What follows is an example of how to use the times in the subsolar longitude zero crossings file to determine the SLS4 longitude for a given time.

Each file (north and south) consists of a list of times when the subsolar longitude was zero (using the SLS4 longitude system).

We will use a standard linear interpolation method to determine the SLS4 subsolar longitude, $\lambda_{Sun}(t)$, at a given time, t:

$$\lambda_{Sun}(t) = \frac{(t_1 - t) \cdot \lambda_0 + (t - t_0) \cdot \lambda_1}{t_1 - t_0}$$

For this example, we will use two zero crossing times from the south file:

2004 270 16:05:08

and

2004 271 02:51:42

Make the following assumptions:

- Let 2004 270 16:05:08 be our base time so that $t_0 = 0$

- Let t_1 be the number of seconds from our base time to 2004 271 02:51:42

- Let t be the number of seconds from our base time to 2004 271 00:00:00

- Let $\lambda_1 - \lambda_0$ be one rotation (360 degrees) so that $\lambda_0 = 0$ and $\lambda_1 = 360$

Making these assumptions allows us to simplify the above equation:

$$\lambda_{Sun}(t) = \left(\frac{t}{t_1}\right) \cdot 360$$

Carrying out the calculation; $t = 28492$ seconds, $t_1 = 38794$ seconds, and $\lambda_{Sun}(t) = 264.4$ degrees.

Once the subsolar longitude is known, then the longitude of another body, such as Cassini λ_{SC} can be determined from its local time:

$$\lambda_{SC}(t) = \lambda_{Sun}(t) + (12 - LT_{SC}) \cdot 15$$

Where LT_{SC} is the local time of the spacecraft. The local time of the spacecraft (or other bodies) can be determined from the SPICE kernels provided by the Cassini project:

http://naif.jpl.nasa.gov/naif/