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Detecting Variable Stars with STEREO's Heliospheric Imagers

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The two Heliospheric Imagers HI 1 and HI 2 of the Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) instrument suite on both of the two satellites of the NASA STEREO Mission continue to provide unique wide field images of the sky since the launch in October 2006. Beyond the main scientific goal of the HI, which is to remotely sense coronal mass ejections in the interplanetary medium, observations of field stars down to about the 14th magnitude brightness are possible. The field of view (FOV) of the 1kx1k HI 1 images, which are taken about 36 times a day, is about 20 square degrees. Individual field stars near the ecliptic can be observed in the HI FOV over a time period of 2-3 weeks as the STEREO satellites slowly separate in angular distance with respect to the Sun-Earth line. Due to the poor spatial sampling of stellar images (20 arcminute pixels), optical aberation at the field edges, and the high density of objects, accurate lightcurves can be determined only for the brightest stars using classical aperture photometry. We have applied difference imaging techniques, originally developed to detect brightness variations of astrophysical objects in crowded-field ground-based observations (Alard & Lupton 1998, ApJ 503, 1998), to remove the constant background and so identify stars with variable brightness. Typically, we are able to detect hundreds of variable objects in a single HI 1 image sequence. This study presents the first results on stellar variability from analysis of the STEREO A and STEREO B HI 1 data.