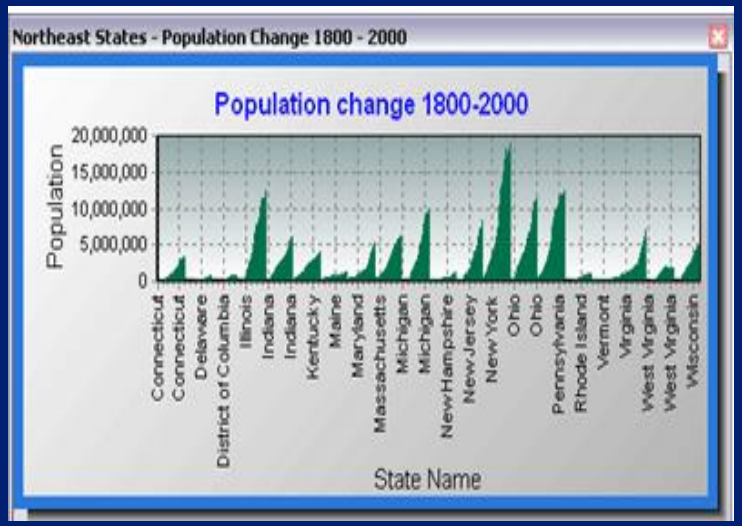
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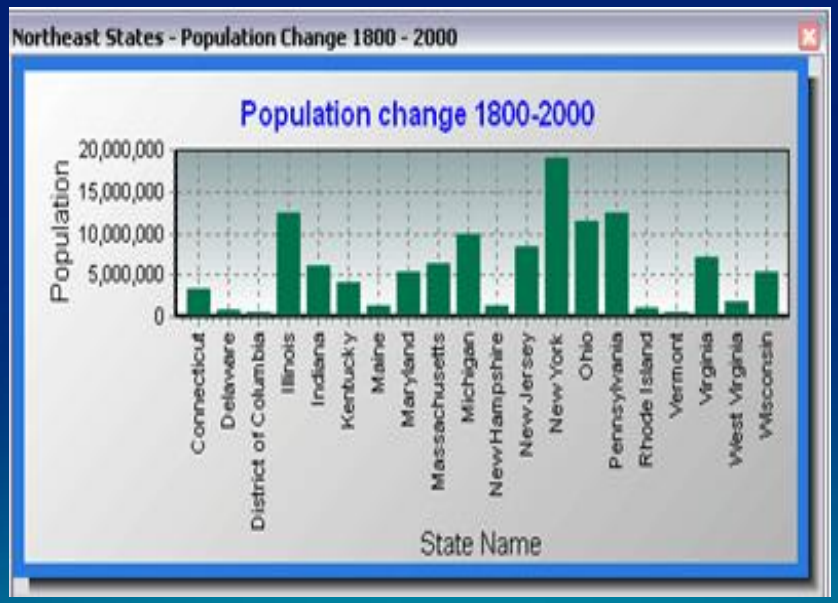
将时间文本添加到您的地图



图表表示时间数据

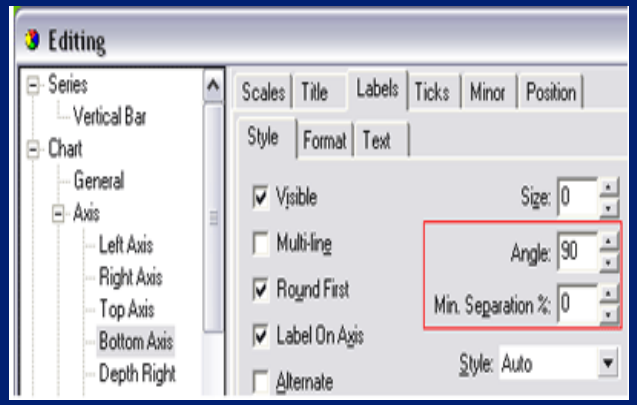


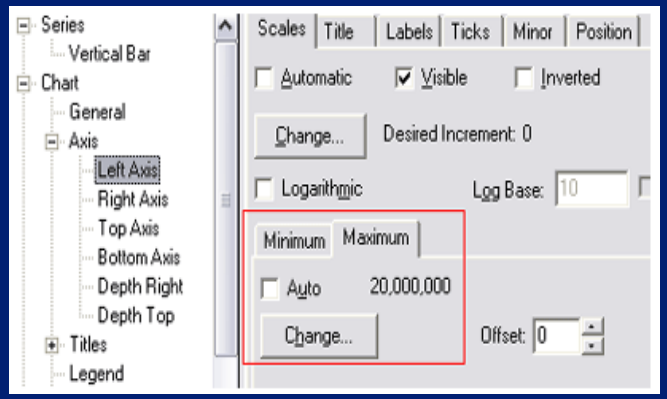


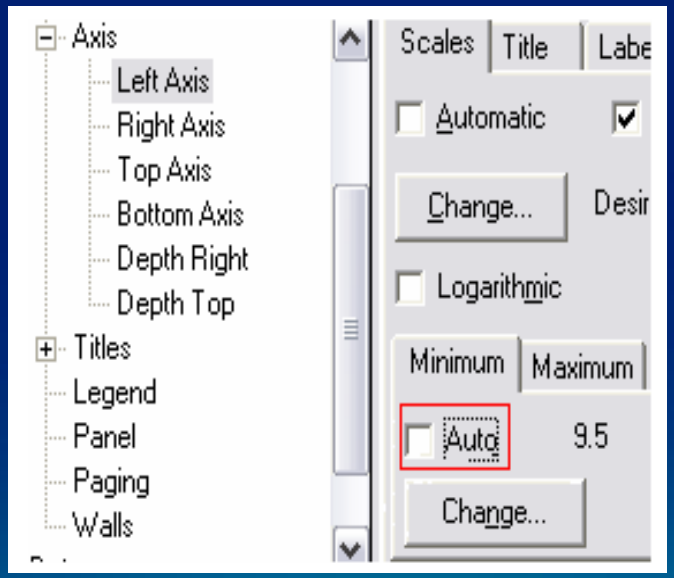


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动画图的提示

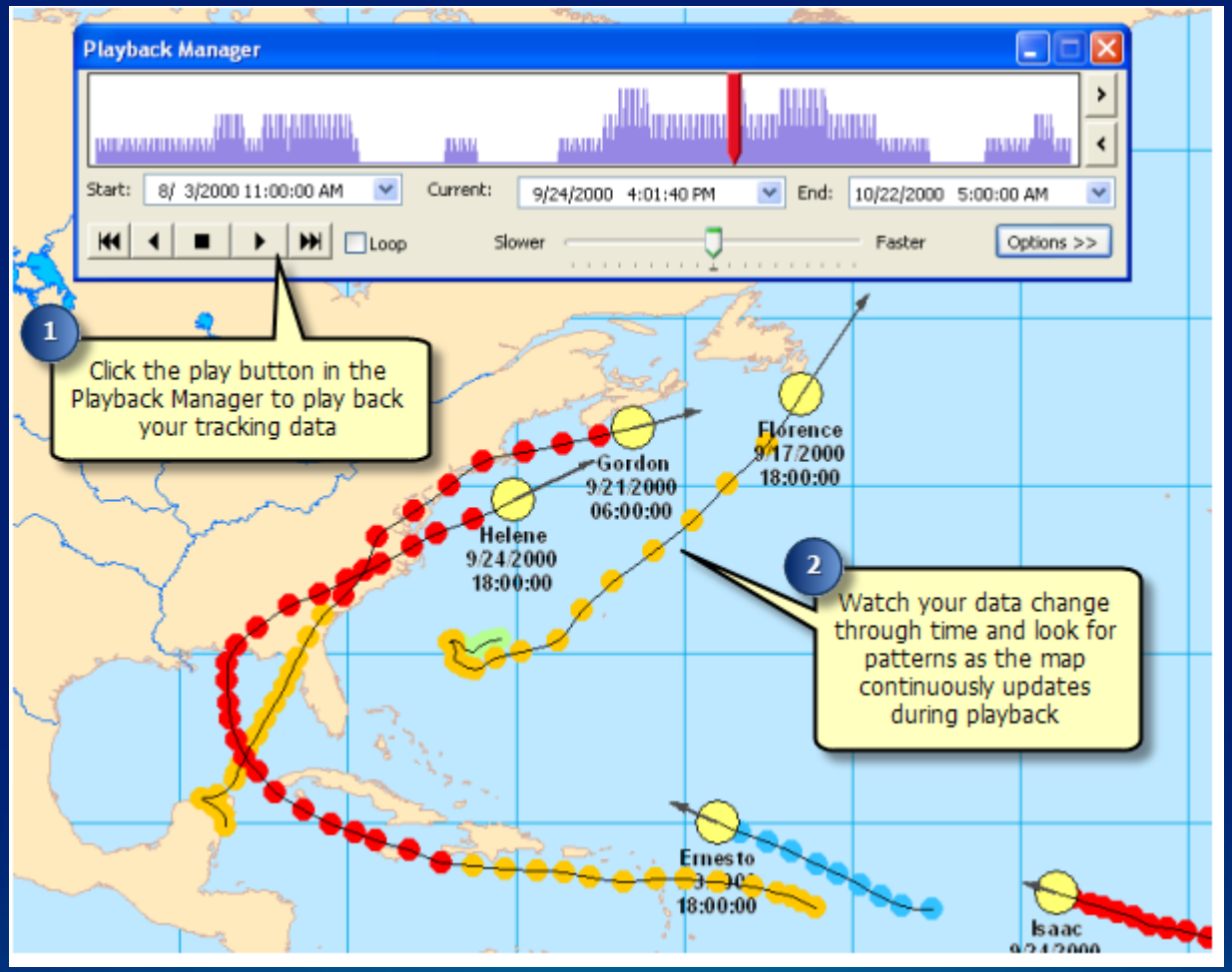




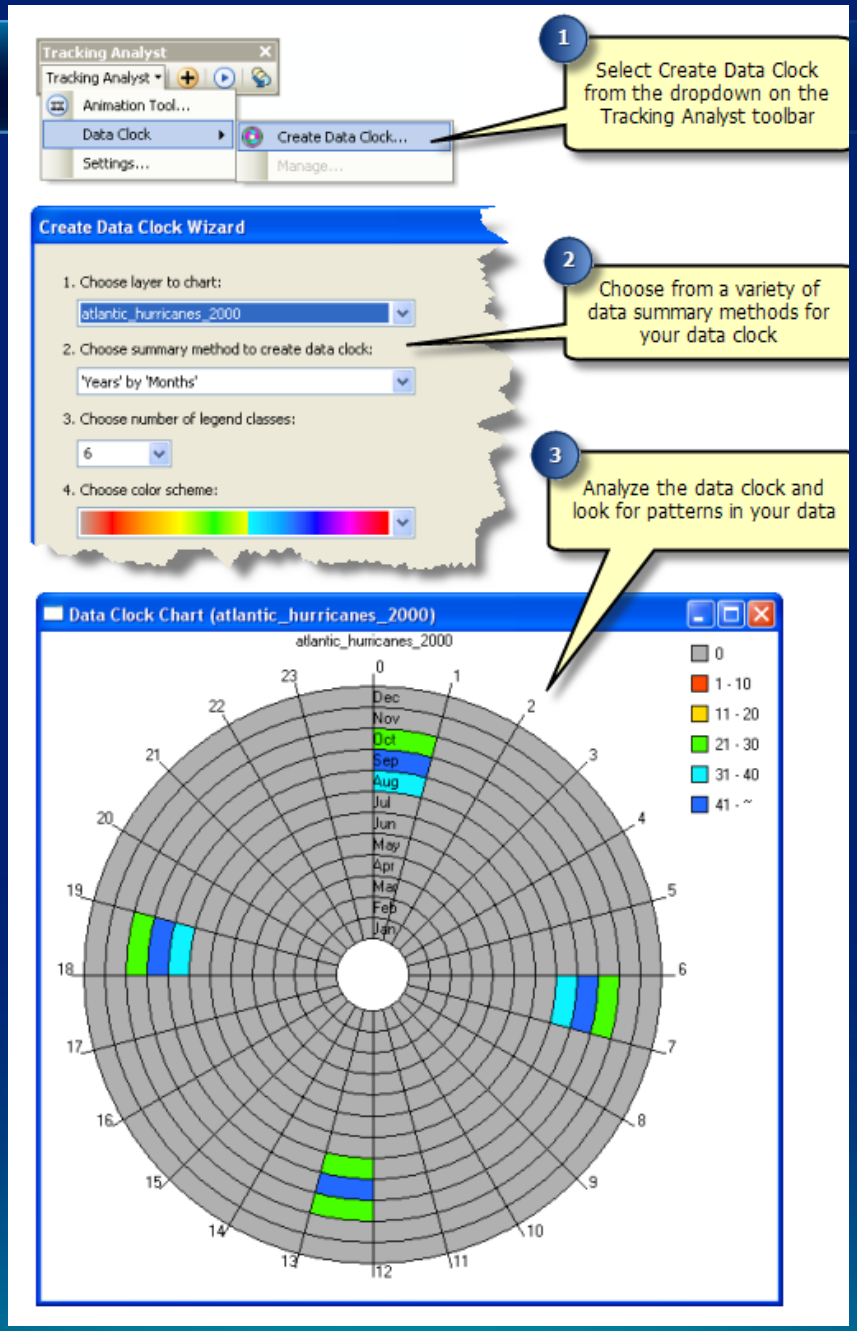


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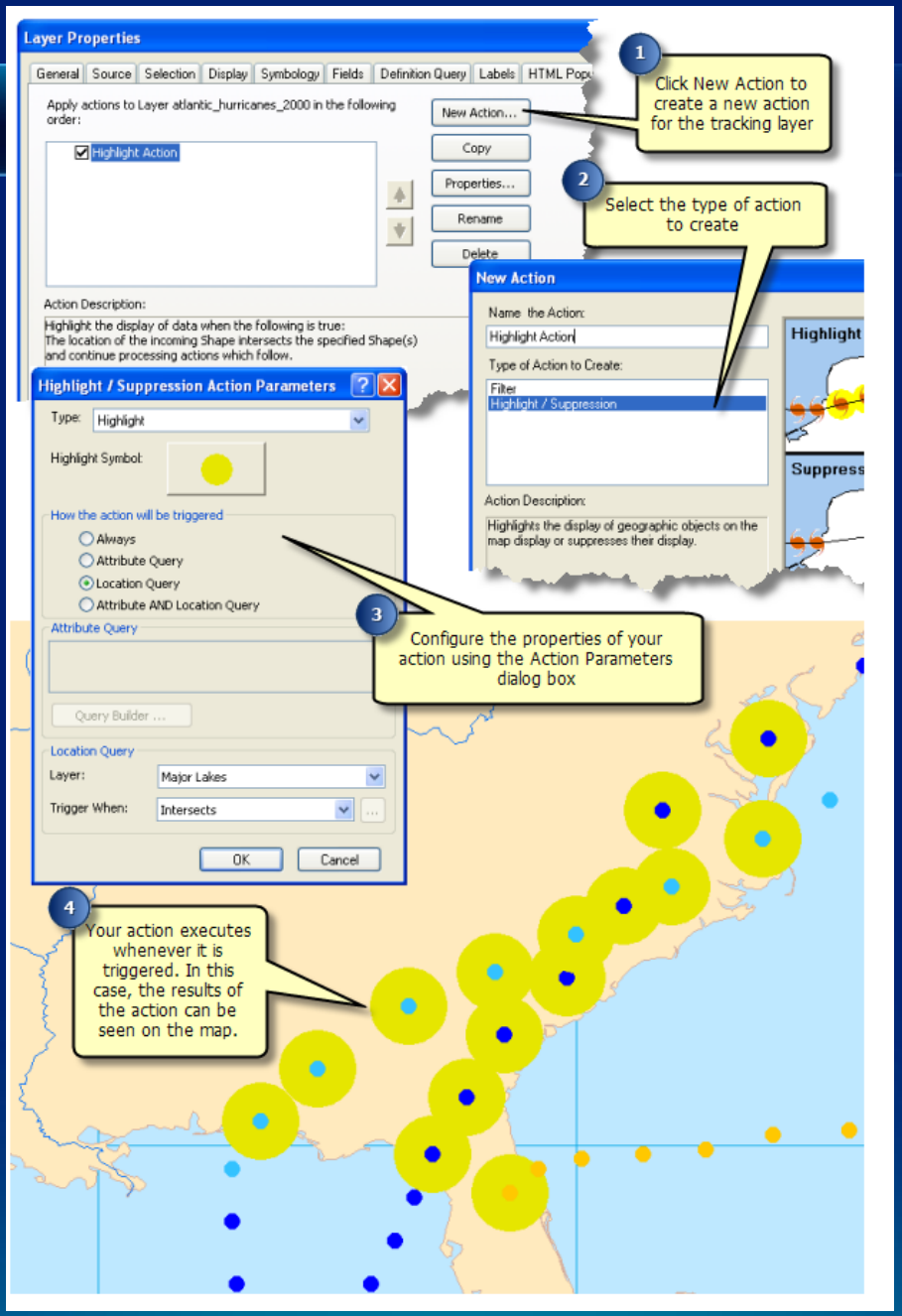
Tracking Analyst



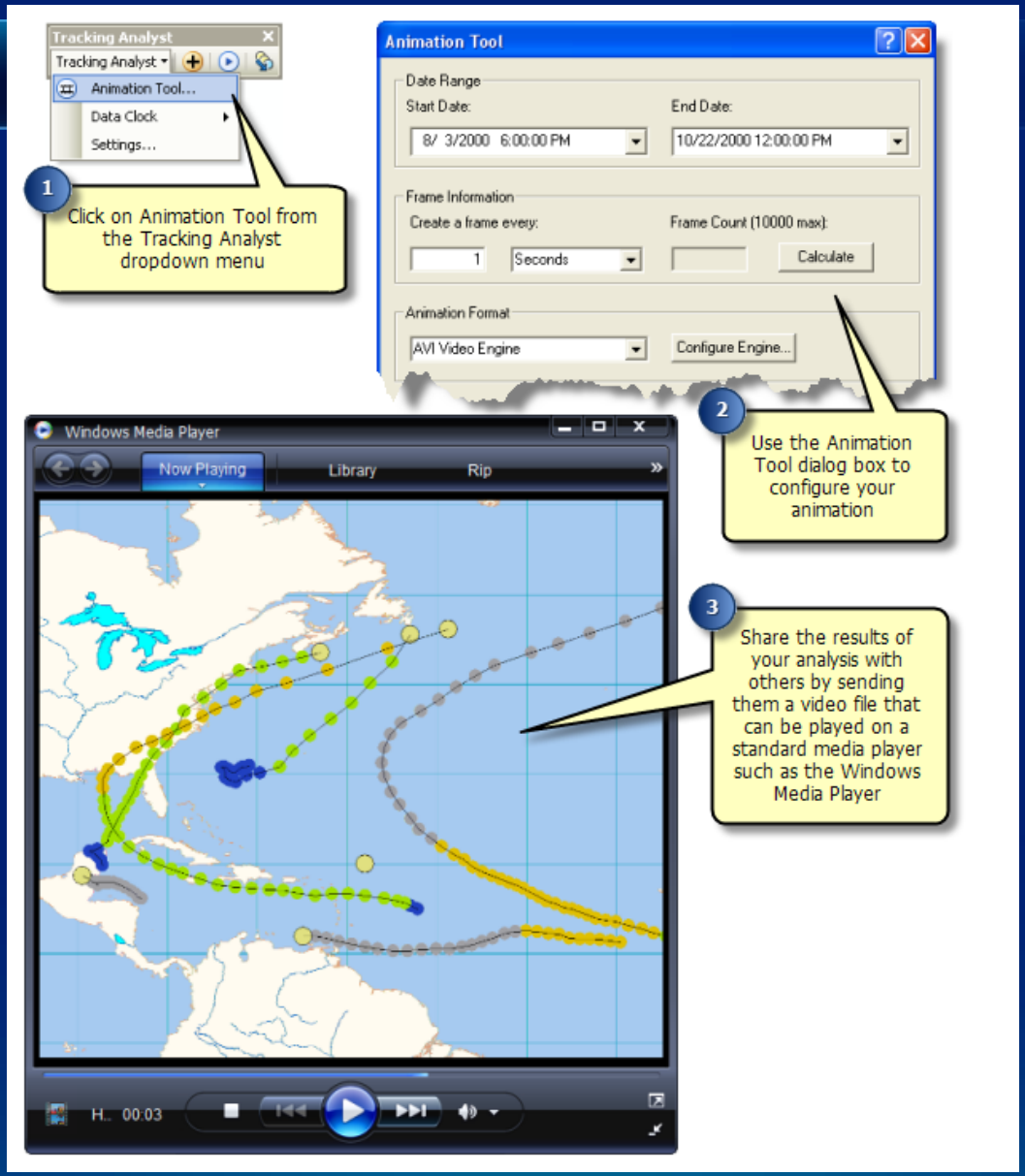
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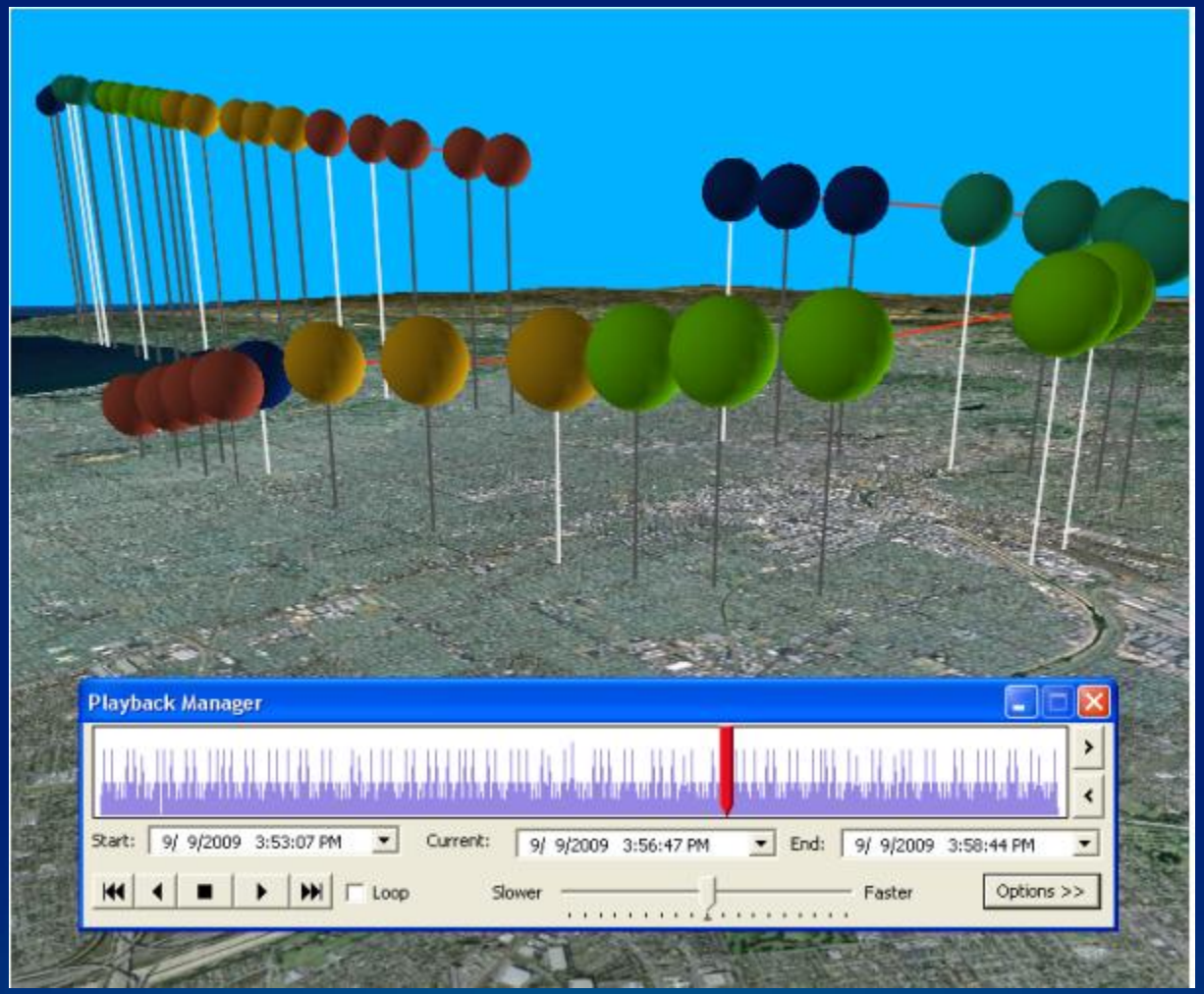


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Tracking Analyst
Tracking Analyst
Animation Tool...
Data Clock
Settings...
1
Click on Animation Tool from the Tracking Analyst dropdown menu
Animation Tool
Date Range
Start Date:
End Date:
8/ 3/2000 6:00:00 PM
10/22/2000 12:00:00 PM
Frame Information
Create a frame every:
Frame Count (10000 max):
1
Seconds
Calculate
Animation Format
AVI Video Engine
Configure Engine...
2
Use the Animation Tool dialog box to configure your animation
Windows Media Player
Now Playing
Library
Rip
H.. 00:03
3
Share the results of your analysis with others by sending them a video file that can be played on a standard media player such as the Windows Media Player


Playback Manager
Start: 9/ 9/2009 3:53:07 PM
Current: 9/ 9/2009 3:56:47 PM
End: 9/ 9/2009 3:58:44 PM
Loop
Slower
Faster
Options >>



存储和导出时态数据

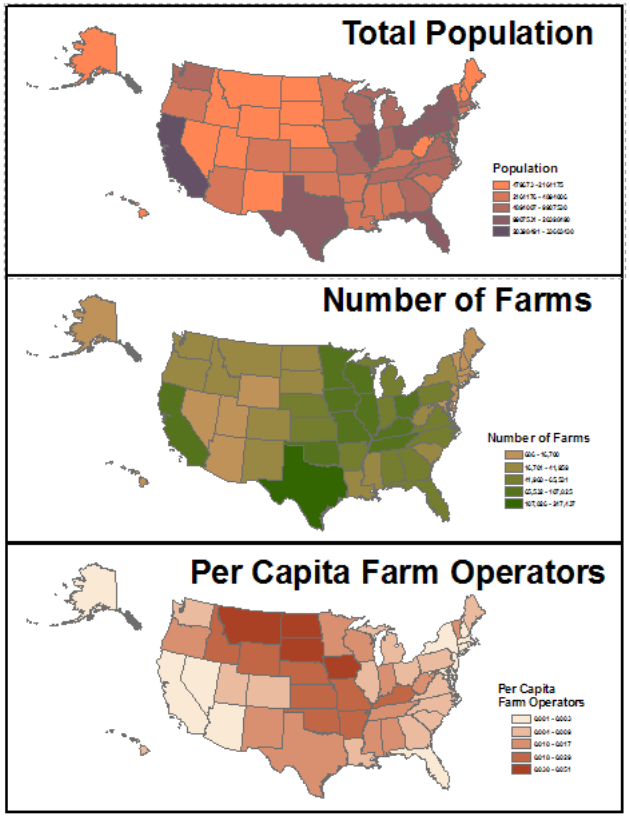
存储和导出时态数据

- 保存时间地图（demo）
- 导出视频 （demo）
- 作为序列图像导出
- 生成多个的数据帧布局的时间系列的视频

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United States Agriculture

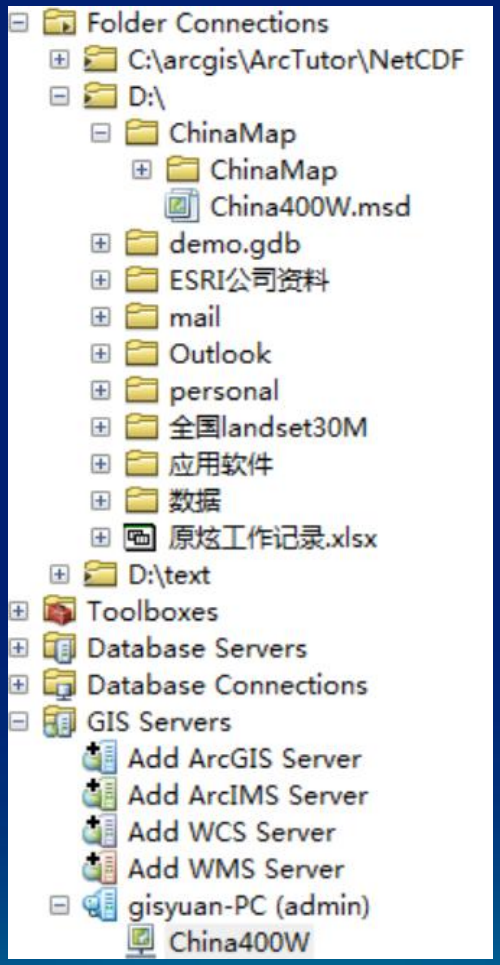
Year 2007



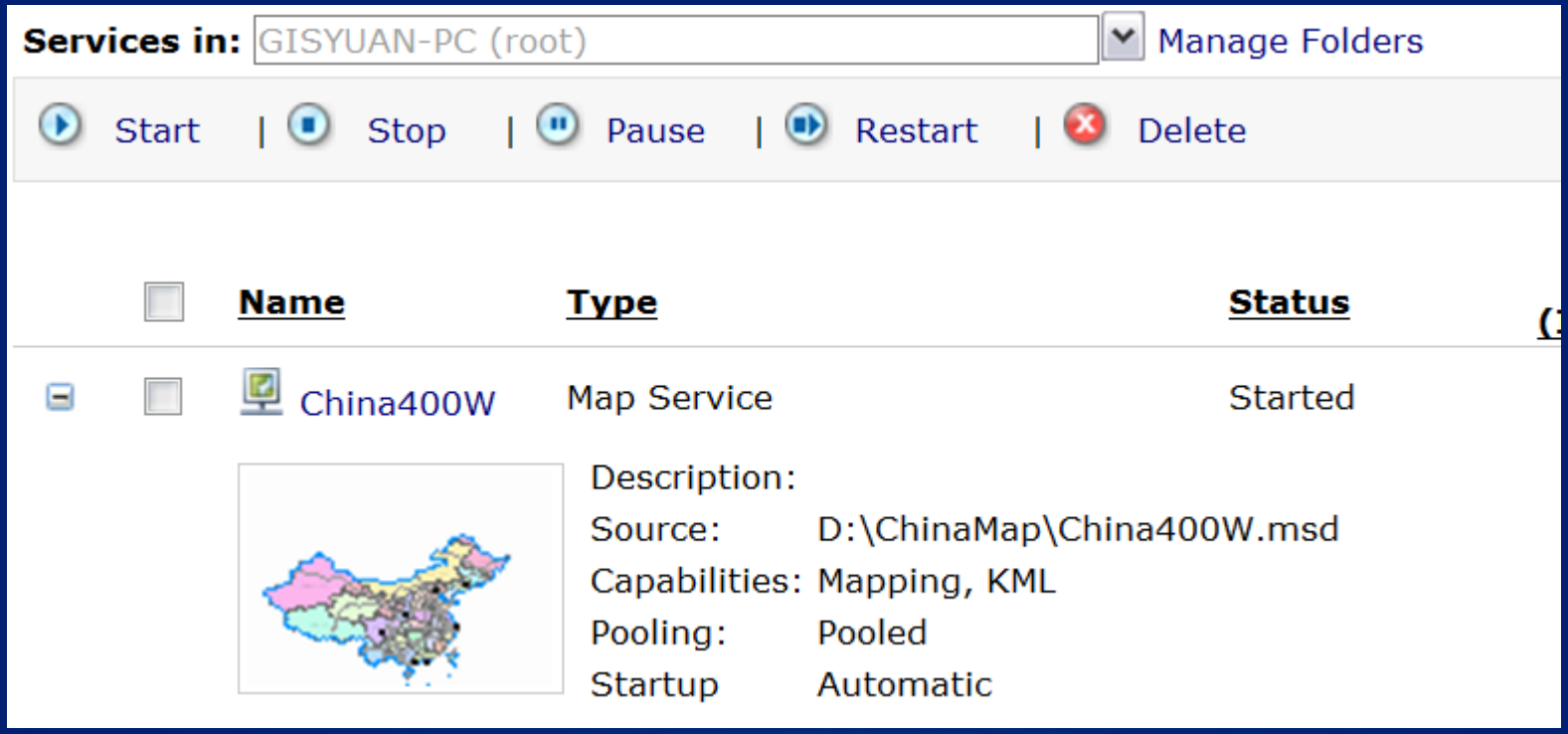
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发布地图服务



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谢 谢！

