SPECTRAL FITTING WITH THE REXIS SOLAR X-RAY MONITOR (SXM). Andrew Cummings¹, Branden Allen², Jaesub Hong², Daniel Hoak², David Guevel¹, Jonathan Grindlay², Richard P. Binzel¹, Rebecca Masterson¹, Mark Chodas¹, Carolyn Thayer¹, Madelin e Lambert¹, Lucy F. Lim³, Dante S. Lauretta⁴.

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The Regolith X-ray Imaging Spectrometer (REXIS) instrument [1] aboard OSIRIS-REx performs its science objectives by measuring the X-ray fluorescence of Bennu’s surface that is stimulated by the incoming flux of solar x-rays. However the Sun’s variation over the course of minutes-to-hours requires simultaneous solar X-ray monitoring for correct interpretation of the flux received from Bennu. For this reason REXIS is equipped with a Solar X-ray Monitor (SXM) which consists of a silicon drift diode (SDD) and measures incident solar x-ray spectra (see Figure 1).

To model the SXM spectra we employ the Chianti Atomic Database [2], which is the premier resource for calculating the spectral energy distribution emitted by the Sun. The ChiantiPy python library is used in conjunction with the Chianti database to model solar spectra and to determine the best-fit (Figure 2) as a function of time on time scales down to 32 s.

This presentation will show the results for raw solar spectra generated over a range of temperatures between 0.5 to 100 MK and multiple abundances in order to properly characterize X-ray flares whose primary emission originates either in the photosphere or the corona of the sun. Fitting the solar temperature is accomplished by folding the simulate Chianti spectra with the SXM response to produce a series of simulated SXM observations as a function of Chianti input parameters (temperature, flux, solar composition) and then a minimization routine is carried out in order to produce the best fit.

The addition of abundances on the reconstruction of solar X-ray spectra is discussed as are the effects on the error budget of the reconstructed solar spectral parameters.

Acknowledgements: This material is based upon work supported by NASA under Contract NNM10AA11C issued through the New Frontiers Program. We are grateful to the entire OSIRIS-REx Team for making the encounter with Bennu possible.

References: