A Simple Method for Correcting Spacecraft Spin Rate in Eclipse

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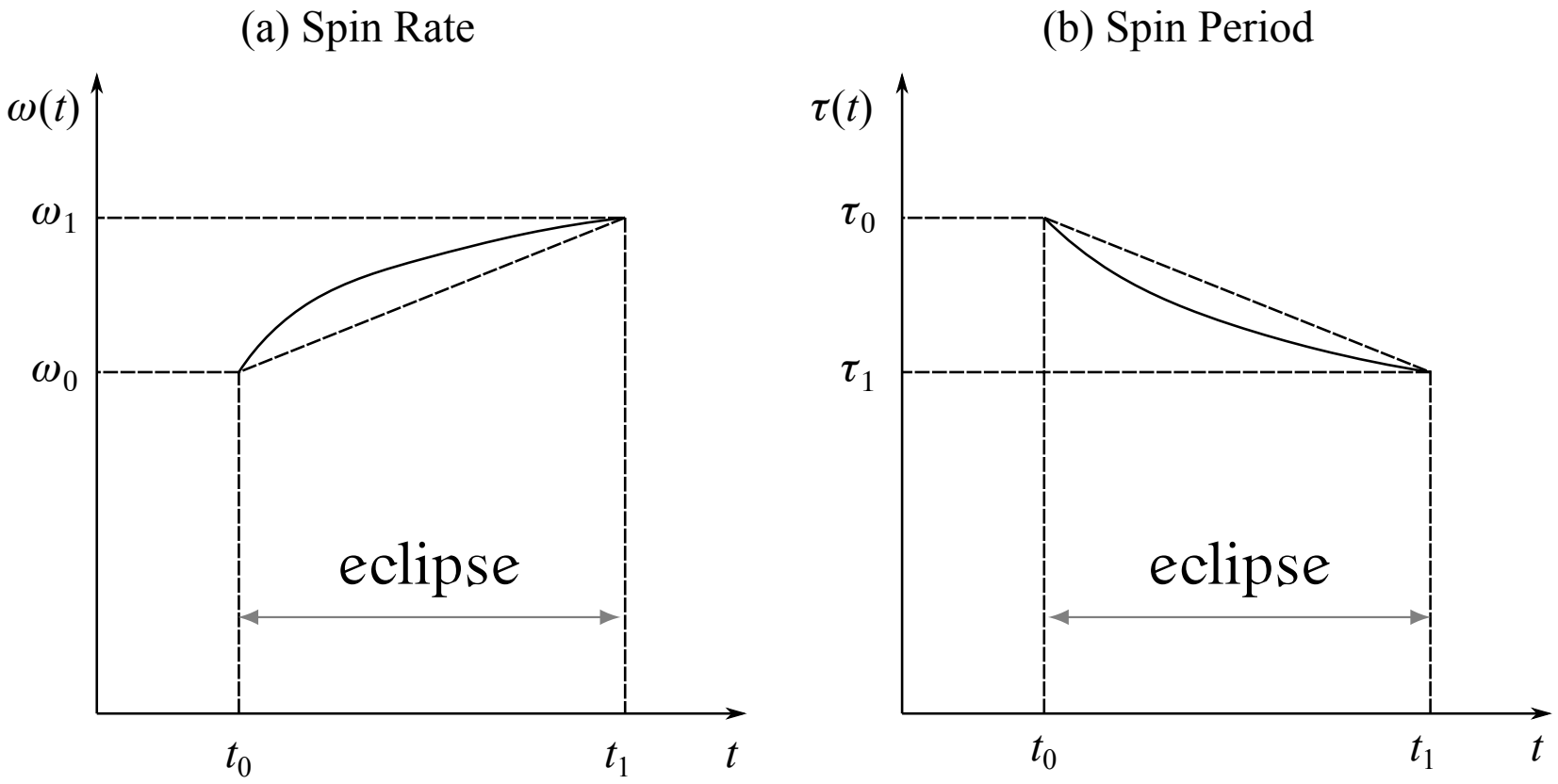
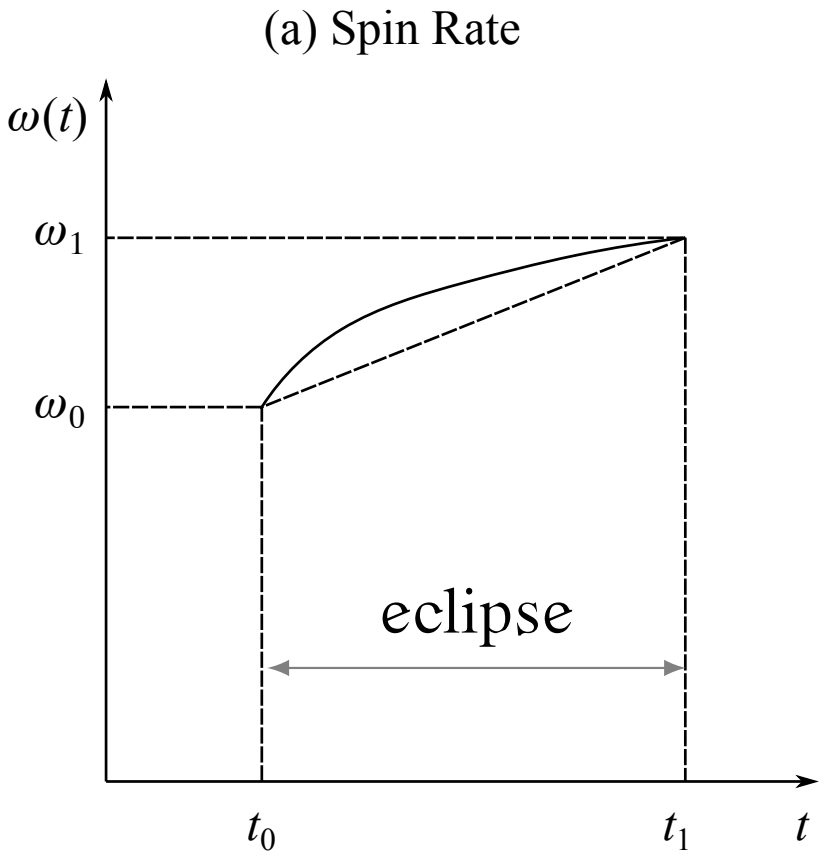
Spin rate and spin period in eclipse



Constraints on spin rate in eclipse



Constraints:

$$\frac{d\omega}{dt} > 0$$

$$\frac{d^2\omega}{dt^2} < 0$$

$$\omega(t_0) = \omega_0$$

$$\omega(t_1) = \omega_1$$

A model of spin rate in eclipse

Model:

$$\omega(t) = \omega_0 + b(t - t_0) + a(t - t_0)^2$$

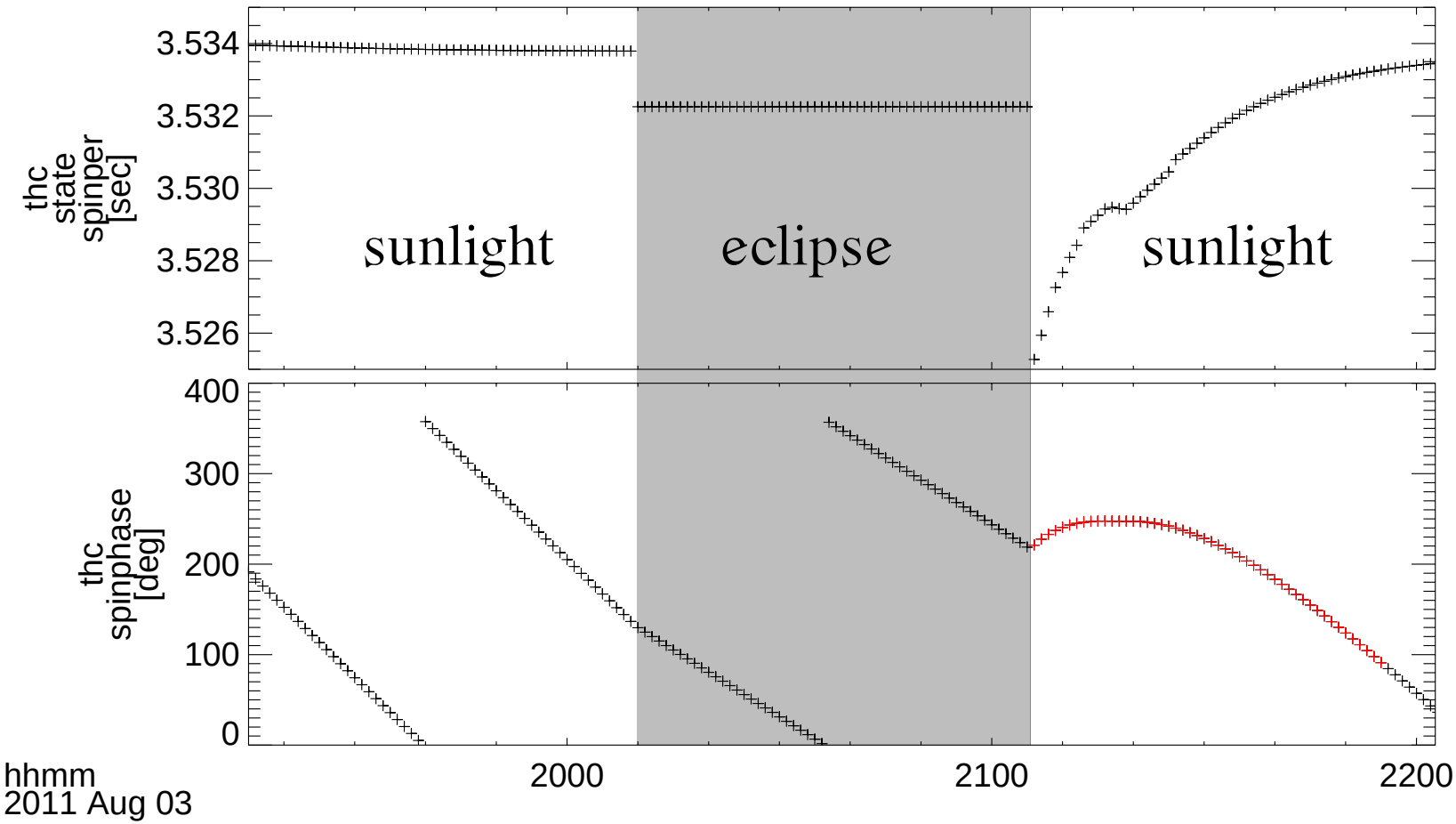
The constraints of ω lead to

$$b = \frac{\omega_1 - \omega_0 - aT^2}{T},$$

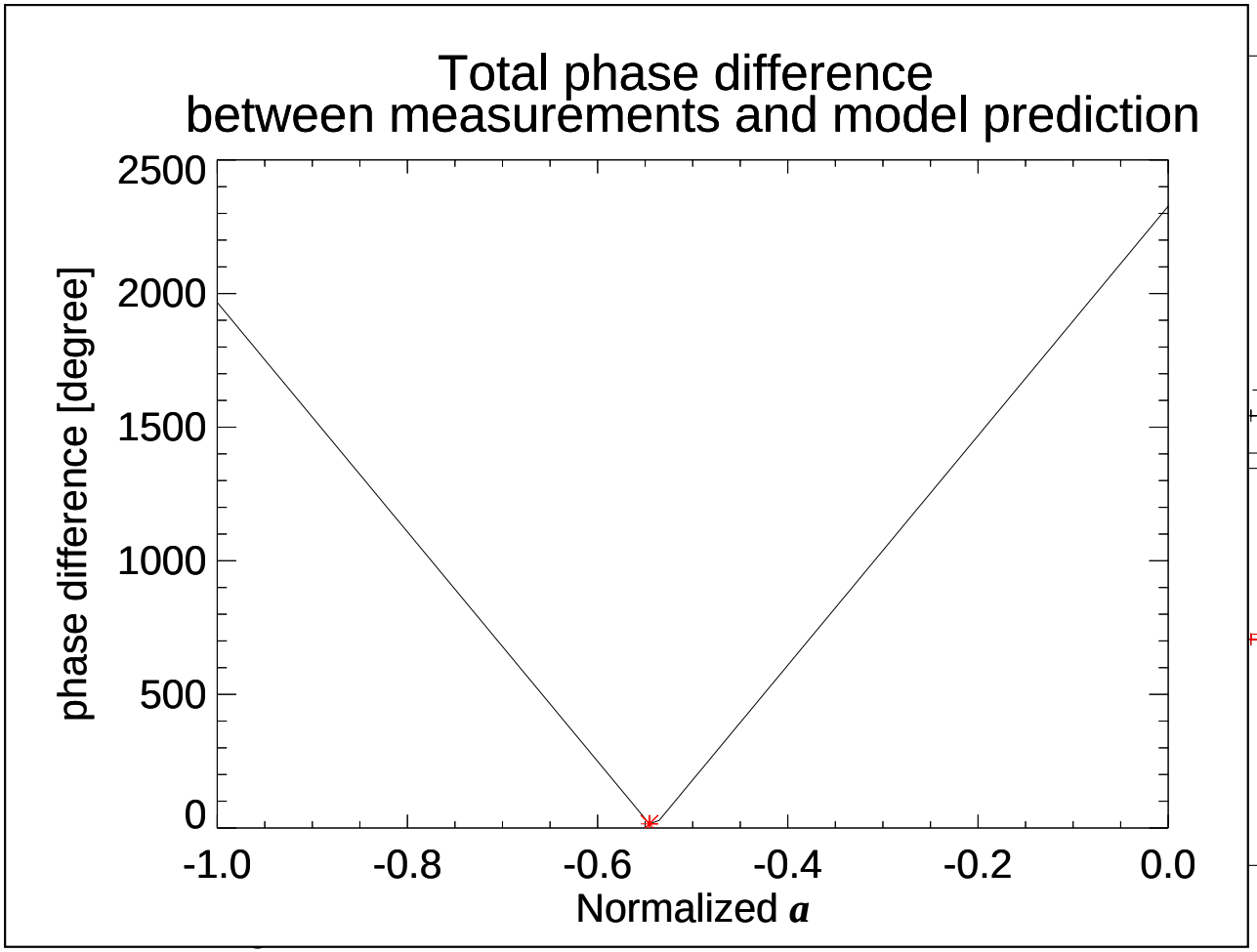
$$-\frac{\omega_1 - \omega_0}{T^2} < a < 0,$$

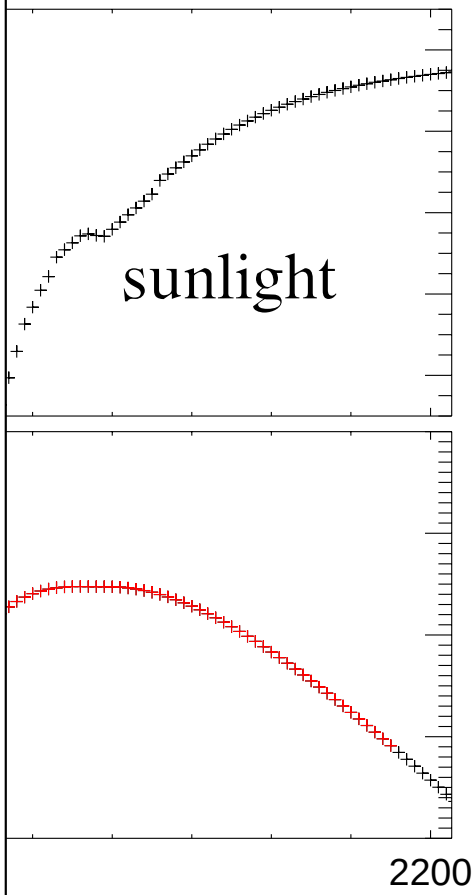
where $T = t_1 - t_0$ is the duration of eclipse.

Finding an optimal α

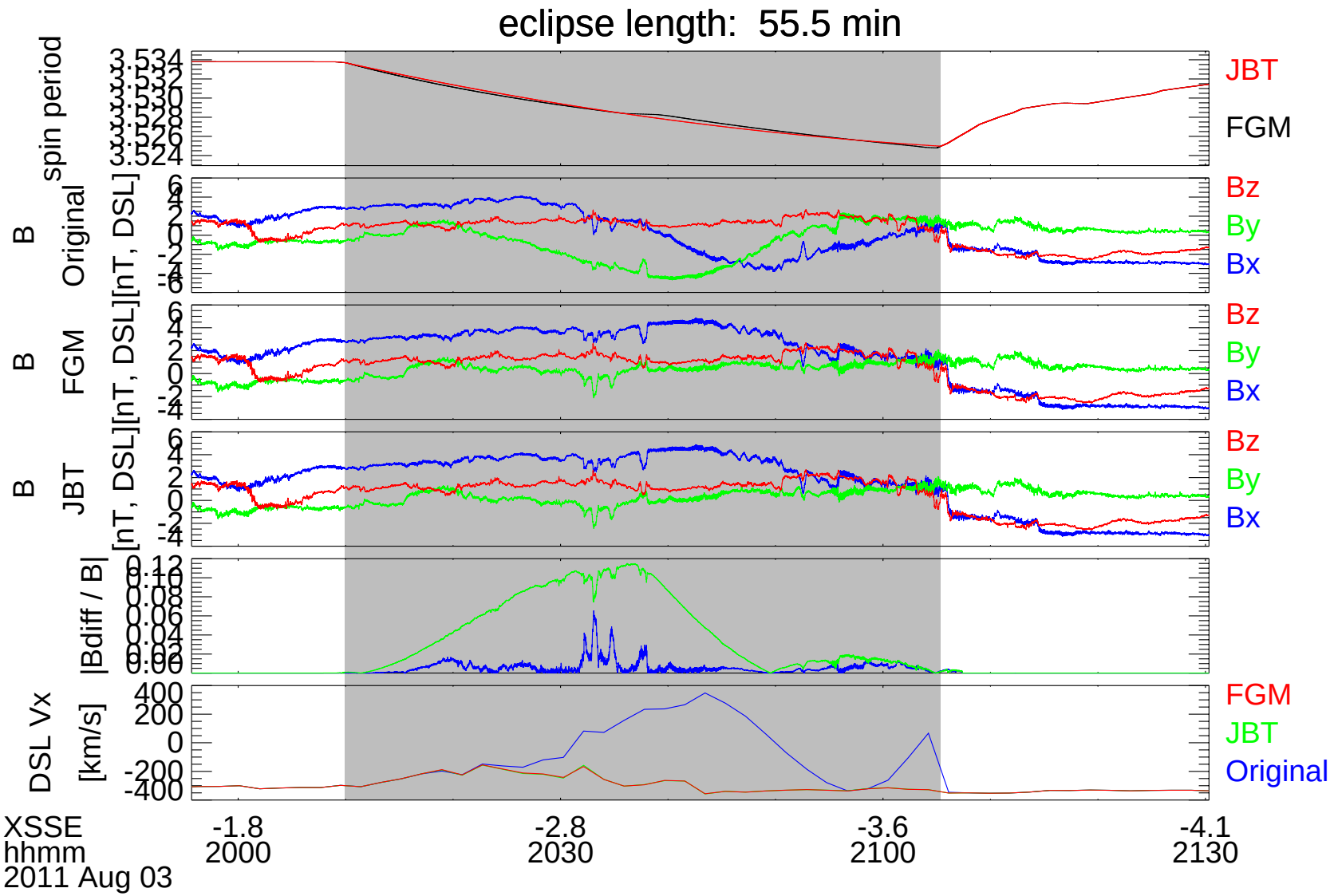


Finding an optimal a





Successful Example: 2011-08-03, THC



Failed Example: 2011-06-05, THC