TimeWeb™ Tutorial for Prehistoric Puzzles

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Introduction

How can archaeologists take strands of evidence from ancient sites and weave them together into stories of ancient lives? How can bits and pieces of data at individual sites be connected through time and space to build a "big picture" of what happened in the past? Archaeologists spend long hours comparing artifacts and other types of evidence from site to site, looking for patterns in the ancient evidence. Now, using a new tool to explore data on the web, you can follow in the archaeologists' footsteps to explore patterns of evidence for yourself.

TimeWeb is a tool for exploring patterns of human behavior through time and space. We will use it to connect to an archaeological database and investigate puzzles of prehistoric evidence. Our exploration will focus on interpreting evidence from sites in Africa. Africa is the continent that preserves the longest record of human achievement on earth, from the earliest Stone Age sites to evidence of complex cities and historical sites. The African Archaeology Database you will be using contains information on selected sites that span this time range from all corners of the continent.

The African Archaeology Database

The database we will be exploring contains information about archaeological sites, their regional and environmental context, and what types of artifacts and other remains were found in them.

Data on site context. You will be able to look through sites in the database according to their geographic region or country, and their environmental or geological context. For example, you can choose to look only for sites that are in South Africa that are also in lowland zones *and* that formed in caves.

Data on artifacts and other finds in sites. The types of evidence recovered from different archaeological sites in this database have been grouped into six different categories:

- **Artifacts** (portable objects that have been manufactured or used by people)
- **Features** (hearths, postholes, middens, rockart, or other signs of human activity that formed or were created as a part of the site location)
- **Plant remains** (includes dried or carbonized plant parts, impressions, etc.)
- **Animal remains** (includes bones, hair, dung, etc. of all non-human animals)
- **Human remains** (includes bones, hair, dung, etc., of members of the Hominid family)
- **Geological evidence** (includes soil samples, etc.)

As you know, archaeologists love to carefully describe and classify things! One of the reasons they classify is so that they can compare the types of artifacts, bones and other finds reported from different sites without having to examine the original specimens each time. You will discover that the different types of evidence found at the sites have been classified in a variety of ways in our database, and you can use these different classification schemes to search for sites that contain specific types of data in which you are interested. For example, animal remains were recovered from many sites in the database, and many of these remains have been classified taxonomically – sometimes down to a detailed genus and species level, but sometimes only into a more general category, such as "fish" or "bovid" (the animal family Bovidae that includes antelopes and cows).

Using TimeWeb

Querying the Database

1. We use the tool by first asking a **query**. A query is a request to find particular sites in the database. Here are some requests we can make:

   - Show me all sites from Eastern Africa.
   - Show me all sites that are both from Kenya AND that formed in caves.
   - Show me all sites containing fish bones.
   - Show me all Kenyan sites that contain either goat bones OR cow bones.

   Let's try this!

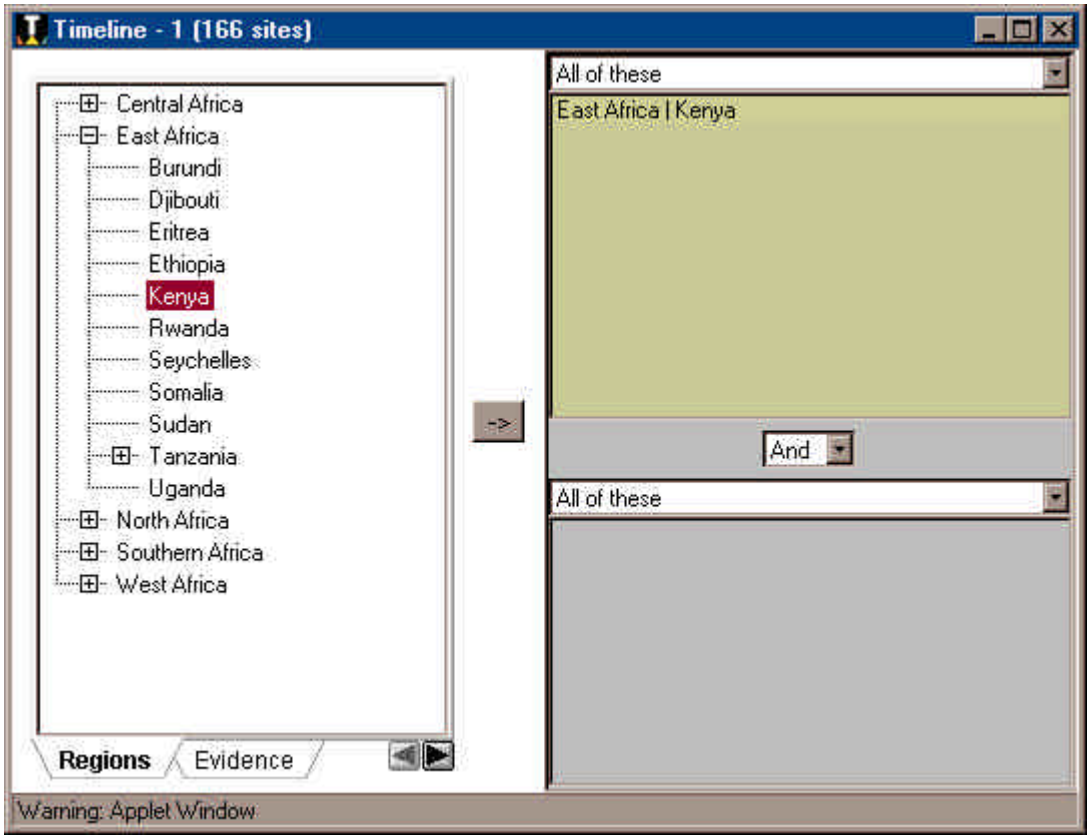
   Let's ask TimeWeb to **show us all sites from Kenya**.

   Look at the left side of the Query Window. Notice that there are tabs at the bottom of the screen that show different categories of information. Click on the tab marked REGION to display the regional list:

   Northern Africa
   Western Africa
   Central Africa
   Eastern Africa
   Southern Africa

2. Click on the square "+" box for **Eastern Africa** to expand this category and to see the menu list of countries. Click on the country **Kenya** so that it is highlighted.

3. Click on the "->" symbol in the center panel to move your country selection into the top box. Your screen should look like this:



4. Now click on the “Run Query” button:

5. The result shows the number of Kenyan sites found in the database reported at the top of the window. In this case, there are **166 sites.**

Some Important Query Tips

- Notice the phrase “All of these”. What does it mean? It means that ALL sites have the characteristics you specify. So if you list Kenya and Tanzania and run the query, you will find *zero* sites. Why? Because no site is both in Kenya and Tanzania! Country classifications are mutually exclusive.

- So what if you want to find all Kenyan sites as well as all the sites located in Tanzania? You need to change the pull down menu from “All of these” to “Some of these”. Logically, you are asking to see sites that are either in Kenya *or* Tanzania.

- Notice the different tabs at the bottom of the query screen. You can query by selecting from any of these classification schemes. For example, you can look for all Kenyan cave sites by selecting "Kenya" from the country list, and "cave" from the list of subcategories of Geological context categories, and choosing "All of these" as the query option.

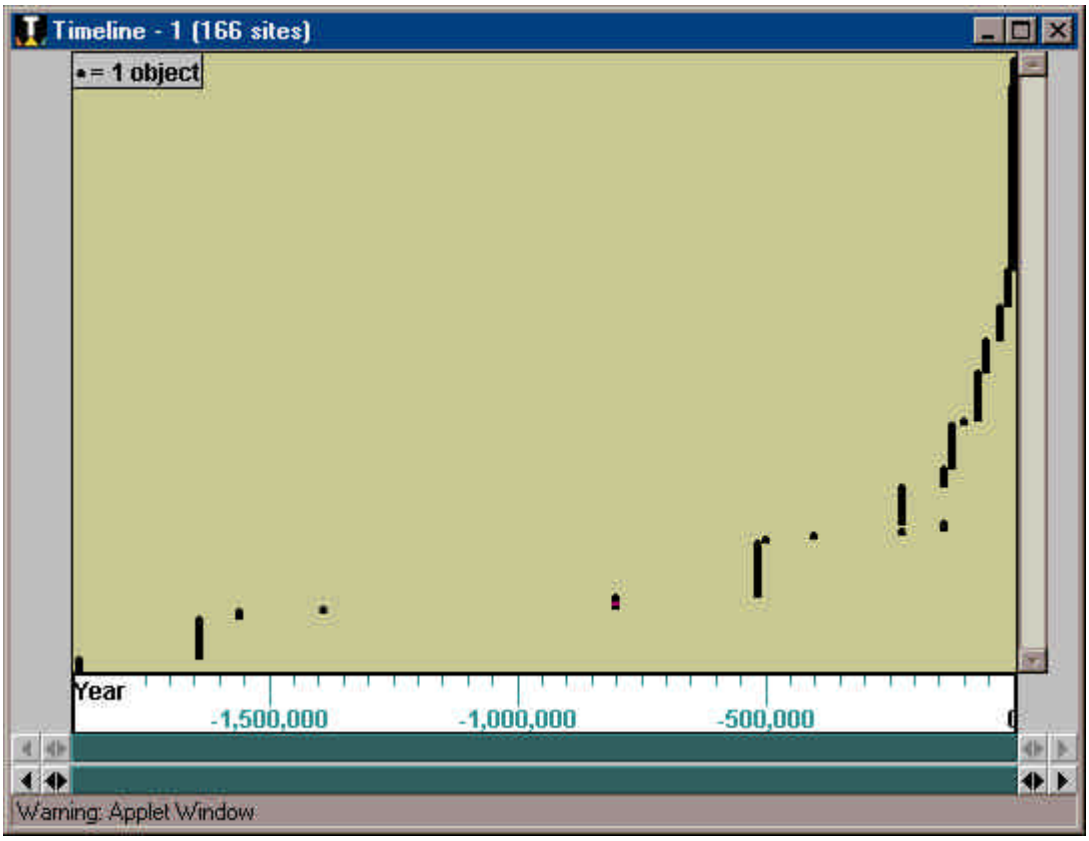
- For advanced queries, you can form a complex logical expression by putting different selection criteria into the upper and lower right-hand query boxes. For example, you could search for sites in Kenya or Tanzania that were NOT cave sites by putting "Some of these: Kenya, Tanzania" in the top box, "None of these: cave" in the lower box, with "AND" in the center panel. But for most purposes, the simple distinction of “All of these” and “Some of these” will be sufficient. **All of these** means that all items in your search must have these features. **Some of these** means that some of the items may have some of the characteristics you listed and some of the items may have other characteristics you listed; in other words, you’ll find all objects that have one or more of these characteristics.

Viewing Sites Chronologically: Forest, Tree, and Leaf

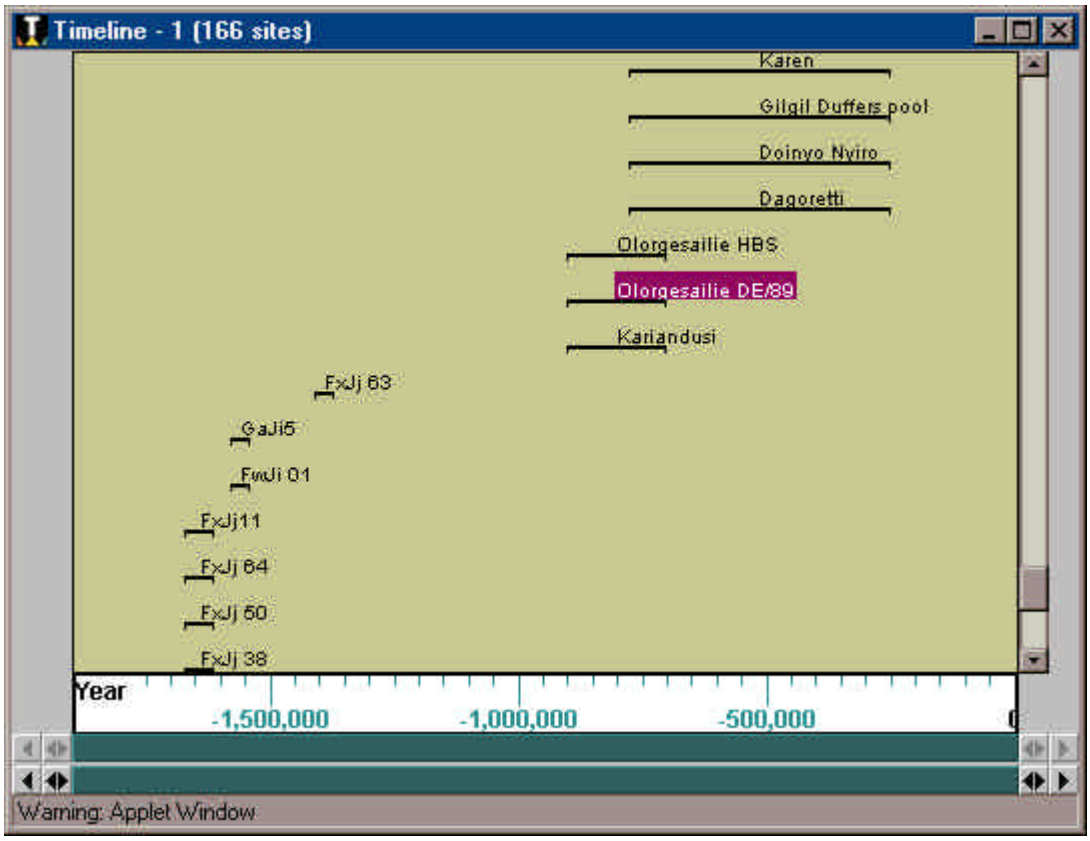
There are three ways to look at the sites after you’ve run a query. Each way is a different view.

1. The **forest** view shows the complete time range of sites that fit your query. Click on the forest button from the top menu to see the artifacts in the forest view: (Note: this menu strip will only be "active" or colorized, after a query has been run.)

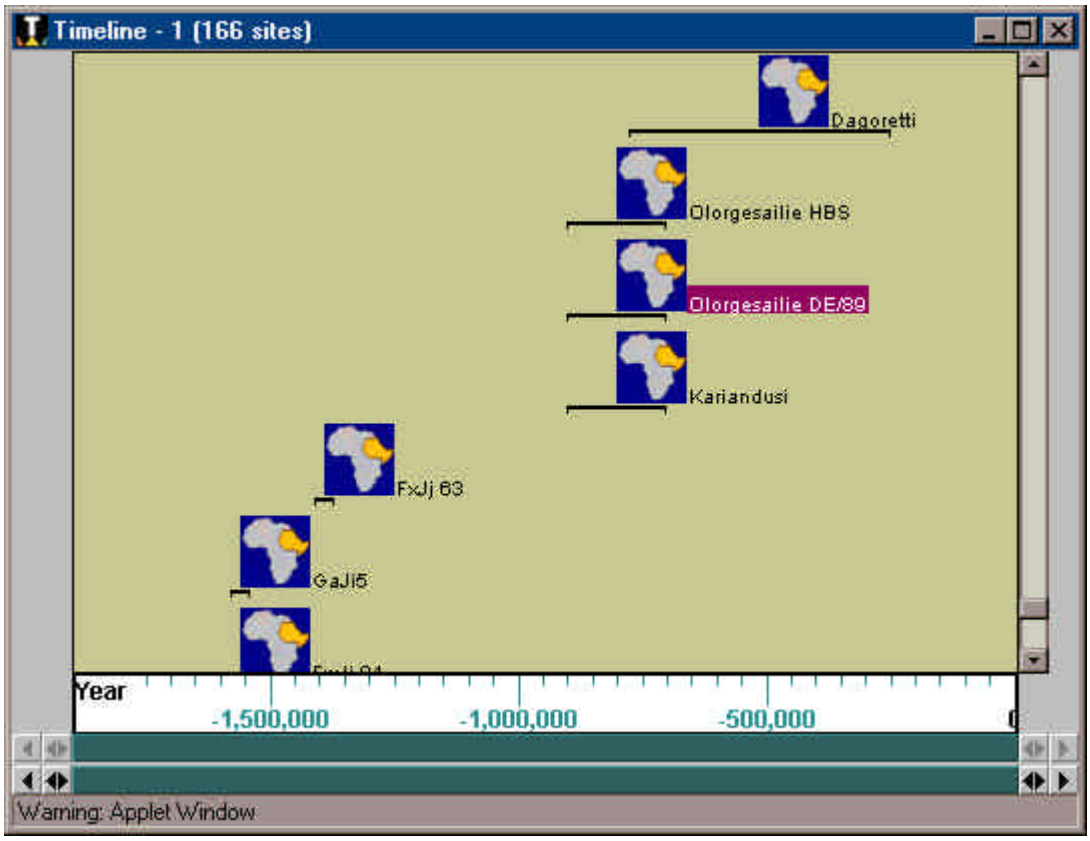
The sites look like dots on the time line. We call this view the forest view because it reminds us of an aerial view of a landscape from the window of an airplane. You can see the general pattern and trends, but you can’t see the details.



2. The **tree** view shows more detail. Click on the tree button to see the sites in the tree view. Now we see more details. Each dot becomes a line with a label. The line tells us the date of the site (the beginning and ending date). Try this. Click the **tree** button.



3. The **leaf** view shows the most detail. Click on the leaf button to see the sites in the leaf view. Now you see little icons representing the region of each site.



Notice that we see more detail. However, we see fewer sites. The closer we get, the more detail we see. The closer we get, the fewer sites we see.

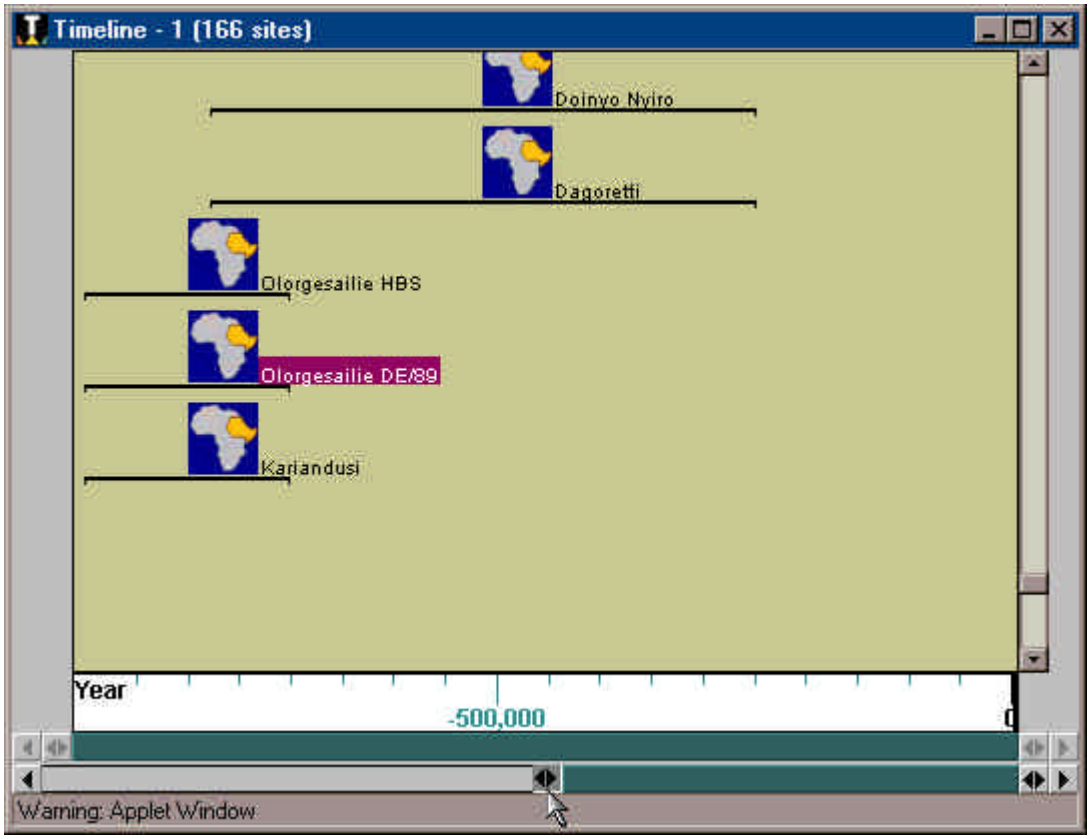
4. The final step is to view a site webpage by **double clicking on one of the site icons**. Here we have selected a site in Kenya called *Olorgesailie DE/89*. The main Olorgesailie DE/89 webpage will appear in a separate window. You can follow the links from this page to explore the descriptions of the site, the different assemblages that were found there, associated dates, and site pictures.

Zooming in Time

In any view of the artifacts, we can change the time scale so that we are looking at a smaller range of years. In the Leaf View above, our time scale showed artifacts from –1,890,000 to 1886 calendar years. (**Note**: while archaeological dates for prehistoric sites are normally reported as date measurements in years "before present," for the purposes of plotting sites from all time periods, the TimeWeb timeline plots in years BC/AD. Negative dates in BLUE represent years BC. Positive dates in BLACK represent years AD. This is just a graphing convention, and does not try to represent correlations with historical events.)

1. By pointing to the zoom bar, holding down your mouse key, and moving your mouse to the right, the bar moves to the right. Try this!

Notice that the time scale changes. Now we see artifacts from –909,928 to 1886.



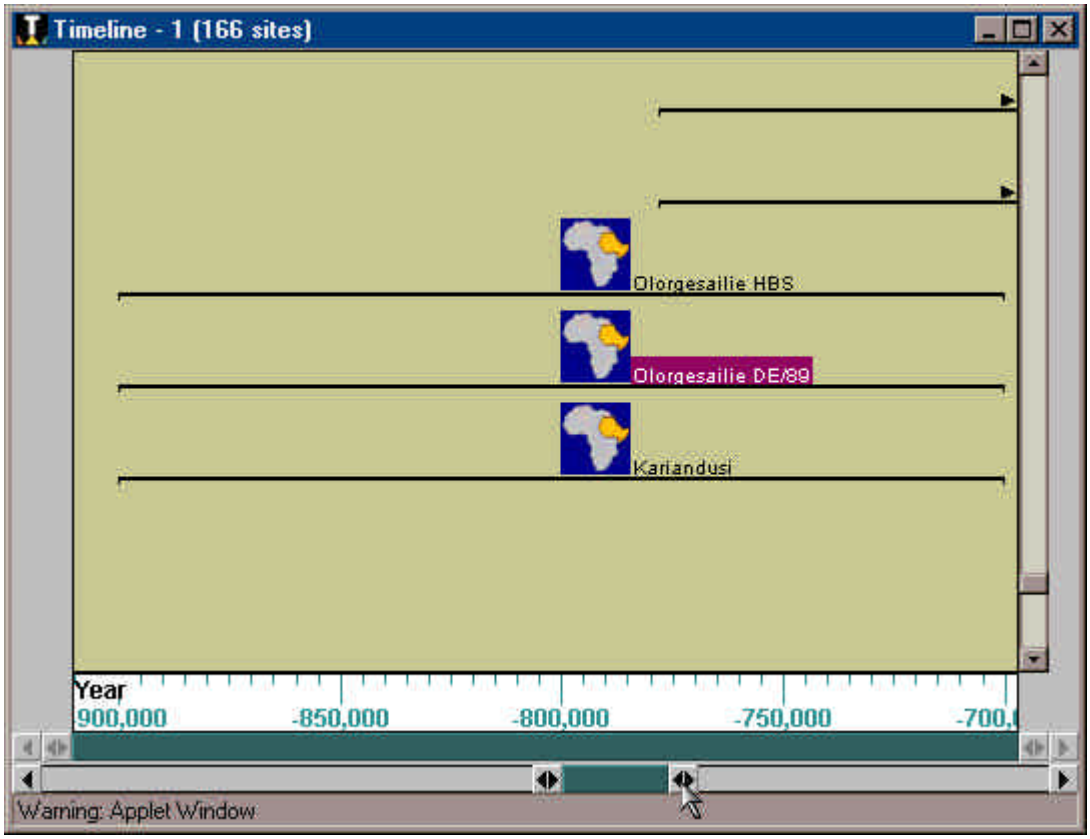
What happened to the duration bars under each artifact icon? The bars got longer!

In fact, the duration bar still represents the same range of time. But the line got longer because the time scale got smaller. Try this experiment:

Extend your hand at arm's length away from your face. Now slowly move your hand closer to your face. What do you see? It looks like your hand is getting bigger! In fact, your hand does not change size. However, it looks like your hand is getting bigger because it is getting closer to your face (and your eyes).

The same thing is happening with the bars under the icons. When we zoom into time (shortening the time scale), we make the duration bars longer.

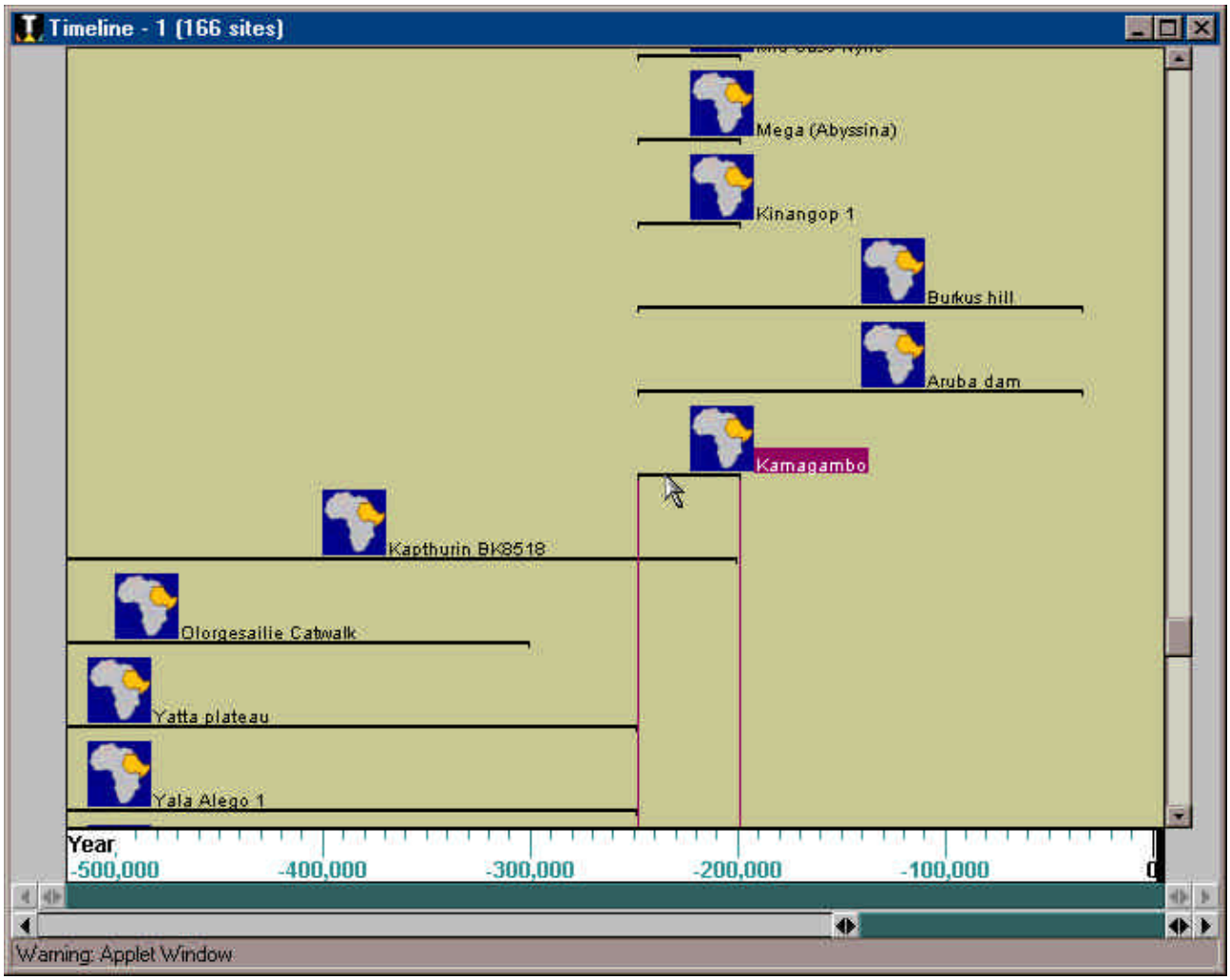
We can zoom from the right as well! Try this.



Now we've made the time range smaller, from about –909,926 to –697,111. What happened to the duration bars? They got longer! (By the way, you can determine the exact range represented by the window. Move your cursor arrow to the timeline. The exact range will be displayed. Try this.)

2. Try zooming in and out from the left and from the right. Notice how the time scale changes and how the duration bars change. Point to the middle of the zoom bar. Then press down the mouse key and drag the zoom bar to the left or right. What happens? You're scrolling the horizontal view along the timeline.

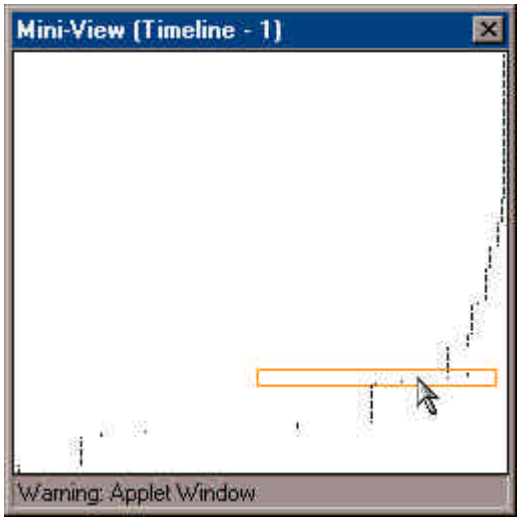
Clicking on a **duration bar** draws **legs** to the time line. This helps you see exactly the dates for the duration bar. Clicking on the duration bar again, removes the legs:



The Mini View

Did you notice the little window to the left? This is the mini view. It always shows the forest view. We use the mini view to move around the larger window when we're showing the tree or leaf views in the larger window.

Move your mouse to the mini view window. Point inside the orange rectangle. Press down your mouse key and drag the rectangle to another place in the mini window. Notice that your view of sites changes when you release your mouse key.



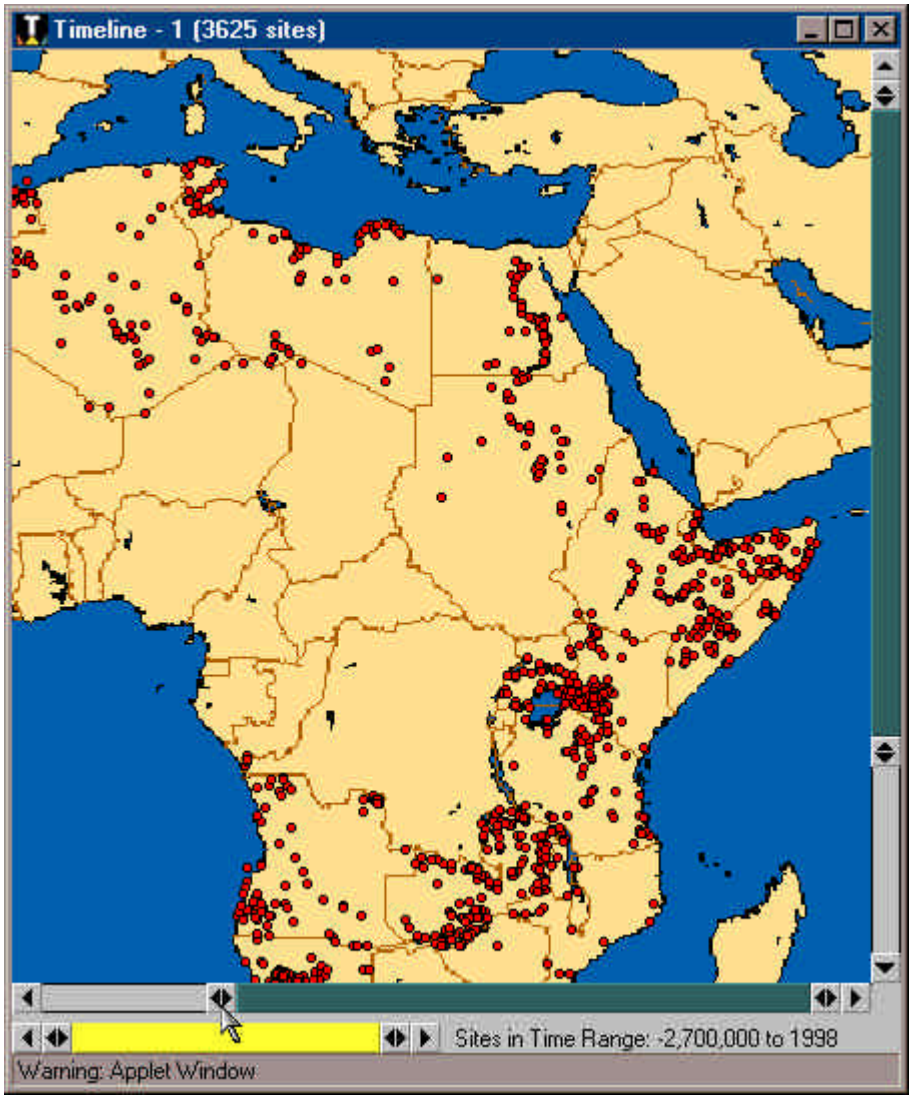
This is a fast way to navigate through the artifacts when in the tree or leaf views.

Viewing Sites in Space : The Map View

The above tools show you *when* a site existed. The Map View shows you *where* a site existed.

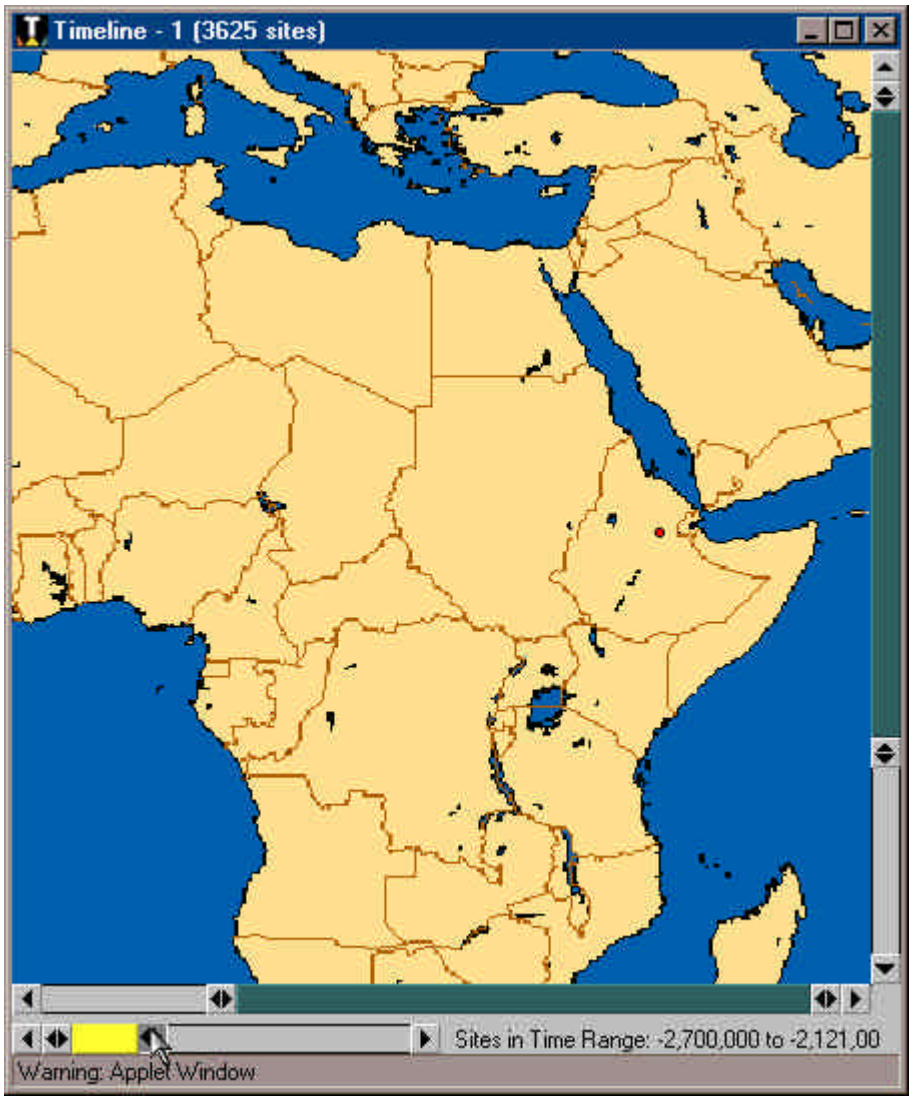
By grabbing the horizontal or vertical zoom bars and moving them, you can zoom in and out of the map, changing the map's resolution.

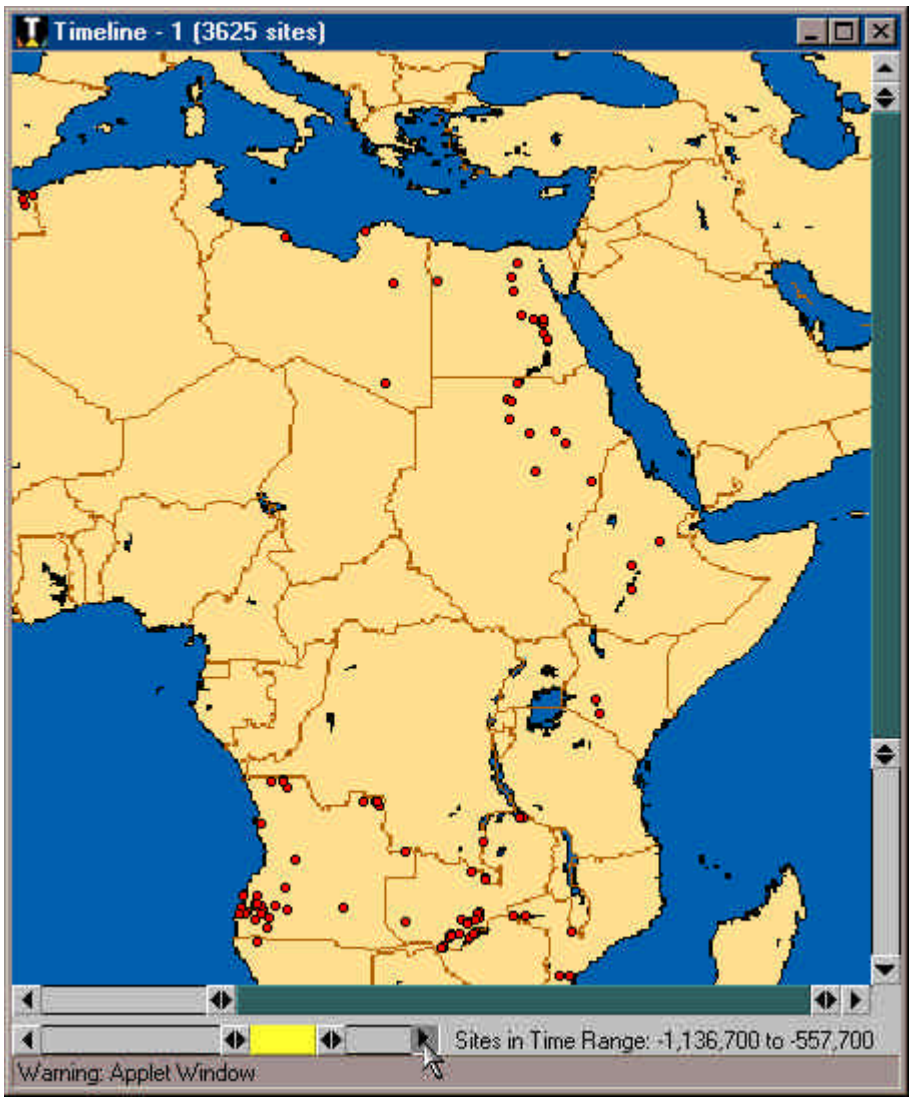
By moving your arrow cursor to a dot, you'll find the name of the site. By double clicking on a dot, you will open another window and examine the site in detail.



Notice the **yellow bar**. This indicates the sites showing in a particular time range; in the above figure, displaying sites from –2,700,000 to 1998.

By grabbing on the right or left side of the bar and moving it to the left or right, you will make the time range smaller. Notice what happens to the site dots on the map. Many disappear!

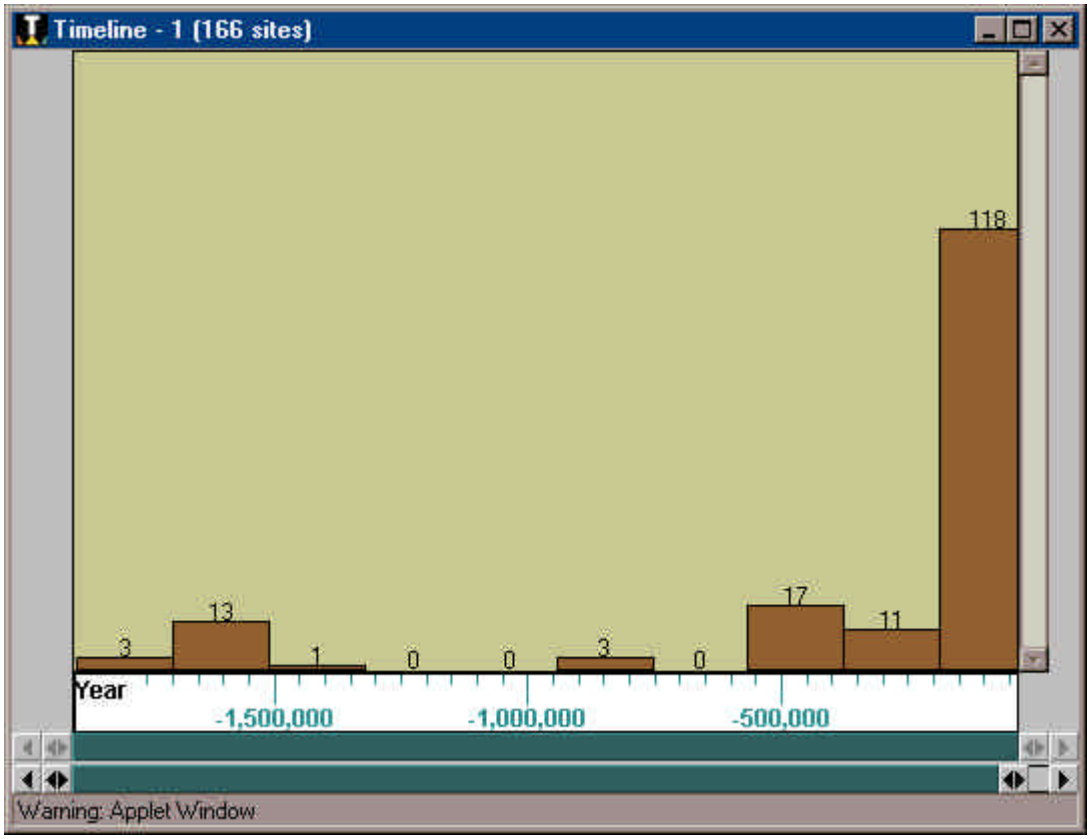




Now by pointing to the right or left arrow and holding down your mouse key, you can create a little “time movie”. Try this. You’ll see that over time, sites seem to come into existence and disappear and sometimes reappear! Depending on the sophistication of your query, this movie may show you something important about cultural migration, human movement, or some other variable.

Some Other Features

Click on the **Graph** button to see a histogram of the data. You can see how many artifacts come from different intervals of time. (Each bar represents the total of sites within a specific time range): You can use the zoom bars in the graph view as well; this will fatten or narrow the duration bars depending on the direction of your zoom. Do you understand why?



The **List** button shows the site names in a table. This is another way to view the sites. By pressing the headings in the table you can sort the list according to that heading (e.g. by site name, or by date range). Pressing on the same heading again, rearranges the list in the opposite order.

Use the site names in a list as a convenient way to quickly locate the name of a particular site you are looking for in a region. If you double-click on the name of a site in the list, TimeWeb will take you to the web page for that site.