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Modeling Nanoflares in AR 11726 Observed by EUNIS.

The theory of impulsive nanoflare heating is a leading contender describing the origins of hot coronal loops. Nanoflares are frequent but relatively small bursts caused by the dissipation of magnetic energy and can quickly heat the local corona to greater than 10 MK. Testing this theory requires observing and characterizing the plasma in coronal loops in this temperature range. The Extreme Ultraviolet Normal Incidence Spectrograph (EUNIS) has a bandpass with many lines formed over a wide temperature range (0.1 MK - 10 MK), making it an ideal instrument to characterize the emission measure distribution of loops in coronal active regions. EUNIS was flown on a sounding rocket in April 2013 and observed AR 11726 with coordinated observations by Hinode/EIS and the suite of SDO instruments. We have used these observations together with the results of a large scale parameter study to constrain a model of nanoflare heating in coronal loops. Our parameter study was designed to test the frequency and energy distribution of nanoflares and how those scale with magnetic field strength. We have characterized the 3D magnetic field in AR 11726 using a non-linear force free field extrapolation and performed 1D simulations of nanoflare heating within numerous individual flux tubes lying along field lines. The predicted emission in the lines observed by EUNIS and EIS are modeled from differential emission measures obtained from the simulations using the CHIANTI atomic database. By comparing predicted with observed emission, we have constrained the energy distribution of nanoflares.