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GX Simulator: A highly interactive 3D modeling tool for studying solar flares and active regions

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Study of solar active regions and flaring loops requires analysis of imaging data obtained in multiple wavelength domains with differing spatial resolution, in a framework supplied by advanced 3D physical models. To facilitate such studies, we have developed our simulation package, GX Simulator, which we maintain, continuously enhance, and distribute through the SolarSoft repository, (ftp://sohoftp.nascom.nasa.gov/solarsoft/packages/GX Simulator/). The object-based architecture of the GX Simulator, which runs on Windows, Mac, and Unix platforms, offers important capabilities, including the abilities to import 3D density and temperature distribution models, or to assign to each individual voxel numerically defined Differential Emission Measure distributions; to apply parametric heating models involving average properties of the magnetic field lines crossing a given voxel volume; to create magnetic flux tubes and populate them with user-defined non-uniform thermal plasma and anisotropic, non-uniform, nonthermal electron distributions; to compute and investigate the spatial and spectral properties of radio, EUV, and X-ray emission calculated from the model, and to compare the model-derived images and spectra with observational data.