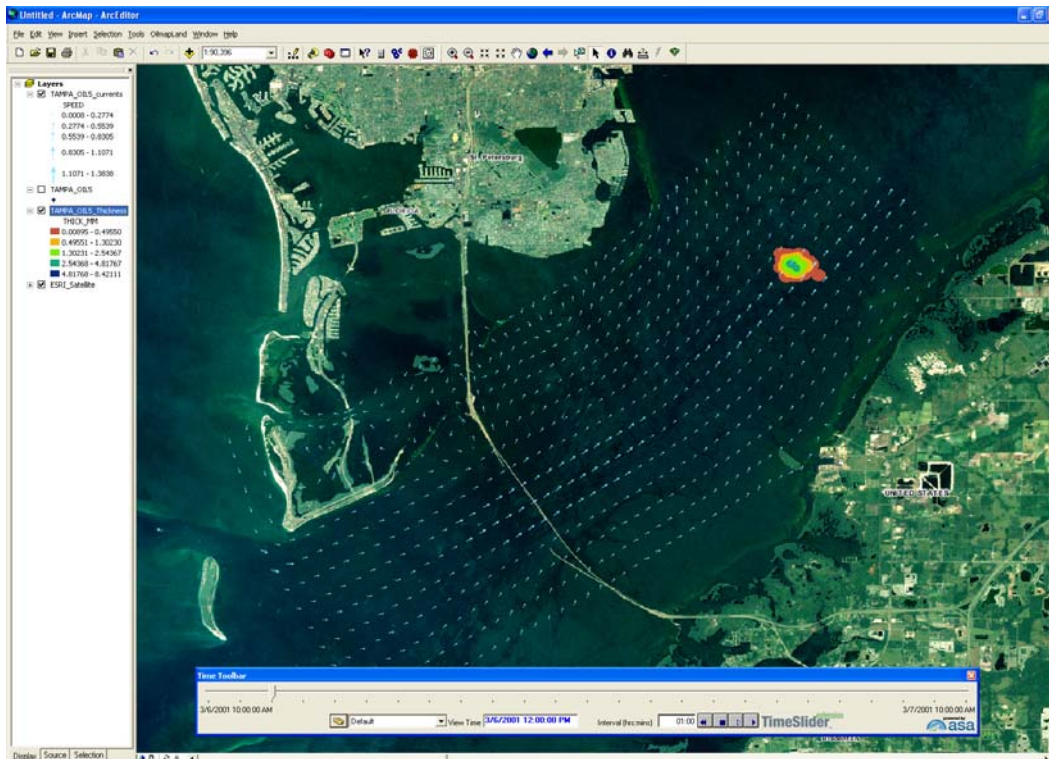




User Guide

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ASA's TimeSlider™ is an extension for ArcGIS 9.1 and 9.2 that provides functionality to animate feature data that has date and time information. One of the challenges with managing 2 and 3-dimensional geospatial data is displaying and understanding data as it evolves over time. Many geographically-based phenomena ranging from geological processes to short-term movement of vehicles or marine mammals require temporal analysis. The TimeSlider extension allows ArcMap users to specify a field that contains date and time information for geographic features. The TimeSlider can manage multiple time-varying layers, including layers that have different time steps. As an example, GPS-locations may have a frequency of 6 seconds, and weather data has new observations every 30 minutes; the TimeSlider will recognize the different time steps, select the most appropriate time step and display the correct data as the user animates in time.

The installation includes sample time-varying feature data:

- Particles (point features) that represent a simulation of avian flocking behavior over time
- Concentrations (polygon features) that represent concentrations of benzene in a moving air plume
- Surface water currents from a computer model represented as point features with speed and direction attributes
- Oil spill concentrations
- Flood inundation predictions.

All of the sample data is provided as standard ESRI SHP files.

The TimeSlider extension has been used to manage time-varying data such as:

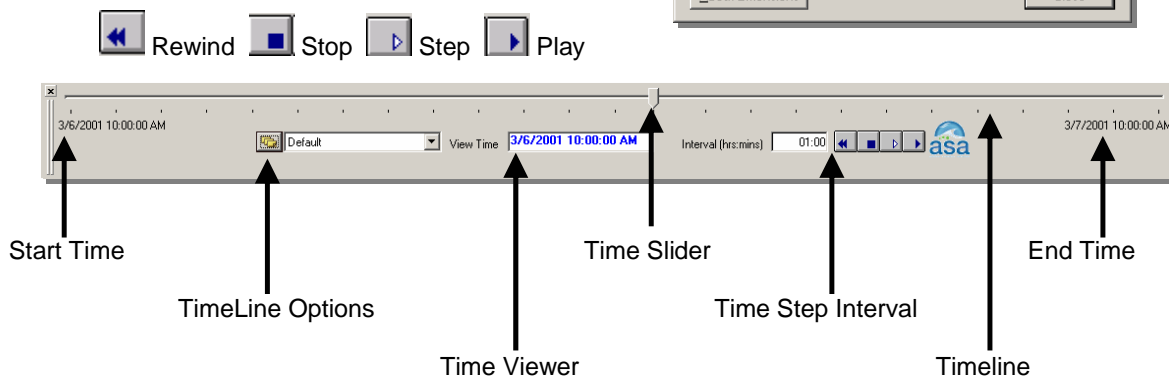
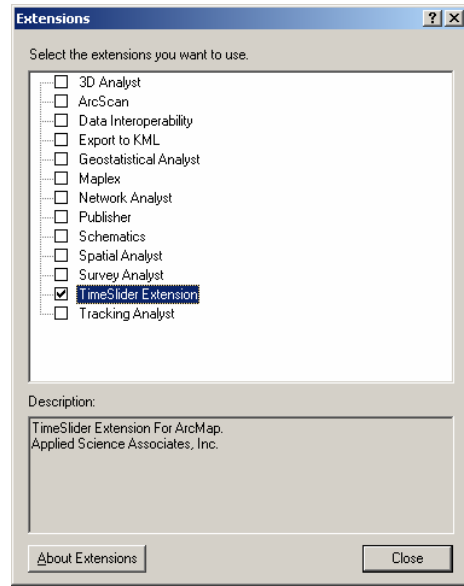
- Time series observation data from multiple points (e.g. current meters, wind stations, water quality sensors)
- Satellite derived observation data (e.g. sea surface temperature)
- Moving objects (e.g. drifting buoys, vehicles, vessels)
- Numerical model Results (e.g. oil spills, hydrodynamic simulations, sediment transport)
- Intelligent agent models (e.g. bird movement, pandemic outbreak, fish schooling, crowd simulation)
- Emergency personnel and resource deployments

The TimeSlider extension is made available for free download and use. No maintenance or technical support is provided, but comments and suggestions may be sent to timeslider@asascience.com.

ASA is a global science and technology solutions company. Through consulting, environmental modeling, and application development, ASA helps a diverse range of clients investigate their issues of concern and obtain functional answers. Headquartered in Narragansett, RI, ASA also has offices in Australia, Brazil, and Dubai. The company's website, www.asascience.com, contains numerous scientific reports written by its staff and extensive information about its products and services.

Getting Started in ArcMap 9

1. When you open a new ArcMap project, you will need to enable the TimeSlider extension. To do this select **Extensions** from the **Tools** menu.
2. Add a check to the boxes next to the extension to enable it.
3. The TimeSlider is easily docked into the bottom of the ArcMap window.

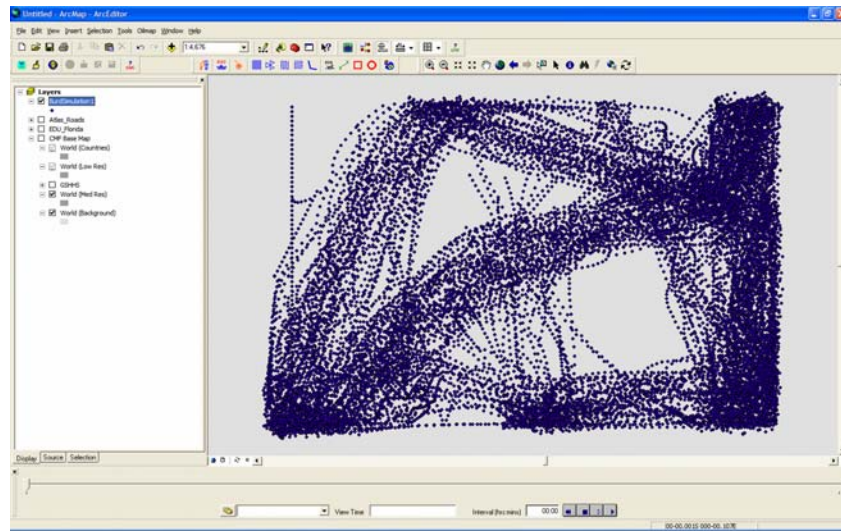


4. You may animate the Time Series from start to finish by clicking the **Play** button, or you may view one frame at a time by clicking the **Step** button. To return to the start of the simulation, press the **Rewind** button.

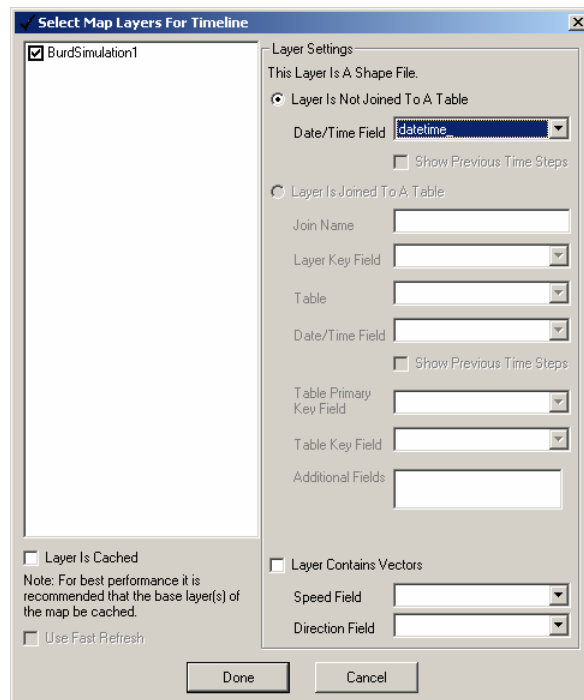
Sample – Viewing Time Series Data - BIRD SIMULATION

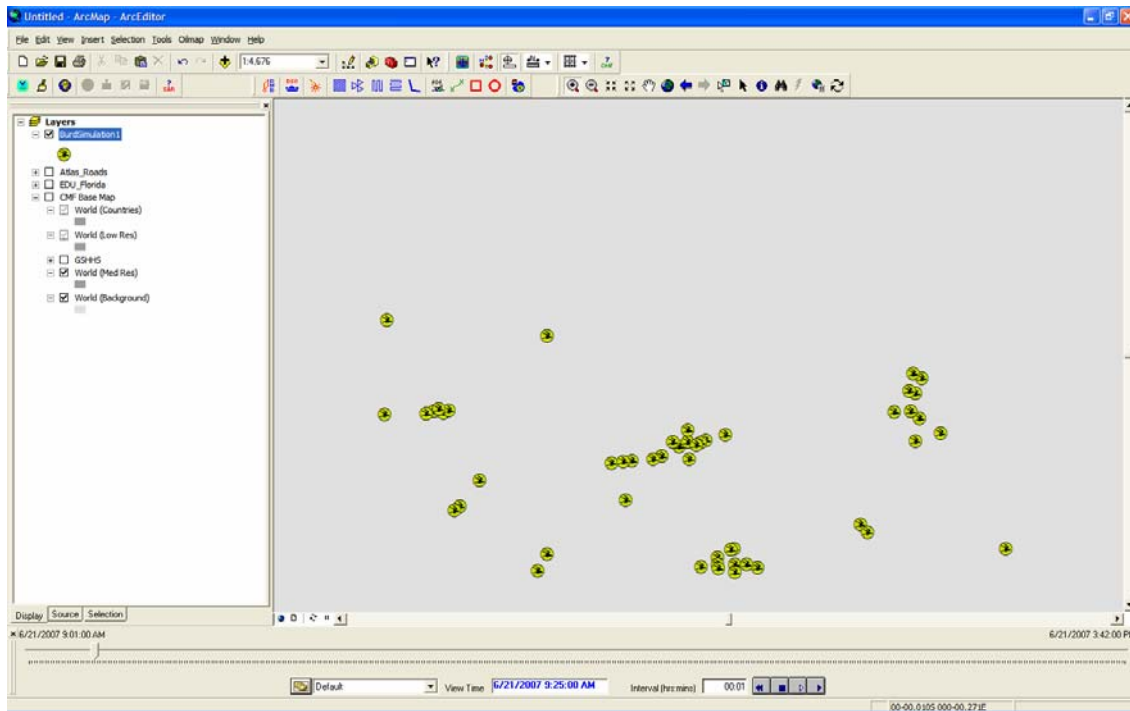
The following example shows a simple time series animated with the TimeSlider. The data represents bird flights tracked for a period of nearly 7 hours.

1. Open ArcMap and enable the TimeSlider extension, if you have not done so already.
2. Click the **Add Data** icon in ArcMap. Navigate to the sample data folder provided with TimeSlider at *C:\Time Slider\Sample Data\Birds* and add **BurdSimulation1.shp** to the map. Zoom to layer to locate the data on the map. This shapefile includes Date/Time attributes and can be added to the TimeSlider and viewed in a Time Series. The shapefile shows all of the positions of the birds at once. You may wish to label or change the colors of the individual birds for easier viewing.



3. Click the **Add Data** icon on the TimeSlider. This will add the shapefiles to the TimeSlider. Check the box next to the **BurdSimulation1** shapefile, and select the date/time field. For data to run in the TimeSlider, it must have a field with a sequential listing of times.
4. The shapefile will now show only one position for each bird: the starting position at 9:01 AM. Clicking the **Play** button will animate the time series, showing the movements of the flock of birds over the next 6 hours and 41 minutes.



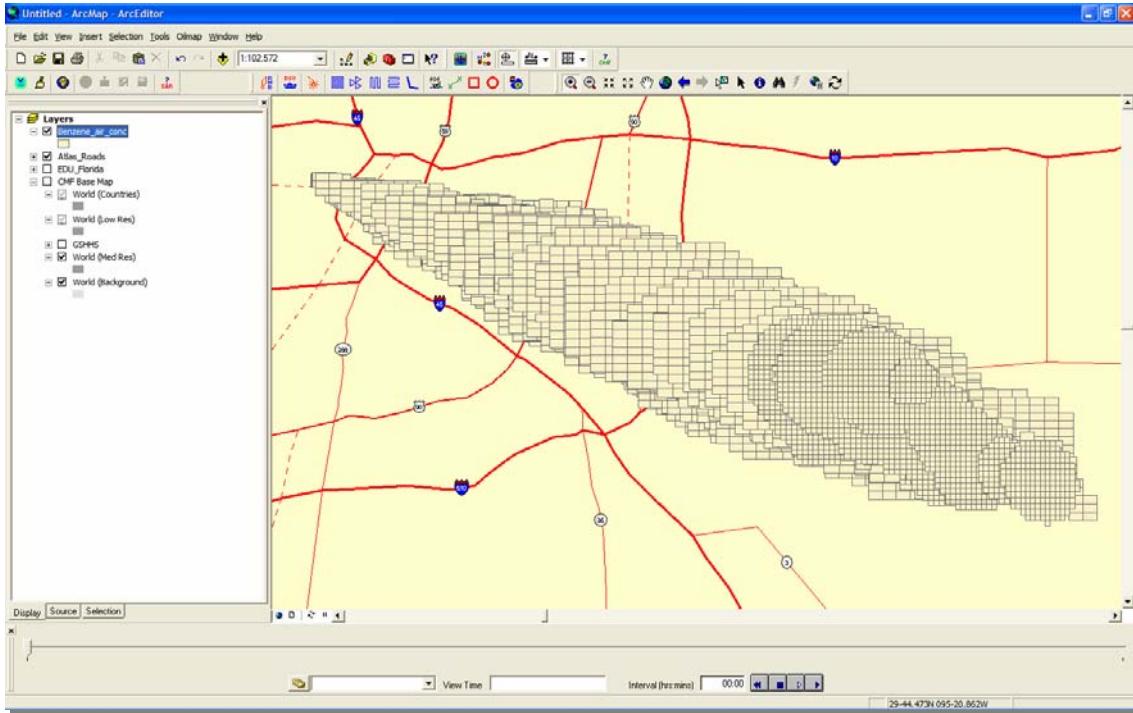


Example of a single time step showing bird locations

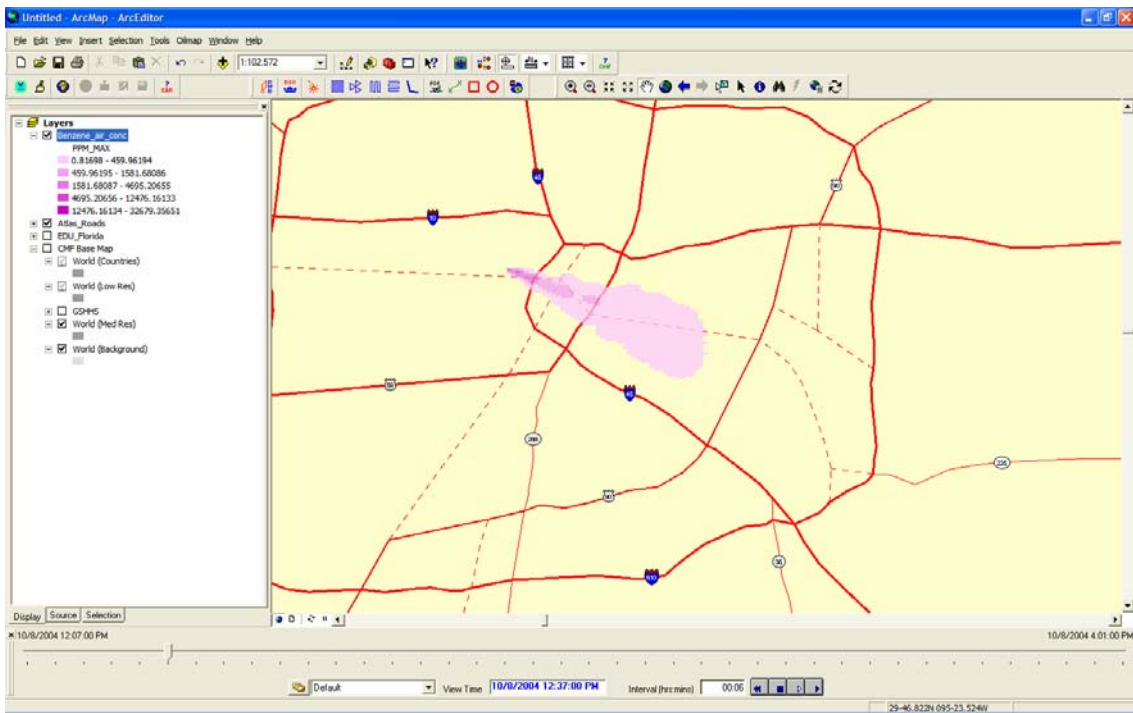
Sample – Changing Properties Over Time - ATMOSPHERIC PLUME

The first example demonstrated the movement of objects, in this case birds, over a period of time. Each bird moved vertically and horizontally over time, but did not change any of its characteristics. When modeling a time series of data, you may find it necessary to display a change in the properties of an object as it travels or as time progresses. This example demonstrates the changing concentrations over time of a release of a chemical plume into the atmosphere.

1. Open ArcMap and enable the TimeSlider extension.
2. Click on the **Add Data** icon in ArcMap and select the **Benzene-air-conc.shp** shapefile in the *C:\Time Slider\Sample Data\Benzene* folder. This shapefile represents a chemical plume produced by ASA's AIRMAP model.
3. Right-click on the shapefile in the Table of Contents and select **Properties**. Select the **Symbology** tab and **Quantities** from the list, and **Graduated Colors**. For the best appearance, it is recommended to use Graduated Colors with no outline. Set the database field that the values will be taken from to **PPM_MAX**. This field is the maximum concentration, in parts per million, of the chemical in the atmosphere. Readjust the class breaks to best display the data.
4. You may also want to add a base map of the Tampa Bay area to your project for reference.
5. Click on the **Add Data** icon on the TimeSlider. Check the box next to the Benzene-air-conc shapefile and select the Date\Time field. Click **Done**.
6. Click **Play** to animate the shapefile. Note the changing chemical concentrations.



Benzene plume before it is added to the TimeSlider



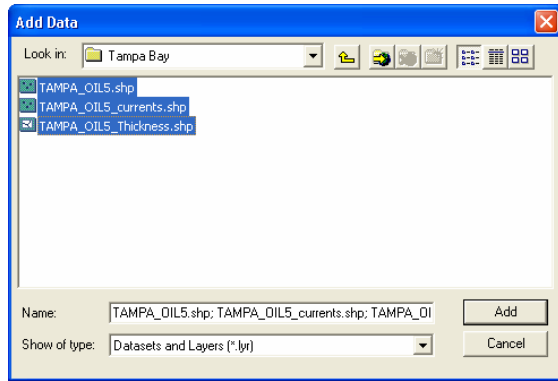
Benzene plume after it is added to the TimeSlider

Sample – Displaying Speed and Direction - OIL SPILL

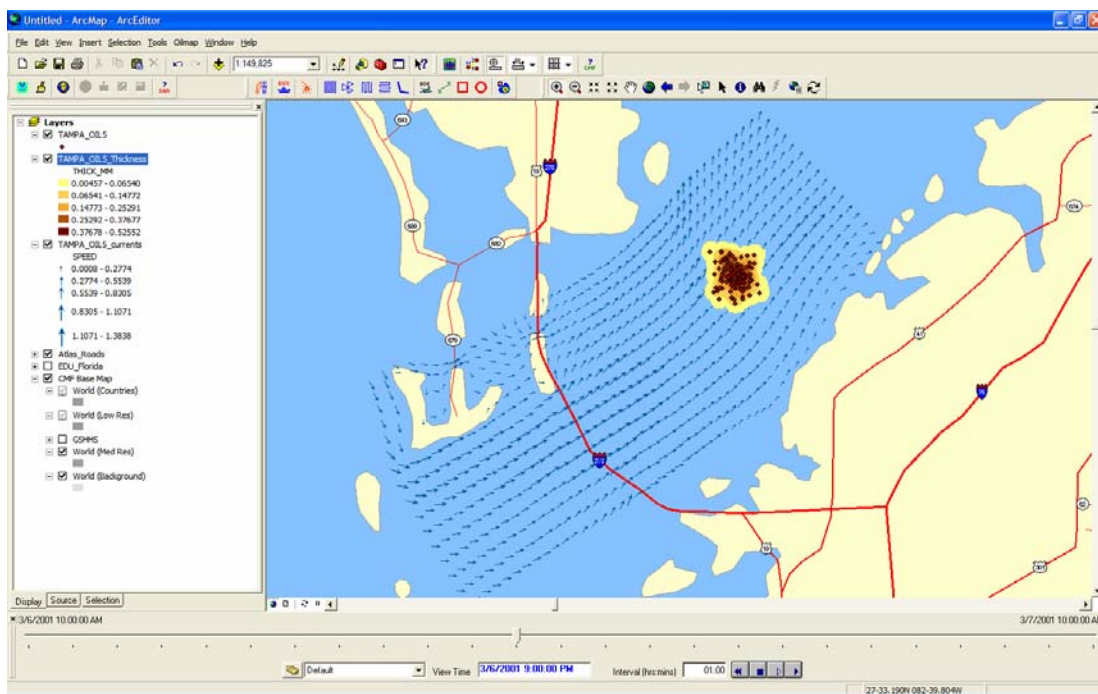
The following example illustrates how TimeSlider displays speed or directional data over time.

1. Open ArcMap and enable the TimeSlider extension.
2. You may want to add a base map of the Tampa Bay area to your project for reference.
3. Now we will add some current data and an oil spill model trajectory. Click the ArcGIS **Add Data** icon to add the three shapefiles from the *C:\Time Slider\Sample Data\Tampa Bay* directory.

When the three shapefiles are added to the map window, they may not have the appropriate symbology (i.e. points instead of vectors). This will be corrected in the next step for the vectors. However, you may want to change the symbology for the **TAMPA_OIL5_Thickness** file now, displaying it with graduated colors and readjusting the class breaks. In the Table of Contents, right-click on the **TAMPA_OIL5_Thickness** file and select **Properties** from the drop-down menu. Use the **THICK_MM** database field to set the value. Select the **Symbology** tab to edit the appearance of shapefiles. For the best appearance, Graduated Colors with no outline is recommended.



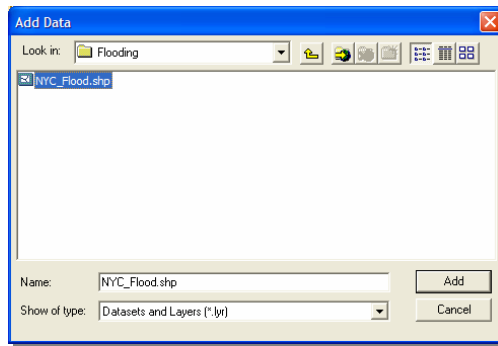
4. Click the **Add Data** icon on the TimeSlider. Check the box next to each of the shapefiles. Under the Layer Settings, the Date/Time Field should automatically be filled with the appropriate option for all three shapefiles. However, for **TAMPA_OIL5_currents** you will have to check the box next to **Layer Contains Vectors**. The Speed and Direction fields should automatically and correctly be chosen. Click **Done**, and click **Play** on the TimeSlider. Current speed and direction will now be displayed as arrows of variable size.



Sample – Displaying Flood Inundation Maps

The following example illustrates how TimeSlider displays flood polygon features over time.

1. Open ArcMap and enable the TimeSlider extension.
2. You may want to add a base map of the New York area to your project for reference.
3. Now we will add some flood inundation data. Click the ArcGIS **Add Data** icon to add the shapefile from the *C:\Time Slider\Sample Data\Flooding* directory.



4. Click the **Add Data** icon on the TimeSlider. Check the box next to the NYC_Flood layer. Under the Layer Settings, the Date/Time Field should automatically be filled with the appropriate option. Use the animation tools to watch the inundation evolve over time.
5. Note: You may set the polygons to transparent, but ArcMap will cause a complete refresh on each time step, including underlying layers, when transparency is on, so the animation will blink.

